

Standard cost coding system (SCCS)

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Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are, as far as possible, intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable for most standards work and according to established procedures defined in NORSOK A-001.

The NORSOK standards are prepared and published with support by The Norwegian Oil Industry Association (OLF), The Federation of Norwegian Industry, Norwegian Shipowners' Association and The Petroleum Safety Authority Norway.

NORSOK standards are administered and published by Standards Norway.

Introduction

This NORSOK standard describes a system for coding of cost and weight estimates and as-built/experience data which has been recognised for some time as standard cost coding system (SCCS).

The SCCS was originally developed in 1989 by the three Norwegian oil companies Norsk Hydro, Saga Petroleum and Statoil with purpose of standardisation and specification of a cost coding system. The Norwegian Petroleum Directorate (NPD) joined the work to ensure consistency between the new standard and NPD's requirements for reporting to their INVERS database.

The SCCS is designed to provide a uniform coding basis for the estimate preparation and to serve as a standard for collecting/collating historical data.

This NORSOK standard has been developed on basis of the SCCS to update, improve and simplify previous edition no. 2 of the system from 1992 and to open for ownership, input and support from the entire Norwegian petroleum industry. NPD's 'Veiledning til PUD/PAD', states that cost reporting should be coded according to SCCS.

Major changes in this edition compared to rev. 2002-10-01 are:

- PBS – physical breakdown structure:
 - For AAC the fifth letter code has been deleted. The text is in principle unchanged;
 - Codes and descriptions for offshore wind park have been included, PBS AW;
 - Code ABR has changed the content, from the abandoned concept conical buoy to circular barge type substructure;
 - Subsea production systems (AD) has been adjusted:
 - Workover system and intervention system are removed from tools system and coded separately within production station (ADA);
 - Riser base (ADC) is moved to infield pipelines (ADK);
 - Subsea distribution unit (ADO) is segregated and moved to respectively; umbilical (ADE), infield pipeline (ADK) and power cable (ADL).
- Standard activity breakdown – SAB
No major changes;
- Code of resource – COR:
 - Structural bulk COR BNB has been deleted and been included in COR BNA. Text is in principle unchanged;
 - Telecommunication bulk has been implemented as a separate code in COR B. This is implemented in order to correspond with discipline codes in engineering disciplines and COR E;

- The second code letter in equipment (COR E) is implemented. This code letter is implemented in order to aggregate COR E code into disciplines, and this code letter corresponds with the second letter code under engineering disciplines. The third code letter in equipment (COR E) is used to split discipline into groups of equipment as required.
- For marine operations and logistics COR X, the third letter code has been deleted and some additional second letter codes are added.

The SCCS is not intended to replace project's work breakdown structure (WBS), TAG/system code or area/module breakdown structure, which are and will remain unique for each separate project. However, this NORSOK standard is prepared to provide a basis for the establishment of such standardised coding systems.

This standard is divided into two main sections, one, which presents the coding structures, and one, which describes the codes in text form.

1 Scope

This NORSOK standard describes a system for coding of cost and weight estimates and as-built/experience data. The system comprises 3 sets of complementary sub-coding systems named:

- PBS (physical breakdown structure)
- SAB (standard activity breakdown)
- COR (code of resources)

2 Normative and informative references

The following standards include provisions and guidelines which, through reference in this text, constitute provisions and guidelines of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet the requirements of the referenced standards.

2.1 Normative references

None

2.2 Informative references

None

3 Terms, definitions and abbreviations

For the purposes of this NORSOK standard, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

shall

verbal form used to indicate requirements strictly to be followed in order to conform to this NORSOK standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.2

should

verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.1.3

may

verbal form used to indicate a course of action permissible within the limits of this NORSOK standard

3.1.4

can

verbal form used for statements of possibility and capability, whether material, physical or casual

3.2 Abbreviations

The SCCS consists of three individual hierarchical coding structures each having separate and different purposes.

- PBS – physical breakdown structure. This hierarchical structure defines the physical/functional components of «Projects» during any phase of development. The PBS provides a coding structure, which enables any known oil and gas production and processing facility configuration scheme to be coded. The structure presented in this manual is independent of project specific area/module/sub-project classification systems.
- SAB – standard activity breakdown. This hierarchical structure provides a timescale attribute to express when during the project lifetime, expenditures and activities occur. The structure presented in this manual is independent of project specific work breakdown structure (WBS) or activity breakdown structures (ABS). The alphabetical prefix introduces a code for use of SCCS throughout all phases of a project, from exploration through removal of facilities.
- COR – code of resource. This hierarchical structure classifies all project resources and categorises resources according to primary, secondary and tertiary levels of resources. This hierarchical structure also termed code of account (COA) classifies the complete scale of resources involved in developing offshore and landbased installations.

4 PBS – physical breakdown structure

4.1 Introduction to PBS code

The physical breakdown structure is a hierarchical structure which defines the physical/functional components of oil and gas facilities/projects during any development phase. The PBS structure defined herein is sought independent of project specific-area/module/preassembly/unit/structure/subproject (as applicable) classification systems.

This section of the SCCS manual provides PBS codes and code names.

Due to the requirement to provide a unique structure, the PBS defines functional areas as physical areas. Actual functional areas and systems within areas may vary from project to project, e.g. actual modules/units may contain functions which combine functional areas and sub areas differently from those defined in the PBS; in such cases it is advised when required to prepare reports conforming to SCCS codes to re-aggregate sub areas functions into PBS codes.

The physical breakdown structure is divided into

- A – offshore field installations,
- B – landbased installations.

4.2 Offshore field installations

A – Offshore field installations

Offshore field installations include all types of facilities for petroleum exploitation, support and transportation, hereunder:

- topsides which may comprise any of a number or combination of functions/facilities like
 - drilling,
 - wellhead and manifolds,
 - processing (incl. compression, injection, etc.),
 - utilities,
 - quarter/accommodation and helideck,
 - flare,
 - deck and deck appurtenances.
- substructures required for support of topsides which may comprise any of a number or combination of structures like
 - steel jackets,
 - gravity base structures,

- jack-up rigs,
- compliant towers,
- semi submersible structures,
- tension leg platform substructures (TLP),
- ship type structure,
- barge type structure,
- single and multicolumn deep floaters (spar buoys, etc.),
- circular barge type structure,
- artificial seabed.
- drilling and completion of production and injection wells, deploying
 - platform installed rig(s),
 - tender rig(s),
 - mobile rig(s).
- subsea production systems which comprise
 - template,
 - satellites,
 - manifolds,
 - control system,
 - workover system,
 - intervention system,
 - subsea separation/booster/injection stations
 - control and monitoring systems
 - tools systems,
 - infield pipelines,
 - riser and riser bases,
 - umbilical system,
 - power cables,
 - hybrid risers and riser towers,
- offshore transport systems which comprise
 - pipelines and expansion loops,
 - pipeline protection and crossings,
 - flexible risers and riser bases,
 - control systems (umbilical, etc.),
 - valve stations/connection points,
 - shore approaches (landfall),
 - booster stations,
 - tie-in to 3rd party facilities,
 - local off take systems for offloading and/or storage and local off take to shuttle tankers,
 - storage systems,
 - cables,
 - bridges.

Battery limits are confined to include all offshore facilities required for exploitation, support and transport from an offshore field to

- landfall for pipeline and cable systems, this includes shore approach via tunnels or at a beach site (onshore pipelines and cables are covered under PBS B),
- tie-in and modifications to existing 3rd party facilities for receiving, processing and further transport of products,
- tie-in to existing pipeline systems for transport of products.

PBS A is outlined and coded as follows:

AA Topsides

Topsides are a grouped term for facilities placed above sea level supported by fixed, compliant or buoyant substructures. Topsides may also be termed topside/topside facilities/production facilities/deck or other dependant on country/operator terminology.

Topside facilities may have any of a number or combinations of functions/facilities, dependant on development scheme configurations, such as

- drilling,
- wellhead and manifold,
- processing (incl. compression, injection, etc.),
- utilities,
- quarter/accommodation and helideck,
- flare,
- deck and deck appurtenances,

all of which enable the exploitation of hydrocarbons.

NOTE Descriptions hereunder describe in a hierarchical way:

- main functional areas, e.g. AAA – drilling area,
- sub functional areas, e.g. AAAA – derrick, and for purposes of completeness and clarity functional systems/facilities within sub areas are further outlined.

System/facilities descriptions hereunder are only intended to provide guidelines for cost coding, as the systems/facilities normally are designed and laid out differently and uniquely for each development project according to technical and functional requirements, construction philosophy and project realisation strategies.

Due to this it remains no exact correlation between a system/facility and PBS, as a system/facility may transgress individual physical areas as defined in this manual. For coding purposes it is suggested that the primary location of tagged equipment for «systems» takes precedence over installed bulk and steel, i.e. transgressing bulk/steel is coded according to the PBS area through which such bulk material pass.

Battery limits between topsides and substructures defined in the physical breakdown structure (PBS) are

- jackets (steel piled jackets) – between leg stab-ins forming part of, and extending from, deck/deck frame and connection points with upper legs of jacket substructure,
- gravity base structures (GBS) – for concrete GBS – between shaft(s) transition ring (steel, concrete or compliant elastomeric connections) and deck structure. For steel GBS – between leg stab-ins forming part of and extending from deck/deck frame and connection points with upper legs of internal jacket,
- semi submersibles – between upper columns of semi submersible substructure and deck structure,
- tension leg platforms (TLP) – between upper columns of TLP hull/substructure and deck structure,
- ship and barge type substructures
 - all facilities placed at/above or upon main deck level; process units, modules, decks, process piping, utilities and flare system (topside),
 - systems – typically utility and support systems placed within hull, which are required to support production of hydrocarbons and not considered to form part of vessel storage/distribution system, main propulsion system or marine systems (substructure),
 - living quarters for ship and barge type substructures are deemed to be part of the substructure.
- jack-up platforms
 - all facilities placed at/above or upon main deck level of the hull; process units, modules, decks, process piping, utilities and flare system (topside),
 - systems – typically utility and support systems placed within hull, which are required to support production of hydrocarbons and not considered to form part of the hull, main propulsion system or marine systems. Normally there is nil or few such systems (substructure).
- compliant towers – between leg stab-ins forming part of, and extending from, deck/deck frame and connection points with upper leg(s) of tower structure. Between transition ring and deck for concrete structures,
- single column deep floaters – between deck structure and transition ring/crushing tubes placed on top of mono column,
- multicolumn deep floater – between the upper columns of the deep floater hull/substructure and the deck structure,
- for artificial seabed, see PBS ABS.

Topside facilities are subdivided and coded as outlined below:

AAA Drilling area

The drilling area is divided into the following subareas:

- derrick – which includes the derrick structure, derrick substructure, drill floor, skid beams and jacks and drillers offices. The "derrick area" contains structures, equipment and machinery for carrying out the drilling operation;
- mud handling and drilling utilities – mud handling is a group of systems, which store, mix, transfer, circulate, recover and treat drilling mud. The systems are used to transport cuttings, cool drill bits and provide a dense medium to prevent blowouts. Drilling utilities is essential utilities required in support of drilling operations – e.g. power, compressed air, water, lighting and storage;
- pipehandling – an arrangement to store, handle, move and feed conductor pipes, casing and tubing to the derrick.

For medium or large topsides normally the derrick tower and a few modules constitute the drilling area. The area is further outlined and coded in the following:

AAAA Derrick

This code covers the drilling derrick, derrick substructure, drill floor, skid beams and jacks which are used for drilling and completion of production and injection wells and workover of completed wells.

The derrick is a tower/mast lattice framework structure rising from the derrick substructure positioned above wellslots in the wellbay area or directly above the wellslots.

The derrick supports the hoisting mechanism – crown and travelling blocks used for raising and lowering drillstrings. The travelling block is connected to the swivel/kelly, the kelly is attached to the drillstring and turned by the rotary table. Topdrive systems have also been used in recent years. Drawworks is the hoisting winch for handling drill pipe, casing and tubing.

Machinery and equipment installed within the derrick area may include

- derrick base/substructure,
- BOP control,
- cathead,
- cat line,
- crown block,
- doghouse/drillers office,
- drawworks,
- drillers console,
- drilling line,
- dynamatic/hydraulic packs,
- elevators,
- fast line,
- gin pole,
- hoisting line,
- hook,
- kelly,
- kelly bushing,
- kelly hose,
- ladders/access,
- line guides,
- derrick mast structure,
- mast lifting line,
- monkey board,
- mousehole,
- piperack (derrick),
- rathole,
- reserve drilling line,

- rotary drive,
- rotary table,
- safety line,
- standpipe,
- swivel,
- swivel springs,
- tongs and travelling block.

AAAB Mud handling and drilling utilities

This code covers mud handling and drilling utilities systems/facilities:

Mud handling

The mud systems comprise mud pumps, mud tanks, mud lines and circulating hoses. The systems, operating through continuous circulation of mud, have several functions:

- removal of drill cuttings from the drill bit;
- cool and lubricate the drill bit and plastering borehole walls;
- provide a dense medium to prevent flow of water, oil and gas into the wellbore thus preventing blowouts.

Mud is a suspension of clays in water or oils; a mixture where bentonite is dosed with barite to increase density. The mud systems are divided into

- mud preparation, which includes bulk storage, distribution and mixing,
- mud pumps,
- mud recovery and treatment system,
- reserve-storage pits and hoppers.

Machinery and equipment installed in the mud handling systems may include

- burner boom,
- centrifuges,
- chemical dosers,
- compounds storage,
- cyclones,
- drill cuttings disposal,
- desanders/desilters,
- degassers,
- discharge lines,
- mud mixing bins/hoppers,
- mud-bulk storage,
- mud-gas separators,
- mud guns,
- mud hoppers,
- mud-lines,
- mud logging unit,
- mud mixers,
- mud mixing plant,
- mud pressure control,
- pump drivers,
- pumps – mud mixing,
- pumps – mud circulation,
- reserve pit/bins,
- sand settling bin/pit,
- shale bin/pits,
- shale shaker,
- storage-bulk barite,
- storage-liquid mud,
- storage mud additives,
- suction lines,

- suction bin/pit,
- water storage and supporting structures.

Drilling utilities

Drilling area utilities are required to support the drilling operation and comprise of such as

- accumulators,
- air compressors,
- drill tool storage,
- engine drivers,
- fuel lines,
- fuel tanks,
- power generators,
- oil and grease storage,
- tool house,
- trip tanks,
- water storage and reticulation,
- plant lighting.

AAAC Pipe handling

Pipe handling is a system adjacent to the drilling derrick used for storage, retrieving and handling of casing and conductor pipe and tubing.

The pipe handling system comprises

- piperacks for storage,
- piperack floor (normally part of weatherdeck),
- catwalk,
- ramp and associated structural components.

The system is confined to the interface with the derrick structure and handles pipes from piperacks through catwalk and up pipe ramps whereupon pipes are stacked/stored in the derrick piperack (see PBS AAAA). Fully automated pipe handling systems have in later years been used for offshore projects.

AAB Wellhead and riser area

The function of the wellhead and riser area is to receive wellstream from the production riser systems for further distribution to separation systems, receive and distribute treated water from water injection system for injection into reservoir(s) and receive separated gas for reinjection into reservoir(s) or gas for gas lift.

This code is subdivided and coded as outlined in the following:

AABA Wellhead area

Wellhead area or wellbay area is located below the derrick/derrick substructure. The lower decking of the area is fabricated with wellslots/covers for later drilling and completion of wells.

Functional systems within the wellhead area/wellbay include

- drilling and well control systems,
- production systems,
- production stimulation systems,
- chemical injection systems,
- systems within the wellbay area related to subsea production.

Manufactured equipment/facilities installed in the wellhead area or related to wellhead area are such as

- surface wellheads,
- X-mas trees,
- emergency shut down system,

- production manifold,
- test manifold,
- water injection manifold,
- mechanical handling equipment,
- fire and safety systems,
- controls,
- blow-out preventer.

See: X-mas trees installed topside will normally be part of drilling and completion's budget, see PBS AC.

AABB Riser area

In the riser area the risers are connected to the topsides facilities. Included are facilities/systems in support of the risers (risers not included) in the riser area – riser balcony for floaters – with riser tensioner/heave compensators for floating structures, connectors, etc.

Some of the components mentioned under the previous code (PBS AABA) may be installed in the riser area.

For rigid and preinstalled risers, see codes under PBS AB. For flexible risers, see codes under PBS AD and AE for flowline and transport pipeline risers respectively.

AAC Process and utilities

Functional systems/facilities within the process and utilities area consist of

- process,
- process support,
- electrical power,
- platform utility.

As outlined and subcoded below.

For medium and large topsides process and utilities will consist of different modules. If a module covers major parts of more than one PBS code below, the PBS level above should be applied.

AACA Process

This code is dedicated to the treatment of produced gases, fluids and sand.

The purpose of the process function as defined hereunder, is to

- separate the well stream into oil, gas, water and sand,
- stabilize oil to required temperature and pressure,
- process gas to specified quality: for sales gas and – where required – for injection and/or gas lift,
- treat produced water and – where required – water for injection.

The main gas oil separation plant process consists of separation train(s) for separation of oil, gas, water and sand from the wellstream and is further divided into systems for gas treatment, oil treatment and water treatment as outlined and coded in the following.

Separation

Test separation and separation and stabilisation:

Test separation

The function of the test separation system is to receive wellstream from individual wells via the test manifold and test each well for production performance: i.e. throughput, gas/oil ratio, water produced and sand content. Products after test separation are fed into the production separation and stabilisation train(s):

Separation and stabilisation

The production separation train(s) separate wellstream into gas, liquid hydrocarbons and free water. The gas passes to gas treatment systems for NGL recovery and free water is passed to the oily water treatment system. Produced oil, after stabilisation to required temperature vapour pressures, is transferred to crude treatment systems for dehydration, de-emulsification and paraffin removal.

Production separation train(s) comprise of dual or multi-phase horizontal separators connected in series (stages) to successively separate water and free associated gas from the crude oil stream. Individual separator operating pressures are reduced during each stage prior to dehydration.

Gas treatment

Under normal operation all produced gas in excess of that required to meet platform fuel demand and for flare line purging is compressed and either exported to the gas pipeline system, used for gas lift or reinjected into the reservoir for secondary recovery, gas drive, etc. The gas treatment function contains systems, which in part comprise the main processing system:

- gas recompression, cooling and scrubbing;
- dehydration and regeneration;
- gas conditioning;
- gas sweetening;
- gas pipeline compression, metering and transfer;
- gas injection;
- gas lift.

As outlined in the following:

Gas recompression, cooling and scrubbing

The function of this system is to successively compress and cool produced gas from separators and remove liquids (NGL and water) from the gas stream. Recovered natural gas liquids are normally spiked into the oil stream, and water is removed in the dehydration system. Dry gas meeting the hydrocarbon and dewpoint control specification is passed to either compression for reinjection into the reservoir system or to the gas pipeline compression, metering and transfer system. Gas not meeting specification is passed to the gas conditioning and sweetening system prior to pipeline compression, metering and transfer.

Dehydration and regeneration

The function of this system is to remove water/contaminants from the gas stream (moisture/water is removed to prevent hydrate formation within pipelines), retard corrosion and to prevent condensation. Dehydration is achieved by

- absorption, where liquid absorbents are used, e.g. glycol (TEG, DEG, MEG),
- adsorption, using packed/trayed towers with active adsorbents, e.g. alumina, silica,
- condensation by cooling/refrigeration. Absorption and adsorption methods require regeneration of absorbents and adsorbents.

Gas conditioning

Systems used for/to treat and condition gas to meet hydrocarbon specification of the gas product, may include stripping of gas stream or dosing to achieve specification.

Gas sweetening

Processes used for the removal of acid gases: hydrogen sulphide, carbon dioxide (CO₂) and other from gas streams. Raw gas is scrubbed in packed/trayed absorber columns, and the removed acid gas solution is stripped by regeneration.

Gas pipeline compression, metering and transfer

Gas meeting specification from foregoing systems is compressed to pipeline export pressure, metered, and transferred into the pipeline system. The system includes also normally pig launchers/receivers for transfer.

For transport pipelines, see PBS AE with subcodes.

Gas injection

Gas injection includes separate topside systems and facilities for secondary recovery of product or storage; gas recycling, gas drive, miscible flooding and for reinjection into reservoir(s) for storage and/or later production:

- gas recycling/cycling – gas recycling/cycling is a technique used to increase production of natural gas liquids (NGL) from gas/condensate reservoirs. NGL is recovered from the produced wet gas stream in the gas treatment plant, dry gas is recycled, compressed and reinjected into reservoir(s) via gas injection wells where further NGL is absorbed;
- gas drive – produced gas is injected into the reservoir gas cap and used as a drive mechanism for oil production;
- miscible flooding – miscible flooding is used in conjunction with oil production. Wet gas (propane) and in some cases carbon dioxide and nitrogen are injected together with dry gas into the reservoir. The gases act as solvents reducing oil viscosity and swell within the reservoir improving mobility of the oil in place;
- gas injection for storage – gas injection for storage is used where pipeline offtake is not available, where phased production is adopted or where gas production is not considered economically feasible. Also relevant for CO₂ injection for underground storage.

Gas lift

Gas lift is the introduction of produced gases at high pressure into individual wellbores to assist oil flow to the surface.

The system includes the gas supply header, piping from header to each well and all associated bulk items (topside located components). The system excludes gas lift completion equipment (part of drilling and completion costs, see PBS ACC) and gas compression facilities.

Gas injection and gas lift do not include costs related to wells, non-dedicated gas injection compressors and installations in the wellhead area.

Oil treatment

The oil treatment function as defined hereunder, contains systems which in part or wholly comprise the main processing system after separation:

- crude cooling;
- crude treatment – dehydration, de-emulsification and paraffin removal;
- crude handling, pumping, metering and transfer.

As further outlined in the following:

Crude cooling

To suit requirements for offshore storage it may be necessary to cool the crude oil stream to specified maximum temperatures. Cooling to required temperatures may be achieved by the use of crude cooling heat exchangers within the separation train between the last separation stages.

Crude treatment

Crude treatment includes crude dehydration, de-emulsification and paraffin removal. The stabilised crude delivered from the last stage of separation will normally contain minor amounts of free water, oil/water emulsion and paraffin. Removal of such may be by use of mechanical, chemical, electrical or thermal means or combinations thereof to remove emulsified water and/or paraffin.

Crude handling, pumping, metering and transfer

Crude oil meeting specification is transferred from the dehydrator/coalescer to

- offshore storage system for later local offtake, pumping, metering and transfer to shuttle tankers,
- export pipeline pumps, pig launcher/receiver, oil metering skid and pipeline transfer piping to pipeline system.

Water treatment

The water treatment function as defined hereunder, consists of

- oily water treatment,
- water injection.

As outlined below.

For systems for seawater, ballast water, fresh water, hot water, fire water and sewage, see under PBS AACD.

Oily water treatment

Oily water treatment includes treatment of: produced water, reclaimed water, sludge and bilge/ballast water. The system collects produced water from separators, test separator(s) and coalescer/dehydrator, recovers oily water from ballast/bilge systems and open/closed drain systems for separation of oil from water. Recovered oil is pumped into the oil separation train(s), gas is normally vented through the flare/vent system and water is either used for injection water or discharged into the sea.

Water injection

Water injection (water flooding) is a production technique, which injects under high pressure filtered and treated seawater, water from aquifer wells and/or produced water into reservoir(s) for the purposes of pressure maintenance. Water injection can be used early in the production phase to supplement natural water drive or employed in a secondary recovery phase.

Seawater/produced water/aquifer water is taken from the platform service water system/well system and stripped of dissolved oxygen. Deaerated water is pumped via filtration units to water injection pumps, and injection water is transferred to water injection wells.

The water injection system comprises of such as

- deaeration unit:
 - deaerators, i.e. vertical cylindrical vessel(s) which operate at full vacuum;
 - inert gas/catalyst stripping systems (Minox-deoxygenation).
- deaerator pumps:
 - booster pumps which discharge to water injection filters;
 - deaerator vacuum pumps.
- filter plant – a number of vessels containing filter elements for particle removal,
- water injection pumps – a number of multistage centrifugal pumps,
- chemical dosing associated with injection water; e.g. antifoam, oxygen scavenger, biocide, filteraid and antiscale.

Excluded are costs related to wells and installations in the wellhead area.

AACB Process support

Process support as defined hereunder covers systems required in a more direct support of the main processes (see PBS AACA), and includes such as

- cooling and refrigeration.
- heating systems,
- chemical injection systems,
- flare, vent and blow-down system,
- fuel gas system.

For support systems of a more general platform utility character, i.e. utilities serving the total platform facilities generally, see PBS AACD.

Cooling and refrigeration

- cooling medium system – provides a medium to remove excess heat from process plant equipment and machinery and for cooling produced crude and/or gas,
- refrigeration systems – the systems are used in combination with gas dehydration for water removal, and/or for stripping of natural gas liquids.

Heating systems

Heating systems include heating medium system/hot oil system. Heating medium system provides heat recovered from turbine waste heat recovery exchangers, recovered from cooling medium system or heat generated by other means e.g. electrically to support production; i.e. for crude oil and gas heating, glycol regeneration, storage purposes and HVAC systems. The heating medium is normally circulated hot oil.

Chemical injection systems

Includes chemical treatment necessary to supplement the performance of the various mechanical processes involved in production processes. The chemicals are used for different purposes such as

- de-emulsification,
- antifoam,
- reverse emulsion,
- anti-hydrate,
- pour point depressant,
- biocide,
- formation anti-scale,
- oxygen scavenger,
- filter aid,
- deaerator anti-foam,
- CO₂ corrosion inhibitor,
- methanol and chlorinators.

Flare, vent and blow-down system

Includes

- liquid blow-down,
- vapour blow-down,
- gas blow-down and blow-down drums.

Under operation all produced gas will be compressed and either exported to the gas pipeline or reinjected into the reservoir. Under emergency conditions the whole of the gas produced on the platform plus blow-down from the gas compression plant must be diverted and flared by the flare system flare stack/boom. The system hereunder does not include relief valves, flare structure, tip or piping within structure (see PBS AAF).

Fuel gas system

The fuel gas system treats and distributes produced gas for use as fuel gas for such as

- gas turbine driven electrical power generators,
- gas turbine driven compressors, -water injection pumps and -export pumps,
- gas driven reciprocating power generators,
- heaters,
- flare pilots/ignition panels,
- starting gas,

- mud burning,
- purge gas for vents and headers.

For diesel and aviation fuel systems, see PBS AACD.

AACC Electrical power

Electrical power comprise

- power generation,
- power distribution and control.

As outlined under the following subcodes:

Power generation

Power generation provides electricity, hereunder main power and emergency power, to the platform facilities.

Power generation includes the major generating sets like

- main gas turbine driver units (e.g. 13.8 kVA/6.0 kVA units) with couplings, alternators, control units, lube oil units, coolers, fuel supply headers, filters, scrubbers and inlet/exhaust ducting,
- emergency generator units (normally diesel driven) complete with couplings, alternators, controls, coolers and fuel supply system.

Power distribution and control

The power distribution and control system centrally controls power generation to ensure correct voltage and frequency for distribution to local power consumers and lighting consumers.

The power distribution and control system includes such as

- central generator controls for load shedding and sharing,
- transformers,
- buses,
- switchboards, to consumers, etc.,
- converters and similar for DC power e.g. from land,
- cabling between switchboards,
- lighting/domestic power,
- industrial power,
- earthing/grounding systems emergency lighting,
- signal lighting for aircraft,
- DC-UPS uninterruptible power supply,
- cathodic protection wiring and panels,
- switchgear rooms/motor control centers,
- fire and safety systems required in area, and
- mechanical handling equipment.

AACD Platform utilities

This code includes utilities of a more general character; i.e. utilities serving the total platform facilities (and not primarily the production processes).

Included are platform utility systems/facilities as defined hereunder:

- heating, ventilation and air conditioning (HVAC),
- water treatment (ballast water, fire water, etc.),
- steam and condensate system,
- main control room facilities,
- open and closed drains,
- dry bulk loading,

- fluid bulk loading,
- fuel treatment (diesel and aviation fuel),
- compressed air systems,
- inert gas,
- hydraulic power,
- workshops and storage,
- fire and safety systems,
- other utilities.

For utility-like systems primarily for process support, see PBS AACB.

The systems/facilities are outlined in the following:

Heating, ventilation and air conditioning (HVAC)

HVAC systems provide

- forced ventilation of enclosed platform areas/modules; removes hydrocarbon laden air, replenishes fresh air,
- heating for enclosed platform areas,
- air conditioning for local control rooms, offices and amenities rooms.

HVAC system is normally centralised with HVAC system equipment and units installed in utility modules/preassemblies for platform distribution.

HVAC systems comprise such as

- air conditioning units,
- fans,
- air heater coils,
- filter/coalescer,
- separators,
- duct attenuators,
- shut-off dampers,
- control dampers,
- fire and gas dampers,
- backflow dampers,
- grilles and bulk ductwork,
- piping,
- instrumentation and electrical supply.

Water treatment (ballast water, fire water, etc.)

Water treatment hereunder includes:

- water supply,
- treatment,
- collection,
- transfer and reticulation.

Systems included hereunder are:

- seawater systems – low/medium/high pressure seawater including seawater lift, supply to water injection header and jet water/service washdown,
- ballast water systems – including permanent and temporary ballast water systems,
- fresh water system – this system provides fresh water for human consumption. It may also provide water for sanitary systems and for fire main pressure maintenance,
- hot water system – this system provides hot water for e.g. sanitary purposes,
- fire water system – this system supplies and distributes seawater for fire control. The fire water system is independent of all other systems except for pressurization of the fire water header by the sea water supply system during non-emergency conditions,

- sewage treatment system – this system handles, treats and disposes waste from e.g. toilets, urinals, showers, wash basins and kitchen sinks.

For oily water treatment, see PBS AACA.

Steam and steam condensate systems

- Steam system – steam can be generated as a by-product through heat exchange, waste heat recovery or directly by steam generation. Steam systems are divided into high pressure, medium pressure and low pressure systems.

High pressure (HP) steam is normally generated by waste heat recovery units and/or separate boilers and is used primarily as the driving medium for steam turbines and generators. The system is normally considered for combined cycle application.

Medium pressure (MP) steams forms part of combined cycle applications and may be used as source for process heating.

Low pressure (LP) steam is generated by waste heat recovery and is normally used for plant heating purposes both for e.g. space heating and as feed for steam tracing systems.

- Steam condensate system – the function of this system is steam condensate collection and recycling by means of a steam regeneration unit/package prior to feedback into the steam supply and distribution system.

Main control room facilities

Included hereunder are systems/facilities in connection with the main control room, which normally is located in the utility area (in a safe zone).

The control room houses the computer for process and facilities monitoring and control (CPC) and the central instrument and communication hardware.

The CPC facilities gather and store e.g. production data, write reports, produce graphs, and perform process and production calculations. They supervise, but do not control the operations. Control is exercised by the operators who indicate the instrumentation set points.

The main CPC facilities can be located offshore or onshore. If offshore, the platform will have computer and input/output stations. If the CPC facilities are onshore, a remote terminal unit (RTU) and an input/output station will be on the platform. The RTU automatically assembles data and relays the data to the onshore facilities. The onshore CPC facilities are accessed through the platform's input/output station.

Included are the control room facilities and if required input/output stations, RTU (onshore CPC system), or CPC computer (offshore CPC system), as well as components for control, communications and navigational aids; intra platform communication and communication with shore, vessels, helicopters, etc. This may include components like

- alarms – emergency horns, bells, etc.,
- microwave radio receiver/transmitter,
- radio – UHF/VHF aviation/marine radio and radio telephone,
- telephone exchange – handsets/telephones, switchboard, etc.,
- public address – speakers and transmitter,
- paging – UHF personal beepers,
- hand transceivers,
- MF beacon – radio beacon for aircraft,
- portable loud speakers,
- portable signal lamps,
- radar meteorological measurement,
- television monitors,
- aircraft visual aids,
- entertainment public address – speakers, transmitter, tape recorder, etc.,
- navigational aids,

- centralized clock.

Open and closed drains

The systems included are

- open deck water drains which collect and handle rain water and wash down fluids,
- atmospheric hydrocarbon closed drains which collect fluids from leakage or spillage,
- pressurized closed drainage systems for collection of oily water emulsion for further treatment in the produced water system (see PBS AACA).

Dry bulk loading

Systems required for offloading from supply vessels, etc., of dry bulk material required during the production and operation period. The systems may be containerised for lifting/storage of chemicals, mud, provision and other, or may be transferred by other means.

Fluid bulk loading

Systems for offloading from supply vessels, etc. of liquid bulk material required during the production and operation period. The systems may be by hose transfer or containerised for lifting by platform cranes. The fluids to be loaded may be diesel fuel, liquid chemicals, water, drilling fluids, liquid gases, etc.

Fuel treatment

Included are systems for treatment of liquid fuels:

- aviation fuel – this system provides storage and pumping of helicopter fuel;
- diesel fuel – this system provides storage, pumping and distribution of diesel fuel. The fuel may be used for drivers in connection with e.g. the crude pumping, chemical storage and injection, cranes, electric power generation, instrument air, fire water pumping and the drilling facilities.

For fuel gas system, see PBS AACB.

Compressed air systems

Compressed air systems include plant utility air and instrument air systems:

Instrument air systems are air supply systems used for pneumatically controlled and actuated instruments/components e.g. flow, level, pressure and temperature instruments, control valves and control panels.

Plant utility air systems provide compressed air for air operated tools, air driven motors/drivers for starting e.g. turbine units.

Compressed air systems include electrical/diesel driven air compressors, receiving surge vessels, air dryers and distribution header. Compressed air may also be generated from turbine bleeding.

Inert gas

Includes facilities for chemically un-/non-reactive gases used for e.g.

- active fire protection – e.g. nitrogen, carbon dioxide, stored in bottle banks and used as blanket gas for extinguishing fires,
- diving gases – helium and argon stored in bottles and mixed with air to provide diver-breathing gases for hyperbaric diving operations.

Hydraulic power

A system for generating, transmission and control of hydraulically operated equipment such as

- emergency shutdown valves (ESD),
- sub surface safety valves (SSSV),
- wing valves,
- oil and gas process train valves,
- remotely operated valves via umbilicals,
- automatic shutdown system,
- shear rams,

- hydraulic motors and linear motion rams.

Power is generated both hydraulic power units (HPU), which may be combined within a general hydraulic supply system or having separate integrity with emergency power back-up (UPS).

Workshops and storage

Fabricated and equipped compartments for storage of materials and for maintenance of facilities during production and operations phase. Included are structures, units, containers, workshop equipment, handling equipment and storage areas/systems.

Fire and safety systems

Fire and safety systems required and located within the process and utilities areas for personnel safety, active fire protection, escape and personnel safety.

Other utilities

Includes other platform utility systems/facilities not covered previously.

AAD Living quarter

Permanent living quarter (LQ) provides space for bedrooms, kitchen, cafeteria, laundry, recreation rooms, offices, etc. Living quarters are self-contained when towed out and include facilities for distribution of fire water, potable water, sewage, power, and facilities for fire detection, communication, HVAC, etc.

For ship and barge type production platforms, the living quarter is deemed to be part of the substructure and is to be PBS coded under ABM and ABN respectively.

AAE Helideck

The helideck provides an open surface away from obstructions for landing of helicopters. The helideck is usually supported above the living quarter by a steel structure, and it is equipped with light and other outfitting.

AAF Flare

The flare boom is generally a truss-type structure cantilevered horizontally or at a slight upward angle of the well end of a platform. Flare towers are also truss-type structures installed on the top deck of a platform, or may be freestanding adjacent from the platform. The purpose of a flare tower or flare boom system is to burn gases at a safe distance from the platform.

The code includes such as

- flare structure,
- flame front generator,
- snuffing equipment,
- piping in structure,
- flare tip.

The flare tip typically consists of a burner, pilot, fluid seal and inlet flange. The flame may be ignited by shooting, and devices for this are also to be included hereunder.

The system excludes relief collection piping and scrubbers.

In the case of a freestanding flare tower located adjacent to the platform, the substructure (i.e. structure from seabed and up to about bridge level or similar) is to be PBS coded under ABA or ABB (in the case of jacket or GBS ("bottle") type substructure). For bridges, see PBS AEJ.

AAG Deck appurtenances

Includes all purpose built support facilities not related to a specific physical area of a topside, such as

- lifeboat stations,
- cranes,

- mooring winches,
- other deck appurtenance.

As outlined and coded in the following:

AAGA Lifeboat stations

Includes stations for lifeboats and rafts, complete with support structure, davits or equivalent, lifeboats and rafts, machinery, etc.

The support structure may be an integrated part of the deck (see PBS codes under AAH).

AAGB Cranes

Included are platform cranes. Most applied are cranes of pedestal type, but other types may be relevant.

Pedestal cranes are sleeving/revolving cranes with fabricated steel pedestals/columns, which are placed on/within or incorporated in deck structures.

Pedestal cranes are typically used for platform service – movement of material onboard and offloading of material delivered by supply vessels. Pedestal cranes may be electrically and/or hydraulically operated/powered, and the cranes normally range from 6 tonnes to 50 tonnes lifting capacity.

For crane pedestal support structure being part of the deck (integrated), PBS codes under AAH apply. For gantry crane for FPSO turret servicing, see PBS ABMCB.

AAGC Mooring winches

This code covers mooring winches located in the topside area and includes winches, drivers, controllers and accessories.

Mooring winches located on a substructure are deemed to be PBS coded under substructure (see PBS AB codes). For mooring winches in FPSO turret, see PBS ABMCC.

AAGD Other deck appurtenances

Includes deck appurtenances other than previously listed, such as separate hoists, stairtowers, etc.

For bridges, see PBS AEJ.

AAH Deck structure

Included in this code are all main structures designed for support of topside facilities which could be in the form of prefabricated modules for lifting onto the deck structure or preassembled packages/pancakes for installation on the deck structure. The deck structure is supported by a substructure (GBS, jacket, etc., see PBS AB). Battery limits are defined under PBS code AA Topsides.

Deck structure as defined hereunder can either be a steel frame constructed as an open truss design which combined with infill structures, forms a complete deck structure, or a complete deck structure built up by plate girders, stiffeners/bulkheads and other plated construction. Alternatively, the deck structure may consist of single beams/girders, constructed of steel or concrete.

Primarily the code shall include the main structure itself, being steel or concrete. All functional items related to process, utility or support systems, etc., are in general to be coded within the relevant PBS AA codes.

The deck structure is subdivided and coded as outlined below.

AAHA Open truss

The open truss is constructed by prefabricated boxes and nodes, welded profiles and/or standard profiles. It will include connection arrangement to the substructure, installation/lifting attachments and may have minor structural outfitting such as walkways, ladders, integrated supports, etc.

AAHB Plated/plate girder

This deck structure consists of single plate-constructed girders or a frame constructed by prefabricated plate girders and plated deck constructions for installation of pre-assembled packages/pancakes. It will include connection arrangement to substructure, support/lifting attachments and may have minor structural outfitting such as ladders and walkways, integrated supports, etc.

For jack-up rigs, the "hull" is considered part of the substructure and included under PBS ABCA.

AAHC Concrete beams

This code includes single girders constructed in concrete. May include outfitting steel items as gangways and ladders for access.

AAHD Load transfer frame (LTF)

The frame is normally installed on top of a steel jacket, steel GBS or compliant tower for transfer of deck loads to the substructure in particular cases. It is built as a steel space frame (cone shaped) from standard or prefabricated profiles, including stabs for connection to substructure.

AB Substructures

The code includes all types of substructures normally designed for support of topside facilities. Battery limits are defined under the PBS code AA, topsides. Jacket and GBS substructures may also be applied as substructures for free standing flare towers.

The substructure may be constructed of steel or concrete, resting on seabed by its own weight with or without skirts/piled to the seabed, resting on bucket foundations or as in the case of floaters, held in position by means of anchors or tethers. Substructures may be equipped with product storage facilities,

In addition to the substructure itself and the piling/foundation system, the code also includes mooring and tethering systems, risers integrated in the structure (preinstalled), turrets and temporary outfitting for installation purposes.

ABA Jacket

A bottom founded fabricated steel structure. This structure may have three or more legs and can be either self-floated, barge launched or derrick barge placed.

The jacket will normally be fabricated and installed in one unit, but may be split in a lower and an upper section.

The jacket is subdivided and PBS coded as outlined in the following:

ABAA Jacket structure

Includes the legs and bracings constructed of steel tubulars and assembled by prefabricated leg nodes and bracing nodes, normally fit with sleeves and guiding structure for piles. Also including mudmats/skirts or bucket foundations and required framing/guides for production related outfitting within the structure. The structure is subdivided and coded as follows:

ABAAA Leg tubulars

All straight tubulars and conical transitions for legs including internal stiffeners.

ABAAB Bracing tubulars

All straight tubulars and conical transitions, vertical and horizontal bracings included internal stiffeners if applicable.

ABAAC Bracing nodes

Nodes or cans for vertical and horizontal bracings.

ABAAD Pile sleeves/mudmats

Pile sleeves

Tubulars which the piles are to be stabbed through. Gathered together to «pile clusters» and located at the bottom of each corner leg of the jacket.

Mudmats

Plane area underneath the leg/pile cluster to prevent excessive jacket penetration into the soil. Sometimes with skirts.

ABAAE Pile guides

Short tubulars with funnel-shaped top to guide the piles during piling operation. Normally located on each leg at certain elevations.

ABAAF Conductor framing

Horizontal framing with conductor guides within the jacket structure.

ABAAG Leg nodes

Nodes or cans for leg sections produced of steel plates, cast steel or forged steel.

ABAAH Bucket foundations

Bucket foundations (used instead of piling and mudmats) are normally prefabricated assemblies connected to the legs at the jacket yard.

The assemblies include plates and stiffeners, preinstalled accessories, transition piece/assembly and often part of the leg.

ABAB Outfitting

Includes all permanent outfitting related to the jacket, such as walkways, ladders and systems used for installation purposes e.g. mooring, ballasting, flooding, pumping, venting, grouting and instrumentation systems, which may be of permanent nature. Outfitting is subgrouped and coded as follows:

ABABA Installation system

Anchors, chains and mooring and ballasting systems necessary to ensure exact positioning above an already installed and predrilled template. Also included are permanent systems (incl. instrumentation) for bucket foundations related to installation (e.g. venting, pumping etc.); normally permanent, but some of it may be removed after installation.

ABABB Flooding and grouting

Pipes, valves and electrical cables for flooding and grouting purpose usually placed in caissons outside the jacket legs. This outfitting is normally permanent, but some of it may be removed after installation.

ABABC Walkways/ladders

Walkways, stairs, ladders and similar applied to the structure.

ABAC Temporary outfitting

Includes temporary arrangements used for installation purposes; floating tanks, installation control devices, lift appurtenances, and temporary systems for bucket foundation; i.e. arrangements, etc., which will be removed after jacket installation. They are subgrouped and coded as follows:

ABACA Auxilliary buoyancy

Floating tanks and clamps for fastening to the jacket legs. Tanks including clamps to be removed after jacket installation.

ABACB Floating and up-ending control system

Control capsule containing instruments to control the floating and installing operation of the jacket. The capsule is normally placed at the top of the jacket and is removed after jacket installation.

ABACC Lift appurtenances

Lifting devices to aid installation of structures.

ABACD Systems for bucket foundations

Temporary systems (or parts of systems) for bucket foundations not covered by previous ABAC codes.

The items are to be removed after jacket installation, such as pumping units, instrumentation, control units, flexible hoses etc.

ABAD Piles

Piles/followers are tubulars made from steel plates, stabbed into the soil through the legs (leg piles) or through the pile guides/pile sleeves (skirt piles) to transfer forces from the structure to the soil.

ABAE Risers/J-tubes and caissons

Risers and J-tubes are pipes, which extend from the wellhead or other surface areas through guides to the jacket base area or to a preinstalled subsea wellspacer/drilling template.

Preinstalled parts of risers and J-tubes are part of the substructure.

Export/import risers – may be installed in jacket structure conductor frames/guides prior to installation (preinstalled) or at field location.

J-tubes – conduits extending from surface facilities down jacket structure guide frames and exiting via long radius bends to the mudline/seabed for later pull-in of flowlines, pipelines, umbilical and cables.

Production risers – tie-back strings transfer wellstream from e.g. a subsea well spacer/drilling template to surface facilities, used for predrilled wells.

Also included hereunder are caissons for protection of small pipes.

Conductors are to be regarded as belonging to PBS code AC Wells.

The PBS ABAE outfitting is subgrouped and coded as follows:

ABAEA Production risers

Production risers transfer wellstream from e.g. a subsea placed well spacer/drilling templates to surface facilities.

Also included hereunder are injection risers which transfer treated water for injection or transfer gas for reinjection from wellbay manifolds to e.g. the subsea well spacer/drilling template.

See also explanation under the code following below:

ABAEB Export risers

Pipes, rigid or flexible, extending from either subsea riser bases or from subsea mechanical/hyperbaric tie-in point to surface facilities' import/export manifold connections for import/export of oil and gas. Risers may in general be

- a) preinstalled forming part of jacket structure outfitting, routed through conductor frames/guides in the jacket structure,
- b) post-installed,
- c) be pulled through J-tubes installed in jacket structure.

Risers of category b) and/or c) are deemed to be covered for under PBS codes AD Subsea production system and AE Transport systems, e.g. risers for flowlines or transport pipelines, etc.

ABAEC J-tubes

A string of steel pipe of varying diameters installed during mechanical outfitting of the jacket structure.

The J-tubes extends from surface facilities vertically through guidedecks/guides to the lower jacket base area where a long radius bend extends and exits above the mudline/seabed. J-tubes form a conduit for later pull-in, pull-through of flowlines, pipelines, umbilicals and cables from subsea entry point through the J-tube to surface facilities.

ABAED Caissons

Tubes/conduits of steel containing pipes for fire water, seawater, etc. This is to protect the smaller pipes against environmental exposure.

ABB Gravity base structure – GBS

A gravity base structure (GBS) is a platform substructure, constructed in concrete, which rests on the seabed and is kept in position by its own weight.

The gravity base structure contains all resources from design through tow-out from the dock, ballasting, mating of the deck, towing to installation at the deep water site.

This code covers GBS concrete structure, mechanical outfitting and (preinstalled) risers/J-tubes, subdivided and coded as outlined below.

Some particular references: In this coding structure GBS is meant to cover concrete structures. Steel GBS structures are considered to be jacket substructures with storage tanks. A GBS of simple type may be used as substructure for a free-standing flare tower; the flare tower is to be PBS coded under AAF.

ABBA Concrete structure

The concrete structure consists of

- bottom area with skirts and lower domes,
- cell area with cells, cells/shafts and upper domes,
- shaft area with shafts, top shafts and riegel (where relevant),
- solid ballast.

Subdivided and coded as outlined below.

The bottom area is completed in dry dock, while cell area and shaft area are completed at the deep water site (inshore) where also the ballasting takes place. Embedment items, reinforcement bars, prestressing cables, etc. are installed successively during the concrete construction.

The concrete structure is normally designed for oil storage in the cells, but some installations do not have this function.

The GBS has one to four shafts and therefore often characterised as monotower or multitower. The shafts include compartments for utilities, risers and J-tubes and drilling outfitting.

ABBAA Skirts

Bottom area construction is performed in dry dock and consists of skirts and lower domes. This code covers skirts.

Depending on soil conditions, either steel skirts or concrete skirts or a combination of both may be used. The purpose is to ensure lateral soil support when the platform is set down on location.

ABBAB Lower domes

Lower domes construction follows the completion of the skirts. Included are also conductor penetrations in the drill cells/shafts.

ABBAC Cells

The cell area consists of cell walls and upper domes. The construction starts in dry dock and is completed at the deep-water site. The lower part of the cells will often be slip-formed up to a certain elevation to secure sufficient buoyancy during tow-out of the dry dock. The remaining work, slip-forming of the upper parts of the cell walls and the upper domes, takes place at the deep-water site. Different tanks – e.g. diesel tanks, sludge tanks, etc. – are built into the cells. Installations of dowels are performed at deep-water site as well as mooring/towing foundations/pad eyes.

This code covers cells, which are closed by upper domes.

For upper domes, see PBS ABBAE.

ABBAD Cells/shafts

Some of the cells do not have upper domes, but continues directly as shafts.

The cells/shafts are dry and designed for non-storage purpose, i.e. for drilling and for housing of utility systems and various other mechanical outfitting.

Cells/shafts extend from lower domes up to about upper domes level.

ABBAAE Upper domes

With the completion of the upper domes – normally at inshore location – the cells are completed as "enclosed space" e.g. for oil storage.

ABBAAF Shafts

The shafts (or legs) consist of the shafts/legs extending from the top of the cell section level and up to the top shafts. The shafts are cones shaped normally with decreasing diameter upwards, and they are often slip-formed in one operation.

In the case of particular deep-water location – and long and slim shafts – the shafts may be built with a riegel (see PBS ABBAJ).

ABBAG Top shafts

The top shafts represent the continuation of the shafts up to the top of the GBS. The top shafts are cone shaped with increasing diameter upwards or cylindrical shaped, ending with the transition rings (or similar) below the topside deck. Transition rings may be in steel, concrete or as an elastomeric connection between GBS and deck. Transition rings and crushing tubes are part of the top shafts.

ABBAH Solid ballast

Included is solid ballast (located in the bottom area), for the purpose of regulating the GBS stability.

As material for solid ballast iron ore and/or olivin are often used.

ABBAJ Riegel

The riegel – a box like structure constructed in concrete – acts like a stiffening link between/for the GBS shafts. The purpose is to avoid/reduce structural vibrations (e.g. ringing) due to environmental impact (from wind, sea and other).

GBS' installed in particular deep waters – and thus have long and slim shafts – may be equipped with a Riegel, which separates the shaft area in shafts below and above the Riegel.

ABBB Mechanical outfitting

This code covers the mechanical outfitting of the GBS structure, i.e. facilities/systems for installation and operation of the GBS and for support of platform topside and drilling and production.

Mechanical outfitting may be performed fully by the GBS contractor, or partly whereas another contractor does the remaining.

This code excludes all risers and J-tubes, which are addressed separately. Conductors are to be PBS coded under AC.

Mechanical outfitting is subdivided and coded as outlined in the following:

ABBBA Ballast water and installation systems

This code consists of installations mainly in the bottom area of the GBS. These are both temporary and permanent systems/facilities needed for ballasting, towing, marine installing and removal purposes like

- ballast water systems,
- skirt evacuation system,
- grouting system,
- air cushion system,
- construction pumps, soil drain and other facilities for the above mentioned purposes.

ABBBB Drilling

Includes installations related to the platform drilling function, such as

- conductor guides,
- shale shute,
- oil skimmers,
- etc.

ABBBC Storage and reticulation

Systems for storage and reticulation and inlet/supply within the substructure for liquids and bulk, where relevant, such as

- gas and/or crude oil,
- diesel oil,
- fire water,
- sea water,
- service water,
- surfactants, etc.

Included is also all piping to and from storage.

ABBBD Utilities

Includes auxiliary systems and facilities within the GBS (primarily in the cells and cells/shafts) such as

- electrical power and lighting systems,
- instrumentation and controls for the outfitting systems, for fire and gas detection, corrosion protection and monitoring, water temperature measurements, etc.,
- personnel safety systems (fire extinguishers, hose reels, etc.),
- communication systems,
- HVAC-systems,
- hydraulic power,
- hoists and personnel lifts, cranes, etc.,
- utilities related to risers, J-tubes and for exterior outfitting (e.g. instrumentation, corrosion protection).

For structural outfitting related to risers, J-tubes and exterior outfitting see PBS code ABBBE. For risers and J-tubes, see under PBS ABBC.

ABBBE Structural outfitting

Includes secondary and outfitting steel items required within the substructure primarily for personnel access, support and safety, such as

- decks,
- ladders, stairs, gangways and handrails,
- manholes,
- pipe guides and supports,
- equipment supports and other structures,
- structural outfitting items for risers and J-tubes and for exterior outfitting.

ABBC Risers/J-tubes

Risers/J-tubes and conductors are pipes, which extend from the wellhead or other surface areas through guidedecks/guides/conductor frames in drill shafts/riser shafts:

Conductors – drilled/driven through plugged conduits installed in lower drill shaft domes. For concrete gravity base structures the conductor acts as a conduit for the surface casing. Conductors are deemed to be PBS coded under AC.

Export/import risers – installed in riser shafts or external to shaft(s) with tie-in connection points external to GBS structure.

J-tubes – conduits extending from surface facilities down shaft(s) exiting via long radius bends through cells/domes to the mudline/seabed for later pull-in of flowlines, pipelines and cables/umbilicals.

Production risers – tie-back string transfers wellstream from e.g. a subsea well spacer/drilling template to surface facilities.

The pipes hereunder are normally of rigid type. Flexible risers are deemed to be PBS coded under AD and/or AE depending on riser function.

Risers/J-tubes are subgrouped and coded as follows:

ABBCA Production risers

This code includes risers for production and injection:

Production risers transfer wellstream from e.g. subsea placed well spacer/drilling templates to surface facilities.

Injection risers transfer treated water for injection or transfer gas for reinjection from wellbay manifolds to the subsea well spacer/drilling template/area.

Predrilling of wells in combination with concrete GBS substructure installations has been considered for some recent development project concepts.

See also riser explanation under the code following below.

ABBCB Export risers

Pipes rigid or flexible extending from either subsea riser bases or from subsea mechanical/hyperbaric tie-in point to surface facilities' import/export manifold connections for import/export of oil, gas and water.

Risers in general may be

- a) preinstalled forming part of GBS structure outfitting, routed through riser shaft(s) or drill shaft(s),
- b) post-installed externally and/or internally fixed to shaft(s),
- c) be pulled through J-tubes installed in GBS structure.

Flexible risers and risers of category b) and c) are deemed to be covered for under PBS AD and AE depending on riser function.

ABBCC J-tubes

A string of steel pipe of varying diameters installed during mechanical outfitting of gravity base structure. The J-tube extends from surface facilities vertically through guidedecks/guides to the lower cell/dome area, where a long radius bend extends through the lower GBS and exits above the mudline/seabed. J-tubes form a conduit for later pull-in, pull-through of flowlines, pipelines and cables/umbilical from subsea entry point through the J-tube to surface facilities.

ABC Jack-up

Jack-up is one type of mobile drilling rig, which may be designed for other purposes such as production platforms, quarter platforms, etc.

Jack-up substructure is defined as including main components such as structure/hull, topside related equipment, legs, jacking arrangements, base/foundation structure and rigid risers where relevant. Included also are outfitting like

- marine related outfitting of the hull, the legs and the foundation (systems for ballast, etc.),
- mechanical outfitting related to oil storage systems in the foundation structure,
- mechanical outfitting related to topside systems.

The seabed foundation may include piles and storage, if any.

Outfitting, systems, structures, etc. related to production of oil and gas (production platforms) or for quarter platforms – i.e. topside related – are included under topsides PBS code AA.

Flexible risers are normally covered for under PBS codes AD Subsea production systems and AE Transport systems (e.g. risers for traditional flowlines or pipelines.).

ABCA Structure/hull

The structure/hull may be of two types:

- truss type structure with deck plating;
- plated/plate girder type structure ("deck box").

Prefabricated boxes and nodes, welded profiles and/or standard profiles, with deck plates, profiles and stiffeners, construct the truss type structure. Outfitting is normally located on the deck.

The box type – most in use – consists of plate-constructed girders or by prefabricated plate girders and plate deck constructions. Outfitting will be installed within the box (normally marine related) and process related (topside related) on the deck.

NOTE: Topside related outfitting etc. is to be included under PBS code AA Topsides.

ABCB Legs

All legs including jacking and locking arrangements. The legs may be of tubular or truss type construction. The jacking arrangement can be either electric or hydraulic driven (see also PBS ABCC following).

ABCC Outfitting

Outfitting of the jack-up substructure includes installations in the hull, legs and the base and can consist of items like:

ABCCA Hull outfitting

- walkways, ladders, etc.,
- marine related mechanical outfitting, systems, etc.,
- jacking/locking machinery with systems,
- outfitting related to oil storage in the base.

ABCCB Topside related systems

Jack-up may have topside related systems, equipment, etc. located in the substructure/hull in a varying degree. I.e. equipment, systems – typically utility, common process and support systems placed within the hull and which are required primarily to support the production of hydrocarbons and not considered to form part of the vessel storage/distribution system, marine systems –e.g. separate electrical power generation, control room equipment, etc.

ABCD Base

The base can be different kind of structures. Depending of soil conditions and purpose, the foundation(s) are designed to prevent excessive leg penetration into the soil. In some designs the base is a large steel mat which gives the name to the jack-up type-mat-supported jack-up. For a production platform oil storage may be integrated in the foundation. The bases may have piles.

ABCE Rigid risers

Risers are permanent pipes extending from e.g. a seabed well spacer/drilling template beneath the wellbay area and to the surface facilities, or pipes extending from a riser base which may form part of well spacer template to surface facilities for export/import of oil, gas and water.

Jack-up substructure may be equipped with rigid risers and/or flexible risers. Rigid risers allow "dry" surface installed x-mas trees.

This code and subsequent subcodes cover only rigid pipe risers (in connection with dry x-mas trees) for jack-ups. Flexible risers are deemed to be PBS coded under AD and/or AE depending on riser function.

For well spacer/drilling template, see PBS ADAA.

The permanent rigid risers hereunder are grouped into production risers and export risers, as outlined in the following:

ABCEA Production risers

Production risers transfer wellstream from e.g. a subsea well spacer/drilling template to surface facilities – wellbay area.

Included are also injection risers which transfer treated water for injection or transfer gas for reinjection from the wellbay manifolds to the subsea well spacer/drilling template.

ABCEB Export risers

Rigid pipes extending from e.g. riser bases which may form part of well spacer/drilling template to surface facilities for export/import of oil, gas and water.

ABD Compliant tower

A bottom founded steel structure with buoyancy tanks and/or guylines used in deep water areas. The compliant tower substructure is subdivided and PBS coded as outlined in the following:

ABDA Structure

Includes the legs and bracings built of steel tubulars and assembled by prefabricated leg nodes and bracing nodes, normally fit with sleeves and guiding structure for piles. Also including mudmats/skirts and required framing/guides for production related outfitting within the structure.

Compliant tower substructures will normally be fabricated and installed in one unit, but may be split in a lower and an upper section. Structure is subdivided and coded as follows:

ABDAA Leg tubulars

All straight tubulars and conical transitions for legs including internal stiffeners.

ABDAB Bracing tubulars

All straight tubulars and conical transitions, vertical and horizontal bracings including internal stiffeners if applicable.

ABDAC Bracing nodes

Includes the nodes or cans prefabricated for assembly of vertical and horizontal bracings.

ABDAD Pile sleeves/mudmatsPile sleeves

Tubulars which the piles are to be stabbed through, gathered together to "pile cluster" and located at the bottom of each corner leg of the compliant tower.

Mudmats

Plane area underneath the leg/pile cluster to prevent excessive structure penetration into the soil, sometimes with skirts.

ABDAE Pile guides

Short tubulars with funnel-shaped top to guide the piles during piling operation. Located on each corner leg at certain elevation.

ABDAF Conductor framing

Horizontal framing with conductor guides within the structure.

ABDAG Leg nodes

Includes the nodes or cans for leg sections produced of steel plates, cast steel or forged steel.

ABDB Outfitting

Includes all permanent outfitting related to the compliant tower, such as walkways, ladders and systems used for installation purposes. Installation systems, flooding and grouting systems and instrumentation systems which may be of permanent nature. Outfitting is subgrouped and coded as follows:

ABDBA Installation system

Anchors, chains and mooring and ballasting systems, etc. necessary to ensure exact positioning above an already installed and predrilled template.

ABDBB Flooding and grouting

Pipes, valves and electrical cables for flooding and grouting purpose usually placed in caissons outside the tower legs. Normally permanent, but some of it may be removed after installation.

ABDBC Walkways/ladders

Walkways, stairs, ladders and similar applied to the structure.

ABDC Temporary outfitting

Includes temporary arrangements used for installation purposes: floating tanks, installation control devices and lift appurtenances (outfitting that will be removed after installation). This outfitting is subgrouped and coded as follows:

ABDCA Auxiliary buoyancy

Floating tanks and clamps for fastening to the legs. Tanks including clamps to be removed after installation.

Buoyancy tanks not intended to be removed (integrated) should be PBS coded under ABDBA.

ABDCB Floating and up-ending control system

Control capsule containing instruments to control the floating and installing operation. The capsule is normally placed at the top of the substructure and removed after installation.

ABDCC Lift appurtenances

Lifting devices to aid installation of structures.

ABDD Mooring items

Guyed tower mooring system consists of a number of steel cables/guylines connected between clump weights with anchor piles and upper compliant tower structure. Guylines maintain constant tension due to clump weights.

Mooring winches will normally be part of the topsides facilities and then is PBS coded under AA. Fairleads and mooring winches located on the substructure are to be PBS coded under ABDBA.

ABDDA Mooring lines

Heavy chains and cables with connectors, connected to piles/anchors/clump weights placed on seabed and to fairleads/stoppers, may require as many as twelve or more mooring lines connected according to a variety of mooring patterns to the legs of the substructure.

ABDDB Anchors/piles

Including anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line. Piles conventionally driven by hydraulic pile drivers. Combined clump weight/piled systems as used for guyed towers. Other types of anchors and piles may also be applied.

ABDE Foundation/piles

For compliant towers due to the many and varied concepts (guyed, articulated, hybrid) this category may include separate or combined well and leg foundations with mudmats and piles (main piles) for structures and structure foundations.

ABDF Risers/J-tubes and caissons

Risers and J-tubes are pipes normally rigid for this type of substructure which extend from the wellhead or other surface areas through guides/conductor frames to the tower base area or to e.g. a preinstalled subsea wellspacer/drilling template.

Preinstalled parts of risers and J-tubes are part of the substructure.

Export/import risers; may be installed in the tower structure conductor frames/guides prior to installation or at field location.

J-tubes; conduits extending from surface facilities down tower structure guide frames and exiting via long radius bends to the mudline/seabed for later pull-in of flowlines, pipelines, umbilicals and cables.

Production risers; tie-back strings transfers wellstream from e.g. a subsea well spacer/drilling template to surface facilities, used for predrilled wells.

Also included hereunder are caissons for protection of small pipes.

Conductors are to be regarded as belonging to PBS code AC Wells.

This outfitting is subgrouped and coded as follows:

ABDFA Production risers

Production risers transfer wellstream from e.g. a subsea placed well spacer/drilling templates to surface facilities.

Included hereunder are also injection risers which transfer treated water for injection or transfer gas for reinjection from wellbay manifolds to e.g. the subsea well spacer/drilling template. See also explanation under the code following below.

ABDFB Export risers

Pipes extending from either subsea riser bases or from subsea mechanical/hyperbaric tie-in point to surface facilities' import/export manifold connections, for import/export of oil, gas and water. Risers may in general be

- a) preinstalled forming part of tower structure outfitting, routed through conductor frames/guides in tower structure,
- b) post-installed,
- c) be pulled through J-tubes installed in tower structure.

Risers of categories b) and/or c) are deemed to be covered for under PBS AD or AE depending on riser function.

ABDFC J-tubes

A string of steel pipe of varying diameters installed during mechanical outfitting of the tower structure.

The J-tube extends from surface facilities vertically through guidedecks/guides to the lower tower base area where a long radius bend extends and exits above the mudline/seabed. J-tubes forms a conduit for later pull-in, pull-through of flowlines, pipelines, umbilicals and cables from subsea entry point through the J-tube to surface facilities.

ABDFD Caissons

Tubes/conduits of steel containing pipes for fire water, seawater, etc. This is to protect the smaller pipes against environmental exposure.

ABK Semi submersible

A seabed anchored or dynamically positioned buoyant/floating substructure constructed in steel or concrete, which provides support for surface production facilities (topsides). The hull/substructure consists of pontoons, nodes, columns and bracings, within which are access, bilge/ballast, storage and auxiliary systems, and mooring items.

This code considers floating production systems of semi submersible type, which are either anchor moored or dynamically positioned. For semi submersibles a large number of design configurations are possible and built; from three columns to multi-column, from separate leg/column pontoons to twin submerged pontoons to ring pontoons and from circular sections/members/structures to rectangular or hybrids.

Semi submersible floating production systems are reliant on subsea production systems or adjacent fixed wellhead platform to provide wellstream for production/processing, storage and further transport. All known semi submersible production platforms use flexible risers and "wet" x-mas trees.

The multicolumn deep floater is in many respects similar to semi submersibles; the concept has a very deep draught and large displacement such that the structure has little vertical movement and restrained lateral movement allowing wellheads to be surface installed. Current concepts consider steel or concrete structures with four columns placed above ring pontoons. Multicolumn deep floaters are deemed to be PBS coded under ABP – (and single column deep floaters under PBS ABQ).

The substructure consists of the following main elements:

- structure;
- outfitting;
- mooring items.

These, with further subcoding, are outlined below.

Flexible risers are to be PBS coded under AD and/or AE (depending on riser function/use).

ABKA Structure

A hull/substructure constructed in steel or concrete, which consists of pontoons, columns, nodes and bracings as subcoded and outlined in the following:

ABKAA Columns

Vertical cylinders/sections between subsurface nodes/pontoons and deck structure. Columns may contain tanks, integral mooring systems (e.g. chain lockers, etc.), utilities and access systems to pontoons/nodes.

ABKAB Pontoons

Horizontal cylinders/sections between subsurface nodes/columns or ellipsoidal structures placed beneath each column. Pontoons may be ring pontoons connecting each column, twin submerged hull pontoons or ellipsoidal pontoons connected to individual columns. Pontoons may contain tanks for storage, de-ballasting and storage.

ABKAC Nodes

Transition structures between columns and pontoons and between bracings to structures.

ABKAD Bracings

Cylindrical steel tubulars between main structural components: columns/nodes/pontoons, to alleviate structural compliance.

ABKB Outfitting

Include mechanical outfitting of semi submersibles to complete integral systems after columns, nodes, pontoons and bracings are constructed/fabricated, assembled and erected into a complete structure.

Outfitting is grouped into

- ballast/bilge systems,
- storage and reticulation systems,
- utility systems,
- structural outfitting,
- propulsion/DP systems,

in the subcodes below.

Outfitting does not include mooring items, which are coded separately.

ABKBA Ballast/bilge

Systems installed within pontoons, nodes and columns to obtain required operating draught and for tank dewatering. Contains ballast water system, vent and drain systems and bilge system.

ABKBB Storage and reticulation

Systems for storage and reticulation and inlet/supply within pontoons, nodes and columns for liquid and bulk storage.

This code contains systems like

- seawater inlet system,
- fire water system,
- diesel storage system,
- potable water system,
- oil systems (where relevant).

ABKBC Utility systems

Auxiliary systems within the hull structure such as

- electrical power and lighting systems,
- instrumentation and controls,
- hydraulic power systems,
- fire and gas systems,
- personnel safety systems,
- HVAC systems,
- personnel access – hoists and personnel lifts.

ABKBD Structural outfitting

Primarily secondary and outfitting steel required within the structure normally for personnel access, support and safety:

- decks;
- structures;
- ladders;
- gangways;
- manholes;
- pipe guides and supports;
- equipment supports;
- fairleads and chain stoppers located on the substructure;
- anodes;
- etc.

Mooring winches, if located on the substructure, are to be coded hereunder. (Normally mooring winches for semi submersibles are part of topsides, see PBS code AAGC).

ABKBE Propulsion/DP system

Propulsion systems required for sailing to location (self-propulsion) and for station keeping – dynamic positioning (DP). May comprise of electrical/hydraulic drivers and screw propellers within hull pontoons for sailing to location or electrical driven azimuth thrusters located under pontoons. Propulsion systems include thrusters/propellers, electrical/hydraulic drivers, power supply and control/instrument systems required providing propulsion.

ABKC Mooring items

Mooring items include mooring lines and anchors/piles as outlined in the subcodes following. For other mooring outfitting, see also description under PBS code ABKBD.

ABKCA Mooring lines

Mooring lines comprise chains, connectors and cables – connected to piles/anchors on the seabed and running through fairleads to mooring winches/stoppers.

ABKCB Anchors/piles

Methods/arrangements for fixing and securing the mooring lines into the seabed may be

- anchors – conventional rated ship anchors placed/embedded into the seabed,
- anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line,
- piles conventionally driven by hydraulic pile drivers,
- suction anchors.

ABL Tension leg substructure – TLP

A seabed anchored buoyant/compliant substructure constructed in steel or concrete, which provides support for surface production facilities (Topsides).

The hull (structure) consists of pontoons, nodes, (bracings when relevant) and columns within which are access, bilge/ballast, storage and auxiliary systems.

The hull is anchored to the seabed between outer columns/nodes or external tie-down porches and foundation template/anchor base with coupled tethers/tendons. De-ballasting the buoyant hull/substructure tensions tethers/tendons. Tether/tendon deployment equipment may be either contained internally within hull columns/nodes or external to hull columns/nodes.

The TLP substructure is subdivided and PBS coded as follows:

ABLA Structure

A hull/substructure constructed in steel or concrete, which consists of Pontoons, Columns and Nodes (hull structure). Structure is subdivided and coded as follows:

- main TLP structural elements;
- TLP substructure.

ABLAA Columns

Vertical cylinders/sections between subsurface nodes/pontoons and deck structure. Columns may contain tanks, integral tether/tendon deployment equipment or may be configured with external tether/tendon deployment equipment.

ABLAB Pontoons

Horizontal cylinders/sections between subsurface nodes/columns contains tanks/compartments for storage, de-ballasting/tensioning of tethers/tendons. Ring pontoons is most applied.

ABLAC Nodes

Transition structures between columns and pontoons, which may contain tether conduits or external porches for tether/tendon installation.

ABLAD Bracings

Bracings – when relevant – consists of cylindrical tubulars between structural components: columns/nodes/pontoons, to alleviate structural compliance.

ABLB Outfitting

Includes mechanical outfitting of TLP hull/substructure to complete integral systems after columns, nodes and pontoons are constructed/fabricated, assembled and erected into a complete structure.

Outfitting does not include tethers/tendons or tether deployment equipment (see PBS code ABLC).

Outfitting is normally grouped into the following main categories: ballast/bilge systems, storage and reticulation systems, utility systems and structural outfitting as outlined in the following:

ABLBA Ballast/bilge

Systems installed within pontoons, nodes and columns for maintaining leg tensioning and tank dewatering. Contains ballast water systems, vent and drain systems and bilge systems.

ABLBB Storage and reticulation

Systems for storage and reticulation and inlet/supply within pontoons, nodes and columns for liquid and bulk storage.

This code contains systems like

- seawater inlet system,
- fire water system,
- diesel storage system,
- potable water system,
- oil systems – where relevant.

ABLBC Utility systems

Auxiliary systems within the hull structure:

- electrical power and lighting systems;
- instrumentation and controls;
- hydraulic power systems;
- fire and gas systems;
- personnel safety systems;
- HVAC systems;
- personnel access – hoists and personnel lifts.

ABLBD Structural outfitting

Includes primarily secondary and outfitting steel required within the structure for personnel access, support and safety:

- decks;
- structures;
- ladders;
- gangways;
- manholes;
- pipe guides and supports;

- equipment supports,
- anodes;
- etc.

ABLBE Propulsion/DP system

TLPs may in particular cases be equipped with propulsion/DP system:

Propulsion systems may be required for sailing to location (self-propulsion) and for station keeping – dynamic positioning (DP). May comprise of electrical/hydraulic drivers and screw propellers within hull pontoons for sailing to location or electrical driven azimuth thrusters located under pontoons. Propulsion systems include thrusters/propellers, electrical/hydraulic drivers, power supply and control/instrument system required to provide propulsion.

ABLC Tethering system

The tethering system includes all permanent system components from anchor connections – anchor latches/anchor base connectors to the tether/tendon tie-off assemblies and tether/tendon deployment equipment required for installation, subgrouped and coded below.

ABLCA Tether equipment

Includes tether/tendon deployment equipment/tool systems required to handle, move, connect, lower, tension and tie-off tethers/tendons at mooring flats or external porches. Equipment may be individual tools or combination tools required for installation of tethers/tendons though which are not further required unless for tether/tendon replacement.

Tether deployment equipment may comprise

- tensioner/motion compensator,
- torque tools,
- polar/radial cranes and handling equipment,
- rollers/guides,
- combination tooling.

ABLCB Tethers

Tethers/tendons are connected between anchor bases with anchor latches/connectors at the anchor base and the TLP substructure. Connection between tethers/tendons and substructure may be integral extending to cross-load bearings within the lower hull nodes/columns, through tether conduits to the mooring flat and further to tensioning and tie-off assemblies. Tethers/tendons may be connected externally to outer node/columns' tether/tendon tie-down porches and tensioned and tied-off.

Tethers/tendons may consist of the following components:

- anchor latches with flexible joints for connection to anchor base foundation;
- tethers/tendons which may be neutrally buoyant and consist of welded pipe for the total tether/tendon length, may comprise a number of tether elements with welded/screwed couplings for installation, or not-neutrally buoyant, forged tethers/tendons with screwed couplings;
- cross-load bearings placed within lower nodes to comply to environmental forces,
- tether/tendon tie-off assemblies for tie-off at internal mooring flat or external porch tie-off.

ABLCC Anchor base/foundations

Normally a piled seabed installed foundation for connection of tethers/tendons, of the following types:

- concrete foundation templates (CFT), constructed in concrete with skirt piles, lowered, ballasted and placed directly beneath TLP columns/nodes;
- fabricated steel foundation template structures placed beneath TLP columns/nodes and conventionally piled with tubular piles;

- combination foundation template/anchor base structures constructed in either concrete or steel and piled to the seabed.

ABLD Mooring items for positioning

Some TLP version concepts have also been designed with mooring for positioning/repositioning (shifting) of the TLP (e.g. in connection with drilling).

Mooring items for positioning of TLPs are subgrouped and PBS coded as follows:

ABLDA Mooring lines**ABLDB Anchors/piles**

As the above is similar to mooring items for other floaters/submersibles, a reference to PBS ABKC regarding details and interface is given.

Mooring winches are normally located on the deck (topside) and should be PBS coded under AA. However for mooring winches and/or fairleads located on the substructure, the PBS code ABLBD applies.

ABLE Rigid risers

Risers are permanent pipes extending from the seabed well spacer/drilling template beneath the wellbay area and to the surface facilities, or pipes extending from a riser base which may form part of well spacer template to surface facilities for export/import of oil, gas and water.

TLPs are normally equipped with rigid risers, but may also have flexible risers. Rigid risers require motion compensation and allow "dry" surface installed x-mas trees; typical for TLPs and very advantageous for installation, workover and operation.

This code and subsequent subcodes cover only rigid pipe risers (in connection with dry x-mas trees) for TLPs. Flexible risers are deemed to be PBS coded under AD and/or AE depending on riser function.

For well spacer/drilling template, see PBS ADAA.

The permanent rigid risers hereunder are grouped into production risers and export risers for TLPs, as outlined in the following:

ABLEA Production risers

Production risers transfer wellstream from the subsea well spacer/drilling template to surface facilities – wellbay area.

Included are also: injection risers which transfer treated water for injection or transfer gas for reinjection from the wellbay manifolds to the subsea well spacer/drilling template.

ABLEB Export risers

Pipes extending from riser bases which may form part of well spacer/drilling template to surface facilities for export/import of oil, gas and water.

ABM Ship type substructure (monohull)

The substructure as defined herein considers floating production, storage and offshore loading (FPSO) systems, which are either

- purpose built ships, or
- converted trading tankers, which are used for the purpose of permanent field production.

For barge type FPSOs, see PBS ABN.

Production test ships, extended test ships, barges and offtake tankers are not included in codes hereunder.

Battery limits between topside facilities/production facilities and substructure monohull/shipshaped vessel are

- all facilities placed at/above (normally on a deck some meters above maindeck) or upon main deck level, hereunder; process units, modules, decks, process piping, utilities and flare system (i.e. topside facilities).

Monohull as defined hereunder comprises: hull structure and hull outfitting (including living quarter), turret systems and mooring items.

This version of the SCCS differs from the May-1992 version with the introduction of the SFI Group System for PBS-coding of ship/barge substructures.

The SFI Group System is a function oriented coding system applied in e.g. ship specifications, estimates, drawings, instruction material, purchasing and material administration, cost control, files, etc.

Shipping companies, shipyards, authorities, consultants, suppliers, etc. more than 800 companies and institutions in about 50 countries use the system.

The group system was developed by The Ship Research Institute of Norway – SFI. After reorganisations SpecTec AS was appointed responsible for marketing and updating of the system, hence inquiries concerning the system should be directed to

- SpecTecAS,
- www.spectec.no

The SFI Group System is structured as a three digit coding system. On the highest level the system divides the ship into 10 main groups, 0 to 9. Of these only 8 (main groups 1 – 8) are standardised in use.

Each of the main groups (first digit) consists of 10 groups (two digits), and each group is further subdivided into 10 sub groups (three digits).

An example of group system subdivision of main group 7 is given below:

main group	7	System for machinery main components
group	73	Compressed air systems
sub group	731	Starting air systems

The system documentation includes a code overview section, detail description and index. In addition and linked to the group system are a detail code (“component oriented”) and a material code (“bulk oriented”).

In the SCCS PBS code the main groups of the SFI Group System are reflected and adapted as follows:

ABM	Ship type substructure (monohull) Main group 1: Ship general is to be included hereunder due to the (common) nature of this main group.
ABMA	Structure/hull Includes main group 2: Hull
ABMB	Outfitting Includes main group 3–8 as follows:
ABMBA	Equipment for cargo (main group 3)
ABMBB	Ship equipment (main group 4)
ABMBC	Equipment for crew and passengers main group 5)
ABMBD	Machinery main components (main group 6)
ABMBE	Systems for machinery main components (main group 7)
ABMBF	Ship common systems (main group 8)
ABMBG	Other (reserved for main group 9 which is vacant at present).

For an outline of the PBS codes, see below. But observe; for full coding (all levels) and comprehensive use of the SFI Group System, the system documentation should be applied.

ABM Ship type substructure (monohull)

To be entered hereunder is main group 1: Ship general, i.e. details and costs which cannot be charged to any specific function on board, such as general arrangements, insurance, provisional rigging, launching, dry-docking, test and trials etc.

Some particular references: For production barge substructures, see PBS code ABN. For floating storage units substructures, see PBS AEC. Circular barge type substructure, see PBS ABR.

ABMA Structure/hull

Structure/hull as defined herein comprises:

- purpose built ships,
- purchased trading tankers converted to FPSOs.

The code includes hull: i.e. the structure for afterbody, engine area, cargo area, forebody and superstructure (living quarters) with particular hull details and material protection.

ABMB Ship outfitting

Includes outfitting as outlined and coded in the following, with examples that may be relevant for production ships:

ABMBA Equipment for cargo

Includes equipment/machinery, systems, etc. concerning the ships cargo, e.g. hatches, cargo handling equipment, rigging for cargo, loading/discharging systems for liquid cargo (e.g. hoses), heating systems for cargo, ventilation systems for cargo tanks, inert gas systems, cargo tank sounding systems, etc.

ABMBB Ship equipment

Includes equipment/machinery, systems, etc. which mainly are typical for ships, e.g. rudders and steering machinery, thrusters and dynamic positioning systems navigation aids, communication equipment, mooring winches (not in connection with fixed turrets), ordinary mooring outfitting for other than station keeping and fixed turrets (see also PBS ABMF), repair/maintenance and cleaning equipment, machinery lifting gear, etc.

ABMBC Equipment for crew and passengers

Includes equipment/machinery, systems, etc. which serve crew and passengers, e.g. lifesaving/protection and medical equipment, internal and external architectural outfitting (insulation, panels, partitions, doors and windows, handrails, ladders, deck covering, etc.), furniture/inventory, galley, pantry, laundry, personnel lifts, accommodation ventilation and air-condition, sanitary systems etc.

ABMBD Machinery main components

Includes primary components in the engine room, e.g. main engine and propulsion plant, boilers and steam generators, machinery for main and emergency power generation, etc.

ABMBE Systems for machinery main components

Includes systems that primarily serve the machinery main components, such as systems for fuel, lube oil, cooling, compressed air, exhaust and air intakes, steam/condensate and feed water, distilled and make up water and automation systems for the machinery.

ABMBF Ship common systems

Includes central ship systems such as ballast and bilge systems, gutter pipes, fire and lifeboat alarm, fire-fighting and wash down systems, air and sounding systems for non-cargo tanks, common hydraulic system, central heating system and electrical systems.

ABMBG Other (vacant – SFI main group 9)

The code is reserved for SFI Group System main group 9, which is vacant at present.

ABMBH Topside related systems

FPSO ships may have topside related systems, equipment, etc. located in the substructure/hull in a varying degree. I.e. equipment, systems – typically utility, common process and support systems placed within the hull and which are required primarily to support the production of hydrocarbons and not considered to form part of the vessel storage/distribution system, main propulsion system or marine systems – such as separate electrical power generation, control room equipment, etc.

The other elements of the ship substructure are as follows:

ABMC Fixed turret

The fixed turret defined hereunder relates to turret devices, which are located **within** the hull structure; placement is normally towards the bow fore of the ship centre. This non-disconnectable turret is independently installed from the main hull and provides full weathervaning capabilities. The turret essentially consists of three main structural components:

- turret collar;
- cylindrical tub;
- chain table.

For other types of ship turrets, see PBS ABMD and ABME.

Fixed turret is subdivided and coded as follows:

ABMCA Structure

The turret body is a cylindrical steel plate structure, which can rotate within the vessel moonpool by means of a bearing system. The bearing system is formed by bogies, which are positioned at the top of the turret between the turret collar and the vessel deck.

The structure (tub) consists of a single wall ring stiffened cylindrical structure strengthened by longitudinal webs.

ABMCB Outfitting

Turret outfitting (excl. mooring components) comprises all components not included (integrated) in the structure. The turret bearing system is located at the turret top at the vessel deck level. This system which comprises low friction bogies (side/lower wheels) and rails allows natural weathervaning capacity, some designs may require turning machines.

Turret outfitting comprises such as

- equipment mounted on or within the turret structure which includes such as: deck mounted manifold blocks and control console, the swivel stack support structure and swivel and riser installation gantry,
- equipment supported from the FPSO deck – hoisting gantry for swivel stack removal, swivel drive frame, manifold piping,
- flexible riser terminations, riser handling winches and associated equipment, all interconnecting piping between riser terminations and manifolds and all systems required in support of safe operation of the turret system.

Flexible risers are normally covered for under PBS code AD Subsea production systems and AE Transport systems (e.g. risers for traditional flowlines, umbilicals/cables or transport pipelines).

ABMCC Mooring equipment

Mooring equipment includes all equipment installed in connection with fixed (internal) turret, related to station keeping.

Mooring equipment comprises

- mooring line winches/reels,
- anchor winches and windlasses,
- cable lifters and anchor capstans,
- rotating chain jack tensioners,
- chain stoppers,
- fairleads and associated equipment.

For mooring chains, anchors, etc. see PBS ABMF.

ABMD Disconnectable turret system

This turret considers a hull docked disconnectable buoy solution and is an alternative to fixed internal turret, as a device for transferring e.g. wellstream to the FPSO and for mooring. Various concepts have been presented.

At present the STP system: submerged turret production – a pendant to STL: submerged turret loading for FSUs (PBS code AECCA) – both provided by APL, is often preferred.

The descriptions following reflect this concept. The disconnectable turret hereunder comprises two main elements:

- the disconnectable buoy docked in the hull during operation/production;
- outfitting incl. mooring of the buoy.

As outlined in the following:

ADMDA Structure

Structure includes the buoy, i.e. a buoyancy cone with internals, e.g. plating and stiffeners, turret shafts, bearings, riser connection tube, swivel, etc.

ABMDB Outfitting

Outfitting comprises

- turret equipment, etc. located outside the buoy and not integrated in the hull,
- mooring items for the buoy (part of the concept).

Turret equipment include such as

- buoy locking mechanism and other components located in the STP-compartment,
- pull-in winch and hydraulic power packs (normally located on deck),
- equipment to operate, monitor and control the turret system.

Mooring, also termed mooring leg, includes

- anchors (e.g suction anchors)/anchor piles,
- anchor chains and connectors,
- anchor cable with connectors,
- mooring line buoyancy elements.
-

Flexible risers are to be coded under PBS codes AE and/or AD depending on riser function.

ABME Other turrets

Comprises turret functions other than internal fixed or disconnectable turrets, i.e. mainly solutions where the wellstream is transferred via bow/stern arrangements connected to towers or buoys (also termed single point or single buoy concepts).

The code may cover – depending of concept – main elements such as

- seabed founded compliant structures with base structure, articulated joint, rigid risers (integrated), swivel/weathervane bearings, hoist, jumper hoses and connectors,
- floating buoy structure with appurtenances and similar outfitting as above,
- mooring lines/guyed lines and anchors for above structures.

Some of the concept under PBS AEB Local offtake system might give an impression of possible solutions.

Flexible risers from seabed to vessel should be coded according to PBS AD or AE.

ABMF Mooring items

This code covers mooring items for fixed, internal turret solutions and for FPSO-ships with conventional spread mooring (no weathervaning capabilities) for station keeping.

For ship mooring in connection with disconnectable turret, see PBS ABMDB.

Mooring items are subgrouped and coded as follows:

ABMFA Mooring lines

Mooring lines comprise chains, cables and connectors – connected to piles/anchors on the seabed and to chain stoppers at e.g. the turret base chain table, as many as twelve or greater moorings are connected according to predefined mooring patterns.

ABMFB Anchors/piles

For FPSO ships pile anchors, suction anchors and fluke anchors are the most commonly used anchoring/piling types used for offshore mooring.

ABN Barge type substructure

The substructure as defined herein considers floating production, storage and offshore loading (FPSO) systems, which are either

- purpose built barges;
- converted barges.

Production test vessels, extended test vessels and offtake tankers are not included in codes hereunder.

Barges used as FPSOs are roomy, flat-bottomed vessels designed simpler as ships (“less ship shape”) and normally without propulsion, i.e. towed/pushed to location.

Battery limits between topside facilities/production facilities and substructure are

- all facilities placed at/above (normally on a deck some meters above main deck) or upon main deck level, hereunder; process units, modules, decks, process piping, utilities and flare system (i.e. all topside related).

FPSO – barges as defined hereunder comprise hull structure and hull outfitting (incl. living quarter), turrets and mooring items. The FPSO-barges are normally steel made, but may be built of concrete.

This version of the SCCS differs from the May 1992 version with the introduction of the SFI Group System for PBS-coding of ship/barge substructures. For information about the system, use and content, see the description of the analogous codes under PBS code ABM Ship type substructure (monohull).

As for ship substructures, the SFI Group System main group 1: Ship general – for barges – is to be PBS coded ABN due to the (common) nature of the main group.

For further subdivision of the FPSO-barges the following ABN codes apply (with main group (M.G.) numbers of the SFI Group System given to the right):

<u>PBS codes:</u>	<u>M.G.no.:</u>
ABNA Structure/hull	2
ABNB Ship outfitting	
ABNBA Equipment for cargo	3
ABNBB Ship equipment	4
ABNBC Equipment for crew and passengers	5
ABNBD Machinery main components	6
ABNBE System for machinery main components	7
ABNBF Ship common systems	8
ABNBG Other (vacant SFI main group)	9
ABNBH Topside related systems	

ABNBG is reserved for main group 9, which is vacant at present. For details regarding ABNBH, see analogous code ABMBH for production ship substructure.

As ships are normally more well equipped than barges, all details of the SFI Group System are not fully relevant for barge substructures.

The other main elements of the barge substructure are as follows:

ABNC Fixed turret

FPSO barges may be equipped with fixed internal turret, subdivided and coded as follows:

ABNCA Structure

ABNCB Outfitting

ABNCC Mooring equipment

For further details, see analogous description under PBS code ABMC.

For mooring items (chains, anchors, etc.) see ABNF. Flexible risers are covered under PBS codes AD and AE, e.g. risers for wellstream or for transport pipelines.

ABND Disconnectable turret system

Another turret solution for FPSO barges is the disconnectable turret system (via buoy), subdivided and coded as follows:

ABNDA Structure

ABNDB Outfitting

For further details, see analogous description under PBS code ABMD.

ABNE Other turrets

Comprises turrets other than fixed internal turrets or disconnectable turrets (via buoys docked in the hull during operation/production). I.e. mainly solutions where the wellstream is transferred via bow/stern arrangements connected to towers or buoys (also termed single point or single buoy concepts).

For further details, see analogous description under PBS code ABME.

ABNF Mooring items

This code covers mooring items for fixed internal turret solutions and for FPSO-barges with conventional spread mooring (no weathervaning capabilities) for station keeping. Mooring items consist of:

ABNFA Mooring lines**ABNFB Anchors/piles**

For further details, see analogous description under PBS code ABMF.

Barge mooring winches for conventional spread mooring for station keeping, are to be coded ABNBB.

ABP Multicolumn deep floater

A seabed anchored buoyant and deep floating substructure constructed in steel or concrete, which provides support for surface production facilities (topsides). The structure consists of pontoons, nodes, columns (and bracings where relevant), within which are access, bilge/ballast, storage and auxiliary systems (outfitting). Dynamical positioning may be relevant.

The multicolumn deep floater substructure is in many respects similar to semi submersibles regarding structure, outfitting and mooring. But the concept has a very deep draught and large displacement. Thus the structure has little vertical movement and restrained lateral movement which may allow wellheads to be surface installed – all relative to semi submersibles. Current concepts consider steel or concrete structures with 4 columns placed above ring pontoons.

For single column deep floater (e.g. SPAR) and circular barge type substructure, see PBS codes ABQ and ABR.

The multicolumn deep floater substructure includes the following subdivision and PBS codes:

ABPA Structure**ABPB Outfitting****ABPC Mooring items****ABPCA Mooring lines****ABPCB Anchors/piles**

As this concept is very similar to semi submersibles regarding structure, outfitting and mooring items a reference is given to PBS ABK (semi submersible) for content, details and interfaces.

ABPD Rigid risers**ABPDA Production risers**

ABPDB Export risers

A PBS ABP type substructure may use flexible risers (and "wet" x-mas trees), but will normally be equipped with rigid risers (and "dry" x-mas trees).

For flexible risers the PBS codes AD and/or AE applies depending on riser function/use.

For rigid risers for the multicolumn deep floater, PBS ABPD, with subcodes, apply. For further details concerning this riser solution, see similar description for e.g. a TLP; i.e. under PBS ABLE.

ABQ Single column deep floater

A seabed anchored buoyant/floating cylindrical substructure constructed in steel or concrete, which provides support for surface production facilities (topsides) and may have oil storage facilities.

The concept was considered for development of marginal and deepwater fields. The most used design is the SPAR concept:

- full cylinder substructure (called the "classic" SPAR);
- part cylinder/part truss substructure (called the Truss SPAR).

The single column deep floater may have flexible or rigid risers (the latter allowing wellheads to be surface installed, i.e. "dry" x-mas trees, typical for SPARs).

Single column deep floaters have up to now generally been catenary anchored. But in a new concept – the so-called buoyant tower – the cylindrical hull is fastened to the seabed by means of tethers (like a TLP).

The SPAR substructure is also applied in the SPAR buoy concept as part of a local offtake system. This application is to be PBS coded under AEBE.

For circular barge type substructure, see PBS ABR.

The single column deep floater substructure is subdivided and PBS coded as outlined in the following:

ABQA Structure

As two hull forms are possible (see previous information), one or both subcodes may be relevant:

ABQAA Column section

Vertical cylinder/section below deck structure (topside) with decks, bulkheads, spiral strakes, fixed ballast, compartments, etc.

The column may contain tanks (also for oil), integral mooring systems (e.g. chain lockers etc.), utilities, structural outfitting, etc. (see also PBS ABQB).

In the case of a subsequent truss below the cylindrical section, also "transition piece/assembly" for connecting the truss to the cylinder, is included.

ABQAB Truss section

The truss section is normally built up of vertical tubulars and bracing tubulars. The lower end contains tanks for tow out and fixed ballast, and square flats are installed at defined levels for damping of movements.

ABQB Outfitting

The single column deep floater substructure may have similar outfitting as other deep floaters/semi submersibles, such as

- bilge/ballast systems,
- storage and reticulation systems for water, diesel, oil (in the case of oil storage), etc.
- utility systems (electrical power, lighting, instrumentation, fire and gas, HVAC, etc.)

- structural outfitting including such as: ladders, manholes, anodes, fairleads, chain stoppers, mooring winches (normally located on top of the cylindrical section for SPARs), etc.
- hull outfitting for the tethers where relevant.

Due to the similarities with other deep floaters/semi submersibles' outfitting, a reference to PBS ABKB for outfitting details is given.

ABQC Tethering system

Buoyant tower type single column deep floaters (only conceptual at present) is designed with a tethering system which consists of and is PBS subcoded as follows:

ABQCA Tether equipment

ABQCB Tethers

ABQCC Anchor base/foundations

Due to the similarity with the TLP tethering system, a reference to PBS ABLC is given for further details.

ABQD Mooring items

Mooring items include mooring lines and anchors/piles as defined in the subcodes following below.

Mooring winches are in general normally located on/in the deck structure and are to be coded under PBS code AA Topsides. If the mooring winches are physically located on/in the substructure, code ABQB applies; e.g. for SPARs.

ABQDA Mooring lines

Mooring lines comprise chains, connectors and cables – connected to piles/anchors on the seabed and running through fairleads to mooring winches/stoppers.

ABQDB Anchors/piles

Methods/arrangements for fixing and securing the mooring lines into the seabed may be

- anchors – conventional rated ship anchors placed/embedded into the seabed,
- anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line,
- piles conventionally driven by hydraulic pile drivers,
- suction anchors.

ABQE Rigid risers

Risers for single column deep floaters may be rigid or flexible.

Flexible risers are deemed to be PBS coded under AD/or AE depending on function/use.

For rigid risers – relevant for e.g. SPAR and buoyant tower type substructures – the following PBS subcoding applies:

ABQEA Production risers

ABQEB Export risers

For SPAR type substructures the above riser codes also include the buoyancy elements of the risers contained within the hull section. For further details concerning rigid risers, see analogous description under PBS ABLE.

In the case of combined riser and tether in one dual function physical unit, PBS ABQE with subcodes is deemed to apply.

ABR Circular barge type substructure

The concept considers a seabed anchored circular barge type substructure, which provides support for surface facilities (topsides). The concept provides a weight efficient substructure with significant oil storage capability.

This code description comprises a floating production system of circular unit's type. For this purpose the substructure will normally contain oil storage facilities and will ordinarily be equipped with flexible risers, but may – for particular conditions – be equipped with rigid risers.

The circular barge type substructure is subdivided and PBS coded as outlined in the following

ABRA Structure

The structure (hull) consists of a cylinder shaped column. The hull is subdivided in several compartments/tanks for oil, slop, ballast, seawater, etc. and can have a sheltered moonpool for e.g. risers.

The structure consists of primary and secondary steel elements; plating, stiffeners, profiles, girders, etc.

ABRB Outfitting**ABRBA Hull outfitting**

The circular barge type substructure may have similar outfitting as ship type substructure/barge type substructure/semi submersibles, such as

- ballast/bilge systems and permanent ballast,
- storage and reticulation systems (for e.g. oil, slop, seawater, firewater, potable water, etc.),
- utility systems (e.g. electrical and lighting systems, instrumentation, hoist and personnel lifts, etc.),
- structural outfitting like: ladders, walkways, manholes, fairleads, anodes, etc.

For an impression of further details see analogous description under PBS code ABKB. Mooring winches, if located on the substructure, are to be coded hereunder.

ABRB Topside related systems

The circular barge type substructure may have topside related systems, equipment, etc. located in the substructure/hull in a varying degree. i.e. equipment, systems – typically utility, common process and support systems placed within the hull and which are required primarily to support the production of hydrocarbons and not considered to form part of the vessel storage/distribution system, marine systems – such as separate electrical power generation, control room equipment, etc.

NOTE Other topside related equipment etc. is to be included under PBS code AA Topsides.

ABRC Mooring items

Mooring items include mooring lines and anchors/piles as outlined in the subcodes following below.

Mooring winches are normally located on/in the deck structure and are to be coded under PBS code AA Topsides (if the mooring winches are physically located on/in the substructure, code ABRB applies).

ABRCA Mooring lines

Mooring lines comprise chains, connectors and cables – connected to piles/anchors on the seabed and running through fairleads to mooring winches/stoppers.

ABRCB Anchors/piles

Methods/arrangements for fixing and securing the mooring lines into the seabed may be

- anchors – conventional rated ship anchors placed/embedded into the seabed,
- anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line,

- piles conventionally driven by hydraulic pile drivers,
- suction anchors.

ABRD Rigid risers

Risers are permanent pipes extending from e.g. a seabed well spacer/drilling template beneath the wellbay area and to the surface facilities, or pipes extending from a riser base which may form part of well spacer template to surface facilities for export/import of oil, gas and water.

Circular barge type substructures are normally to be equipped with flexible risers but may also have rigid risers for certain conditions (depending on weather and sea, substructure size, depth, etc.). Rigid risers require motion compensation allow "dry" surface installed x-mas trees.

This code and subsequent subcodes cover only rigid pipe risers (in connection with dry x-mas trees) for circular barge type substructure. Flexible risers are deemed to be PBS coded under AD and/or AE depending on riser function.

For well spacer/drilling template, see PBS ADAA.

The permanent rigid risers hereunder are grouped into production risers and export risers, as outlined in the following:

ABRDA Production risers

Production risers transfer wellstream from e.g. a subsea well spacer/drilling template to surface facilities – wellbay area.

Included are also injection risers which transfer treated water for injection or transfer gas for reinjection from the wellbay manifolds to the subsea well spacer/drilling template.

ABRDB Export risers

Rigid pipes extending from e.g. riser bases which may form part of well spacer/drilling template to surface facilities for export/import of oil, gas and water.

ABS Artificial seabed

Artificial seabed (e.g. Atlantis, originated by Proffshore A/S) considers concepts for

- exploration drilling,
- field development drilling and production.

The concepts are particularly developed for deepwater activities. The basic principle of Atlantis is to establish an artificial buoyant seabed (ABS) at a convenient water depth for accommodation of wellheads.

The exploration drilling concept includes the following main elements:

- a buoy (ABS) installed 200 m to 300 m below sea level, carrying a blowout preventer (BOP);
- a casing string running from the ABS to below seabed and cemented conventionally, thus also acting as an anchor for the ABS (like a tether);
- a drilling riser between the BOP and the drilling vessel;
- outfitting and systems for installing, controlling and monitoring the main elements.

The concept for field development drilling and production includes for the drilling mode similar elements as previously listed, plus a circular seabed drilling guidebase (for multi-wells). The production mode includes the following main elements:

- the ABS-buoy with wells and x-mas trees;
- the casing string with tie-back connectors at seabed level;
- flexible risers to e.g. FPSO-turret (export risers may also be relevant);
- outfitting and systems for installing, controlling and monitoring.

The total artificial seabed concept(s) include(s) various PBS-codes. At present, since all is at the concept stage, code ABS may apply only for

- the ABS-buoy with e.g. manifold, connections, tie back guideframe, protective cap, etc.,
- outfitting and systems for installing, controlling and monitoring of the buoy, e.g. pull-down lines, ballast distribution and control system, ballast system air hoses, control umbilical and systems for monitoring (conditions, position), etc.

For the other main elements of the concept, the following PBS codes may apply:

- the casing string, see code AC Wells;
- BOP, see AC Wells;
- X-mas tree, see AD Subsea production systems;
- seabed drilling guidebase, see AND;
- flexible risers, see AD Subsea production systems (for flowline related risers) or AE Transport systems (for export risers).

AC Wells

The wells transport wellstream products (oil/gas/water/sand) from subterranean reservoirs to the mud line for subsea wells or to the wellhead area for platform drilled wells. Injection wells and exploration wells are also covered under this code.

Wells may be drilled and completed with mobile units:

- semi submersibles;
- drill ships;
- drill barges;
- jack-up/self-elevated platforms.

Drilled through a subsea well spacer/drilling template, or drilled and completed from a fixed platform installed drilling rig.

Wells are established in two major operations:

- drilling is the operation resulting in a cased and cemented well/borehole, drilled to target depth at a defined location within the subterranean reservoir;
- completion is the preparation of the well bore for production or injection after the drilling operation, enabling permanent contact between the producing zone(s) and the well bore.

Drilling of the wells may start at the mudline/seabed (later termed standard drilled wells) or further down in an established well and drilled at a slight angle away from the existing well bore (later termed branch drilled wells). For some wells a pilot hole will be drilled first.

ACA Standard drilled wells

Drilling is resulting in a cased and cemented well/borehole, drilled from mudline/seabed to target depths at a defined location within the subterranean reservoir. The drilling operation may be carried out by fixed platform installed drilling rigs or by mobile drilling rigs.

Fixed platform wells are wells drilled from platform installed drilling facilities (see topsides-drilling area under PBS AAA). The casing extends from the subterranean downhole target location in the reservoir via conductors to

- the wellhead area/surface facilities for e.g. jackets, compliant/guyed towers and gravity base structures (GBS),
- the production/injection risers for floating production platforms like semi submersibles, ships, etc.

Mobile unit drilled wells are wells drilled by

- semi submersible drilling rigs,

- drillships,
- drillbarges,
- jack-up drilling rigs.

The casing extends from subterranean downhole target location in the reservoir normally via conductors to

- the mudline for subsea wells,
- the mudline well spacer/drilling template for predrilled wells,
- wellhead area for surface drilled wells, drilled by cantilevered jack-up rigs (tender rigs) over wellhead platforms.

Some particular references: For drilling facilities (derrick, etc.) located on a production platform topside, see PBS AAA. For outfitting related to drilling in a gravity base structure, see PBS ABBBB.

Standard drilled wells are grouped according to well type and coded as follows:

ACAA Oil producer

ACAB Gas producer

ACAC Water producer

A producing well taking water from an aquifer, e.g. the Utsira aquifer, for later injection purposes.

ACAD Gas injector

ACAE Water injector

ACAF Water and gas injector

An injection well where alternating water and gas (WAG) are used as injection medium.

ACAG Exploration well

An exploration well is normally drilled in the exploration phase (see SCCS SAB code prefix E), but may also be drilled in connection with a development project.

ACB Branch drilled wells

A branch drilled well implies drilling of a new well besides an existing well, using the upper part of the existing non-producing well. This is obtained with the use of a whipstock (or similar), i.e. a down-hole tool which forces the drill bit to drill at a slight angle through the existing well bore (and casing) to a new well target location. The method may also be used for drilling past obstructions in a well (side tracking).

Branch drilled wells may be drilled from fixed platform installed drilling rigs or by mobile drilling rigs, similar to standard drilled wells. Therefore a reference to PBS ACA is given for further details.

Drilling of the wells under this code is also subcoded according to well type as follows:

ACBA Oil producer

ACBB Gas producer

ACBC Water producer

ACBD Gas injector

ACBE Water injector

ACBF Water and gas injector

ACBG Exploration well**ACC Completion**

Completion means preparation of the wells for production and injection after the drilling operation.

Making permanent contact between the production zone(s) and the wellbore completes each production/injection horizon ("area"). Contact with each horizon may be achieved directly or by perforating casings.

Completions may be single, multiple or TFL (through flow-line) completions. Type of selected completion will vary with reservoir parameters (permeability, hardness, sand, etc.).

Completions may consist of

- tubing,
- tubing hangers,
- tubing anchors,
- downhole valves,
- packers,
- expansion joints,
- flow control devices, screens,

and other downhole devices and equipment depending on type of completion.

Completions may be performed by platform-installed rigs and equipment or by mobile drilling units.

Fixed platform completion may include the following activities depending on type of drilling rig/facility:

- run tubing;
- install anchors;
- install packers;
- install expansion joints;
- install plugs;
- install valves;
- install flow control devices and screens;
- install other downhole devices and equipment depending on type of completion;
- perforation of casing (where relevant).

for permanent contact with producing zone.

Surface completed wells' X-mas trees are included herein.

Subsea X-mas trees are included under subsea production systems (see PBS AD).

Completions are subdivided and coded according to well types and type of completion per well type, as outlined in the following:

ACCA Standard producers

This code covers completion of standard producers, i.e. for wells producing oil, gas or water (aquifer water) drilled from mudline/seabed to target location in the reservoir (see PBS ACA).

The various completions of standard producers are subcoded as outlined in the following:

ACCAA Standard completion

In the standard completion the end of the tubing is secured with a packer against the casing, and the casing is perforated below the packer level to the hole bottom. The perforation is obtained through use of a shooting device, e.g. by means of a wireline gun. The well fluid/gas streams through the casing perforations and further up into the tubing.

ACCAB Gravel packed completion

This type of completion is used where sand, silt or similar in the reservoir might cause later problems (clogging, abrasion, etc.). The completion is similar to the standard completion, but the tubing is extended with a screen to the bottom of the hole. After the casing is perforated, the screen is installed, and gravel is pumped in the space between the screen and the perforated casing. The gravel function is to stop/reduce the flow of sand/silt.

ACCAC Open hole completion

In the open hole completion the casing is not perforated. A packer is set near the casing end. The tubing is extended below the packer, and a screen is normally installed at the tubing end, extending down to the bottom of the borehole. This completion requires a relative firm or solid reservoir/ground structure.

ACCAD Smart well completion

In this type of completion a number of packers between casing and tubing are set at predestined intervals over the length of the perforated casing, thus creating a number of enclosed spaces (sections). In these sliding sleeves are installed around the tubing which are partially perforated. By moving the sleeves, the tubing perforations will be covered (closed) or uncovered (opened), thus enabling regulation of the wellstream and which section(s) to produce.

The sliding sleeves are hydraulically operated (surface controlled), and sensors for temperature and pressure are normally installed in the sliding sleeves. This allows for surface monitoring and control of the well production.

ACCAE Well stimulation

Well stimulation may be performed as an addition to most of the previous types of completions. Two operations for well stimulation are applied:

- acid stimulation – an acid is pumped into the ground structure around the well bore, to wash out impurities (sand, silt, etc.) and open up clogged areas, to increase the producing area surface;
- fracturation – liquids are pumped with high pressure into the (hard) ground structure around the well bore to create fractures, enabling an increase in the producing area surface. Gravel may be pumped into the fractures to avoid/reduce collapses over time.

Well stimulation may be applied before production start and/or during production.

ACCAF Downhole separation

This code includes downhole separators with accessories. These facilities may be installed (as an "addition") in connection with most of the previous types of completions.

Downhole separation is in the concept/test stage. The intention is to separate the water from the wellstream downhole and inject it in another reservoir zone that might be favourable for the production, thus also avoiding/reducing topside separation of the water.

For subsea separation stations, see PBS ADD.

ACCB Branched producers

This code covers completion of branch drilled producer wells, i.e. wells drilled through the well bore and casing in the upper part of an existing (drilled) well and further to target location. For further details on branch drilled wells, see under PBS ACB.

The completion of branched producers, i.e. wells producing oil, gas and water (aquifer water), are of similar type as completions for standard producers (wells drilled from mudline/seabed), and therefore a reference to PBS ACCA is given for definition and further details.

The various completions for branched producers are subcoded as follows:

ACCBA Standard completion**ACCBB Gravel packed completion****ACCBC Open hole completion****ACCBD Smart well completion****ACCBE Well stimulation****ACCBF Downhole separation****ACCC Standard injectors**

This code covers completion of injection wells, i.e. wells for injection of water, gas and/or water and gas (WAG), drilled from mudline/seabed to well target location.

Completions of injector wells are in general simpler than for producer wells, but most of the same types of completions may be applied. For practical reasons the completions of Standard Injectors are grouped and coded only according to injector type:

ACCCA Water injector**ACCCB Gas injector****ACCCC Water and gas injector****ACCD Branched injectors**

Included hereunder are completions for branch drilled injection wells – i.e. wells for injection of water, gas and/or water and gas (WAG). Branch drilled injection wells are drilled through the well bore and casing in the upper part of an existing (drilled) well and further to target location.

As for standard injectors, also completions of branched injectors are in general simpler than completions of producer wells, but most of the same types of completions may be applied. For practical reasons the completions of Branched Injectors are grouped and coded only according to injector type:

ACCCA Water injector**ACCDB Gas injector****ACCDC Water and gas injector****AD Subsea production systems**

Subsea production systems comprise

- production station being either a multi-well manifold template or single satellite well structure(s),
- manifold station for gathering flow from/to production station(s),
- riser base for support of marine production riser or loading terminal,
- subsea separation/booster station/injection station for separation gas/oil from a subsea installation and transfer for further processing/injection,
- umbilicals and control distribution unit(s) (CDU), which provide the control and monitoring link between the subsea station (being any of the mentioned installations) and its mother facility and/or between different subsea stations within the field,
- tools for subsea facilities,
- infield transport including riser base(s) for support of marine production riser or loading terminal and pipeline end module(s) (PLEM) for flowline distribution, which provides the transportation link between a subsea installation and the production facility and/or between different subsea stations within the field,
- power cables and power control distribution unit(s) (PCDU) for subsea facilities,
- risers (dynamic/flexible and hybrid), riser towers,

- well spacer/pre-drilling templates and subsea distribution unit (SDU) are covered,
- specific equipment installed at a mother facility (e.g. platform or onshore facility) for monitoring and control of the subsea production system.

Some particular references: For pipelines transporting processed gases and fluids, see PBS AE with subcodes. For artificial seabed, see PBS ABS.

Subsea production systems are subdivided and coded as follows:

ADA Production station

The production station includes all facilities/items/components required/installed on the seabed in order to control and transport flow from/to the reservoir (wellstream, injection water and gas, etc.) to a manifold station for gathering the flows or direct to a mother facility for further processing, as well as facilities for control and transport of injection fluids.

The production station may be designed as a multi-well template structure or as single satellite well structure, and is subdivided and coded as outlined in the following:

ADAA Template structure

The template structure is installed and secured to the seabed and provides a base for drilling, for support of subsea production and for control equipment/components.

Installation aids, piles/skirts, mudmats and levelling equipment are included within the code as required. Also included are outfitting items such as pull-in porches, receiver funnels (fixed tie-in devices), hinges, etc.

The codes split between multi-well and single well stations. The codes split further between structures without and with integrated protection. A production station without protection structure can be used for very deep-water fields, however, restrictions are made against this type of structure for several exploitation zones.

Normally, a protection structure is included to protect the equipment against dropped objects. The protection structure may be designed to be overtrawlable; i.e. it protects the trawl gear against damage.

ADAAA Multi-well/manifold template without protection structure

A template structure with multiple wellslots, supporting a manifold system and components/items related to subsea completion systems as well as production control and monitoring systems.

ADAAB Single satellite without protection structure

A single satellite structure without protection may be a guide base structure itself. It supports components/items related to subsea completion systems as well as production control and monitoring systems.

ADAAC Multi-well/manifold template with integrated protection structure

A template structure with multiple wellslots, supporting a manifold system and components/items related to subsea completion systems as well as production control and monitoring systems.

Includes also an integrated structure to protect the station against dropped objects, such as anchor chains, trawl gear etc. or any other damages for installation in restricted areas with regard to trawling. The protection structure may also be designed as fully overtrawlable, i.e. the structure protects the trawl gear against damage.

ADAAD Single satellite with integrated protection structure

Includes single satellite structures, often permanent guide base structures which support components/items related to subsea completion systems as well as production control and monitoring systems.

Includes also an integrated structure to protect the satellite well against dropped objects, such as anchor chains, trawl gear etc or any other damages, for installation in restricted areas with regard to trawling. The

protection structure may also be designed as fully overtrawable, i.e. the structure protects the trawl gear against damage.

This code also covers the concept of single satellite structure designed as a silo.

ADAAE Multi-well protection structure

Protection structure for multi-well/manifold templates. I.e. a structure to protect against dropped objects, anchor chains, trawl gear etc. or any other damages. The protection structure may also be designed as fully overtrawable.

ADAAF Single satellite protection structure

Protection structure for single satellite templates. I.e. a structure to protect against dropped objects, anchor chains, trawl gear etc. or any other damages. The protection structure may also be designed as fully overtrawable.

ADAB Manifold/piping area

A system of piping, valves and associated equipment on a production station, used to gather produced fluids or distribute injection fluids to the wells. The manifold will also include required service functions such as methanol injection for hydrate prevention, TFL (through flow line) service, etc.

The manifold may be in the form of a valve block with conduits and corresponding flanges for valves and piping. The manifold system may be designed as a separate retrievable structure.

The manifold/piping area covers normally the following items:

Valves

Valves related to manifold system, of gate or ball valve type, remotely or mechanically operated, integrated in the piping or of an insert type.

Manifold piping

Piping systems for gathering produced fluids/distribute injection fluids, normally in stainless steel (duplex).

Hydraulic distribution

Includes the piping/tubing for distribution of hydraulic oil for control functions.

Cabling, hydraulic and electrical connectors and interface items to control modules are part of the code for «production control and monitoring system», see PBS ADAD.

HIPPS (high integrity pressure protection system) is to prevent over-pressurisation of pipeline by shutting off the source of the high pressure.

Choke module or flow control module (FCM)

The flow control module is normally part of the X-mas tree system and acts as a platform for equipment to regulate (choke) and monitor (instruments) the well flow. The flow control module can be installed and retrieved separately from the x-mas tree. In some applications the flow control module is also a bridging module between the Xmas tree and the manifold. The flow control module is also called a choke module or Xmas tree choke, but the main difference is that the flow control module includes a multiphase meter.

Pigging facilities

Includes permanent facilities for pigging, which may be a pigging module including valves, piping and connectors or a separate arrangement for round trip pigging.

Single satellite piping

Covers the piping system for single wells, with isolation valves, piping and hydraulic distribution.

Connection equipment

Includes all hubs, seal plates and clamps defined for the manifold system. Also included are special connection equipment for tie-ins and connections between manifold and X-mas tree required for diverless installation.

ADAC Subsea completion system

Includes equipment on a production station specifically related to the well, being an oil or gas producer, or a gas or water injector. The subsea completion system comprises the subsea wellhead system, tubing hanger and X-mas tree and as required, subsea chokes and test equipment, as outlined in the following:

ADACA Wellhead system

The subsea wellhead performs the same general function as a conventional surface wellhead. It supports and seals casing strings, as well as supporting the blow-out preventer (BOP) stack during drilling and the tree after completion. The functional requirements are similar to comparable surface equipment, but the design is different due to the need for remotely operations of casing landing, sealing and completion from surface.

A typical subsea wellhead system includes such as

- a temporary guide base which attach wire guidelines to the drilling vessel allowing subsea re-entry to the well and providing guidance for subsea components,
- a conductor housing which is attached to the conductor casing and provides the installation point for the permanent guide base, as well as a landing area for the wellhead housing,
- a permanent guide base which provides positive guidance for the BOP (blow-out preventer) stack during drilling and for the subsea tree during completion,
- permanent guide base to ensure correct interface between wellhead and template/satellite,
- a wellhead housing which provides a landing area for all subsequent casing strings and a profile for attachment of the BOP stack or subsea tree,
- the casing hangers and seal assemblies, which hang off casing strings and seal the annuli as additional casing strings are run.

ADACB X-mas tree systemTubing hanger

The subsea tubing hanger system suspends the tubing inside the wellhead and locks and seal off the tubing/production casing annulus. The system includes conduits for well fluids, annulus and control and monitoring functions.

X-mas tree

The X-mas tree controls the production or the injection fluids. The subsea tree consists of an arrangement of remotely controlled valves to interrupt or direct flow when necessary for operational or safety reasons. The subsea tree differs from the surface tree by its design of remotely control and underwater services.

Subsea trees are normally designed for two categories; through flowline (TFL) and non-through flowline (non-TFL) tree design. TFL trees are designed for use of pump down tools in well bore maintenance, whilst non-TFL trees require wireline operations for well bore maintenance. Both categories may be designed for diver-assisted or diverless operations.

Further included within this code are the wellhead connector, tree cap, structural parts and intervention fixtures.

Test equipment

Includes all special equipment required for testing of subsea completion equipment/system.

ADAD Production control and monitoring system

The system facilitates the control of subsea wells from a mother facility which normally include the remote monitoring of key parameters such as wellhead pressures and temperatures and covers both the surface control and the subsea production control systems as outlined under the subcodes following:

ADADA Topside (surface) production control system

Control equipment installed on the platform topside or onshore. Normally it includes subsea units in a local control room (also incl. surface test equipment and umbilical termination devices), SPCU (subsea power and communication unit) and a hydraulic power unit (HPU). The topside computers are normally excluded, as this is a part of the platform control system delivery.

ADADB Subsea production control and monitoring system

This code includes the sub-surface part of the control system, which covers the following items:

Subsea control module/pod

Unless a direct control system is selected, a subsea control module (SCM) with its base will normally be installed on the X-mas trees and in the manifold system.

Subsea sensors

Subsea sensors are normally used for pressure and temperature monitoring and installed on the X-mas tree. Monitoring of choke functions will also require sensors. Downhole sensors are not included.

Power and signal distribution

For manifold wells, the power and signals are normally distributed from the umbilical(s) to the individual control pods.

Umbilical termination

At each subsea connection point the umbilicals will be terminated and hydraulic and/or electric connectors installed. This subelement also includes termination heads for integrated service umbilicals. 50 % of the termination outfitting is to be included hereunder, the remaining 50 % (often termed "outboard hub") is to be PBS coded under ADE.

Test equipment

Production control and monitoring system require dedicated test equipment, whereas this code covers subsea installed items.

For surface installed parts of the test equipment PBS ADADA applies.

ADAE Workover system

The workover/completion system is a temporary system that is used during the following two scenarios:

- completion: to install all well equipment during installation and completion of a subsea well before operation start-up;
- workover: to perform well maintenance (intervention) on subsea wells.

The workover/completion system consists of the following sub-systems:

- workover control system (WOCS);
- workover riser system;
- workover umbilical reels.

There are several different workover systems available. The systems differ depending on several variables, such as

- type of rig/vessel,
- completion/workover programme and philosophy,
- live well operations or not.

The most common systems are

- landing string systems for running in marine riser,
- simplified landing string systems for running in marine riser,
- open water systems with workover risers,
- riserless open water systems.

These are generalized types of systems, and there are almost infinite variables within these general systems.

For rented tools (from tool pool), see PBS ADF.

Workover riser system equipment

The workover riser system is used for installation and retrieval of the X-mas tree system, and consists normally of equipment like lower riser package, emergency disconnect unit, workover riser and surface flow tree. Additional running tools may also be a part of the system.

Workover control system equipment

The workover control system is used to control the workover riser system. The equipment consists of a topside supply and communication module.

Components necessary for testing related to subsea, including test equipment, handling equipment, dummy structures, dedicated consumables, etc. shall be included under this code. Range of testing covers integration testing, shallow water testing and commissioning.

ADAF Intervention system

The purpose of the intervention and tooling system is to install, connect, operate and retrieve different parts of the subsea production systems.

For rented tools (from tool pool), see PBS ADF.

Intervention system equipment and tools (ROT)

The intervention system (ROT system) may consist of a tool carrier connected to dedicated tools for pull-in and connection, for running of control pods and insert pieces. Alternatively, it may consist of a system with separate tools only.

ROV/ROMV and tools

Included are remotely operated vehicles (ROV), remotely operated maintenance vehicles (ROMV) and necessary tooling which are purpose built for dedicated development projects.

Intervention control system equipment

The control system for the intervention system normally consists of equipment like a topside supply and communication unit.

Test equipment

Equipment required for testing of tools as well as for integration testing. May include dummy manifolds and pull-in ramps.

For test equipment for the production control and monitoring system, see PBS ADAD with subcodes.

Tie-in devices like pull-in porches, receiver funnels, etc. fixed to the subsea stations are regarded as part of the stations.

ADB Manifold station

The manifold station includes all facilities/items/components required/installed on seabed in order to gather, control and transport fluid from production station(s) to further processing facilities as well as facilities for control, distribution and transport of injection fluids to the production station(s).

The code for manifold station includes the structure, the manifold/piping area and the control system, as outlined in the following:

ADBA Template structure

The structure is installed and secured to the seabed and provides a base support for the subsea production and control equipment/components.

Installation aids, piles/skirts, mudmats, levelling equipment and fixed tie-in devices, etc. are included within the code as required.

The code is further split between structures without and with integrated protection. A manifold station without protection structure can be used for very deep-water fields; however, restrictions are made against this type of structure for several exploitation zones.

Normally, a protection structure is included to protect the equipment against dropped objects. The protection structure may be designed to be overtrawlable. Structure is subgrouped and coded as follows:

ADBAA Manifold without protection structure

A structure, supporting a manifold system for produced or injection fluids and components/items related to distribution of subsea production control and monitoring systems.

ADBAB Manifold with integrated protection structure

A structure, supporting a manifold system for produced or injection fluids and components/items related to distribution of subsea production control and monitoring systems.

Includes also an integrated structure to protect the station against dropped objects, such as anchor chains, trawl gear etc or any other damages for installation in restricted areas with regard to trawling. The protection structure may also be designed as fully overtrawlable.

ADBAC Manifold protection structure

Protection structure for manifold templates. I.e. a structure to protect against dropped objects, anchor chains, trawl gear etc. or any other damages. The protection structure may also be designed as fully overtrawlable.

ADBB Manifold/piping area

A system of piping, valves and associated equipment used to gather produced fluids or distribute injection fluids. The manifold will also include required service functions such as methanol injection for hydrate prevention, TFL service, etc.

The manifold may be in the form of a valve block with conduits and corresponding flanges for valves and piping. The manifold system may be designed as a separate retrievable structure.

The following items are covered by this code:

Valves

Valves related to manifold system, of gate or ball valve type, remotely or mechanically operated, integrated in the piping or of an insert type.

Manifold piping

Piping systems for gathering produced fluids/distribute injection fluids, normally in stainless steel (duplex).

HIPPS (high integrity pressure protection system) is to prevent over-pressurisation of pipeline by shutting off the source of the high pressure.

Hydraulic distribution

Includes the piping/tubing for distribution of hydraulic control functions.

Cabling, hydraulic and electrical connectors and interface items to control modules are part of the code for «control system» (see PBS ADBC).

Pigging facilities

Includes permanent facilities for pigging, which may be a pigging module including valves, piping and connectors or a separate arrangement for round trip pigging.

Connection equipment

Includes all hubs, seal plates and clamps defined for the manifold system. For diverless installations, special connection equipment will be used for tie-ins.

ADBC Control system

The manifold station will normally distribute power and control signals. Some installations will also include control system for manifold or X-mas tree functions. Included are such as

Manifold control pod

The manifold may support control pod with its base.

Power and signal distribution

The power and signals are normally distributed from the main umbilical(s) to the umbilicals for each well and/or to the control pods.

Umbilical termination

At each subsea connection point the umbilicals will be terminated and hydraulic and/or electric connectors installed. This subelement also includes termination heads for integrated service umbilicals. 50 % of the outfitting is to be coded hereunder, the remaining 50 % is to be PBS coded under ADE.

ADD Subsea separation/booster station/injection station

These stations have recently found commercial application. Facilities considered hereunder are subsea facilities to separate and/or pump untreated hydrocarbons, as well as for injection purposes.

Booster stations within transport systems are separately coded, under PBS AEAJ.

The stations are subdivided and coded as follows:

ADDA Structure

A seabed founded structure fabricated/constructed normally in steel, which houses and provides support and protection for subsea separation/booster/injection station equipment and systems. The structure may be outfitted with piping, pull-in porches and connection equipment where required.

ADDB Separation equipment

Subsea separation equipment considers various gas/oil separators with individual offtake to other facilities for further processing.

ADDC Pumping equipment

Subsea pumping equipment for

- transfer from subsea separation plant of liquids to surface facilities,
- liquid flowline booster pumps/pump stations.

ADDD Compression equipment

Subsea installed compression equipment for gas flowlines and for injection purposes.

ADDE Manifold/piping area

May comprise of production and test manifolds from wells, liquid and gas headers, valves and controllers for pipeline transfer to other facilities and pigging systems.

For subsea pig launcher/receiver, see PBS ADF.

ADDF Subsea completion system

Includes any components of the subsea completion system related to the PBS ADD stations.
For umbilicals, see PBS ADE. For subsea completion system for production stations, see PBS ADAC.

ADDG Power equipment

Includes power equipment and devices as well as power cables on the stations.

This code covers also a new power module concept. The concept includes a total system for distribution and control of electrical power on the station. The power is normally supplied from topside facilities in one sea cable.

For the sea power cable, see PBS ADL.

ADDH Control system

At each subsea connection point the umbilicals will be terminated and hydraulic and/or electric connectors be installed. This code include termination heads for integrated service umbilicals where relevant, control components, signal cables and hydraulic lines with accessories; all located on the stations. 50 % of the termination outfitting is to be included hereunder, the remaining 50 % is to be PBS coded under ADE.

For umbilicals, see PBS ADE. For power supply cables from surface facilities to the PBS ADD stations, see PBS ADL.

ADE Umbilical system

This system provides the control and monitoring link between the stations/bases under PBS AD and the mother facility (i.e. topsides or onshore facilities) and between the stations/bases.

Well service functions such as methanol injection lines, may also be included in the umbilical. Umbilicals are both static as for flowlines and dynamic as for risers to floating platforms.

Battery limits of the umbilical system are the connection points on the stations/bases and at the mother facility.

Some particular references: For umbilicals for offshore pipeline transport systems, see PBS AEAG. For separate power cables to PBS ADD type stations, see PBS ADL. For integrated production umbilical (IPU), see PBS ADKAB. For onshore control cables/umbilicals to shore approach (for subsea facilities), see PBS BCDF.

The umbilical system is subdivided and coded as follows:

ADEA Umbilicals

Includes hydraulic, electro-hydraulic and integrated service umbilicals, and electrical or fibre-optical signal/control cables, for remote control of the stations/bases covered under PBS AD.

ADEB Umbilical protection

Protection of the umbilicals/cables may include trenching with or without backfill, rock/gravel dumping and/or grout bags/mattresses.

ADEC Crossings

Crossings of the umbilicals/cables over existing pipelines or other umbilicals/cables may involve trenching, rock/gravel dumping, grout bags/mattresses or a bridged construction. Crossings are subcoded as follows:

ADECA Umbilical/cable crossing

A crossing designed for crossing over other umbilicals/cables.

ADECB Pipeline crossing

Crossing of the umbilicals/cables over existing/installed pipelines.

ADED Umbilical risers

Includes risers for the umbilicals/cables, normally of a dynamic type.

ADEE Umbilical distribution – subsea umbilical distribution unit (SUDU)

Includes subsea distribution from a control umbilical as one large line to several minor lines. The unit consists of a foundation structure with a protection structure and a distribution facility:

- umbilical distribution consists of electrical jumpers and hydraulic pipes and tie-in.

The SUDU can also have a separate control system (to be included hereunder).

ADEL Shore approach

This code is relevant for subsea station/base control from onshore facilities. Shore approach covers the transmission area between subsea and land. The umbilicals/cables have to be protected against impact and erosion due to waves, traffic and similar.

The shore approach may be of a tunnel or trenched type, starting onshore and ending in the sea at a depth safe for outside impact, both covered under this code.

ADF Tools system

This code covers tools for the units/elements covered under PBS AD. The tools and their purpose are outlined below.

The tool requirements are often project specific, but renting/hiring/leasing of tools from tool pools have increased; Companies normally operate a tool pool for servicing a multiple of projects/fields.

The tools system may include such as

Hired completion, workover and intervention tools and equipment

Tools, normally operated from the drilling rig for well completion, X-mas tree installation and well intervention and miscellaneous running tools required for tree cap installation, control pod and insert valve/choke replacement, etc. This category of tools also includes workover riser, lower riser package and ROV equipment (remote operated vehicle).

Pull-in and connection tools

Diverless tools for the tie-in of infield pipelines and umbilicals/cables to the X-mas tree manifold, subsea stations or riser bases.

Hired control system for tools

The control system may be integrated into one or several systems depending on project requirements. Generally, a hydraulic control system with ROV support will be used. The control system may include

- installation and workover control system,
- intervention control system,
- intervention umbilical system,
- etc.

Hired ROV/ROMV/ROT tooling

Associated operating tools used for various intervention tasks. Most projects require specialised tools.

Test equipment

Equipment required for testing of tools as well as for integration testing. May include dummy manifolds and pull-in ramps.

For test equipment for the production control and monitoring system, see PBS ADAD with subcodes.

Tie-in devices like pull-in porches, receiver funnels, etc. fixed to the subsea stations are regarded as part of the stations.

ADK Infield pipelines

These pipelines provide the transportation link between subsea and platform production facilities or between subsea and land based production facilities. Infield pipelines are subdivided and coded as outlined in the following:

ADKA Pipelines

A pipeline system as covered hereunder, begins with the one half of the connector used at the production facility with no processing capacity and which ends at one of the following facilities:

- the one half of a connector used at another subsea facility;
- the pipeline side of a surface connection or weld at the top of a platform riser (see PBS ADKF);
- the connecting point in the shore approach area in the case of land based processing of the wellstream from the subsea production stations (for the onshore side of the pipeline PBS BDA is deemed to apply).

The half of a connector at a pipeline end (often termed "outboard hub") follows the infield pipeline, while at the other half (often termed "inboard hub") on a structure/station is to be PBS coded under the structure/station code.

The infield pipelines may be of single line type or of bundled type (i.e. a multiple of lines enclosed within e.g. a protection pipe), as outlined under the following subcodes:

ADKAA Single line

This code covers single lines, i.e. separate one-medium/one-purpose lines. The single lines (rigid or flexible) may be dedicated to a number of separate purposes such as

- flowlines – used for production and, in some cases, for servicing wells. The term flowlines generally is applied to pipelines upstream of processing facilities,
- gathering lines – used for transporting produced fluids from two or more wellhead facilities within a field to a central treating and/or processing location,
- injection lines – used for the injection of water, gas, methanol or other chemicals to a wellhead facility,
- service lines – includes test and hydraulic lines used for the control of a wellhead facility, annulus access/monitoring lines and kill lines. Some of these lines are often incorporated into an umbilical.

Included is also one half of a connector in each flowline end.

ADKAB Bundled line

The bundled line carries a multiple of lines for similar purposes as outlined under the previous code. The bundled line may also contain signal cables and power cables.

This code covers 3 types of bundled lines:

- pipe-in-pipe;
- a spacious outer protection pipe (carrier pipe) enclosing sleeve pipe and pipes for various mediums, cables, etc.;
- IPU – integrated production umbilical; a new concept now under qualification testing. This is an umbilical with a flowline (at present "6-12") in the center in addition to the other lines/cables.

For traditional umbilicals (without flowline) for subsea facilities, see PBS ADE with subcodes.

ADKB Expansion loops

I.e. expansion spool pieces normally built up of welded line pipe. The expansion loop act as a link between e.g. the flowline end on the seabed and normally a platform substructure riser (or a subsea station).

The shape of expansion loop (U-, L- and/or S-shape) will depend on topography/location of riser and pipeline end. In particular cases flexible pipes may be used for the purpose.

For expansion loops for transport pipelines, see PBS AEAB.

ADKD Pipeline protection

Protection of pipelines defined under PBS ADKA codes may include trenching with or without backfill, rock/gravel dumping and/or use of grout bags/mattresses. The protection hereunder is against dropping objects, overtrawling, anchoring and similar physical exposure.

Rigid infield pipelines with coating (weight and corrosion) are to be PBS coded under ADKA.

ADKE Crossings

This code covers special measures taken to protect infield pipelines, as outlined below:

ADKEA Umbilical/cable crossing

A crossing designed for crossing of infield lines over existing/installed umbilicals/cables. Crossing may be of grout bag construction (mattresses), bridged (mechanical) crossing or other.

ADKEB Pipeline crossing

Crossing of infield pipelines over existing/installed pipelines. Crossing may be of grout bag construction, stone filling, bridged (mechanical) crossing or other.

ADKF Risers

This code covers risers for PBS ADKA pipelines, other than hybrid type risers.

Risers hereunder are pipes, rigid or flexible, extending from either subsea riser bases/wells or from subsea mechanical/hyperbaric tie-in point to surface facilities' manifold connections for oil and gas. Risers may in general be

- a) preinstalled forming part of substructure outfitting, routed through conductor frames/guides in the substructure (e.g. in a jacket),
- b) post-installed,
- c) pulled through J-tubes installed in the substructure.

This code covers flexible risers as well as rigid risers of category b) and/or c).

Some particular references: For category a risers, these are PBS coded under relevant substructures; e.g. preinstalled risers in jackets are PBS coded under ABAE. For rigid risers extending from well spacer/pre-drilling template to floating platforms with "dry" x-mas trees (e.g. TLPs, SPARs, etc.), the risers are to be PBS coded under the substructure (e.g. under PBS ABLE and ABQE for TLPs and SPARs respectively). For hybrid risers and riser towers, see PBS ADM.

ADKG Riser base

A base structure which may be needed to support a marine production (and injection) riser and which serves to react loads on the riser throughout its service life. The structure may also include a pipeline connection capability. Riser base is subdivided and coded as follows below.

Riser bases for transport pipelines are separately coded within PBS AEAF.

ADKGA Structure

The structure is installed on the seabed and provides the support for the riser. The structure may be equipped with piping, pull-in porches and connection outfitting where required.

ADKGB Manifold/piping area

Manifolds/piping may be incorporated in the riser base.

ADKGC Control system

Power and signal distribution and control functions may form a part of a riser base.

ADKH Flowline distribution – pipeline end module (PLEM)

Includes subsea distribution from a flowline as one large line to several minor lines. The unit consists of a foundation structure with a protection structure and a distribution facility:

- flowline distribution consists of valves/piping and tie-in.

The PLEM can also have a separate control system (to be included hereunder).

ADKL Shore approach

If e.g. flowlines are delivering wellstream to land based processing facilities, the lines has to pass the transition area between subsea and land (shore approach).

In the transition area the lines will normally be trenched (with backfilling), but may be protected in a purpose built tunnel, both covered under this code.

ADL Power cables for subsea facilities

Subsea separation/booster station/injection stations (see PBS ADD) will usually need a high effect power supply from surface facilities, i.e. from topside facilities or from land based facilities.

This code covers a separate offshore cable system for the supply of electrical power to the above listed subsea stations. Battery limits are the cable connection points at the stations and the topside connection point or the connection point in the shore approach area (for onshore power supply from power plant or national grid).

Some particular references: For electric power supply to subsea production or manifold station via umbilicals, see PBS ADE (or PBS ADKAB for integrated production umbilical). For onshore power cables (land cables), see under PBS BDD. For offshore signal and control cables to subsea facilities, see PBS ADEA.

The power cable system for subsea facilities is subdivided and coded as follows:

ADLA Cables for subsea facilities**ADLB Cable protection****ADLC Crossings****ADLCA Umbilical/cable crossing****ADLCB Pipeline crossing****ADLD Risers****ADLE Power distribution – power control distribution unit (PCDU)**

Includes subsea distribution from a power cable as one large line to several minor lines. The unit consists of a foundation structure with a protection structure and a distribution facility:

- power distribution may consist of a transformer, internal cables and tie-in.

The PCDU can also have a separate control system (to be included hereunder).

ADLL Shore approach

Due to the similarity in code structure, etc. with sea cables and umbilicals, a reference is given to e.g. PBS ADE for further details.

ADM Hybrid risers and riser towers

This new concept considers a tower with internal risers and flexible risers from the tower top to e.g. a floating platform.

The risers may be production risers, import/export risers, etc.

The code covers the tower with structure, outfitting (structural and other outfitting), foundation (piling or similar), etc., as well as risers (rigid and flexible).

For the concept artificial seabed, see PBS ABS.

AE Transport systems

This code covers offshore transport pipeline and cable systems and adjoining facilities like local offtake and storage systems.

AEA Pipeline systems

Includes offshore transport facilities for processed hydrocarbons – liquids and/or gases, and also CO₂ for offshore deposit. Associated injection lines and umbilicals are also included.

Some particular references: For infield pipelines/flowlines, see PBS ADK. For onshore pipelines, see PBS BDA.

Pipeline systems are subdivided and coded as follows:

AEAA Pipelines

Pipeline systems as covered herein, begin with both halves of the connector used at the offshore processing facility (platform riser) and end with one of the following:

- both halves of a connector used at another offshore facility;
- the pipeline side of a land facility connection.

Pipelines may be dedicated to a number of special purposes including but not limited to the following:

AEAAA Production/trunk line

The lines are used for transportation of treated wellstream, fluids or gas. The term production line generally is applied to pipelines downstream of offshore processing facilities and upstream of land facilities or other offshore facilities.

AEAAB Injection line

Lines used for the injection/delivery of water, gas, methanol or other chemicals to an offshore platform facility with processing capability.

For injection lines to subsea wellhead facilities, see under PBS ADK.

AEAB Expansion loops

Includes expansion spool pieces normally built up of welded line pipe. The expansion loop act as a link between the transport pipeline ends on the seabed and normally a platform substructure riser. The shape of the spool (U-, L-, and S-shape) will depend on topography/location of riser and pipeline end. In particular cases flexible pipes may be used for the purpose.

AEAC Pipeline protection

Protection of pipelines defined under previous PBS AEA codes, may include trenching with or without backfill, rock/gravel dumping and/or grout bag/mattresses protection. The protection hereunder is against dropping objects, overtrawling, anchoring and similar physical exposure.

Transport pipelines with coating (related to weight and corrosion) are to be PBS coded under AEAA.

AEAD Crossings

Crossings over existing pipelines or umbilicals/cables may involve trenching, rock/gravel dumping with or without back filling, grout bags/mattresses or a bridge. The crossings are subcoded as follows:

AEADA Umbilical/cable crossing

A crossing designed for crossing of transport pipelines over existing/installed umbilicals/cables.

AEADB Pipeline crossing

Crossing of transport pipelines over existing/installed pipelines.

AEAE Conventional risers

This code covers risers for PBS AEA pipelines, other than hybrid type risers.

Risers hereunder are pipes, rigid or flexible, extending from either subsea riser bases or from subsea mechanical/hyperbaric tie-in point to surface facilities' import/export manifold connections for import/export of oil and gas. Risers may in general be

- a) preinstalled forming part of substructure outfitting, routed through conductor frames/guides in the substructure (e.g. in a jacket),
- b) post-installed,
- c) be pulled through J-tubes installed in the substructure.

This code covers flexible risers as well as rigid risers of category b) and/or c). The risers are subcoded according to pipeline type as follows:

AEAEA Production/trunk line**AEAEB Injection line**

Some particular references: For category a risers, these are PBS coded under relevant substructures; e.g. preinstalled risers in jackets are PBS coded under ABAE. For rigid pipeline risers extending from well spacer/predrilling template to floating platforms with "dry" X-mas trees (e.g. TLPs, SPARS, etc.), the risers are to be PBS coded under the substructure (e.g. under PBS ABLE and ABQE for TLPs and SPARS respectively). For hybrid risers and riser towers, see PBS ADM.

AEAF Riser bases

A riser base is the subsea facility/connection point between the riser(s) to a floating production facility and a pipeline, consisting of a structure and outfitting:

AEAFA Structure

The Structure is to provide support for the riser and to house connections.

AEAFB Outfitting

Outfitting includes a system of piping and associated equipment used to connect the export/import risers to the pipeline.

AEAG Umbilical/cable system

This code covers the umbilical/cable system for remote operation/control of pipeline valve stations and/or booster stations and for electrical powering of it. The system is subdivided and coded as follows:

AEAGA Umbilicals/cables

Includes hydraulic, electro-hydraulic and/or integrated service umbilical. Included are also electrical control/signal cables (also fibre-optical cables where relevant) and power cables for e.g. pipeline booster stations.

AEAGB Umbilical protection

Protection of the umbilicals/cables may include trenching with or without backfilling, rock/gravel dumping and/or grout bags/mattresses.

AEAGC Crossings

Crossings of umbilicals/cables over existing pipelines or umbilicals/cables may involve trenching with or without backfilling, rock/gravel dumping, grout bags/mattresses or a bridged construction. Crossings are subcoded as follows:

AEAGCA Umbilical/cable crossing

A crossing designed for crossing over other umbilicals/cables.

AEAGCB Pipeline crossing

Crossing of the umbilicals/cables over existing/installed pipelines.

AEAGD Umbilical risers

Includes risers for umbilicals/cables normally of dynamic type.

AEAGE Shore approach

If e.g. a pipeline booster or valve station is controlled from land based facilities, the umbilicals/cables have to pass the transition area between subsea and land (shore approach).

In the transition area the umbilicals/cables will normally be trenched (with backfilling), but may be protected in a tunnel; both covered by this code.

This code covers separate shore approach for the umbilicals/cables. If the shore approach is combined for both transport pipelines and related umbilicals/cables, PBS AEAL with subcodes apply.

For land cables for remote control, see PBS BCDF.

AEAH Valve stations/connection points

Include subsea facilities to connect and regulate the flow for one or more transport pipelines. There are different types of facilities including:

AEAHA Y-connection

A subsea structure which connects two pipelines of the same diameter together to one pipeline. All the pipelines have the same diameter and the connection is pigable.

AEAHB T-connection

Two pipelines often with different diameter, are connected together through a T-connection. The flow can be directed either from two to one pipeline or the opposite way. The branch line of this connection is not pigable, and if needed a subsea pig-launcher/receiver must be constructed as part of the total structure.

AEAHC ESD valve station

Emergency shutdown valves are valves placed as part of the subsea pipeline and the function is to shut down the flow to prevent leakage and pollution in emergency situations.

AEAJ Booster stations

Booster stations herein consist of both subsea installed pumping booster stations for liquid export and compressor booster stations for transfer of treated gas, both related to transport pipelines. The stations are subdivided and coded as outlined in the following.

For subsea booster stations, see PBS ADD.

AEAJA Structure

The structure is designed to house and support the installed outfitting and to protect the booster station against trawl gear, anchor chains or any other damages.

AEAJB Outfitting

Outfitting includes the system of piping, pumps, compressors and associated equipment used to increase the pressure in the pipeline.

AEAJC Test facilities

Test facilities includes all facilities designed to test and verify the final product, including prototyping and testing of these.

AEAK Surface control facilities

Surface control facilities consist of facilities placed either onboard platforms or onshore, and the purpose is to control the pipeline flow and/or control the various subsea facilities described under PBS AEA.

For umbilicals/cables for control of valve stations and/or booster stations, see PBS AEAG.

AEAL Shore approach

Shore approach hereunder covers the transition area between subsea and land for transport pipelines. The pipelines have to be protected against impact and erosion due to waves. It includes tunnel or beach types as subcoded and outlined below:

AEALA Tunnel

The tunnel can either be a prefabricated concrete structure, constructed in a dry dock and towed in position and submerged, or a tunnel blast out in rock. The tunnel starts above sea level and ends at a depth below sea level where waves do not damage the pipelines.

AEALB Beach

Shore approach on a beach normally consists of a trench starting onshore and ends out in the sea at a depth below sea level where tie-in can be performed. Back filling follows after pipeline installation.

AEB Local offtake systems

The term local offtake systems and this code relate to offshore loading facilities with or without storage, which transfer processed liquid hydrocarbons to shuttle tankers and act as a mooring system. Local offtake systems may be

- buoyant structures catenary anchored to the seabed,
- rigid/fixed structures,
- compliant structures with seabed piled bases and articulated base joints,
- systems comprising flexible catenary risers/buoyancy elements and offloading hoses.

There exists a large variety of designs of local offtake systems for different purposes, systems defined hereunder are limited to the pipeline connection between the riser base(s) of the local offtake system (pipeline from production facilities is not included) including all structures, appurtenances, machinery and equipment and limited to the loading hose connection to shuttle tankers.

Some particular references: loading hoses (transfer hoses) between floating production, storage and offshore loading units (FPSOs) or floating storage units (FSUs) and shuttle tankers are deemed to be part of FPSOs or FSUs. FSUs (with loading system) are separately defined under PBS code AEC. Production turret systems used in combination with FPSOs are defined under PBS Codes ABM and ABN. Flexible risers (for processed hydrocarbons) extending from seabed to shuttle tanker/buoy, should be coded according to PBS code AEA unless otherwise stated in the following.

Local offtake systems include

- articulated loading platform – (ALP)/single point mooring – (SPM),
- Uglund Kongsberg Offshore Loading System – (UKOLS),
- single anchor leg mooring (system) – (SALM),
- catenary anchor leg mooring (system) – (CALM),
- SPAR buoy,
- single anchor leg storage – (SALS),
- exposed location single buoy mooring – (ELSBM),
- catenary anchor leg rigid arm mooring – (CALRAM),
- single buoy storage – (SBS),
- fixed towers – (FT),
- submerged turret loading system – (STL),
- single anchor loading system – (SAL).

Some of the offtake systems outlined in the following may be relevant both for loading of shuttle tankers and FSUs. However, PBS code AEB only applies for loading systems for shuttle tankers.

AEBA Articulated loading platform – (ALP)

A compliant structure (incl. rigid risers) comprising a piled foundation gravity base, a universal joint for transfer of product, a vertical column/shaft which may be constructed in steel as a truss type structure or reinforced steel plated structure or in concrete, a rotating head equipped with loading arm/hose boom, mooring hawser, loading hoses/connectors, helideck and essential emergency facilities. The head rotates on a slewing ring, under loading the orientation of head/boom and shuttle tanker is towards prevailing weather conditions.

An ALP is similar to a SPM – single point mooring

AEBB Uglund-Kongsberg Offshore Loading System – (UKOLS)

The UKOLS system is comprised of a riser base/foundation with flexible connector, a vertical compliant riser supported by a subsurface buoy, a swivel assembly and a flexible catenary riser. The UKOLS system is designed for loading of purpose built shuttle tankers equipped with full dynamic positioning equipment and bow mounted manifold/connectors/coupling head. When the UKOLS system is abandoned after shuttle loading the catenary riser lays on the seabed, the catenary riser is attached to a pick-up hawser and to a surface marker buoy for later pick-up and retrieval for loading.

Flexible risers (for processed hydrocarbons) extending from seabed to shuttle tankers, should be coded according to PBS code AEA.

AEBC Single anchor leg mooring – (SALM)

A compliant structure comprising a piled foundation gravity base, a universal joint for transfer of the product, and

- a vertical column/shaft which may be constructed in steel as a truss type structure or reinforced steel plated structure or in concrete with rigid riser,

- a buoyant surface buoy connected by chains to the base foundation and loading arm/hose boom, mooring hawser-loading hoses/connectors.

SALM systems are used as

- permanently connected with soft or rigid yokes to floating storage units,
- as a shuttle tanker loading system with hose pick-up and loading.

For all SALM systems the orientation of head/yoke/lines and tanker is towards prevailing weather conditions.

AEBD Catenary anchor leg mooring – (CALM)

Includes a buoyant surface structure moored by a number of catenary anchor chains extending from the buoyant loading buoy structure to seabed anchors or anchor piles.

The oil is transported from a pipeline end manifold via flexible risers to the surface CALM buoy.

CALM systems are used as

- permanently connected with soft or rigid yokes to floating storage units,
- as a shuttle tanker loading system with hose pick-up and loading.

For all CALM systems the orientation of head/yoke/lines and tanker is towards prevailing weather conditions.

Flexible risers from seabed to the CALM buoy are deemed to be PBS coded under AEA.

AEBE SPAR buoy

SPAR buoy is a large single point mooring system, and the buoy is a combined storage, pumping, metering and offloading system, which requires manned operation.

The buoy is moored by a number of catenary anchor chains extending from the buoy structure to seabed anchors or anchor piles.

The SPAR buoy comprises

- pipeline connection,
- central rigid risers,
- loading hoses,
- storage caisson/compartments,
- water treatment facilities,
- metering and pumping systems,
- control rooms,
- accommodation facilities,
- turntable,
- helideck,
- cranes/loading boom,
- transfer hoses,
- diving equipment and catenary anchor system.

For a SPAR buoy acting as a substructure for topsides (production) facilities, PBS code ABQ applies.

AEBF Single anchor leg storage – (SALS)

The SALS is a single point mooring and loading system normally designed specifically for permanent mooring of floating storage units by means of rigid or soft mooring yokes. SALS is constructed with buoyancy tanks to ensure that the anchor leg is always kept under tension to act as a rigid arm during operation. The compliant structure comprises a piled foundation gravity base, a universal joint for transfer of product, and

- a vertical column/shaft which may be constructed in steel as a truss type structure or reinforced steel plated structure or in concrete,

- a buoyant surface buoy connected by chains to the base foundation.

For both alternatives a loading arm/hose boom, mooring hawser and loading hoses/connectors are included.

AEBG Exposed location single buoy mooring – (ELSBM)

The exposed location single buoy mooring is a catenary anchored buoyant local offtake system, which comprises of

- a mooring turntable/swivel system which permits tanker weathervaning,
- storage tanks in column,
- riser and pipeline end manifold connector,
- hoses,
- mooring hawser,
- mooring lines,
- helideck,
- essential facilities – emergency, control, power generation, diesel system, accommodation, etc.

The ELSBM normally serves under unmanned operation.

AEBH Catenary anchor leg rigid arm mooring – (CALRAM)

A buoyant surface structure moored by a number of catenary anchor chains extending from the buoyant loading buoy structure to seabed anchors or anchor piles. The oil is transported from a pipeline end manifold via flexible risers to the surface CALRAM buoy.

The CALRAM systems are normally permanently connected with yokes to floating storage units. The orientation of head/yoke/lines and tanker is towards prevailing weather conditions.

The CALRAM is essentially like the CALM system with rigid arm mooring.

Flexible risers from the seabed – to the CALRAM buoy are deemed to be PBS coded under AEA.

AEBJ Single buoy storage – (SBS)

A buoyant surface structure moored by a number of catenary anchor chains extending from the buoyant loading buoy structure to seabed anchors or anchor piles. The oil is transported from a pipeline end manifold via flexible risers to the surface SBS buoy.

The SBS systems are normally permanently connected with soft or rigid yokes to floating storage units. The orientation of head/yoke/lines and tanker is towards prevailing weather conditions.

The SBS is essentially like the CALRAM system.

Flexible risers from the seabed – to the SBS buoy are deemed to be PBS coded under AEA.

AEBK Fixed towers – (FT)

Fixed towers included hereunder group all forms of bottom founded piled steel jackets used for local offtake systems. Fixed towers are typically used for field development in moderate water depths. The functions are like the other systems – it comprises of

- a weathervaning rigid or soft yoke/wishbone normally permanently connected to a floating storage unit,
- a jacket structure which may be of tripod design or four legged design,
- rigid risers connected to supply pipelines.

Other terms given to fixed towers are

- tripod with articulated arms,
- tower wishbone mooring, and
- single point offshore loading system.

AEBL Submerged turret loading system – (STL)

The system – provided by advanced production and loading (APL) – comprises a disconnectable buoy (docked into the hull during loading), outfitting and catenary mooring of the buoy. The oil is transported from the seabed to the buoy and swivel via flexible risers. The STL system is applied for loading of both shuttle tankers and FSUs (STP – a pendant to STL – is used in combination with FPSOs), and the STL system includes:

The buoy, i.e. a buoyancy cone with internals (e.g. plating and stiffeners), turret shaft, bearings, riser connection tube, swivel, etc.

Outfitting comprises turret equipment, etc. located outside the buoy and not integrated in the hull, including such as

- buoy locking mechanism and other components located in the STL-compartment,
- pull-in winch and hydraulic power packs (normally located on deck),
- equipment to operate, monitor and control the system.

The mooring system – also termed mooring leg – includes

- anchors (e.g. suction anchors)/anchor piles,
- anchor chains, cables and connectors,
- mooring line buoyancy elements.

Flexible risers are to be coded under PBS code AEA.

AEBM Single anchor loading system – (SAL)

The SAL system is a combined loading and mooring system for shuttle tankers, where a riser/loading hose and a mooring line are connected to a multifunction suction anchor, running to and connected to a submerged buoyancy structure and further to a bow loading/mooring arrangement during operation.

SAL – also provided by advanced production and loading (APL) – is a low cost/simpler alternative to the STL system, applicable for fields with less demanding operational requirements.

The system under this code comprises such as

- multifunction suction anchor with swivel and pipeline end module,
- mooring line with connectors,
- submerged buoyancy structure,
- flexible risers/loading hose with connectors,
- messenger line with buoy (for picking up of mooring line and hose).

AEC Offshore surface storage system

Offshore surface storage system considers a storage system normally for local offtake by shuttle tankers:

- surface facilities placed downstream of loading system comprising floating storage units (FSUs) which are permanently moored for the purpose of storage and offtake;
- loading system for the FSU.

For storage facilities in vessels and buoys/towers, see PBS AB and AEB.

Surface storage facilities include permanently moored floating storage units:

- ship shaped tankers;
- purpose built barges;
- converted tankers/barges,

and other systems to receive stabilised crude oil from production facilities via loading system, store in tanks and offload to shuttle tankers.

FSUs hereunder do not normally have any form of processing facilities.

As for ship type substructures, the SFI Group System main group I: ship general – for FSUs – is to be PBS coded AEC due to the (common) nature of the main group.

For further subdivision of the FSU the following AEC codes apply (with main group numbers of the SFI Group System given to the right):

<u>PBS codes:</u>	<u>Main groupo:</u>
AECA Structure/hull	2
AECB Ship outfitting	
AECBA Equipment for cargo	3
AECBB Ship equipment	4
AECBC Equipment for crew and passengers	5
AECBD Machinery main components	6
AECBE System for machinery main components	7
AECBF Ship common system	8
AECBG Other	9

AECBG is reserved for main group 9, which is vacant at present.

There is no code for topside related equipment and bulk as under PBS ABM, since FSUs have nil or marginal outfitting of this kind.

The offshore surface storage system – as a natural entity for costs – includes (in addition to the FSU) the loading system for the FSU:

AECC Loading system

FSUs may be used in combination with a variety of loading systems, which can be seen under PBS code AEB as many of these concepts may be used both for shuttle tanker and FSU loading, e.g. SALM, SALS, CALRAM, CALM, fixed towers, SLT, etc. NB! PBS AEB is to be used only for coding of loading systems – local offtake systems – for shuttle tankers.

At present and particularly in the North Sea, the SLT-system is often preferred for FSUs:

AECCA Submerged turret loading system – SLT

The STL system comprises two main elements:

- the buoy docked into the hull during loading/operation of the FSU;
- outfitting incl. mooring.

For further information, see the description under PBS code AECL.

Flexible risers for processed hydrocarbons are deemed to be covered for under PBS code AE Transport systems.

AECCB Other loading systems

In addition to STL other loading systems for FSUs may be relevant, particularly used outside the North Sea area. As can be seen under PBS code AEB a variety of concepts may be applicable for FSUs (however some of these may be somewhat less in use today).

These concepts include mainly solutions where processed hydrocarbons are transferred via FSU bow/stern arrangements connected to towers or buoys, and are to be coded with PBS code AECCB when applicable for FSUs.

For an outline of main elements that may be included, see analogous description under PBS AEB.

AED Offshore subsea storage system

Offshore subsea storage system considers a storage system normally for local offtake by shuttle tankers and includes:

- subsea storage facilities placed downstream of production facilities and upstream of local offtake systems – current concepts consider seabed founded/skirt piled, ballasted concrete or steel storage caissons.

Some particular references: For storage facilities in base for jack-ups, see PBS code ABCD. For local offtake systems for loading of shuttle tankers, see PBS code AEB.

Offshore subsea storage system is subdivided and coded as follows:

AEDA Structure

Includes the caisson in steel or concrete with all integrated/embedded parts, incl. transition piece to riser/offtake system.

AEDB Outfitting

Comprises outfitting (temporary and permanent) of/for the caisson. Outfitting may include such as

- systems for installation of the caisson, e.g. for ballast, levelling, grouting, skirt evacuation, air cushion, installation monitoring and similar,
- piles,
- transition assembly (for riser/offtake system connection), etc. as relevant,
- system for operation, monitoring and control,
- etc.

For risers, see other PBS codes.

AEE Umbilicals/cables for remote platform control

This code covers the umbilical/cable system for remote platform control – i.e. control from land based facilities or from another offshore platform. The system is subdivided and coded as follows below.

Battery limits of the system are the cable connection point(s) at the topside(s) and the connection point in the shore approach area.

Some particular references: For electrical power cables to offshore platforms from other platforms or from land, see PBS AEG and AEF respectively. For control cables and power cables located on land, see PBS BCDF and BDD respectively.

AEEA Umbilicals/cables

This code includes hydraulic, electro-hydraulic and integrated service umbilicals – and electrical control cables (also fibre-optical where relevant) – for remote control of platforms.

AEEB Risers

Includes risers for the umbilicals/cables, normally of dynamic type.

AEEC Cable protection

Protection of the umbilicals/cables may include trenching with or without backfill, rock/gravel dumping and/or grout bags/mattresses.

AEED Crossings

Crossings of the umbilicals/cables over existing pipelines or other umbilicals/cables may involve trenching, rock/gravel dumping, grout bags/mattresses or a bridged construction. Crossings are subcoded as follows:

AEEDA Umbilical/cable crossing

A crossing designed for crossing over other umbilicals/cables.

AEEDB Pipeline crossing

Crossing of the umbilicals/cables over existing/installed pipelines.

AEEE Shore approach

Includes the transition area between subsea and land (shore approach). The umbilicals/cables have to be protected against impact and erosion due to waves, traffic and similar.

The shore approach may be of a tunnel or trenched type starting onshore and ending in the sea at a depth safe from outside impact – both types are to be included hereunder.

For umbilicals/cables located on the land side for remote control of offshore platforms, see PBS BCDF.

AEF Power cables land – platform

This code covers the offshore side of an electrical power cable system between land based facilities (e.g. an electrical power plant or a national grid connection) and an offshore platform.

Battery limits of the system are the cable connection point at the topside and the connection point in the shore approach area.

The electrical power will normally be supplied from land to the platform (but theoretically the other direction is possible). The power supply will usually be of a high voltage direct current (DC) type, but alternating current (AC) may be feasible depending on power supply distance. Rectifiers/converters/transistors may be located topside and/or at the land side.

Some particular references: For onshore power cables, see under PBS BDD. For umbilical/cable system for remote control of offshore platforms, see PBS AEE. For power cable systems between platforms, see PBS AEG.

The power cable system land – platform is subdivided and coded as follows:

AEFA Cables**AEFB Risers****AEFC Cable protection****AEFD Crossings****AEFDA Umbilical/cable crossing****AEFDB Pipeline crossing****AEFE Shore approach**

Due to the similarity with other offshore sea cable systems, a reference is given to PBS AEE with subcodes for further details regarding the break down.

AEG Power cables platform – platform

This code covers the electrical power cable system (sea cables) between platforms, where one platform supplies the other platform (e.g. an unmanned platform) with electrical power.

Battery limits for the system are the topside connection points for the power cable.

Some particular references: For power cables from land to a platform, see PBS AEF. For umbilicals/cables for remote control of platforms, see PBS AEE.

The power cable system platform – platform is subdivided and coded as follows:

AEGA Cables

AEGB Risers

AEGC Cable protection

AEGD Crossings

AEGDA Umbilical/cable crossing

AEGDB Pipeline crossing

Due to the similarity with other offshore sea cable systems, a reference is given to PBS AEE with the subcodes for further details regarding the break down.

AEH Power cables for overseas supply/import

This code covers the offshore side of an electrical power cable system for power supply/import between continents, countries, land – islands and similar.

Battery limits of the sea cable system are the connection point in the shore approach area on both sides.

The electrical power will normally be supplied as a high voltage direct current (DC) type. But alternating current (AC) may be relevant if the power supply distance is short (less than 50 km to 100 km). Rectifiers/converters/transistors are located at the land side facilities.

Some particular references: For onshore power cable system, see PBS BDD. For offshore power cable system land – platform, see PBS AEF.

The overseas power cable system is subdivided and coded as follows:

AEHA Cables

AEHB Cable protection

AEHC Crossings

AEHCA Umbilical/cable crossing

AEHCB Pipeline crossing

AEHD Shore approach

Due to the similarity with other offshore sea cable systems, a reference is given to PBS AEE for further details regarding the break down.

AEJ Bridges

Bridges are transport systems for personnel, products and goods between platforms and between platforms and freestanding flare towers, flotel and similar.

Some particular references: For freestanding flare towers (i.e. towers not located on the platform topside), the lower part (up to e.g. bridge deck level) is regarded as substructure; e.g. as a jacket or a concrete structure like a GBS and coded under PBS ABA or ABB respectively. The upper part of the tower is to be regarded as topside and coded under PBS AAF.

Bridges are subdivided and coded as outlined in the following:

AEJA Structure

The structure is built of standard profiles/pipes or welded profiles and includes also structural transition elements at the bridge ends for bridge landing.

AEJB Outfitting

Outfitting includes structural outfitting like cladding, grating and railing, and systems specified to cross the bridge e.g. process, control, utility, communication and other systems.

AEJC Support structure (tower)

Some bridges – depending on the bridge span – may be supported by a tower.

The tower has a structure similar to the bridge and is normally piled to the seabed. Piles and any outfitting are included.

AW Offshore wind park

Offshore wind park is a grouped term for facilities placed offshore for electrical power generation from wind energy. It comprises both windmills and substations, supported by fixed or buoyant foundations and connected with infield subsea power cables. The offshore wind park is also connected to export power cables to shore and necessary connection point in the shore approach area.

Offshore windpark comprise of

- windmills, WTG's,
- substations for the WTG's,
- substructures for the WTG's and the substations,
- infield cables,
- offshore export cables,
- onshore export cables,
- harbor/jetty,
- onshore substation.

Some particular references:

- infield cables, see PBS AEG.
- offshore export cables, see PBS AEF.
- onshore export cables, see PBS BDD.
- onshore substation, see PBS BDDH.
- jetties, see PBS BCCB.

Offshore wind park are subdivided and coded as outlined below:

AWA Windmill

Windmill can be supported by a fixed or floating structure, substructure. It may have a transition piece between the substructure and the WTG itself. The WTG comprises of tower, rotor, generator and control system. If the structure is floating it will be supported by a mooring system.

Windmill systems comprise of

- WTG's,
- WTG foundations, fixed or floating,
- mooring system (for floating installations).

The windmill is further outlined and coded in the following:

AWAA WTG – wind turbine generators

A wind turbine generator, WTG, includes the following: tower, generator, rotor (hub and blades) and control system.

The WTG can be both with gear and gearless.

AWAB WTG foundations

The code includes all types of foundations normally designed for support of WTGs. The substructure may be constructed of steel or concrete, resting on the seabed by its own weight or piled to the seabed, resting on bucket foundations or in the case of floaters, held in position by anchors or tethers.

WTG foundations are subdivided and coded as outlined in the following:

AWABA WTG foundations fixed

The code includes all types of foundations where the windmill is supported by its own leg, fixed to the seabed. Up to now it includes monopiles and jackets, but there are some new developments in the market, including concrete gravity based structures, GBS. For jackets, the piles are included in this code. For monopiles, the transition piece is included in this code.

Some particular references:

- jackets, see PBS ABA.
- gravity based structures, GBS, see PBS ABB.

AWABB WTG foundations floating

The floating structure supports the WTG, and is anchored by wires and ropes to the seabed.

A floating spar buoy (single column deep floater) is the only full-scale produced, but new concepts are under development. The new developments include semi submersible substructures and tension leg substructures, TLP.

In addition to the substructure itself, the code also includes mooring and tethering systems.

Some particular references:

- semi submersible, see PBS ABK
- tension leg substructure, TLP, see PBS ABL.
- single column deep floater, see PBS ABQ

The floating foundation is subdivided and coded as outlined in the following:

AWABBA WTG foundations floating structure

The floating structure is a steel or concrete structure, with a draft depending on the concept, displacing water and thus creating buoyancy. The structure supports the WTG. The semi submersible and TLP structures

consist of pontoons, columns and nodes, while the single column is a vertical cylinder. The semi submersible and single column concepts are anchored to the seabed, while the TLP is fastened by the means of tethers.

AWABBB WTG foundations floating mooring

A floating structure can be anchored by chains, wires and ropes to the seabed. The anchors or piles secure the mooring lines into the seabed and can be one of the following types:

- anchors – conventional rated ship anchors placed/embedded into the seabed;
- anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line;
- piles conventionally driven by hydraulic pile drivers;
- suction anchors.

AWB Substation

The substation is an electrical transformer and can also include an AC/DC converter. The substation is supported by a fixed or floating structure, substructure. It may have a transition piece between the substructure and the substation itself. If the structure is floating it will be supported by a mooring system.

Substation system comprise of

- substations,
- substation foundations, fixed or floating,
- mooring system (for floating installations).

The substation is further outlined and coded in the following:

AWBA Substation topside

Substation topside is an electrical transformer, transforming the current from the WTG to high voltage current. The topside can also include a converter system for conversion of alternating current, AC, to direct current, DC.

AWBB Substation foundations

The code includes all types of foundations normally designed for support of substations. The substructure may be constructed of steel or concrete, resting on the seabed by its own weight or piled to the seabed, resting on bucket foundations or in the case of floaters, held in position by anchors or tethers.

Substation foundations are subdivided and coded as outlined in the following:

AWBBA Substation foundations fixed

The code includes all types of foundations where the substation is supported by its own leg, fixed to the seabed. Up to now it includes monopiles and jackets, but there are some new developments in the market, including concrete gravity based structures, GBS. For jackets, the piles are included in this code. For monopiles, the transition piece is included in this code.

Some particular references:

- for jackets, see PBS ABA;
- for gravity based structures, GBS, see PBS ABB.

AWBBB Substation foundations floating

The floating structure supports the substation, and is anchored by wires and ropes to the seabed. There are no floaters made for offshore wind farm substations, though, the concepts made are in use in the oil and gas business. The concepts considered, are semi submersibles, tension leg platforms, TLP's and single column deep floaters.

In addition to the substructure itself, the code also includes mooring and tethering systems.

Some particular references:

- for semi submersible, see PBS ABK;
- for tension leg substructure, TLP, see PBS ABL;
- for single column deep floater, see PBS ABQ.

The foundation is subdivided and coded as outlined in the following:

AWBBBA Substation foundations floating structure

The floating structure is a steel or concrete structure, with a draft depending on the concept, displacing water and thus creating buoyancy. The structure supports the substation. The semi submersible and TLP structures consists of pontoons, columns and nodes, while the single column is a vertical cylinder. The semi submersible and single column concepts are anchored to the seabed, while the TLP is fastened by the means of tethers.

AWBBBB Substation foundations mooring

A floating structure can be anchored by chains, wires and ropes to the seabed. The anchors or piles secure the mooring lines into the seabed and can be one of the following types:

- anchors – conventional rated ship anchors placed/embedded into the seabed;
- anchor piling – drilled, set and cemented piles in shallow boreholes connected to each mooring line;
- piles conventionally driven by hydraulic pile drivers;
- suction anchors.

4.3 Land based installations

B Land based installations

Land based installations include all types of facilities for

- oil and gas exploitation, production and transport of product from land based petroleum development projects,
- oil and gas receiving terminals for receiving, processing, storage and further transport of oil and gas delivered from offshore installations,
- further refinement of feedstock delivered from above into a range of refined products,
- electrical power generation (by means of gas as feedstock) and transmission.

Land based facilities include:

Utilities – utility systems in support of land based installations to provide – power, control, communication, cooling and heating, chemicals, air, fuel, water, waste disposal and fire and safety systems.

Offsites – systems for raw and product storage, transfer, loading and distribution. The systems may be above ground/below ground or containerised. Comprises – product metering/loading/transportation, interplant reticulation/distribution and systems for flaring, venting and blowdown.

Site – site means such as on plot civil works, buildings, civil structures and off plot external access, power, telephone telemetry, fresh water supply, and heliport.

Transport systems – pipelines above/below ground from plot perimeter to delivery point including crossings and facilities, railway systems, roads/haul roads for transport of product as well as el. power transmission line.

Onshore drilling facilities – drilling derrick, mud systems and utilities.

Onshore wells – production and injection wells for production.

Temporary facilities – construction camps and temporary buildings required during construction.

Process systems – pre-treatment, separation, fractionation, treatment, crude refining, LPG/NGL/LNG process plants and processes for thermoplastics, methanol, gas to liquids, bioprotein and electrical power generation.

Land based installations are subdivided and coded as follows:

BA Utilities

Utilities are those systems that essentially assist, measure and control as well as safeguard all processing and other plant activities.

The following major systems and their assigned sub-systems have been nominated as utility systems:

BAA Electrical power systems

These systems comprise all installations made to receive, produce, distribute and/or maintain the electrical power supply. They are grouped in the following systems:

BAAA Electrical power supply

Defined as the receiving system for general grid power supply and comprises all installation from point of tie-in up to and include to the main plant intake transformer and switch gear from where the plant power is distributed.

BAAB Electrical power generation

Defined as plant's own power generation facility for the generation of the plant's total power, back-up power or emergency power generation. Systems include all facilities up to the point of distribution.

BAAC Electrical power distribution

The power distribution systems comprises all facilities (equipment and materials) which are necessary to distribute the electrical power over the plant from the point of main intake to the take over connection of the various users inclusive of all intermediate distribution panels and potential step-down transformers.

BAAD Emergency power system

This system is designed to back-up power in case of emergency as well as in case of power failure from the main grid line. It shall secure plant lighting and process and plant control until the emergency power generation can take over.

The system will comprise UPS battery facilities at several DC volt levels (i.e. 110, 48, 24 V DC) which will be used for diverse applications.

BAAE Earthing system

The earthing system should include all earthing circuits and lightning protection systems of the plant as well as all anodic protection systems necessary.

BAAF Plant lighting system

All out-door lighting applications are covered hereunder such as street lighting, area lighting, equipment and aviation lighting, security and traffic lights. Indoor lighting requirements are covered under the building codes (see PBS BCD).

BAB Instrument systems

This major system group comprises all facilities that measure, control and represent the operating philosophy of the plant or installation and is subgrouped as follows:

BABA Process data acquisition and control

This is the main plant computerised operational system, where all process, utility and offsite activities are monitored, data collected and processed. This system is located in the main control room with local subsystem stations if required.

The system consists of control panels, logging computers, monitors and other operational functions that collect information from the plant instrumentation system for analysis and further processing.

BABB General instruments

The general instrumentation system will include all data collecting, measuring and controlling features like temperature, pressure, level, flow controlling instruments as well as analyser house and corresponding installation incl. of all cabling and control panels required to collect and transmit the signals to the main operational system.

BABC Computer systems

Hereunder included are all mainframe and local computer stations not directly linked with plant the operational computer system, such as administration and research computer installation, personal computers and the like.

BABD Environmental control systems

Environmental control systems will deal with the monitoring of the plant environment by monitoring air, water and soil conditions in accordance with the applicable regulations for pollution.

BABE Emergency shut down

The objective of this system is the possibility to bring the whole plant or parts of it with one or few manipulations into a safe pre-determined position. This is understood to be the situation where the feed to the plant is blocked, or, that the energy to a unit is shut-down and/or that the feed leading facilities are separated in case of leakage to avoid damage to the installation. ESD function will not automatically be achieved by other functions (e.g. fire detection system), but will be released from the main control room where all ESD subsystems are terminating.

The ESD system is split into various independent areas and is an independent computer controlled shut-down installation connected to the operational control system.

BABF Marine systems

Marine systems are understood as navigational guide systems for harbour operations includes; radar, lighthouses, visible/audible devices and other harbour safeguarding electronic/electrical facilities.

BAC Communication systems

These systems cover all installations for communication purposes and are split into the following subsystems:

BACA Telephone and intercommunication

The system comprises all cable – linked inter-plant communication whether by fibre-optic or by normal telecomm cable transmission. It also includes the required intermediate relay station and the respective terminal facilities (e.g. switchboards, multiplexer and other hardware to complete this system).

BACB Telex and telefax systems

System contains all facilities linked with above subject. Transmission cabling is included under before mentioned code.

BACC Radio communication system

All wireless operated facilities as well as public address systems in the plant should be included here (portable radios, satellite communication facilities, etc.)

BACD CCTV and security systems

Closed circuit TV systems for plant security, as well as all other security installation (personnel access systems, gate security, etc.) shall be covered hereunder.

BAD Cooling systems

These systems shall include all those plant cooling facilities which are used as utility systems, such as:

BADA Seawater cooling

Includes the system that serves the purpose of providing seawater as a cooling medium to the required areas of utilisation. Hereunder are also to be included all installations for intake, filtration, cleaning, chlorinating and other chemical make-up facilities plus final the discharge installation into the sea.

BADB Freshwater cooling

Freshwater cooling as an alternative to seawater cooling or as an extra and separate circuit, shall include all installations that will be required to provide this medium at the areas of utilisation and shall also comprise potential cooling water make-up unit, cooling towers, discharge and regeneration units.

BADC Air cooling

Air-cooling applies when cooling capacity requires a great amount of cooling medium. Air coolers are forced draft fan-operated coolers or natural draft coolers, which cool via a counter-current air stream and these are used to regenerate other cooling media or to further cool down product streams to ambient temperature.

BAE Water systems

The systems hereunder shall include all water supply installations that are not used for cooling or fire water purposes (for these, see separate PBS code):

BAEA Freshwater supply

This system shall provide fresh (raw) water for general plant use includes potential pre-treatment facilities from battery limits to point of further make-up and other systems tie-ins.

It should not include outside-battery-limit facilities such as pumping stations, transfer piping etc., which are listed under a separate PBS code.

BAEB Demineralized water system

De-mineralised water is mainly used in closed water circuits like cooling or steam systems, where corrosion of water contaminants will do damage to equipment and piping network. For this purpose the water will need a make-up and control by a de-mineralising water plant package unit. Injection of chemical inhibitors to prevent pollution or corrosion is standard procedure. See also chemical injection systems.

BAEC Potable water system

Potable water systems include the total sweet water distribution for the total plant and end at the various consumer points. Special make-up facilities, if required, shall be included here. Potable water is defined as suitable for drinking.

BAF Steam systems

Steam is one of the most important utilities used in processing. It can be either generated during processing as a by-product through heat exchange, waste heat recovery or directly by steam generation facilities. All types of steam systems are included hereunder such as:

BAFA High pressure steam – HP

HP steam is normally generated by waste heat recovery or separate boilers and is used as driving medium for turbines and generators.

BAFB Medium pressure steam – MP

See explanation for HP steam system, additionally there is also use of MP steam in process applications.

BAFC Low pressure steam – LP

Low-pressure steam is also generated in heat exchangers and as a result of feedstock processing and is normally used for plant heating purposes in various applications.

BAFD Condensate system

This system mainly is a collecting facility at the end of the steam circulation and includes a regeneration package as the most important item before feeding back again into the steam generation process.

BAG Heating systems

These systems are only used for the product heating during processing and in further treatment operations. The heating for buildings is not included here. Systems included and coded are:

BAGA Hot oil heating

This system uses hot oil as a heating medium in for example heat exchangers for feedstock stabilisation or mild heat treatment.

BAGB Electrical heating

This system uses electric power for heating purposes in all sorts of process applications where controlled heat is required (solvent refining, hydrofining, de-sulfurisation processes, etc.).

BAGC Medium heating

Also feedstock can become a heating medium and is frequently used to counter currently transfer heat to other feedstock. This is usually achieved through heat exchangers.

BAH Chemical injection systems

These systems serve as utilities for make-up purposes of water, products and when required by the processes and include:

BAHA Dehydration

Methanol/glycol is usually linked to the dehydration of the feedstock. The system includes generation and regeneration of the medium with all-applicable packages, equipment, bulks and labour.

BAHB Chlorination

Chlorination is used in connection with seawater systems normally in order to avoid biological growth in the system. However, raw water supply may also call for the use of chlorination as for the same purpose. Chlorination systems are commonly supplied in package units.

BAHC Ammonia

This system is connected to steam production mainly where it is used to control the ph-value of the boiler feedwater.

BAHD Other chemical injection facilities

All other chemical injection packages (for uses in the various types of downstream processes or for water make-up purposes) shall be covered hereunder as complete systems with all their respective resources.

BAI Air systems

These systems will produce the necessary compressed air for instruments and plant operations as well as nitrogen and/or other gases that may be required by plant operation other than air cooling (see PBS BADC). Included are:

BAIA Instrument air

Instrument air is mainly used for pneumatic actuators employed in positioning control valves. But also applied to various measurement systems and as purge protection of electrical equipment which are located in hazardous areas.

BAIB Plant air

Plant air is used for power tools, air driven pumps and general utility use. Normally instrument air and plant air is operated/provided from the same system package. Only if there is a separate plant air system (equipment package) then this should be listed here.

BAIC Inert gas

In this code nitrogen generation facilities shall be included. Nitrogen gas is required to purge and seal various types of plant equipment and is also the back-up system for the instrument air in case of failure. If other inert gases shall be generated, their respective facilities shall be included here.

BAJ Fuel systems

Part of the feedstock or excess down-stream products is used to provide the firing fuel for the miscellaneous heating applications in a plant. The fuel systems are sub-grouped according to the feedstocks:

BAJA Liquid fuels

All resources that belong to this fuel system shall be represented here.

BAJB Gaseous fuels

All resources that belong to this fuel system shall be represented here.

BAJC Solid fuels

All resources that belong to this fuel system shall be represented here.

BAJD Mixed fuels

All resources that belong to this fuel system shall be represented here.

BAK Waste disposal systems

Systems that serve environmental requirements are listed and coded hereunder:

BAKA Effluent treatment package

This system is the most comprehensive installation of all waste disposal systems. It collects and treats all aqueous effluents present in a plant, i.e. from

- clean water system,
- oily water system,
- chemical waste water systems,
- jetty drain system,
- sanitary sewer systems, etc.

All packages, basins/tanks and facilities needed for this purpose shall be placed under this code. Chemical injection where required, is listed under separate respective coding (see PBS BAH).

BAKB Sewage system

The sewer system is the collection system of all plant sewers that shall be treated in the effluent treatment package system. It will contain all required, equipment, bulks and labour for this system from the points of collections to the tie-ins at the effluent treatment plant.

BAKC Ballast water

Ballast water is usually ship tanker related and therefore linked to the jetty area. The code shall contain all storage, pumping and piping systems from the point of collection to the tie-in-to treatment facilities and discharge units.

BAKD Drain system

The drain system covers all facilities to collect the wash water from plant surface areas, which need to be collected for further effluent treatment before recharge. This is especially the case where hydrocarbons spills are most likely to occur, e.g. in process areas, receiving stations, storage facilities, jetties, etc.

BAL Fire and safety systems

All systems that are designed to protect the plant from hazards are to be included here:

BALA Fire water system

The complete fire water system is understood as the firewater providing facility and shall include all hydrants and all related equipment, bulks and labour.

BALB Sprinkler and deluge system

Sprinkler and deluge systems (e.g. with water or similar) complete with all equipment are meant to be included here. These systems are special area covering installations and are usually linked to fire detection systems, which are listed under a separate PBS code.

BALC Chemical fire fighting system

Chemical fire fighting systems generally consist of foam generators and chemicals that can be stored in tanks and or in mobile facilities. Fixed monitoring towers for process and/or storage area protection are included hereunder.

BALD Mobile fire fighting

Mobile fire fighting encompassing: e.g. fire fighting trucks, foam and water tender vehicles and ambulances as well as corresponding marine vessels to support fire fighting operations.

BALE Fire and gas monitoring systems

The most important systems in fire and gas leakage warnings are the F and G detection systems (fire and gas).

The functions of these systems are

- to detect hazardous events, supply alarm indication for starting manually actuated fire-fighting systems by the operator,
- to supply alarm indication to start automatic fire-fighting by e.g. hard-wired logic,
- to indicate common and/or individual alarms,
- to print grouped alarms,
- to generate acoustical and visual alarms.

The systems may be composed of smoke detectors, flame detectors, gas detectors and heat detectors at all areas of the plant, in and outside of buildings, and the complete wiring and monitoring facilities as well as warning systems are included.

BALF Fire fighting training area

These facilities cover training area installations and simulation stations necessary for constant fire fighting training of personnel.

BB Offsite

The offsite systems are generally defined as primarily product associated facilities, where processed feeds are transported, stored, measured and packed prior to shipment. Offsite systems are divided into

- product storage,
- product metering,
- product loading,
- transport and packing,
- flare, vent and blowdown.

Similar facilities for crude oil and bulks are also included, as specifically stated in the following:

BBA Product storage

The product storage systems cover the storage installations for gaseous, liquid and solid products which are following feed processing or may be used as intermediate storage facilities before subsequent utilisation. These systems cover both underground and above ground installations. The systems distinguish between storage of gases, liquids (also crude oil) and solids (bulks) and include:

BBA Gas storage

Gases are normally stored in a liquefacted condition that requires expensive design for safety reasons as well as for temperature control. In general two major sub-systems can be identified:

BBAA Above ground storage

Above ground facilities are supposed to cover the different types of storage tanks that are imperative for the miscellaneous gases which may require dissimilar designs to cover their specific storage necessities. Half-buried or earth-covered tankage shall be considered above ground installations.

BBAAB Underground storage

Underground storage for gases requires very special geological conditions and design criteria. Under this code Underground storage is restricted to storage of gases in caverns and includes also the cavern header installations.

BBAB Liquid storage

These storage complexes cover storage for raw crude, natural gas liquids (gasoline), middle distillates, liquid petrochemical feedstock, acids and caustics as well as water.

BBABA Above ground storage

The same criteria as for above ground storage for gases apply. However design criteria are different and the tank farms do not require so complex vessels as liquefacted gases do. All types of tanks appear here which are COR-coded in accordance with their specific product applications.

BBABB Underground storage

Criteria for storage are like those for gases. However, underground storage is in general more likely to be used for crude storage because of capacity reasons. Inlet/outlet installations directly linked to the system are included hereunder.

BBAC Solids (bulk) storage

All products which can be regarded as «solids», that is to be understood as of non-liquids or gaseous consistence, shall be covered by this code. Grease, soap or other soft products which needs packing prior to shipment are defined to be «solid» and are covered hereunder. This storage covers three major general purpose areas:

BBACA Warehouse or sheltered storage

This code covers all facilities whether of mobile or resident nature, which are to be an integrated part of a warehouse storage installation. That is lifting, transporting, and storing of products inside this defined area.

BBACB Silo/container storage

Chemical bulk, pellets, powder or other mass products often require a separate silo/container storage prior to packing or shipment. This code covers only silos/containers that are not part of a warehouse and are defined as independent product storage facilities and include for all sub-systems to make them functioning units.

BBACC Open air storage

Open air storage covers predefined product dumping areas including the related facilities for moving of dumps, piling and other bulks (storage and handling facilities), bulks non-sensitive to weather damage like for example:

- ferrous pellets,
- sand,
- gravel,
- lumber,
- palliated products, etc.

Suitable for open air storage are the major items for this code.

BBB Product metering

Prior to shipment products will be metered which can be achieved by volumetric (gases/liquids) or weight measurement (bulks). Product metering is subgrouped and coded as follows:

BBBA Volumetric flow metering

The mass flow and the standard volumetric flow can be calculated when actual flow, temperature, pressure and density are measured. Volumetric flow measurement is applied for gases and liquids. The normal facilities would consist of

- manifold system,
- metering station,
- metering computer.

The metering station measurement tubes that comprise flow, pressure, density and temperature metering elements are connected to the flow computer where mass flow and volumetric flows are calculated from the

measured data. These are routed via a data-collecting computer to the central operating data acquisition system (see under instruments – PBS BAB).

BBBB Weight metering

Bulk material products (solids) are measured by weight in general. This can be achieved by mechanical or electronically scaling equipment which is also combined with temperature, density, humidity controls and linked to a scaling computer that collects the measured data for transfer to the central data acquisition system.

BBC Product loading

These systems shall be defined as the product, crude oil and bulks transfer installations to facilitate the loading on board the shipment vessel, which can be either a sea or land going means of transport.

The shipment facilities are determined by the products produced and the owner's shipment philosophy. Loading facilities are required if dispatches are made via seaways, road or railway transport.

Serving these different purposes the following subsystems are required:

BBCA Liquefacted gas loading

This system covers the loading of liquefied gases (e.g. LNG, propane, ethane and butane). The facilities comprise loading arms, transfer pumps as well all other equipment and bulks linked to the purpose of this system, which shall transfer the products from the storage area on board the specific vessel.

BBCB Crude oil/distillate loading

The loading of crude oil and liquid distillate products (e.g. natural gasoline, benzene, diesel, kerosene) follows the same principle as said above and shall include for the transfer from storage to the point of loading inclusive all necessary equipment and bulk installations.

BBCC Chemical liquids loading

Chemical liquid loading also includes same principle facilities as described above.

BBCD Bulk loading

Bulk loading facilities will cover all installations that are designed to dispatch bulks. The following shall be included

- loading equipment for palletized bulks,
- containers,
- loose bulk stock,
- crates,
- bags,
- drums including the mobile equipment required for this operation.

BBD Transportation and packing

These systems comprise of all installations that serve the transportation of stock or products from/to process area to from/to storage area inside plant limits as well as all product-packing systems prior to dispatch:

BBDA Pipeways

The normal way of transporting gases and liquids from the process to the storage area is by means of piping. All resources that constitute this type of transport are covered hereunder. The tie-in point for this system is the battery limits of process area and storage installation.

BBDAA Pipeways product

All product distribution pipeways from/to process and to/from storage shall be listed here.

BBDAB Pipeways flare systems

The flare systems for pipeways shall be covered under this code.

BBDB Conveyor belt systems

Solid products or general bulks may require a conveyer-belt system to their point of packing and/or storage. This code shall cover all provisions for this purpose.

BBDC Blending systems

Some products require blending operations prior to final dispatch. Installations to serve this blending (mixing) purpose shall be listed here.

BBDD Chemical and catalyst handling

Catalysts and chemicals that are part of the plant operation activities have their own separate storage and handling installations. Depending on the type and sensitivity of the stock various protective installations have to be maintained. All the resources in connection with the purpose of this system will have this code.

BBDE Bulk packing systems

Bulk packing installations can be of complex nature. Each type of packing requires its own independently controlled system.

Packing installations listed here shall only be the final «wrapping» of the products. There are different systems for filling drums, cans, bottles, bags, boxes as well as automatic palletising, labelling and foil shrinking processes. All shall be included hereunder.

Bulk packing activities of composite nature, e.g. involving blending and intermediate transport operations are covered under separate coding.

BBDF Liquid packing systems

Liquid packing systems are in principle similar to the above mentioned systems which also may include blending operations prior to final filling.

The filling into the various types of vessels, level and quality controlling processes require the same complex installations as for solid products. All resources required for these systems shall come under this code.

BBE Flare, vent and blowdown

These systems cover the «hot» disposal of relieved hydrocarbons (liquids or vapours) by burning them at a safe location.

The hydrocarbons are relieved by depressurising operations at the point of plant entrance or within the plant pressure control systems, and in connection with drainage of vessels or pipes, waste of process and shut-down operations or in case of emergency. The systems are split into the following groups:

BBEA High pressure process

The process flaring system is designed to handle safe removal of the relieved hydrocarbons during process reactions, emergency situations, or shut-down/start-up operations at process pressure conditions.

For flare systems for pipeways, see PBS BBDAB.

BBEB Low pressure system

The low pressure system is designed to collect and handle the removal of low pressure hydrocarbons independent of the high pressure process system. The reason for this segregation is to prevent a back-pressure built-up from higher pressure sources.

Application: vapour returns from tankage and loading installations, venting of systems, chilling operations, etc.

BBEC Liquid burner system

This system is designed to handle that fraction of hydrocarbon liquids that cannot be evaporated in the flare knock-out drums. It will be collected from all plant areas and be burned in the liquid burner, which is a low stack ground flare. Normally only small amounts of liquids are needed to be disposed by this system.

BC Site

This code shall cover all plant facilities and improvement that in majority will consists of earth, concrete and building construction activities which are often understood as «civil» works.

Under this coding only civil works of permanent nature shall be incorporated. One can split this code into the following major groupings:

BCA General site

This code incorporates all civil works within battery limits that will be a prerequisite and a permanent part of the plant operational installations (process, utilities and offsites). It will not include for buildings and shore installations (see other PBS codes).

As local conditions and traditions may influence the scope, subcode contents may to some degree vary. The subcode content is outlined in the following:

BCAA Civil 1 – site preparation

Site preparation may cover such as

- site clearance (removal of forest, top soil, debris, etc.),
- earth moving, rock blasting and moving,
- leveling, fill up to grade and comprise, also for roads, walkways and parking areas,
- access road to the site (from battery limits) with – where relevant (depending on infrastructure) – trench for piping/cables for such as supply of water and power, for communication and sewage, normally incl. pipe/cable and backfilling,
- basic drainage system,
- fencing and gates.

BCAB Civil 2 – main civil works

Main civil works may include

- piling (if required),
- all foundations works for equipment and modules,
- tank foundations and concrete paving,
- all concrete structures for pipe racks, and pipe ways, and other support structures,
- bundwalls,
- basins,
- concrete stacks,
- loading ramparts and platforms,
- roads (other than access road – see PBS BCAA), road bridges or bridged walkways, inclusive of guard rails and other subject related installations.

Not included:

- Foundations for buildings including piling (see PBS BCB).

Further included is trenching and drainage system – other than listed under PBS BCAA – covering facilities installed underground in trenches or is subject to water drainage.

Trenching covers

- pipe,
- cables,
- culverts,
- open trenches and channels.

Drainage covers

- manholes,
- gutters,
- concrete manifolds and piping as well as other collectors for underground and surface water drainage.

BCAC Civil 3 – landscaping

Landscaping – also termed restoration – may cover the following:

- refill and green plant area after construction;
- remove surplus civil bulk, debris and similar;
- asphalt paving (installed after completion of heavy construction works) for roads, walkways, parking areas and similar, may be included.

Not included:

- concrete paving, e.g. for tanks see PBS BCAB.

BCB Buildings

This code shall cover all installation associated with plant buildings and related structures and shall be divided into:

BCBA Administration buildings

This code covers the administration facility of a plant and includes

- all earthwork,
- piling,
- foundations,
- architectural work including heating, ventilation and sanitary systems,
- power and water systems within battery limits (building),
- all indoors outfitting in accordance with requirements.

Exclusions: electronic equipment like computers or communication facilities, which are part of the utility system coding. Backfilling and greening is part of landscaping (see PBS BCAC).

BCBB Control rooms and utility buildings

This code covers plant buildings like

- control rooms,
- sub-stations,
- utility buildings :
 - compressor buildings,
 - package units' shelters/buildings,
 - boiler houses,
 - pump houses,
 - switchgear and transformer stations,

- subcontrol rooms,
- other buildings for operational purposes.
- particular buildings for housing of process facilities (e.g. for PBS BT type of buildings) including
 - earthwork,
 - piling,
 - foundations,
 - architectural structures,
 - heating and ventilation,
 - power and water,
 - all other facilities necessary to make use of these installations within battery limits.

Excluded are the machinery, equipment, computer and communication systems, emergency or other utility systems, which are covered under their respective PBS coding. Backfilling and greening is part of landscaping/restoration (see PBS BCAC)

BCBC Laboratories

This code covers all laboratories or buildings of similar purpose inclusive of earthwork, piling, foundations, architectural structures and inclusive of all other facilities to make use of these buildings.

Backfill and greening around the buildings are part of Landscaping/Restoration (see PBS BCAC).

BCBD Warehouses

This code covers all building facilities that shall be destined to store plant products/commodities.

Included hereunder are

- all earthworks,
- pilings,
- foundations,
- architectural structures,
- heating and ventilation systems,
- power,
- water,
- air,

and other facilities that will make a warehouse system operable, except loading, packing, measuring and computer systems are not included here. They have to be coded separately (see other PBS codes). Backfill and greening around the facilities are part of landscaping/restoration (see PBS BCAC).

BCBE Other building facilities

All other plant buildings like

- gatehouse,
- machine shops,
- garage buildings,
- gasoline stations,
- fire brigade buildings,
- shelters.

Including

- all earthworks,
- pilings,
- foundations,
- architectural structures,
- indoor installations.

Exclusions are communication and computer systems, which have been listed under separate coding. Backfill and greening is part of landscaping/restoration (see PBS BCAC).

BCC Jetties and shore installations

This code is used to cover all civil facilities in connection with harbour operations. This includes for jetties, shore improvements, piers, dams, lighthouses and other civil works related hereto.

Major groupings are:

BCCA Product jetties

Product handling piers and jetties are to be coded here. Included are such as

- seabed preparations,
- dredging,
- piling and concrete support structures,
- gangways and structural steel for loading bridges,
- access ways,
- mooring points and columns drainage systems,
- cathodic protection,
- fenders,
- surface paving where applicable.

BCCB Other jetties

Bulk, container and equipment handling jetties as well as passenger jetties are covered hereunder, and included are

- all seabed preparations and dredging,
- pilings,
- concrete and other structures,
- gangways and access bridges,
- mooring points and columns,
- fenders,
- cathodic protection,
- drainage systems,
- as well as paving where required.

BCCC Shore improvements

This code shall comprise all activities and installations that will be the object of improving shore conditions, i.e.

- building of dams,
- harbor entrances,
- lighthouses and navigational signs,
- wave breaking measures,
- rock, brick, concrete or piling reinforcements of the shoreline,
- flood gates or other harbor protecting measures.

BCD External facilities

External facilities are those installations, which do not directly belong to the plant facilities (i.e. all installations inside battery limits-fence), but are part of a project and have to be funded from project sources. External facilities are sub-coded as follows:

BCDA Access from main road

All access-ways from a main road to the plant area, which are essential to the plant and must be developed by the project, shall be part of this code.

This also includes all other access road related investments like bridges, tunnels, securing measures, traffic lights, etc., which may be included in accessing a plant location.

BCDB Electric power

If electric power installations are not provided free plant borders, but must be accessed by from the main grid lines at remote distances, all necessary installations to cover this distance and also potential intermediate power stations with their respective equipment have to be included here.

BCDC Telephone/telemetry

All telephone/telemetry installation required outside battery limits shall be included here; from the main plant switchboard where normally public telephone systems interconnect to the point of tie-in into the public network.

This includes all necessary investments like trenching, poles or other means of transfer facilities, e.g. satellite communication installation, lease lines to public transmission, radio facilities, etc.

BCDD Freshwater supply

Water is normally provided fob battery limits. If this is not the case, but the water must be provided from outside sources by the project, all investments to be made shall be covered by this code.

This includes wells, pumping stations, transfer pipelines and/or water treatment packages (e.g. seawater desalination facilities if located outside battery limits) and other installation required to secure water supplies.

BCDE Heliport

If helicopter pads are part of the plant development, and not covered by other funding sources, all such investments shall be covered under this coding.

This includes for civil, navigational, control and safety systems as well as for passenger transfer facilities as may be deemed specified from case to case.

BCDF Remote control of other facilities

Offshore facilities (e.g. topsides, subsea and transport system facilities) may be remote controlled from an onshore facility.

Included under this code are control cables from control room (or similar) to the connection point (to the sea cable) in the shore approach area, with all necessary investments like separate trenching, poles, etc.

The code also covers remote control of a land facility from another land facility/plant.

For the sea cables from shore approach area to subsea transport system and/or topside facilities, see PBS ADE, AEAG and/or AEE respectively.

BD Transport systems

This code includes onshore transport systems like pipeline, railway, roads and el. power transmission line, as outlined and coded below:

BDA Pipeline

Pipeline is a system for transportation of fluids and/or gases (also CO₂ for offshore deposit). Battery limits for pipeline systems defined hereunder are

- receiving pipelines connecting offshore pipelines/flowlines at shore approach area and further to onshore facilities plot perimeter. (Whereupon pipeline becomes offsite/process as applicable),
- export pipelines for product(s) transported from onshore facilities' export pumps/compressors,
- receiving pipelines/flowlines from onshore wellsites to onshore facilities plot perimeter.

Pipeline is subdivided and coded as follows:

BDAA Route preparation

Route preparation includes

- survey of corridors,
- archaeological studies and similar,
- right of way (ROW) acquisition,
- aero plane and satellite photographs,
- clearing and grubbing,
- earthworks associated with pipeline routes,
- culverts,
- drainage in connection with the preparation activities,

and other work which is not directly associated with pipeline trenching operations.

BDAB Trenching/backfill

Excavation to below grade to specified depths, of trenches for later pipeline installation. Backfill with selected imported fill material to cover pipeline(s). Backfill with excavated materials to complete cover ready for restoration.

BDAC Pipeline installation

The pipeline installation consists of several strings of pipe, which are transported, prepared and bent, and which are welded together and coated. Depending of how to install the pipeline; it is either placed in a trench, on foundations on top of the ground or on pillars above the ground:

BDACA In trench

The pipeline is welded together and finished before the pipeline string or parts thereof are placed in a trench often using sideboom track tractors.

BDACB Above ground

The pipeline is welded together and finished before the pipeline string or parts thereof are placed on foundations on the ground or pillars above ground often using sideboom track tractors.

BDAD Route restoration

Clean up including earth movement and landscaping work to minimise the environmental impact of the pipeline.

BDAE Drainage system

Drainage system for evacuation of ground or rain water around pipeline and to control soil-bearing capacity. Included are drainage types like:

BDAEA In tunnel

A system comprising bilge sump pumps and pipeworks or spears, pumps and pipework to evacuate water from tunnels.

BDAEB In sump

May consist of diversion structures and spear/rod drainage pumps and pipeworks to evacuate water from workfronts.

BDAEC In open landscape

Consists of grading open drains, sumps and culvert systems.

BDAF Crossings

Crossings are constructions to pass barriers like

- rivers,
- fjords,
- trenches/ravines,
- roads,
- railways, etc.

They consist mainly of bridges and tunnels:

BDAFA Road crossing

Road crossings are usually made by

- horizontal directional drilling/pressing under the road without disturbing the surface or halting the traffic,
- through preinstalled culverts,
- bridged road crossing.

BDAFB Rail crossing

Rail crossings are usually made by

- horizontal directional drilling/pressing under the railroad without disturbing the surface or halting the traffic,
- through preinstalled culverts,
- bridged rail crossing.

BDAFC River crossing

Depending of the crossing length, the river crossings can be made by

- horizontal directional drilling/pressing below scour level,
- suspension bridge for aerial crossing,
- piers support,
- pipeline installed by barges,
- launched and pulled over, etc.

BDAFD Fjord crossing

Depending of the crossing length, the fjord crossings can be installed by

- barges,
- suspension bridge for aerial crossing,
- launched and pulled over, etc.

BDAFE Ravine crossing

The most common method to cross a ravine is that the pipe, as it is pushed out over the ravine by hydraulic jacks, is supported by a bent (structural frame) which is pin-connected both at the foundation and where it joints the truss carrying the pipe. The pipe segments from each bank are joined together in final position.

BDAFF Piperacks/pipetracks

Elevated gallery/trussed structures allowing movement/access below or underneath structures.

BDAG Facilities

The operation of the pipeline entails mechanical functions like metering, pigging, regulating flow and compression. Facilities include the mechanical functions with necessary buildings/housings/structures (complete), such as:

BDAGA Metering station

The central points in an oil or gas transportation system where measurement and control of the fluids take place. Typically, it will include flowmeters and monitoring equipment, telemetry and control systems as well automatic shut-off systems.

Metering station for transport systems relates to those metering stations required along the pipeline route where offtake from the system is delivered to consumers and where metering stations are not a part of third part facilities. Does not include metering stations of central processing facilities.

BDAGB Pig station

A facility on a pipeline for inserting/launching or receiving a pig, also called a pig trap. The pig launcher essentially is a breech-loading cylinder isolated from the pipeline by a series of gate valves.

BDAGC Flare/venting station

A facility in connection to a pipeline for flaring or venting of the transported product in emergency situations.

BDAGD Valve station

Valve stations are stations for sectioning the pipeline for different purposes, like hydro testing, emergency shut-down, etc. Other stations can be for by-pass lines, branch lines, etc.

BDAGE Booster station

Booster station, also called compressor station (gas) or pumping station (liquids), is an intermediate station in the transport system which purpose is to increase pressure of the product coming through the pipeline and being sent on to the next station or terminal.

BDAGG Control centre

Control centre is the operating centre of a transport system where the flow, pressure, etc. is controlled, measured and recorded.

BDB Railway

Railway as a transport system is used for transporting products – liquid and/or solids from remotely located processing/treatment/handling facilities to export facilities, subdivided and coded as follows:

BDBA Civil works – formation

Civil works – formation are all civil works required to complete railway formations, hereunder – the establishment of quarries, clearing and grubbing of railway route corridor, bulk cutting and filling of common masses to achieve specified grade, drainage systems for diversion of water from formations, earth retention to avoid scouring and route restoration to make good track route after railway construction, as outlined in the following:

BDBAA Quarry

Quarries are established to extract/excavate/provide high quality hard rock materials of different screenings/sizes for bulk filling where select fill is specified and for rail-line ballast material.

BDBAB Clearing and grubbing

Clearing and grubbing is the removal and disposal of trees/stumps and organic materials along the railway line route prior to formation works.

BDBAC Formation works

Formation works are works related to bulk cutting and filling, cutting to spoil and filling with selected fill or borrowed materials to achieve specified formation grade/levels ready prior to tracklaying.

BDBAD Drainage systems

Drainage systems include the excavation/construction of open drains to allow bypass of catchment water from formations, construction of culverts under formation embankments and stormwater pipe drain systems.

BDBAE Earth retention

Earth retention – systems and methods used to avoid erosion of embankments and/or retaining systems – includes such as

- stone filled gabions/reno-mattresses,
- filter fabrics and geotextiles,
- sprayed cement/concrete (gunite).

BDBAF Restoration

Restoration includes the removal of spoiled material/rubbish, spreading of topsoil, seeding and planting of natural vegetation along railway route after construction is complete.

BDBB Civil works – structures

All civil works other than earthworks/drainage required to be constructed and which form part of the railway system, including the construction of bridges, abutments, tunnels, loading facilities, receiving facilities and station buildings:

BDBBA River/fjord crossings

River/fjord crossings include the construction of bridges of various design types and construction materials – river bridges are normally concrete pyloned with piled bases and precast concrete beams.

BDBBB Road crossings

Railway road crossings may be bridged overpasses where the railway line is elevated above the road. Roads may be bridged and elevated above the railway line or the crossing may simply be a crossing at the same level with security gates to allow train passage.

BDBBC Tunnels

Tunnels are normally

- benched or full face driven through hard rocks in undulating terrain where open cutting is not considered economical,
- machine cut by rotating full-face moles where tunnels are exceedingly long and/or where materials cut are not excessively hard.

BDBBD Loading facilities

Loading facilities consist of rail terminal buildings/structures and weigh scales and

- loading arms for liquids/liquid gases for discharge into tank wagons,
- storage hoppers/loading chutes for solid materials,
- other loading systems.

BDBBE Receiving facilities

Rail terminal buildings/structures for receiving railway transported products, including such as

- discharge arms/systems for liquids/liquid gases and reticulation to storage tanks for later export,
- dumper/turnover systems for solids,
- other receiving/discharging systems.

BDBBF Station buildings

Buildings/platforms constructed as part of the railway system will normally house local control systems, amenity and service facilities.

BDBC Trackwork

Trackwork includes

- placing of sleepers, points, turnouts, rail handling, rail laying, fixing to sleepers, welding, ballasting alignment tamping of railway line,
- signal/control systems along route and track access prevention.

As outlined and coded in the following:

BDBCA Tracklaying

Receiving of materials, placing of sleepers, points and turnouts, handling, placing and fixing of rails to sleeper fish plates/pandrols and welding of prestressed rails.

BDBCB Ballasting/alignment

Placing spreading of selected crushed ballast rock around sleepers and rails, lifting, tamping and alignment of railway line to gradient/curvature specification.

BDBCC Signals/control systems

Signals/control systems installed along railway line route, include such as: masts, signal lights, local control systems, point switches/actuators and crossing signals.

BDBCD Track access prevention

Track access prevention includes along route fencing/guard systems to prevent access to railway line.

BDBD Rolling stock operation facilities

Rolling stock operation facilities are facilities required in support of railway operations and will normally include

- mechanical service and repair workshops,
- rolling stock yards/storage yards,
- buildings and services and permanent housing.

As outlined and coded below:

BDBDA Mechanical service and repair workshops

Workshops constructed for mechanical servicing and repair of

- rolling stock locomotives, prime movers, service/maintenance wagons and machines and transport wagons,
- signals and control systems,

- electrical units.

BDBDB Stock yards/storage yards

Stock yards are lines spurred from the main line for storage of rolling stock that may be located at different locations along the railway route, normally at the rolling stock operation facilities' main workshop locations. Storage yards are laydown areas for open-air storage of materials, and enclosed storage for equipment.

BDBDC Buildings and services

Buildings and services at main operation facility yards include industrial and administrative buildings – Administration building, gatehouses, change houses and services required at facility.

BDBDD Permanent accommodation

Permanent accommodation includes houses, quarters and amenity buildings for housing railway operations staff.

BDBE Railway utilities

Railway utilities consist of all systems required in support and operation of the railway systems:

- electrical power supply and distribution;
- overhead power lines;
- lighting systems;
- instrumentation and central control systems;
- communications;
- water supply;
- fuel supply and storage;
- lube systems and effluent disposal.

As outlined and coded in the following:

BDBEA Electrical power supply and distribution

Electrical power supply and distribution consists of supply from connection to national power grids, high-tension mast/poles and aerial cabling to railway system sub-stations for further distribution.

BDBEB Overhead power lines

High tension overhead power line systems used for the supply of power to electric prime mover sets, includes

- lines,
- masts,
- brakes,
- insulators and cables,
- local substations.

BDBEC Lighting systems

Area and flooding lighting as required along the railway route and at the facilities.

BDBED Instrumentation and central control systems

Instrumentation and central control systems for the railway system.

BDBEE Communication systems

Communication systems for the railway system – telemetry, UHF/VHF radios, telephones, etc.

BDBEF Water supply

Water supply, treatment and reticulation to the railway facilities.

BDBEG Fuel supply systems

Diesel oil storage tanks, transfer metering and filling systems.

BDBEH Lube systems

Lube oil and grease storage and servicing systems.

BDBEI Effluent disposal systems

Systems for receiving, storage, treatment and disposal of waste.

BDC Roads

Roads as a transport system is used for transporting products – liquid and/or solids from remotely located processing/treatment/handling facilities to export facilities. Roads are subdivided and coded as follows:

BDCA Civil works – formation

Civil works – formation are all civil works required to complete road formations hereunder – the establishment of quarries, clearing and grubbing of road route corridor, bulk cutting and filling of common masses to achieve specified grade, drainage systems for diversion of water from formations, earth retention to avoid scouring and route restoration to make good route after road construction as outlined and coded in the following:

BDCAA Quarry

Quarries are established to extract/excavate/provide high quality hard rock materials of different screenings/sizes for bulk filling where select fill is specified and for sub-base/base course material.

BDCAB Clearing and grubbing

Clearing and grubbing is the removal and disposal of trees/stumps and organic materials along the road route prior to formation works.

BDCAC Formation works

Formation works are works related to bulk cutting and filling, cutting to spoil and filling with selected fill or borrowed materials to achieve specified formation grade/levels.

BDCAD Drainage systems

Drainage systems include the excavation/construction of open drains to allow bypass of catchment water from formations, construction of culverts under formation embankments and stormwater pipe drain systems.

BDCAE Earth retention

Earth retention – systems and methods used to avoid erosion of embankments and/or retaining systems – including such as

- stone filled gabions/reno-mattresses,
- filter fabrics and geotextiles,
- sprayed cement/concrete (gunite).

BDCAF Restoration

Restoration includes the removal of spoiled material/rubbish, spreading of topsoil, seeding and planting of natural vegetation along road route after construction is complete.

BDCB Civil works – structures

All civil works other than earthworks/drainage, required to be constructed and which form part of the road including the construction of bridges, abutments, tunnels, loading facilities, receiving facilities and buildings:

BDCBA River/fjord crossings

River/fjord crossings include the construction of bridges of various design types and construction materials – river bridges are normally concrete pyloned with piled bases and precast concrete beams.

BDCBB Rail crossings

Railway/road crossings may be bridged overpasses where the railway line is elevated above the road, roads may be bridged and elevated above the railway line or the crossing may simply be a crossing at the same level with security gates to allow train passage.

BDCBC Tunnels

Tunnels are normally:

- benched or full face driven through hard rocks in undulating terrain where open cutting is not considered economical,
- machine cut by rotating full-face moles where tunnels are exceedingly long and/or where materials cut are not excessively hard.

BDCBD Loading facilities

Loading facilities consist of road terminal buildings/structures and weigh scales and

- loading arms for liquids/liquid gases for discharge into tank wagons,
- storage hoppers/loading chutes for solid materials,
- other loading systems.

BDCBE Receiving facilities

Terminal buildings/structures for receiving road transported products, including such as

- discharge arms/systems for liquids/liquid gases and reticulation to storage tanks for later export,
- dumper systems for solids,
- other receiving/discharging systems.

BDCC Road completion

Road completion includes all resources and activities to complete roads after completion of road formation and civil structures, such as

- placement spreading and compaction of sub-base and base courses,
- tarmac paving with asphaltic cement,
- concrete paving,
- placement of signals and signs,
- erection of safety systems including guardrails,
- power supply and lighting and communication systems.

As outlined and coded in the following:

BDCCA Sub-base/base courses

Sub-base/base courses include the handling, transport, loading, provision of select fill material, spreading, grading and compaction of sub-base and base courses ready for paving.

BDCCB Tarmac paving

Tarmac paving is the

- handling, transport, loading and provision of asphaltic cement – asphalt paving,
- handling, transport, loading of coated sprayed asphalt binder with fine crushed rock screening covers.

BDCCC Concrete paving

Concrete paving includes

- the provision, transport, loading and placement of precast concrete road pavement elements, placed on prepared formations,
- the in-situ construction of reinforced concrete pavement in formed sections,
- the in-situ construction of reinforced concrete pavement using continual poured slab techniques with purpose built paving machines.

BDCCD Signals/signs

Signals and signs include all sign posts, automatic signal lights, guide posts, line marking and painted symbols, required to provide direction along route for safe passage.

BDCCE Safety systems

Safety systems include

- guardrails placed along roads to prevent passage away from roadways,
- precast concrete/guardrailed systems to prevent crossing to oncoming traffic lanes,
- automated traffic lights.

BDCCF Power supply and lighting

Power supply and lighting include

- connection to power supply/national grid masts/poles and aerial cabling to substations,
- roadway floodlighting masts, poles, cabling and floodlights for road illumination,
- power supply to automated traffic lights.

BDCCG Communications

Communication systems along roads: telephone sets, UHF/VHF radio and other.

BDCHD Maintenance facilities

Facilities which are required in support of road maintenance:

BDCDA Plant and equipment workshops

Workshops required for the maintenance, for such as

- repair and servicing of plant and equipment used for maintenance of roads,
- repair of safety systems/power supply and lighting systems and communication systems.

BDCDB Storage yards/warehouses

Storage yards and depots for storage of such as

- asphalt, cement, crushed rock and sand,
- storage of precast concrete paving slabs,
- outdoor storage of pipe, cable masts, etc.
- indoor storage of spare parts, machinery, tools and equipment.

BDCDC Buildings and services

Buildings and services required to house maintenance plant and equipment, such as

- garages/storage halls,
- administrative buildings,
- services required in support of foregoing.

BDCDD Permanent accommodation

Permanent accommodation including housing, quarters and amenities buildings to house road maintenance personnel.

BDD Electrical power transmission line

Onshore el. power transmission line (includes switch yard) is for electric power supply

- from power plant (e.g. gas fired) to another land based plant (battery limit is the land based plants switchboard), or to the main (national) grid,
- from power plant to offshore facilities (battery limit is the connection point in the shore approach area; shore approach is "part" of the sea cable),
- from the main grid to offshore facilities (battery limit as above) and theoretical vice versa,
- from overseas import/export via sea cable (battery limit as above) to grid/onshore plant.

For sea (power) cables, see PBS AEF and AEH. For power cables from the main grid to onshore plants, see PBS BCDB (external facilities).

The onshore el. power transmission line is subdivided and coded as outlined in the following:

BDDA Route preparation

The code for route preparation may include

- survey of corridors,
- archaeological studies and similar,
- right of way (ROW) acquisition,
- airplane/satellite photographs,
- clearing and grubbing,
- earthworks and drainage associated with route preparation,
- other relevant work which is not associated with cable trenching operations.

Bddb Trenching/culverts/backfill

Includes the following works related to buried cables:

- excavation to below grade to specified depths, of trench for later cable installation;
- installation of culverts, mattresses, pipes and similar protection;
- backfill with e.g. selected, imported fill material, to cover cable(s). Backfill with excavated materials to complete cover, ready for restoration.

For installation of cable(s) in trench, see PBS BDDDA.

BDDC Power pylons/poles

Included are power pylons/poles for overhead power lines with such as

- masts/structures,
- foundations and supports,
- insulators and other appurtenances/accessories.

BDDD Cable installation

Overland power cables may be installed underground or as overhead power lines as outlined below. Also signal/instrument cables for the el. power transmission line system (e.g. to power station) are included herein.

BDDDA In trench

The cables are rolled out from cable drums, placed underground in trench, lined, interconnected and tested.

BDDDB Above ground

For overhead power lines, the cables are installed on pylons/poles with separating elements and standard aerial markings as relevant.

BDDE Route restoration

Clean up including any earth movement and landscaping work to minimise the environmental impact of the power line.

BDDF Crossings

Crossings are constructions and particular precautions to pass barriers like

- roads,
- rails,
- rivers,
- fjords,
- ravines, etc.

Crossings often consist of bridges and tunnels as outlined below. Also included are particular precautions (and costs thereof) – compared to traditional/normal cable installation operations – to perform crossing.

Normally crossings will have more impact on/relevance for underground installations than for overhead lines.

BDDFA Road crossing

Road crossings are usually made by

- horizontal directional drilling/pressing under the road without disturbing the surface or halting the traffic,
- through preinstalled culverts,
- bridged road crossing.

BDDFB Rail crossing

Rail crossings are usually made through similar arrangements as for road crossings.

BDDFC River crossing

Depending of the crossing length, the river crossings can be made by

- horizontal directional drilling/pressing below scour level,
- suspension bridge for aerial crossing (of “original”/previous underground cable),
- piers support (of “original”/previous underground cable),
- cable installed by barges.

BDDFD Fjord crossing

Depending on the crossing length, the fjord crossings may be installed by

- barges,
- suspension bridge for aerial crossing (of “original”/previous underground cable).

Also included are particular line markings or signal systems for aeroplane warning of obstructions by the line.

BDDFE Ravine crossing

May include aerial crossing over the ravine for the “original”/previous underground cable(s), and particular crossing precautions.

BDDG Switch yard

The switch yard is the centre for control and monitoring of the power transmission line system and is subdivided and coded as follows:

BDDGA Buildings/foundations

Buildings/foundations for the switch yard include

- all earthwork,
- piling – if necessary,
- foundations/civil structures/buildings/shelters,
- architectural work and outfitting,
- heating, ventilation and sanitary systems, el. distribution and lighting systems, within battery limits (buildings),
- all other facilities/outfitting necessary to make use of the above, within battery limits,
- refill and greening after construction.

Excluded are outfitting for the control and monitoring:

BDDGB Outfitting

Includes outfitting for control and monitoring of the power line system, such as

- switchgear,
- bus ducts,
- power metering equipment,
- control units,
- signal and communication system,
- etc.

BDDH Transformers, rectifiers and converters

This code includes major electrical equipment – for particular power lines – such as

- transformers,
- rectifiers,
- converters.

The code is relevant for long distance power lines normally passing both land and sea, with electrical transformation – AC/DC – often in both ends.

Gas power stations will normally have such major electrical equipment as listed above within its battery limit (see PBS BT).

Offshore platforms supplied with electric power from land will normally have such equipment as part of the topside equipment (see PBS AA).

BE Drilling facilities

Onshore drilling facilities is subdivided as follows:

- wellhead area or wellbay area is located below the derrick/derrick substructure. The area includes wellheads, X-mas trees and manifolds for test, production and injection.
- derrick – which includes the derrick structure, derrick substructure, drillfloor, skidbeams and jacks and drillers offices. The Derrick "area" contains all structures, equipment and machinery for carrying out the drilling operation.
- mud handling – a group of systems, which store, mix, transfer, circulate, recover and treat drilling mud. The systems are also used to transport cuttings, cool drill bits and provide a dense medium to prevent blowouts.
- pipe handling – an arrangement to store, handle, move and feed conductor pipes, casing and tubing to the derrick.
- drilling utilities – essential utilities required in support of drilling operations such as power, compressed air, water, lighting and storage.

An outline and coding are given below:

BEA Wellhead

The function of the wellhead area/well pad/well site is to receive wellstream from production riser systems for further distribution to separation systems, receive and distribute treated water from water injection system for injection into reservoir(s), and receive separated gas for reinjection into reservoir(s) or gas for gas lift.

Functional systems within the area are

- drilling and well control systems,
- production systems,
- production stimulation systems,
- chemical injection systems.

Manufactured/fabricated equipment installed in or related to the area is such as

- surface wellheads,
- X-mas trees,
- emergency shut-down system,
- production manifold,
- test manifold,
- injection manifold,
- mechanical handling equipment,
- fire and safety systems,
- controls and blow-out preventer.

BEB Derrick

The drilling derrick with derrick substructure, drill floor, skid beams and jacks and drillers office are used for drilling and completion of production and injection wells and workover of completed wells: all included under this code.

The derrick is a tower/mast lattice framework structure positioned above the wellslots. The derrick supports the hoisting mechanism – crown and travelling blocks used for raising and lowering drillstrings. The travelling block is connected to the swivel/kelly, and the kelly is attached to the drillstring and turned by the rotary table. Drawworks is the hoisting winch for handling drill pipe, casing and tubing.

Fabricated/manufactured and installed machinery and equipment related to the derrick include such as

- derrick base/substructure,
- bop control,
- cathead,

- cat line,
- crown block,
- doghouse/drillers office,
- drawworks,
- drillers console,
- drilling line,
- dynamatic/hydrumatic packs,
- elevators,
- fast line,
- gin pole,
- hoisting line,
- hook,
- kelly,
- kelly bushing,
- kelly hose,
- ladders/access,
- line guides,
- derrick mast structure,
- mast lifting line,
- monkey board,
- mousehole,
- derrick piperack,
- rathole,
- reserve drilling line,
- rotary drive,
- rotary table,
- safety line,
- standpipe,
- swivel,
- swivel springs,
- tongs and travelling block.

BEC Mud handling

The systems for mud handling (mud systems) comprise of mud pumps, mud tanks, mud lines and circulating hoses. The systems through continuous circulation of mud have several functions:

- removal of drill cuttings from the drill bits;
- cool and lubricate the drill bits and plastering borehole walls;
- provide a dense medium to prevent flow of water, oil and gas into the wellbore to prevent blowouts.

Mud is a suspension of clays in water or oils, a mixture where bentonite is dosed with barite, etc. to increase density. Mud systems may be divided into

- mud preparation which includes bulk storage, distribution and mixing,
- mud pumps,
- mud recovery and treatment system,
- reserve – storage pits and hoppers.

Fabricated/manufactured and installed equipment in mud handling systems are such as

- burner boom,
- centrifuges,
- chemical dosers,
- compounds storage,
- cyclones,
- drill cuttings disposal,
- desanders/desilters,
- degassers,

- discharge lines,
- mud mixing bins/hoppers,
- mud-bulk storage,
- mud-gas separators,
- mud guns,
- mud hoppers,
- mud-lines,
- mud logging unit,
- mud mixers,
- mud mixing plant,
- mud pressure control,
- pump drivers,
- pumps – mud mixing,
- pumps – mud circulation,
- reserve pit/bins,
- sand settling bin/pit,
- shale bin/pits,
- shale shaker,
- storage-bulk (barite, etc.),
- storage-liquid mud,
- storage mud additives,
- suction lines,
- suction bin/pit,
- water storage and supporting structures.

BED Pipe handling

Pipe handling is a system adjacent to the drilling derrick used for storage, retrieving and handling of pipes and tubing. The system comprises

- piperacks for storage,
- piperack catwalk,
- ramp and associated structural components.

The system is confined to the interface with the derrick structure and handles pipe from piperacks through catwalk and up pipe ramps whereupon pipes are stacked/stored in the derrick piperack.

BEE Drilling utilities

Drilling utilities are required to support the drilling operations and comprise of such as

- accumulators,
- air compressors,
- drill tool storage,
- engine drivers,
- fuel lines,
- fuel tanks,
- power generators,
- oil and grease storage,
- tool house,
- trip tanks,
- water storage and reticulation and plant lighting.

BF Onshore wells

Wells hereunder are the facility that transports wellstream products (oil/gas/water/sand) from the sub-terrain reservoirs to the onshore surface for the purposes of petroleum exploration. The wells are subdivided and coded as follows:

BFA Drilling

Drilled wells are the result of the drilling operations. Resultant from the drilling operations is cased and cemented wells, finished to target measured depths at specific locations within the reservoir. Two types of rigs/rig functions may be used; fixed or mobile drilling rigs:

BFAA Fixed drilling rig

A fixed drilling rig is a dedicated wellsite rig where a number of wells are to be drilled. The fixed drilling rig is assembled from packages, containing all necessary functional equipment and support services.

The fixed drilling rig similar to offshore rigs is skidded, jacked over wellsite location whereupon the drilling operation begins.

BFAB Mobile drilling rig

A mobile drilling rig have the same functions as the fixed drilling rig, however the mobile unit is a completely self-contained unit with tracks or multi-rubber tyres which can be steered, manoeuvred and transported to separate locations, normally individual satellite type locations, remote from a batch drilled wellsite.

BFB Downhole completion

Preparation of a well for production after drilling (the wells are cased, cemented, serviced). Making permanent contact between the horizon completes each productive horizon "area" and the well bore, installing tubing and equipment for controlling fluid flow. Contact with each horizon may be achieved directly (barefoot) or by perforating casings.

Completions may be single or multiple completions, separate tubing is run according to the number of productive zones, performed by:

BFBA Fixed drilling rig

A fixed drilling rig dedicated as a multiple wellsite rig used for downhole completion of well(s) as described for under the code for drilling. The rig is identical, assembled from modules/units/assemblies and packages, to a fixed rig at wellsite location.

BFBB Mobile drilling rig

Mobile drilling rigs used for completion have essentially the same functions as fixed rigs as described for under the code for drilling. Essentially a completely self-contained unit with tracks or multi-rubber tyres which can be transported/manoeuvred into place for completion.

BG Temporary facilities

This code covers facilities with appurtenant services required to support workers and staff during the construction period of an onshore plant/land based installation. Temporary facilities are normally removed after plant/installation completion, and include

- construction camp,
- utility construction,
- office buildings,
- warehouses and workshops,
- communication.

As outlined under the following subcodes:

BGA Construction camp

Construction camp comprises all resources required to

- physically set-up the temporary housing, hotel, mess room and similar other building facilities which includes site preparation,

- temporary road and parking area construction,
- prefabrication and laydown area preparation,
- temporary plant and camp fencing,
- security systems and access installations.
- furniture and equipment to run a construction camp.

BGB Utility construction

Utility construction provides the temporary logistics that make a camp and construction operation possible and includes the installation of

- water supply lines,
- electrical power for camp and construction purposes,
- heating facilities,
- sewer treatment and waste disposal systems,
- other systems that must be installed to assist in construction.

BGC Office buildings

Office buildings that are required by the administration requirements of the construction activity are covered under this code.

The construction includes all civil work, complete installation of power, water, office equipment and furniture necessary to run the office. Size and quality are normally determined by the administration requirements of the owner.

BGD Warehouses and workshops

Temporary warehouse/storage facilities and workshops inclusive all constructed facilities to run this facility, like e.g. storage racks, silos, containers, fencing, overhead cranes, unloading facilities as well as workshops machinery and tools, shall be included here.

BGE Communication

Temporary telephone, telex, telefax, radio, TV or other communication means that must be installed to interconnect and connect the construction site to the public network are coded hereunder.

BK Process – hydro carbons – gas/oil

Under this code a group of major processes pertaining gas and oil are covered:

- pre-treatment and separation;
- LPG/LNG fractionation and product treatment;
- crude refining;
- LNG processing.

The processes are outlined and coded as follows:

BKA Process – pretreatment and separation

This is a brief description of the oil/gas pre-treatment and separation process, which comprises three main groups:

- receiving facilities;
- pre-treatment facilities;
- separation facilities.

As outlined below:

BKAA Receiving facilities

Receiving facilities are defined as the inlet port of an onshore plant for products being produced outside plant area. Facilities are designed for handling gaseous, liquid, a blending thereof or solid feedstock.

The segments of these facilities are very much dependent on the kind of feedstocks provided and their ways of transfer. This can either be by:

- pipelines;
- ships;
- road/rail tankers;
- or by a combination thereof.

In general these facilities include (if applicable by feedstock)

- pig receiver stations,
- slug catcher,
- pressure and temperature controls,
- buffer storage tanks,
- feed metering systems,
- feed loading arms,
- surge facilities,
- feed booster pumps, compressors.

BKAB Pretreatment facilities

The pre-treatment facilities are the subsequent systems through which any feedstock received must pass before being ready for further processing. By passing-through these systems all process (product) contaminating elements are removed from the feedstock which then is prepared to enter the separation and distillation systems in a stabilised condition. The removal of contaminating elements may entail

- H₂S/CO₂ removal,
- desalting of crude oil,
- mercury removal,
- MEG removal,
- dehydration,
- other unwanted elements.

The stabilisation systems may include for

- gas regeneration systems,
- crude stabilization facilities,
- liquid drying facilities,
- gas drying facilities,
- vaporization installations,
- other feed stabilizing elements.

BKAC Separation facilities

These facilities separate the by-components from the main-components either by a refrigeration process or by distillation. Thus NGL (natural gas liquids) is extracted from feed gas by way of various refrigeration stages. The main-component will be **lean gas**, which will be sold as **sales gas** via pipeline compression or be sent to a LNG-plant (liquefied natural gas) for liquefaction.

A typical NGL extraction plant may consist of the following:

- feed gas cooler;
- expander suction drum;
- expander;
- demethaniser feed exchanger;
- demethaniser feed separator;

- demethaniser reboiler (2);
- demethaniser side reboiler (2);
- brake compressor.

BKB Process – LPG/NGL

General description of the LPG/NGL (liquefied natural gas/natural gas liquids) fractionation and treatment process scheme: The NGL plant is designed to separate the natural gas liquid fraction of the feed gas into the following commercial products:

- ethane C_2 ;
- propane C_3 ;
- isobutane C_{4-i} ;
- normal butane C_{4-n} ;
- natural gasoline (pentane) C_{5+} .

The above process can be grouped into two major systems:

- fractionation;
- product treatment.

As outlined and coded in the following:

BKBA Fractionation

The bottom product of the demethaniser (see gas/oil pre-treatment and separation process – PBS BKAC) is fed to the fractionation plant.

The fractionation plant consists of the following systems:

- deethaniser;
- depropaniser;
- debutaniser;
- butane splitter.

Each of these systems are almost identical with respect to process and may comprise the following major equipment:

- column with tray internals;
- condensate stripper;
- reboiler;
- overhead condenser;
- reflux drum;
- reflux pumps.

In each system the most volatile hydrocarbons or the hydrocarbons with the lowest boiling point temperature are separated from the hydrocarbon mixture by distillation.

The overall pattern in a distillation column is counter-current contacting of vapour and liquid at a number of trays stacked one above the other and enclosed in a cylindrical shell to form a column. The liquid passes down the column from tray to tray and the vapour rises up through each tray causing intimate mixing of the two counter-current streams.

The liquid reaching the bottom of the column is partially vaporised in a reboiler to provide vapour flow up the column. The remainder of the bottom liquid is withdrawn as bottom product.

The vapour reaching the top of the column is condensed to liquid in an overhead condenser. Part of this cold liquid flows down the column again. The remainder is withdrawn as distillate product.

The demethaniser described under PBS BKAC, however, is only a stripping column with no reflux system.

The overall fractionation achieved between the overhead product and the bottom product depends primarily on the relative volatility of the hydrocarbons, the number of the trays and the ratio of the liquid to the vapour phase.

BKBB Product treatment

The product treatment facilities for NGL/LNG mainly consist of the following major systems:

- process refrigeration;
- process chilling and vapour recovery;
- product cooling;
- sales gas compression;
- LNG liquefaction ;
- LNG vaporisation.

The need of the above is, however, subject to the desired product outputs.

A general brief description of the above systems is:

Process refrigeration system

The process refrigeration system – having liquid propane as refrigerant – provides cooling of the NGL products (propane, n-butane and condensation of the deethaniser overhead vapour).

The system is a closed circuit system and may consist of the following major equipment:

- propane refrigeration receiver;
- high pressure propane refrigeration drum;
- medium pressure propane refrigeration drum;
- propane refrigeration compressor and turbine;
- propane refrigeration condenser;
- deethaniser;
- product chillers.

The following products need further chilling to storage temperature:

- ethane (C₂);
- propane (C₃);
- i-butane (C_{4i});
- LNG (C₁).

Product chilling and vapour recovery system

This system is designed to achieve

- the final refrigeration of ethane, propane and iso-butane products from the process train before entering the storage tanks,
- the liquefaction of vapours generated in the storage tanks and loading systems.

This refrigeration and liquefaction is achieved by an open circuit propane refrigeration system consisting of the following sections:

- propane refrigeration system (open);
- propane and iso-butane product chillers;
- iso-butane and normal butane tank condenser.

The propane refrigeration system is designed as an open circuit where propane vapour from storage and loading is used in the refrigeration cycle. The system may have the following major equipment incorporated:

- first level propane refrigeration drum;
- second level propane refrigeration drum;
- propane refrigeration vapour recovery compressors (2);
- propane condensers (2);

- propane liquid subcooler;
- propane receiver.

Product cooling system (seawater)

Generally this system is used for the bottom products of the

- debutaniser, product: natural gasoline (C5+),
- butane splitter, product: n-butane.

The system will use for example seawater as cooling medium via heat exchanger to process before sending

- gasoline to storage,
- n-butane to the product chilling system.

Sales gas compression system

The sales gas compression system is designed to provide sufficient discharge pressure for the transportation of the gas to the point of destination at required rate and pressure. It will generally consist of:

- sales gas compression drum,
- compression units (normally min. two units),
- sales gas coolers.

The sales gas is mainly methane from the NGL extraction plant (see BKAC code description) or a blending of higher boiling point gases (e.g. ethane). The gas from the process train(s) is mixed prior to entering a suction drum where any liquids – if present – are removed. The compression unit consists of:

- sales gas compressor,
- driver,
- sales gas compressor aftercooler.

During the compression phase the gas is heated up and must be cooled down by use of heat exchanger (e.g. seawater) before entering the sales gas metering section.

LNG liquefaction

There are two major LNG liquefaction processes in use:

- APCI (MCR) process,
- TELEARC process.

For a more detailed description of LNG Liquefaction, see PBS BDK.

In general the liquefaction process is a product cooling process using a multi stage cooling and vaporisation system.

LNG vaporisation

Facilities for LNG vaporisation are used in LNG import terminals and generally consists of the following alternative systems or a combination thereof depending on local situations:

- simple heat exchange with seawater or water source, such as river water or cooling tower effluent,
- gas fired vaporises most often of the submerged combustion type,
- indirect or intermediate vaporises in which vaporisation takes place in heat exchange with intermediate fluid heated by an external source.

Most LNG terminals employ a combination of seawater and gas fired vaporises with seawater vaporises used as base load sent out. Gas fired vaporises provide additional output during short-term peak demand periods as back-up in the event of interruption in operation of the seawater vaporises.

BKC Process – crude refining

The basic purpose of refining has always been to make lighter products. This brief description shall give an overview of the most applied process steps of crude oil refining to produce fuels, lubricants, asphalt and

waxes. Some of the separation methods included are for the purpose of extracting materials as feedstocks for the petro-chemical side of hydrocarbon processing.

A general summary would list the various steps of refining as follows:

- crude distillation;
- cracking;
- hydro treating;
- catalytic reforming;
- isomerisation;
- alkylation and MTBE;
- solvent refining;
- other refining processes.

The following process descriptions indicate the above steps with major systems together with their general output products, and codes:

BKCA Crude distillation

Crude distillation uses single or multiple fractionation columns to separate crude oil into fractions usually identified by boiling range. These fractions become the intermediate streams for additional downstream processing. Typically, these streams are identified as follows:

Crude oil fractions	Boiling range degrees Fahrenheit
---------------------	----------------------------------

- | | |
|-----------------|------------|
| • gases | below 80 |
| • light naphtha | 80 to 220 |
| • heavy naphtha | 180 to 520 |
| • light gas oil | 425 to 650 |
| • heavy gas oil | 610 to 800 |
| • residues | above 800 |

A crude distillation layout can be described as follows:

When only one crude distillation column is used, it is operated at atmospheric pressure. The sidestream products from this column go to smaller individual stripper columns. In the stripper columns, the lighter fractions are removed by steam and inserted back into the main column to continue their passage up the column.

The liquid from the bottom of the main column (reduced crude) can be isolated into additional fractions by adding a second stage of distillation under vacuum.

Lubricant production often requires yet a third stage also operated under vacuum.

The crude distillation unit is one of the largest users of heat in a refining scheme. A typical unit will get half of its heat from heat recovery via exchangers and the remainder from fuel fired preheaters.

Cracking converts heavy petroleum fractions into lighter, more valuable fractions. The cracking process can be divided into three main categories:

- thermal cracking (two processes):
 - coking;
 - visbreaking.
- fluid catalytic cracking;
- hydrocracking.

As outlined in the following:

BKCB Coking

This is the more severe form of thermal cracking. The feedstock is a residual, which may resist cracking by other means. In some other cases coking is used because it is a less expensive way to get more light stocks from a barrel of crude. The coke is in fact considered a by-product of the process.

Processes in use are

- delayed coking,
- flexicoking,
- LR coking,
- selective yield delayed coking (SYDEC).

Products:

Coke, gas, LPG, naphtha and gas oils.

BKCC Visbreaking

Visbreaking is the milder form of thermal cracking. It is used to reduce the viscosity of some residual fractions so that a less cutter stock is needed to meet fuel oil specifications for viscosity.

Common used processes are

- shell soaker visbreaking,
- Thervahl thermal visbreaking.

Products:

Gas, naphtha, gas oil and stable fuel oil.

BKCD Fluid catalytic cracking

Innovations which are made from time to time hold the fluid catalytic cracking (FCCU) process in the position of being the major way to convert more of a barrel of crude into lighter fuels.

The following processes are in use:

- asphalt residual treating (ART);
- heavy oil cracking (HOC);
- reduced crude conversion (RCC);
- ultra – orthoflow.

Products:

Ranging from light olefins for alkylation and polymerisation, LPG and petrochemicals to high-octane gasoline, distillates and fuel oils.

BKCE Hydrocracking

Hydrocracking processes give both cracking and hydrogenation, and can be viewed as a special extension of the hydrotreating process, which is described later.

Hydrocracking processing objective range from the production of LPG from naphtha feed to the production of gasoline, middle distillates, lube stocks, ethylene plant feedstock and high-quality catalytic cracking feedstock from very heavy feeds.

The following processes are in use:

- catalytic dewaxing (CDW);
- H oil;
- HC unibon;

- hydroconversion;
- isocracking;
- LC fining;
- mild hydrocracking;
- mild resid hydrocracking (MRH);
- residfining;
- unicracking.

Today hydrocracking and fluid catalytic cracking are companion processes whose relative sizes depend upon the crude oil being processed and the product distribution sought.

BKCF Hydrotreating

Hydrotreating may handle a variety of feeds. In all cases, the feed is combined with hydrogen and passed over a catalyst at elevated temperature and pressure. The extent of treatment depends on the nature of the feedstock, the severity of the reacting conditions and the type of catalyst. Hydrotreating can be classified into two types depending on its purpose:

- the hydrotreated stream becomes a feedstock for subsequent processes;
- the hydrotreated material is a blending stock for finished products.

For catalytic reforming hydrotreating is a must. The reforming catalyst is susceptible to poisoning by sulphur, nitrogen and metal compounds in the reformer feed. The hydrotreating processes reflect a wide range of applications in the hydrocarbon processing such as removal of sulphur, nitrogen, asphaltene and metal contaminants from atmospheric or vacuum feedstock, convert some residuum into lighter products and reduce the viscosity of the unconverted product.

The following processes are in use:

- HYVAHL hydrotreatment;
- RDS/VRDS hydrotreating;
- unionfining.

Products:

FCCU feedstock, coker feedstock, low sulphur fuel oil, middle distillate products, chemical feedstock.

BKCG Catalytic reforming

The need to increase the anti-knock quality of naphtha as a blending stock for motor fuels is the greatest single reason for installing catalytic reforming. Although a number of reactions take place during reforming, the predominant one is the dehydrogenation of naphthenes to form aromatics. Some of these aromatics are isolated to become petrochemical feedstock, but most become motor fuel blending stocks of high anti-knock quality.

Most feedstocks for reforming are hydrotreated first to remove arsenic, sulphur and nitrogen compounds (see also under hydrotreating above).

Hydrogen is a by-product of catalytic reforming. Some of it is recycled to the reformer reactor, but the majority is available for such processes as

- hydrotreating,
- isomerisation,
- manufacture of petrochemicals.

The following processes are in use:

- magnaforming;
- platforming;
- powerforming;
- rheniforming.

Products:

Premium blending components, high yield benzene or other aromatics, aviation gasoline.

BKCH Isomerisation

Somewhat like catalytic reforming, isomerisation processes also rearrange the molecular form of a feedstock while holding down the losses from cracking or condensation reactions. The process can be split into:

- Butane isomerisation:
This form of isomerisation is linked closely with alkylation (see further description). By building isomerisation and alkylation units together, each one can share common distillation equipment. The purpose of this process is to make petrochemical feedstock.
- Pentane and heavier feed isomerisation:
The most popular form of isomerisation for motor fuels is pentane and hexane isomerisation. The requirement for this process comes from the need to upgrade the anti-knock quality of the lighter portions of the fuel blend: for example pentane having a research octane rating of 62, can be converted to isopentane having a clear research octane rating of e.g. 92.

The most common processes are

- HYSOMER,
- ISOSIV,
- MOLEX,
- PENEX,
- TIP, or a combination thereof.

Products:

Increased octane rating C₅/C₆ fraction.

BKCI Alkylation

These processes combine isobutane with light olefins (propylene, butylene and occasionally amylene) to produce a branched and chained paraffinic fuel that is generally the best motor octane component of a gasoline pool.

The alkylate is a high quality motor fuel having excellent octane qualities. With proper feed pre-treatment and the use of proprietary acid additive, unleaded, high octane ratings can be produced, depending on feedstock, operation conditions and reactor configuration.

Most applied processes are

- cascade sulphuric acid alkylation,
- effluent refrigeration,
- HF alkylation,
- H₂SO₄ alkylation.

Products:

Motor and/or aviation blending stock.

BKCJ MTBE (methyl tertiary butyl ether)

The purpose of these processes is to manufacture the gasoline octane enhancer MTBE from methanol and isobutene.

Isobutane concentrate with fresh and recycle methanol is fed to reactors containing ion exchange resin. The isobutene concentrate can be mixed with olefins from an FCCU or steam cracker operation, as well as on-

purpose isobutene from an isobutane dehydrogenation process. The reactor operates in the liquid phase under mild temperature and pressure. High purity MTBE is removed as a bottom product from the MTBE fractionator. A methanol fractionator ensures high recovery. Process provides residual butene stream suitable without further treatment to charge directly to an alkylation or polymerisation unit.

Processes in use are

- MTBE,
- ETHEROL.

Product:

MTBE

When SOLVENT REFINING separation of petroleum fractions is mentioned, it is common to think in term of some form of fractional distillation. Yet there is another form of separation that is vital to modern processing: SOLVENT REFINING. These processes separate petroleum fractions – or remove impurities – on the basis of materials having different relative solubility in particular solvents. There are as many processes available as there are solvents, which shall not be described in full herein. The following major areas are briefly covered:

- deasphalting;
- treating;
- wax/oil separation;
- lube treatment.

These are outlined and coded as follows:

BKCK Deasphalting

Application:

Solvent extraction to recover processible heavy oil from vacuum residues.

Description:

Residual oil (generally at vacuum tower bottom) is charged to an extractor and contacted counter-currently by solvent. The rich solvent containing the extracted, demetallized oil (DMO) product is taken from the top of the extractor while the raffinate, comprising asphalt and dissolved solvent, flows from the extractor bottom. The raffinate stream is heated and sent to the asphalt separator from which flashed solvent is condensed and directed to a solvent surge drum. The stripper bottom stream is an asphalt product, which is sent to fuel oil blending, asphalt blending or other uses.

Several processes are in use:

- Demex;
- low-energy-deasphalting (LEDA);
- residue solvent refining (RSR);
- rose supercritical fluid technology;
- solvent deasphalting.

Products:

Refined oil for further processing, FCCU (fluid catalytic cracking unit) feedstock, resins and various asphalt.

BKCL Treating

Application:

These processes are designed to remove entrained caustic and water haze from gasoline, naphthas and distillates, and also to remove acids monoalkyl sulphates from sulphuric acid alkylate. The general way of treating feedstreams is via:

- electrical distillate treating
- electrofining

Products:

Bright, haze-free stock without solids suspension.

BKCM Wax/oil separation

Application:

To remove wax from either distillate or residual stocks from any crude source in the raw or refined stage using a solvent process.

Description:

The process involves the crystallisation of wax or a selected portion of the wax contained in a waxy concentrate, in the presence of a substantial amount of solvent. The solid wax is separated from the liquid phase by filtration at a temperature suitable for the desired degree of fractionation.

Processes in use are e.g.:

- MIBK wax deoiling
- solvent dewaxing
- wax fractionation

Products:

Dewaxed oils with pour points closely approaching the dewaxing processing temperature, plus slack waxes with max 10 % dewaxed oil content.

BKCN Lube treatment

Application:

Upgrade raw paraffinic or naphthenic lubricating oil stocks for: viscosity index, colour, carbon residue, sulphur, additive response and oxidation stability, or for the solvent extraction of diesel fuel oils, burning oils, cracking stocks and cycle oils to remove materials having low cetane number as well as such undesirable materials as unstable compounds of acid, sulphur, organometallics and nitrogen.

Processes are e.g.:

- furfural refining
- MP refining
- lube isocracking
- percolation filtration

Products:

High-quality distillate oil and bright stock raffinates suitable (after dewaxing, if paraffinic) for blending into high motor oils and industrial products, plus an aromatic extract by-product stream.

Other refining processes:

There are a variety of other processes, which prepare feedstock for further conversion or improve the quality of final products. Sweetening denotes that mercaptan sulphur compounds are removed from refinery the stream, or else the mercaptans are converted to less objectionable disulphide compounds. Some of the solvent refining processes accomplishes sweetening. But there are also other groups of processes that use a fixed bed of absorbents to sweeten a stream. Other processes, which are included under this last BKC section, are

- grease production,
- asphalt blowing,

- coke calcining.

These processes are outlined and coded as follows:

BKCO Grease production

Application:

Manufacture of optimum quality lubricant greases.

Description:

Oil is charged to a contactor and soap ingredients added. Saponification is conducted as temperature increases to a preset maximum. Time cycles of only 30 minutes are required to complete saponification. Excess water is removed simultaneously by a knock-out drum in a vacuum system. Remainder of oil and additives are then charged into a contactor where grease is cooled and finished to specification.

Products:

Lubricant greases: conventional lithium, calcium, sodium, barium, aluminium, and mixed based: non-soap (clay) and complex-soap products.

BKCP Asphalt blowing

Application:

To obtain various types of bitumen with minimum thermal susceptibility.
Charge: vacuum asphaltic residuum.

Description:

When hot feed is directly taken from a vacuum unit, the feedstock is cooled to reaction temperature by a steam generation system. The cooled feed enters the oxidiser column on a continuous basis. The asphalt level of the feed increases within the oxidiser, depending on the air addition rate and the reaction temperature. The resulting oxidised bitumen is continuously siphoned to a surge drum, and after cooling again within the steam generation system, the product is discharged to storage.

Product:

Various types of asphalt having minimum thermal susceptibility and higher softening points than can be obtained by distillation for a given penetration.

BKCQ Coke calcining

Application:

Produce calcined coke from raw petroleum coke.

Description:

Moist raw (green) coke is dried by indirect preheating and fed to a refractory lined rotary kiln calciner. The kiln is inclined and the rotation speed variable. The calcined coke is then charged to a rotary cooler that is indirectly cooled by water. The process is under subatmospheric pressure to avoid uncontrolled emissions.

Products:

Regular calcined coke used for the production of anodes for aluminium smelters or calcined needle coke used to manufacture graphite electrodes.

BKD Process – LNG (liquefied natural gas)

The conversion of natural gas at ambient temperature to liquid at atmospheric pressure requires the removal of heat at progressively lower temperatures. The heat removed is rejected to the surroundings, i.e. cooling water or ambient air.

Techniques to accomplish this in a continuous manner include:

- heat exchange with an external vaporizing refrigerant,
- pressure expansion of the process fluid producing a Joule-Thomson cooling effect,
- performance of external work by the process fluid through an expansion engine.

Liquefaction processes of commercial importance for base load plants use an external, closed loop refrigerant process to achieve liquefaction. Supplemental refrigeration is obtained from the Joule-Thomson cooling effect or the performance of external work through an expansion engine during pressure reduction from feed gas conditions to LNG storage condition.

Two major categories of refrigerant type process used in existing base load LNG plants are:

- cascade cycles using several, single component refrigerants at progressively lower temperature levels,
- mixed-refrigerant cycles using a mixture of hydrocarbons and nitrogen in a single refrigeration circuit.

Several variations of the mixed refrigerant process have been developed to increase thermodynamic efficiency and improve design flexibility without increasing capital investment, such as:

- single pressure, all mixed refrigerant process,
- dual pressure, mixed refrigerant process,
- propane precooled, mixed refrigerant process,
- double (dual cycle) mixed refrigerant process.

The most successful process design has been a propane precooled, mixed refrigerant process.

A LNG process plant will combine the following facilities:

- pre-treatment/separation (already described under PBS BKA) incorporating:
 - feed metering and condensate stabilization;
 - H₂S/CO₂ removal;
 - dehydration;
 - mercury removal.
- LPG/NGL fractionation (already described under PBS BKB) incorporating:
 - deethanizer;
 - de-propanizer;
 - debutaniser.
- LNG liquefaction (PBS BKD).

Process description:

Assuming prior removal of acid gases and water, the liquefaction process is described as follows: Precooling and partial condensation of the natural gas in heat exchangers with multiple levels of propane refrigeration to -34°C, and then hydrocarbon distillation in the scrub column. Liquefaction and subcooling of the precooled, light hydrocarbon feed gas by means of heat exchange with a recalcitrating, multi-component refrigerant stream composed of nitrogen, methane, ethane and propane. This is further outlined and coded below:

BKDA Precooling step

Includes single/multi-component refrigeration for recovery of a portion of the light hydrocarbons (methane, ethane, propane) for subsequent fractionation and use as refrigerant makeup.

BKDB Heavy hydrocarbon extraction and stabilization

Includes removal of the aromatic and heavy carbon fractions, which could freeze out on subsequent pressure letdown to storage.

The bottom stream from the heavy hydrocarbon removal column is fractionated and stabilised to produce refrigerant make-up, LPG and condensate. LPG is sent to storage.

BKDC Liquefaction/sub-cooling

Includes multi-component liquefaction for liquefaction and subcooling of the precooled, light hydrocarbon feed gas, and may include pressure letdown prior to storage.

The LNG may then be directly sent to storage (depending on feedstock/product specification). Butane and gasoline as by-product of the fractionation process may be stored or alternatively used as fuel.

BKDD Nitrogen removal

The liquefied feed gas may need nitrogen removal (reduction) depending on sales gas specification. After the nitrogen removal the LNG – normally at $\pm 163^{\circ}\text{C}$ – will be sent to storage.

BKDE Refrigerant make-up

In this process-step the refrigerant is taken from the heavy hydrocarbon extraction part (PBS BKDB), treated and redelivered to the precooling step (PBS BKDA) and to liquefaction/subcooling (PBS BKDC).

BM Process – alcohol**BMA Methanol**

Basics:

Methanol (methylalcohol) is the most important alcohol for industrial use. Methanol is a neuter, colourless and toxic fluid with a characteristic smell. It is generally produced from synthesis gas.

Production levels:

The production of methanol is in principle following the below listed steps though there are different process arrangements available to achieve the final product:

- receive synthesis gas/natural gas;
- remove sulphur;
- catalytic reforming;
- enrich with CO_2 ;
- compression;
- methanol synthesis;
- distillation.

Product: Methanol

Applications:

Methanol's importance is found in the use of synthesis of formaldehyde, as a general dissolvent and as an additive to fuels which gains higher octane numbers and cleaner exhausts against the disadvantages of reduced heating value. Methanol is also of increasing importance to the production of fermented protein production.

Process description

Objective: To produce methanol from light end hydrocarbon feedstocks (either primarily C₁s or a C₁ – C₃ paraffinic blend) using steam reforming followed by low-pressure synthesis. The following different process steps are distinguished as follows:

BMAA Receiving, desulphurisation and mercury removal

The feed gas received at the battery limits is passed through a knockout drum and a mercury removal vessel. The hydrogen sulphide in the feed gas would poison the reforming and synthesis catalyst. Therefore the process stream must be preheated (as required by the desulphuriser) in the convection section of the primary reformer furnace and passed through the desulphuriser who contains zinc oxide catalyst. Sulphur is removed. Should it be necessary that other impurities, which are toxic to catalyst, must be removed, such provisions will be taken care of under this code.

BMAB Catalytic reforming and synthesis gas compression

A primary reformer is all that is needed to convert the desulphurised natural gas to synthesis gas.

Desulphurised gas is mixed with steam in the convection section of the furnace, then distributed to the catalyst tube of the radiant section of the reformer. The synthesis gas then is cooled in a heat recovery train consisting of high-pressure steam generation, high pressure boiler feed water preheat and deaerator feed water preheat. Once the raw synthesis gas has been cooled, process condensate is separated and the gas is compressed to the synthesis loops operating pressure by a make-up gas compressor.

BMAC Methanol synthesis

The compressed gas leaving the make-up compressor is blended with recycle gas coming from a recirculation compressor. It will be preheated to the proper synthesis temperature in a process-to-process interchanger. Process feed from the interchanger then goes directly to a multibed intercooled methanol converter system.

The two principal reactions occurring in the reactors are

- methanol synthesis,
- reverse water-gas shift.

The converter effluent (such as ethanol, butanol and other traces of impurities) preheats incoming feed before passing on to a cooler and catchpot where crude methanol is filtered through wax strainers to remove small amounts of waxy paraffin and will then be separated from dissolved gases. These are recycled. The crude methanol is fed directly to the purification section. Caustics may be injected in order to neutralise the trace amounts of organic acids.

BMAD Product purification

The crude methanol product is passed on to a distillation train. In the first column all remaining dissolved gases are removed as well as any light ends formed in the converter system. (Such may be acetone, methylformate and non-condensable gases like hydrogen, methane, carbon dioxides and nitrogen).

The de-gassed methanol is then fed to a refining column where either A (95 % pure) or AA (>99.5 % pure) grade methanol is withdrawn as a side stream very near the top of the column. Higher alcohols present are withdrawn as a side stream further down the column and water formed in the synthesis reaction is removed from as a bottom product. The pure methanol product is then routed after down cooling to storage.

BN Process – gas to liquids

BNA Receiving facilities/feed gas treatment

BNB Oxygen production

BNC Synthesis gas production

BND Fischer-Tropsch synthesis

BNE	Separation/upgrading
BQ	Process – bioprotein
BT	Process – electrical power generation
BTA	Receiving facilities
BTB	Catalytic reforming
BTC	Power plant
BTD	NO_x removal
BTE	CO₂ recovery plant
BTEA	Pretreatment
BTEB	Separation
BTDC	Compression/drying

5 SAB – standard activity breakdown

Introduction to SAB code structure

SAB – standard activity breakdown

This hierarchical breakdown code structure provides a timescale attribute for use primarily when preparing phased cost estimates, but also for estimate presentation and cost reporting.

This section of the SCCS manual provides SAB codes and code names.

The SAB code defines all resources necessary for the planning and execution of an oil and gas project/facility. The resources have been grouped as follows:

- management
- engineering
- procurement
- construction
- operations
- unit work
- general

With introduction of the SAB code prefix and some new codes, this SAB edition opens up for use in all phases of oil and gas facilities development, i.e. from field exploration to facilities removal.

SAB – phase prefix

E	exploration
P	planning
D	development
O	operation
S	shutdown and decommissioning
R	removal

Exploration phase is defined from point of time when block/area is assigned to company

Planning phase is defined from point of time when an oil or gas field is declared commercial

Development phase is defined from point of time for licensee's acceptance of development concept

Operation phase is defined from point of time for regular start-up of production

Shutdown and decommissioning phase is defined from point of time when operator submits schedule for shutdown of wells

Removal phase is defined from point of time when operator confirms current concept for removal of field installations

1 Management

Management contains both owners' personnel and Contracted personnel required to provide project and construction management during the realisation phase of projects, i.e. from approval of development plans to handover to production and operations organisations for production of resources.

11 Project management

Project management (home office) includes both company and contracted personnel, primarily senior level managers and project support/service functions not directly engaged with management at dedicated construction sites. This will include project control, engineering supervision and public relation activities.

12 Construction management

Construction management (site teams) includes company and contracted staff required to monitor, control, and verify the construction of facilities.

Construction management typically involves the establishment of site teams after award of contracts, through the period of prefabrication, fabrication, construction, installation/assembly, pre-commissioning to handover to:

- other sites for incorporation/integration,
- commissioning and handover to production and operations personnel.

13 External services

Management services are costs for services rendered to company to carry out discrete work activities under separate agreements with owner's management though related to the projected scope of work.

2 Engineering and procurement

21 Engineering

This activity represents the different phases of engineering design activities typical of development project realisation.

211 Pre-engineering

This activity consists of preliminary design engineering activities after the approval of plans for development and operation by statutory authorities and initiates the first phase of project realisation. Pre-engineering leads through to a design basis and project execution plan sufficient for design engineering activities to commence. Different strategies and terms may be adopted by different operating organisations such that pre-engineering may be termed basic engineering, extended conceptual engineering or other.

212 Design engineering

This activity continues from the design basis developed during pre-engineering in accordance with the project execution plan. The design engineering function is required to prepare all technical and functional definition required and sufficient to enable tendering for defined work scope and subsequently construct parts or complete facilities. (See definitions under COR – Engineering).

213 Fabrication engineering

This activity continues after design engineering during the fabrication/construction period and ends with the final commissioning and start-up of facilities/plants. Activities include resolving changes during project realisation, as-built documentation, prepare for start-up and handover to production and operations organisations.

22 Procurement

This activity consists of purchasing and contracting, expediting and inspection for the supply of all process, utility and support equipment, bulk material and services contracts as required.

23 Construction supervision

Construction supervision relates to personnel required to supervise, control, co-ordinate, monitor construction and ensure conformity to design specifications and drawings for contracts including fabrication and construction.

3 Material deliveries

31 Equipment

The procurement of all permanently installed process, utility and support equipment at or on facilities. Equipment procurement is divided into:

- company provided equipment;
- «free issue» to contractors;
- contractor provided equipment;
- forming part of contractors' contract for supply.

311 Company provided equipment (see COR E)

Process, utility and support equipment procured by company for «free issue» to contractors for installation/assembly/erection at/on or in facilities.

Such equipment includes;

- long-lead time equipment, purchased by company prior to award of construction/fabrication contracts,
- special equipment that may not be readily available or which may have to be specially developed,
- equipment «off-shelf» normally purchased by company for «free issue».

312 Contractor provided equipment

Process, utility and support equipment to be procured by contractor and forming a part of the contract with company. May form a part of an EPC contract or a turnkey contract with company.

313 Surplus equipment

Process, utility and support equipment procured by company or contractor for installation/assembly/erection at/on or in facilities and which for any reason has not been used during the construction and will not be used for project spare purposes.

32 Bulk (see COR B)

Bulk material includes the purchase of all bulks required to fabricate/construct facilities. Includes both permanently and temporary installed bulk materials. Also includes civil/buildings materials.

321 Company provided bulk

Bulk material specified, and purchased by company as «free issue» to fabricators/contractors/constructors.

Includes also civils/buildings materials.

322 Contractor provided bulk

Bulk material purchased by contractors/fabricators/constructors outwit «free issue» bulk material, forming part of EPC, turnkey, fabrication and construction contracts with company. Contractor provided bulk might also include bulk material ordered under frame/blanket agreements between company and suppliers/vendors. Also includes civil/buildings materials.

323 Surplus bulk

Bulk material specified, and purchased by company or contractor, which for any reason has not been used during the construction and will not be used for project spare purposes.

33 Spare parts

This code includes both capital spares and commissioning spares.

Capital spares are spare parts for equipment and machinery installed in the constructed facilities, typically spares for the first years of operation.

Commissioning spares are spares used during testing and commissioning of the constructed facilities.

4 Construction

Construction activities may be carried out onshore, atshore, inshore or offshore.

Construction includes:

- mobilization/demobilization,
- prefabrication of components,
- fabrication/assembly/erection/hook-up of buildings/modules/units/preassemblies,
- civil work,
- modification to facilities,
- precommissioning/commissioning,
- start-up of facilities/plants,
- particular abandonment operations and removal of facilities,
- abandonment and removal.

41 Onshore construction

All construction activities carried out at an onshore location, site, workshop or yard in order to construct/fabricate parts of or complete facilities/plants.

411 Mobilisation

Mobilisation/demobilisation is the establishment of an onshore site such that the site is ready to receive personnel, materials and construction equipment in order to carry out civil works, construction and fabrication.

412 Civil work

Civil works are all activities related to the construction of

- roads,
- bridges,
- crossings,
- railway,
- earthworks,
- structural excavation,
- concrete structures,
- dams,
- ponds,
- basins
- sewage systems and reticulation,
- water supply treatment and reticulation.

Includes supervision, plant and equipment, labour, services, etc., to complete civil works ready for installation of prefabricated units/modules and the installation/assembly/erection of plant/facilities.

413 Fabrication of major assemblies and modules

Onshore fabrication (construction) of major assemblies includes prefabrication of

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,
- etc.,

at different locations and installation/assembly/erection (field erection) after delivery at fabrication/construction sites.

Major assemblies are to be understood as assemblies with a weight in excess of the capacity of the platform cranes for offshore platforms. Typically, assemblies which weigh more than 50 tonnes.

4131 Prefabrication

Onshore fabrication of

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,
- etc.,

at different locations for later installation/assembly/erection (field erection) into complete assemblies/facilities.

4132 Installation/assembly/erection

Onshore integration of prefabricated

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,
- etc.,

into parts of, or mechanically completed major assemblies/modules.

414 Other fabrication

Other fabrication includes onshore prefabrication of

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,

- etc.,

at different locations and installation/assembly/erection (field erection) after delivery at fabrication/construction sites.

4141 Prefabrication

Onshore prefabrication in this category includes prefabrication of

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,
- etc.,

at different locations for later installation/assembly/erection (field erection).

Prefabrication hereunder also include onshore prefabrication for later integration (installation/assembly/erection) offshore.

4142 Installation/assembly/erection

Onshore integration of prefabricated

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures,
- etc.,

into parts of, or mechanically completed assemblies. Integration and hook-up work is included hereunder.

415 Modification

Modification work includes conversion of existing facilities to perform other functions than those originally intended, or to make place for installation and integration of new modules.

The modification activities include:

- stripping/dismantling of existing – structures/equipment/machinery and associated installed bulk to make place for refitting/replacement/new modules;
- refitting – installation of equipment and bulk conforming to revised design specifications and requirements;
- revamp – expanding/debottlenecking/modifying/renewing existing structures/equipment/machinery and associated installed bulk to increase performance and production throughput;
- relocate – relocation of existing structures/equipment/machinery and associated installed bulk.

4151 Stripping/dismantling

Stripping/dismantling includes the permanent removal of existing – structures/equipment/machinery and associated installed bulk – to provide space for installation of new modules or new/refurbished equipment and bulk.

4152 Refitting

Refitting includes the installation of equipment and bulk conforming to the engineering design and specifications for the refitted materials.

4153 Revamp

Revamp includes changes to existing structures/equipment/machinery and associated installed bulk in order to increase performance or throughput by either expanding, debottlenecking, modification or renewal of systems within facilities/plants/platforms.

4154 Relocate

Includes relocation of existing structures/equipment/machinery and associated installed bulk in order to provide space for installation of new assemblies or equipment and bulk.

416 Vendor assistance

Includes all activities onshore associated with the provision of vendor assistance required and related to procured equipment and material. These activities, vendor representatives, are often covered for under agreements for technical services (ATS).

417 Commissioning

Commissioning includes

- commissioning,
- start-up.

Commissioning is carried out after plant/facility systems are mechanically completed. Each system is tested under actual or simulated conditions for conformance to technical and functional requirements. Commissioning is progressively completed according to system priorities.

Some systems are required to be completed prior to habitation:

- safety and personnel evacuation;
- emergency power;
- mechanical handling;
- parts of the utility systems.

Whereas hydrocarbon systems are commissioned at location with wellstream product.

4171 Commissioning

Commissioning includes system testing under actual or simulated conditions to conform to technical and functional performance requirements.

Commissioning is carried out according to priorities for offshore platforms:

- safety and personnel evacuation;
- emergency power;
- mechanical handling.

Parts of the utility systems are commissioned prior to habitation.

Hydrocarbon systems are commissioned at offshore location.

For land based plants/facilities all systems are commissioned progressively.

4172 Start-up

Start-up for production and operations follows immediately after all systems are commissioned conforming to performance requirements and are progressively handed over to the production and operations organisations for commercial production.

418 Weighing, seafastening and load-out

This category shall comprise all activities such as labour, supervision and administration that can be associated with the control of weight of components, modules or materials, equipment and or other built-ins.

Commissioning includes

- commissioning,
- start-up.

Commissioning is carried out after plant/facility systems are mechanically completed. Each system is tested under actual or simulated conditions for conformance to technical and functional requirements.

Commissioning is progressively completed according to system priorities.

Some systems are required to be completed prior to habitation:

- safety and personnel evacuation;
- emergency power;
- mechanical handling;
- parts of the utility systems.

Whereas hydrocarbon systems are commissioned at location with wellstream product.

418 Weighing, seafastening and load-out

This category shall comprise all activities such as labour, supervision and administration that can be associated with the control of weight of components, modules or materials, equipment and or other built-ins.

42 Atshore construction

All construction activities carried out at an atshore location in water adjacent to a yard/site or quay linked with personnel access bridges/gangways from land to topside facilities or substructures.

421 Mobilisation

Mobilisation/demobilisation is the establishment of an atshore site such that the site is ready to receive personnel, materials, and construction equipment in order to carry out civil works construction, fabrication, modifications and complete atshore hook-up and commissioning.

422 Civil work

Civil works are all activities related to the construction of

- roads,
- paving,
- bridges,
- crossings,
- earthworks,
- excavations,
- foundations,
- piling,
- dredging,
- concrete support structures,
- sewage systems and reticulation,
- water supply and reticulation.

Includes supervision, plant and equipment, labour, services etc. to complete civil works ready for atshore construction.

423 Activities related to major assemblies

Atshore construction activities which relates to major assemblies. This category includes atshore installation, hook-up and completion of modules/major assemblies.

Major assemblies are to be understood as assemblies with a weight in excess of the capacity of the platform cranes for offshore platforms. Typically, assemblies which weigh more than 50 tonnes.

4231 Prefabrication

Atshore prefabrication related to major assemblies.

4232 Installation/assembly/erection

Atshore integration of prefabricated elements into completed assemblies/modules

424 Other fabrication activities

Other fabrication hereunder is related to atshore fabrication of assemblies weighing less than 50 tonnes. Assemblies that may be handled by the platform cranes.

4241 Prefabrication

Atshore prefabrication.

4242 Installation/assembly/erection

Atshore installation/assembly/erection of prefabricated elements. This category includes hook-up work.

425 Modification

Modification work includes atshore conversion of existing facilities to perform other functions than those originally intended, or to make place for installation and integration of new modules.

The modification activities include:

- stripping/dismantling of existing – structures/equipment/machinery and associated installed bulk to make place for refitting/replacement/new modules;
- refitting – installation of equipment and bulk which is conforming to new design specifications and requirements;
- revamp – expanding/debottlenecking/modifying/renewing existing structures/equipment/machinery and associated installed bulk to increase performance and production throughput;
- relocate – relocation of existing structures/equipment/machinery and associated installed bulk.

4251 Stripping/dismantling

Stripping/dismantling includes the removal of existing – structures/equipment/machinery and associated installed bulk – to provide space for installation of new modules or new/refurbished equipment and bulk.

4252 Refitting

Refitting includes the installation of equipment and bulk conforming to the engineering design and specifications for the refitted materials.

4253 Revamp

Revamp includes changes to existing structures/equipment/machinery and associated installed bulk in order to increase performance or throughput by either expanding, debottlenecking, modification or renewal of systems within facilities/plants/platforms.

4254 Relocate

Includes relocation of existing structures/equipment/machinery and associated installed bulk in order to provide space for installation of new assemblies or equipment and bulk.

426 Vendor assistance

Includes all activities atshore associated with the provision of vendor assistance required and related to procured equipment and material. These activities, vendor representatives, are often covered for under agreements for technical services (ATS).

Hydrocarbon systems are commissioned at offshore location.

427 Commissioning

Commissioning atshore includes system testing under actual or simulated conditions to conform to technical and functional performance requirements.

Commissioning is carried out according to priorities for offshore platforms:

- safety and personnel evacuation;
- emergency power;
- mechanical handling.

Parts of the utility systems are commissioned prior to habitation. Hydrocarbon systems are commissioned at offshore location.

43 Inshore construction

All construction activities carried out at an inshore location, including a sheltered deepwater location where inshore mating and subsequent, inshore hook-up and commissioning take place.

431 Mobilisation

Mobilisation/demobilisation is the establishment of an inshore site such that the site is ready to receive personnel, materials, construction equipment in order to carry out civil works construction, fabrication, modifications and complete inshore hook-up and commissioning.

432 Civil work

Civil works are all activities related to the construction of or expansion of construction camps and facilities in support of the inshore hook-up and commissioning activities.

433 Activities related to major assemblies

Inshore construction activities which relates to major assemblies. This category includes inshore installation, hook-up and completion of modules/major assemblies.

Major assemblies are to be understood as assemblies with a weight in excess of the capacity of the platform cranes for offshore platforms. Typically, assemblies which weigh more than 50 tonnes.

4331 Prefabrication

Inshore prefabrication related to major assemblies.

4332 Installation/assembly/erection

Inshore installation/assembly/erection of major assemblies/modules.

434 Other fabrication activities

This category of inshore fabrication (construction), which is not related to major assemblies, includes

- prefabrication of parts,
- sections,
- spools,
- skids,
- preassemblies
- units,
- structural infill as required,

which form part of inshore hook-up materials, which are installed/erected/placed after mating of substructures/hulls.

4341 Prefabrication

Fabrication of

- parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures as required.

For installation/integration at inshore location.

4342 Installation/assembly/erection

Integration of prefabricated

- hook-up parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures, etc.,

as applicable at the inshore location.

Inshore hook-up is included hereunder.

435 Modification

Inshore modification work includes conversion of existing facilities to perform other functions than those originally intended, or to make place for installation and integration of new modules.

The modification activities include;

stripping/dismantling of existing – structures/equipment/machinery and associated installed bulk to make place for refitting/replacement/new modules.

refitting – installation of equipment and bulk which is conforming to revised design specifications and requirements.

revamp – expanding/debottlenecking/modifying/renewing existing structures/equipment/machinery and associated installed bulk to increase performance and production throughput.

relocate – relocation of existing structures/equipment/machinery and associated installed bulk

4351 Stripping/dismantling

Stripping/dismantling includes the removal of existing – structures/equipment/machinery and associated installed bulk – to provide space for installation of new modules or new/refurbished equipment and bulk.

4352 Refitting

Refitting includes the installation of equipment and bulk conforming to the engineering design and specifications for the refitted materials.

4353 Revamp

Revamp includes changes to existing structures/equipment/machinery and associated installed bulk in order to increase performance or throughput by either expanding or modifying the existing systems of the facility.

4354 Relocate

Includes relocation of existing structures/equipment/machinery and associated installed bulk in order to provide space for installation of new assemblies or equipment and bulk.

436 Vendor assistance

Includes all activities inshore associated with the provision of vendor assistance required and related to procured equipment and material. These activities, vendor representatives, are often covered for under agreements for technical services (ATS).

437 Commissioning

Commissioning is carried out after plant/facility systems are mechanically completed. Each system is tested under actual or simulated conditions for conformance to technical and functional requirements. Commissioning is progressively completed according to system priorities.

Some systems are required to be completed prior to habitation:

- safety and personnel evacuation;
- emergency power;
- mechanical handling;
- parts of the utility systems,

whereas hydrocarbon systems are commissioned at location with wellstream product.

44 Offshore construction

All construction activities carried out at an offshore location after installation of the facilities.

Activities include mobilisation, civil works, fabrication, modifications and commissioning.

441 Mobilisation

Mobilisation/demobilisation is the establishment offshore such that the facility is ready to receive personnel, materials, construction equipment in order to carry out civil works, construction, fabrication, modifications and complete offshore hook-up and commissioning.

442 Civil work

All construction related to offshore loading terminals (artificial islands) connected to land by approach trestles or separate strongpoint offshore loading wharfs/loading terminals. Activities include civil work construction; bottom preparation, erosion protection, piling, headstocks, concrete caissons, precast concrete road beams. It does not include mechanical installations.

443 Activities related to major assemblies

Offshore construction activities which relates to major assemblies.

This category includes offshore installation, hook-up and completion of modules/major assemblies.

Major assemblies are to be understood as assemblies with a weight in excess of the capacity of the platform cranes for offshore platforms. Typically, assemblies which weigh more than 50 tonnes.

4431 Prefabrication

Offshore prefabrication related to major assemblies.

4432 Installation/assembly/erection

Offshore installation/assembly/erection of major assemblies/modules.

444 Other fabrication activities

This category of offshore fabrication (construction), which is not related to major assemblies, includes

- prefabrication of parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structural infill as required,

which form part of offshore hook-up materials, which are installed/erected/placed after mating of substructures/hulls or form part of offshore integration in case of a facility modification.

4441 Prefabrication

Offshore prefabrication

4442 Installation/assembly/erection

Integration of prefabricated

- hook-up parts,
- sections,
- spools,
- skids,
- preassemblies,
- units,
- structures, etc.

As applicable at the offshore location. Offshore integration and hook-up is included hereunder.

445 Modification

Offshore modification work includes conversion of existing facilities to perform other functions than those originally intended, or to make place for installation and integration of new modules.

The modification activities include;

stripping/dismantling of existing – structures/equipment/machinery and associated installed bulk to make place for refitting/replacement/new modules.

refitting – installation of equipment and bulk which is conforming to revised design specifications and requirements.

revamp – expanding/debottlenecking/modifying/renewing existing structures/equipment/machinery and associated installed bulk to increase performance and production throughput.

relocate – relocation of existing structures/equipment/machinery and associated installed bulk

4451 Stripping/dismantling

Stripping/dismantling includes the removal of existing – structures/equipment/machinery and associated installed bulk – to provide space for installation of new modules or new/refurbished equipment and bulk.

4452 Refitting

Refitting includes the installation of equipment and bulk conforming to the engineering design and specifications for the refitted materials.

4453 Revamp

Revamp includes changes to existing structures/equipment/machinery and associated installed bulk in order to increase performance or throughput by either expanding or modifying the existing systems of the facility.

4454 Relocate

Includes relocation of existing structures/equipment/machinery and associated installed bulk in order to provide space for installation of new assemblies or equipment and bulk.

446 Vendor assistance

Includes all activities offshore associated with the provision of vendor assistance required and related to procured equipment and material. These activities, vendor representatives, are often covered for under agreements for technical services (ATS).

447 Commissioning

Commissioning is carried out after plant/facility systems are mechanically completed. Each system is tested under actual or simulated conditions for conformance to technical and functional requirements.

Commissioning is progressively completed according to system priorities.

Some systems are required to be completed prior to habitation:

- safety and personnel evacuation;
- emergency power;
- mechanical handling;
- parts of the utility systems,

whereas hydrocarbon systems are commissioned at location with wellstream product.

4471 Commissioning

Commissioning includes system testing under actual conditions to conform to technical and functional performance requirements and specifications.

4472 Start-up

Start-up for production and operations follows immediately after all systems are commissioned conforming to performance requirements and are progressively handed over to the production and operations organisations for the commercial production.

448 Non-working hours (lunch, standby, etc.)

This offshore category includes lunch, standby and other non-productive activities.

5 Operations

Operations are activities related to

- heavy lifting,
- heavy transport,
- pipelaying,
- surveying,
- field installation,
- cable laying,
- logistics,
- support,
- drilling,
- removal.

51 Land based operations

Land based operations include activities related to lifting, transport and other land based machine operations.

511 Lifting

Lifting operations carried out by specialised contractors, may include quayside offloading of modules/units/assemblies delivered by vessels or may further include heavy lifts required at onshore site by means of jacking towers, mobile cranes, etc.

512 Transport

Includes multi rubber tyred vehicles for heavy transport from receiving locations to site(s), and all other intermediate transport activities on site from storage to place of erection.

513 Pipeline operations

This code includes operations/activities related to land based pipelines such as

- pipelaying,
- trenching and backfilling for pipelines,
- crossing of barriers,
- tie-in of pipelines,
- pipeline RFO.

514 Cable operations

This code includes operations/activities related to land based cable such as

- cable laying,
- trenching and backfilling for cables,
- crossing of barriers,
- tie-in of cables.

515 Other land based operations

Includes all other operations related to land based construction.

52 Offshore operations

Offshore operations are all activities required to transport, lift, move, install, lay, survey and support the Installation of offshore facilities.

521 Survey

Vessels hired to perform surveying operations in support of field Installations activities include

- pre-lay survey,
- route survey,
- as-laid survey,
- ROV surveys,
- location surveys,
- soils testing,
- installation surveys.

522 Seabed preparation

Seabed preparation includes trenching, backfilling and dredging activities required preparing seabed for Installation of offshore facilities, hereunder substructures, pipelines and subsea production systems.

5221 Trenching

Operation activities include the use of plows, water jets or mechanical trenchers and mother barges/vessels to provide trenches for pipelines and flowlines.

5222 Dredging

Operation activities include the use of suction hopper dredgers or cutter suction dredgers to remove overburden/soils in areas where the seabed is required to be profiled and discharge spoil at other locations.

5223 Back filling

Operation activities include the use of purpose built plows/equipment towed and controlled from surface vessels for backfilling of excavated materials from trenching and after pipelaying operation.

5224 Rock dumping

Operation activities include the deployment of purpose built rock dumping vessels; bottom dumping vessels, fallpipe vessels and bottom/side dump barges used for span correction, pipeline cover and scour protection.

523 Installation

Operation activities related to the installation of facilities and installations offshore. Installation of subsea structures are covered by 527 Subsea structure operations.

5231 Lifting

Lifting operation activities include the use of semi submersible crane vessels, crane barges and assisting vessels for the lifting and placement of

- jackets,
- structures,
- modules,
- units,
- subsea structures,
- etc.

5232 Piling

Piling operation activities include the use of hydraulic pile hammers/drivers and mother support vessels to drive steel piles to specified depths to provide foundations for seabed founded structures.

5233 Grouting

Grouting operation activities include the use of purpose built vessels/equipment to grout and seal seabed foundations. Vessels are self-contained with high-pressure injection pumps, concrete-batching plants and storage holds for containment of cement and sand.

5234 Mating

An operation normally carried out at an inshore sheltered location where topside facilities are mated to substructures. Operation is carried out by use of barges and tugs combined with ballasting/deballasting of substructures.

524 Pipeline operations

All operations and activities associated with the installation of pipelines and flowlines.

5241 Pipelaying

Vessels used for pipelaying operations:

- laybarges/spreads;
- layvessels/spreads;
- reel layvessels.

The pipelaying operation is an activity where layvessels are used to

- receive and store linepipe/reeled pipe,
- assemble/align,
- weld joints,
- X-ray,
- protect/coat,
- install.

5242 Tie-in

Connection of pipelines/flowlines between exporting/receiving facilities. Tie-in may be a hyperbaric welded joint, a mechanical flanged connection, a pull-in guided into a pull-in connection or pull-in through J-tubes at facilities.

5243 Hydro testing

Pipelines/flowlines are filled with treated/inhibitor dosed water and pressurised to design pressures. Pressure is maintained according to procedures.

Hydro testing is normally part of the laying-contract, and may also be performed after trenching and tie-in operations.

5244 RFO

Pipeline RFO – ready for operation – covers precommissioning/commissioning of offshore pipelines and flowlines (infield pipelines).

The work will normally include such as

- flooding,
- hydro testing,
- dewatering,
- cleaning and gauging,
- pigtracking,
- transportation, logistics and services.

For description of the work included, see description of RFO in the COR section of this document.

525 Umbilical and cable operations

Cable operations include the use of vessels to install subsea power cable, subsea power/control cable between offshore installations or between land based national power grid and offshore installations. Umbilical operations include the use of vessels to install subsea umbilical – electrical, hydraulic, electrical/hydraulic.

Cables/umbilicals are constructed and coiled at land based manufacturing facilities and transported by or to cable laying/umbilical laying vessels for installation.

Cable layers normally have a combined water-jetting trencher and plow backfiller used in the same operation.

5251 Laying

Operation activities include the use of purpose built cable laying vessels, umbilical laying vessels or combination lay vessels to lay cables/umbilicals between

- subsea systems and surface control systems,
- cables between platforms or from platform to land,
- umbilicals/cables between central platforms and unmanned wellhead platforms.

5252 Pull-in and connection

Operation activities include the use of purpose built pull-in tools operated from surface vessels for connection to subsea systems, platform or onshore facilities.

5253 Testing

Testing (commissioning) of installed cables/umbilicals prior to production or supply, includes personnel, equipment and services to carry out load testing, pressure testing, endurance testing, signal and functions testing.

526 Transport

Transport includes all required tugs, barges, ships, vessels and heavy lift carriers to receive, load, transport to sites and unload – modules/structures/units/assemblies as required.

5261 Towing

Towing includes the rental of tugs and if required barges for transport of modules/structures/units/assemblies from fabrication/construction facilities/yards, sites to either other facilities onshore/atshore/inshore or to offshore locations.

5262 Heavy Lift Transport

Heavy lift transport includes the use of heavy lift carriers, purpose built carriers or converted VLCCs, which have the capability to carry/transport very large structures – often over large distances.

527 Subsea structure operations

5271 Testing

Operations' activities include the deployment of labour, plant, equipment facilities, services for submerged testing of subsea systems in both shallow water and/or deep water. Testing includes load, pressure, endurance, signal, component and system functional testing of permanent facilities and remotely operated tooling systems.

5272 Installation

Operation activities related to the installation of subsea structures. Installation activities include the use of semi submersible crane vessels, crane barges and assisting vessels for installation and foundation to seabed.

5273 Commissioning

Commissioning is carried out after subsea structures are installed and connected. Each system is tested under actual conditions for conformance to technical and functional requirements. Commissioning is progressively completed according to system priorities. Commissioning is carried out after subsea structures are installed and connected and have been RFO completed. Each system is tested under actual conditions for conformance to technical and functional requirements. Commissioning is progressively completed according to system priorities:

- flooding;
- hydrotesting;
- dewatering;
- cleaning and gauging;
- pigtracking;
- transportation, logistics and services.

528 Particular abandonment operations

Operation activities related to the removal of facilities and installations offshore.

5281 Cutting of structures

Operation activities related to cutting of offshore steel structures.

5282 Toppling

Operation activities related to full or partial toppling of offshore structures.

52821 Full toppling

52822 Partial toppling

5283 Removal/lifting

Removal/lifting operation activities include the use of semi submersible crane vessels, crane barges and assisting vessels for the removal/lifting of offshore facilities, such as

- jackets,
- structures,
- modules,
- units,
- subsea structures,
- etc.

5284 Transport and dumping

Transport of removed facilities including dumping.

53 Logistics

Logistics includes

- supply base/terminal,
- supply and distribution,
- personnel transport,
- accommodation facilities.

531 Supply base/terminal

Bases comprising storage yards, warehouses, offices and plant and equipment to receive and store and expedite materials, equipment, goods, parts, linepipe for later distribution as required to offshore operations, yards, sites, facilities as applicable.

532 Supply and distribution

Supply vessels, pipe carriers, transporters, trucks, trailers, loaders, etc., required to supply ongoing onshore/offshore operations.

533 Personnel transport

Helicopters, fixed wing aircraft, ferries, vessels, busses and vehicles required to provide personnel transport from onshore airports to offshore locations or from personnel terminals to landbased project sites.

534 Flotel/LQ/camps

The provision of temporary accommodation for construction workers and staff, hereunder; contractors, company and visitor accommodation.

Flotels

Semi submersible units or other floating accommodation systems which provides cabins, catering and amenities.

LQ

Provision of cabins, catering and amenities from permanent offshore installed facilities, i.e. the projects own LQ or at neighbouring installations.

Camps

Construction camps provides rooms, catering and amenities at onshore site(s).

54 Drilling and completion

Drilling of development wells, operation carried out by specialised contractors. Drilling is divided into onshore drilling operations and offshore drilling operations.

541 Onshore drilling and completion

The drilling of onshore development wells includes production wells and injection wells as well as reinjection wells, water source wells and disposal wells.

5411 Fixed rig drilling

Onshore wells drilled and completed from a wellsite/wellpad location where from a number of wells are drilled deviated from the wellheads to downhole reservoir target location.

5412 Mobile rig drilling

Onshore wells drilled and completed using mobile/self contained drilling rigs may be used

- where well patterns are dispersed over large areas,
- where exploration/appraisal wells are drilled.

542 Offshore drilling and completion

Offshore drilling operations include drilling and completion of development wells. Wells are grouped into predrilled wells, subsea drilled and completed wells and platform drilled and completed wells.

5421 Predrilling

Predrilled wells are wells drilled by a mobile drilling rig such as

- semi submersible drilling rigs,
- jack-up drilling rigs,
- drilling ships,
- drilling barges.

Wells are drilled only through a well spacer/drilling template or satellite structure for consecutive completion or for drilling/completion of wells prior to production start.

5422 Subsea drilling

Subsea wells are drilled and completed with mobile drilling rigs.

5423 Platform drilling

Platform wells are production and injection wells drilled from a drilling rig installed on a fixed platform. The rig is also used for well completions of platform drilled wells and predrilled wells.

6 Unit work

Unit work within the standard activity breakdown structure relate to those costs/groups of cost elements incurred and entered under code of resource – unit work. (Refer code of resource «S» unit work).

7 General

General activities within the standard activity breakdown structure relate to those costs/groups of cost elements incurred and entered under code of resource A: "General costs", except COR AEB "Commissioning spares", AEC: "Freight" and AED: "Custom charges, fees and duties" which are SAB-coded as "Procurement" and COR AK: "Vendor representatives" which is SAB-coded as "Construction".

6 COR – Code of resources

Introduction to COR Code Structure

COR – Code of Resource

This hierarchical breakdown code structure classifies all project resources and generically categorises resources according to primary, secondary and tertiary levels of resource.

This section of the SCCS manual provides COR codes and code names.

The COR structure, also termed code of account (COA), is intended to provide codes to classify the complete scale of resources involved in developing both offshore and landbased Installations. The structure is compiled primarily for oil and gas facilities/projects with associated infrastructure and generally conforms to standard industry terms and structure.

The code of resource structure has an equal integrity to that of the standard activity breakdown (SAB) structure and to that of the physical breakdown structure (PBS) in the SCCS context, though in use is handled subordinately in estimate preparation and data collation.

The COR codes identifies the individual records/items/lines/components/elements of estimates which when summarised comprise physical functional areas (PBS) and which occur during the different development phases (SAB).

A General costs

General costs are normally costs incurred to «company» required to manage, administer, plan, support, insure, acquire and to conform to statutory requirements. However, some of the general costs codes are relevant both for “company” and contractors, as marked particularly in the following.

General costs are capital costs which may be partly or wholly assignable to each project or group of projects, though which are of such a particular nature that they are not assignable to other primary codes within the code of resource (COR).

AA Statutory costs, licences and permits

This code includes costs of the following categories:

- authorization and certification fees;
- environmental charges and fees;
- special studies;
- patented process licenses;
- licenses and permits.

As defined under the tertiary level codes:

AAA Authorization and certification fees

Authorization and certification fees relate to charges and fees required to be paid in order to obtain an authorization/certification to proceed or develop.

AAB Environmental charges and fees

Charges and fees paid conforming to statutory requirements related to the environment – pollution/emission, erosion, fisheries, watercourses, wild life, animal husbandry and other.

AAC Special studies

Special studies in this context are studies required by statutory bodies in order to obtain consent to develop or exploit. Such studies may be: environmental impact assessments for complete developments or parts thereof or studies required as part of licence/contract agreement obligations e.g. warranty surveyor studies and services.

AAD Patented process licences

Costs, charges, royalties and fees relating to the use of patented process licences.

AAE Licences and permits

Licences and permits charges and fees are many and varied. Such costs are incurred in order to allow a development to proceed.

AB Financing and related costs

Financing and related costs include

- financial cost,
- depreciation,
- currency impact.

As defined under the tertiary level codes:

ABA Financial costs

Financial costs are costs related to financing a development project. Costs include interest, guarantee fees, establishment charges and other directly related to financing.

ABB Depreciation

Depreciation costs are costs, which have devaluated buildings, plant, equipment and machinery from the initial value, though which through the direct requirement of such to construct and develop a project/facility naturally fall in value when disposed of.

ABC Currency impact

Currency impact occurs when project/facility components are purchased in foreign currencies at different time periods, because of the natural fluctuation in currencies. Fixed project estimates currencies are normally adopted against which the value and volume of each currency is monitored and reported against rise and fall. In the project close-out report, the currency impact is implemented in the final cost figures.

AC Insurance

Include all insurances not directly covered by contractors under contractual obligations.

Such insurances may cover

- contractor all-risk insurance,
- special transport insurances,
- general insurance against fire, accident, loss of life etc.,
- insurances against non-fulfillment of obligations,
- etc.

AD Purchases and rentals

This code includes costs of the following categories:

- land acquisition;
- buildings and facilities;
- data purchases.

As defined under the tertiary level codes:

ADA Land acquisition

Land acquisition includes costs for purchase of right-of-way, access corridors, general land/plot acquisitions and the otherwise incurred costs – leasing, hire and/or other.

ADB Buildings and facilities

Buildings and facilities within general costs relate to offices, storage facilities, rental of plant, etc., which are required partly or are shared for an individual project. Costs for such may be backcharged to the project budget.

Buildings and facilities may be rented or purchased but do not directly form part of a development project, e.g. hired regional offices, temporary laboratories, etc.

NOTE – Onshore support base for offshore works, also termed supply base, see COR XV.

ADC Data purchases

Data purchases relate to the acquisition of data from organisations outside of each project and which is required to develop a project.

Such purchases may be

- seismic data,
- geophysical data,
- weather data,

- satellite photographs,
- other types of data.

AE Material related costs

Material related costs include

- capital spares,
- commissioning spares,
- freight,
- custom charges, fees and duties.

As defined under the tertiary level codes following. The costs hereunder may be incurred by “company” or contractors, and the COR-codes under AE are deemed to be linked to relevant SAB 3-codes (in addition to PBS-code) for full SCCS-coding of an estimate element.

AEA Capital spares

Capital spares are spare parts for equipment and machinery installed in the constructed facilities, typically spares for the first years of operation.

Spare parts being procured under production and operations budgets are excluded.

AEB Commissioning spares

Commissioning spares are spares used during testing and commissioning of the constructed facilities.

AEC Freight

Freight/freight forwarding as a general cost is intended to cover the costs of transport for materials and equipment from the location of purchase delivered to site/sites.

AED Customs charges, fees and duties

Statutory charges, fees and duties for importing/exporting goods, from different locations.

AF Personnel related costs

Personnel related costs include

- health, medical and social care,
- security,
- training and courses.

As defined under the tertiary level codes:

AFA Health, medical and social care

Costs related to health care and medical expenses may cover for

- provision of hospitals/health care centers at remote locations,
- provision of transport for health care and medical or costs to be paid under statutory requirements,
- agreements to use local health care and medical services.

AFB Security

Costs for security relate to both at site security and general security of properties, buildings, plant and equipment (combined).

AFC Training and courses

Training and courses which company is obligated to pay for. These may be related to licence/contract agreement obligations or statutory required courses such as offshore safety courses, health and medical courses, prequalification, etc.

AG Taxes

Taxes includes value added taxes and investment taxes as defined under the tertiary level codes:

AGA Value added taxes

Value added taxes or sales taxes are taxes, which are added to the value of goods and services over the initial selling price. VAT is normally a flat percentage rate. These taxes vary in value from country and states within countries.

AGB Investment taxes

Taxes related to investments.

AH Product related cost

This code includes costs of the following categories:

- sales and marketing;
- production fees, royalties and costs;
- tariffs and transport charges;
- contributions.

As defined under the tertiary level codes:

AHA Sales and marketing

Costs for sales and marketing of products. May be in conjunction with early/test/pilot production and may be a shared regional cost backcharged to individual projects.

AHB Production fees, royalties and costs

Production fees, royalties and associated costs are costs paid to statutory bodies and/or other operators in connection with production. Production may be early test production or pilot plant production, prior to full development of projects.

AHC Tariffs and transport charges

Costs for tariffs and transport are related to charges for early test and/or pilot production where products are transported, treated and/or processed by third party facilities.

AHD Contributions

Contributions and donations are costs which may entail e.g. constructing/developing local infrastructure for local authorities in order to obtain access to sites, payment or contributions to local authorities for public welfare and other related types of costs: i.e. efforts to promote products in the long run.

AJ Research and development

Research and development costs for work carried out by company or third parties not directly related to the construction/development of a project though which may be incurred or backcharged to the project. May also form part of licence/contract agreement obligations.

AK Vendor rep. costs (ATS)

Includes all costs associated with the provision of vendor assistance required and related to procured equipment and material during the construction and commissioning/start-up period. The costs for vendor representatives are often covered for under agreements for technical services (ATS).

The costs hereunder may be incurred by “company” or contractors and are deemed to be linked to relevant SAB 4-codes (in addition to PBS-codes) for full SCCS-coding of an estimate element.

AV Contingency

The cost addition – based on Monte Carlo simulations in a cost risk analysis or on judgement and experience – to the base estimate for reaching a 50/50 or expected estimate. Contingency does not cover for project/conceptual changes.

AW Project reserve

The addition to a 50/50 or expected estimate required by company management, to reduce the total RISC. The requirements (and content) may vary with company/project. Normally a project reserve will include (fully or partially) for project/conceptual changes.

AZ Other general costs

Includes general costs, which do not fall within other COR «A» codes.

B Bulk materials

Bulk materials are normally bought in lots. These items may be purchased from a standard catalogue description and are bought in quantity for distribution as required. Examples are pipe (nonspooled), conduit, fittings and wire.

Bulk materials are reconciled with equipment to reflect current company practice with regard to definition of bulk materials and equipment. This also to avoid doubles coding. As practice has varied earlier, a reference is given to COR E equipment.

Bulk materials as defined herein, are also seen in connection with weight control requirements to obtain consistence; of vital importance for cost estimating and control. It applies for engineering and closely also for direct labour.

Thus the second code letter in bulk (COR B) corresponds with the second letter code under engineering and direct labour disciplines; e.g.: piping bulk (COR BL), piping engineering (COR KL) and piping direct labour (COR LL).

For materials included for in all inclusive unit rates covering two or more resources, see COR S unit work.

BC Architectural and building bulk

Architectural and building bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier/factory specifications.

Listed below are tertiary level codes, which categorise bulk materials into commodity groups with item content indicated:

BCA Walls

Included are such as

- prefabricated blast walls,
- prefabricated fire walls,
- non rated walls,
- acoustic wall elements,
- louvres and wind shields,

- explosion relief panels,
- heat shield cladding.

BCB Floors

Included are such as

- floor screed,
- raised access floor,
- acoustic elements for floors,
- floor finishes.

BCC Ceilings

Included are such as

- ceiling panels,
- total access ceiling,
- strip ceiling and special ceiling.

BCD Doors and windows

Included are doors, windows, skylights and similar. Items include framing. Actuated doors and actuated hatches are deemed to be COR coded under EAAD.

BCE Furniture and accessories including arts

Furniture/accessories/outfitting like e.g. cupboards, shelves, workbenches, tables, chairs, china, cutlery and other particular room outfitting in various rooms and compartments, such as

- kitchen outfitting,
- laundry outfitting,
- stores outfitting,
- laboratory outfitting,
- workshops outfitting,
- gymnasium outfitting,
- health center outfitting,
- furniture in cabins, offices, etc.,
- sport and recreation items.

Kitchen machinery, etc. and workshop machines are deemed to be COR coded as equipment, see under COR EAA and ERMH respectively.

BCF Signs

Included are such as

- identification signs and company logo,
- directional/orientation signs,
- safety and information signs.

BCG Insulation

Included is architectural insulation such as

- acoustic insulation (other than acoustic elements),
- fire insulation (not fireproofing),
- thermal insulation,
- water and damp proofing materials.

Insulation materials related to other disciplines are covered under the respective bulk discipline; e.g. piping insulation materials are COR coded under BLD. For fire proofing materials, see COR BSA.

BCH Prefabricated modules

Included are outfitted, prefabricated room modules for such as bathrooms, cabins and similar.

BCM Particular onshore building materials

This code covers bulk materials normally only relevant for onshore buildings, such as

- concrete, cement, sand and aggregates,
- reinforced bars and rods,
- precast concrete building units,
- masonry,
- structural components for buildings in wood,
- external roofing incl. gutters and external siding,
- internal wood work and metal,
- stairways, handrails and sheet metal for onshore buildings.

For other architectural bulk used in/for onshore buildings, the other COR BC codes apply as relevant, e.g. for windows and doors in onshore buildings; COR BCD applies. Other bulk disciplines may also be relevant for onshore buildings; e.g. for sanitary piping bulk COR BHE applies. For steel structures, see COR BN.

For bulk materials for general civil works construction, see COR BQ (for civil construction other than onshore buildings).

BCZ Other architectural and building bulk

Includes bulk of COR BC type which do not fall within other BC codes.

BD Drilling bulk

Drilling bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications used for drilling and completion of wells.

Listed below are tertiary level codes, which categorise drilling bulk materials into commodity groups, with item content indicated.

For drilling equipment, see COR EDB.

BDA Conductors and casings**BDB Drilling fluids and consumables**

Included are such as

- mud – bentonite, barite, etc.,
- chemicals,
- cement and gravel,
- drillbits,
- fuel.

BDC Tubing**BDD Downhole completion devices and accessories**

Included are such as

- tubing anchors,
- downhole valves,

- packers and nipples,
- sensors,
- connectors,
- expansion joints,
- downhole separators and pumps.

BDZ Other drilling bulk

Includes bulk of COR BD type, which does not fall within other BD codes.

BE Electrical bulk

Electrical bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorise electrical bulk materials into commodity groups with item content indicated.

For electrical equipment, see COR EEE.

BEA Cables and cable accessories

Included are such as

- cables (for power, light and heat tracing),
- cable straps, glands and cleats,
- cable markings,
- termination items.

For instrument cable materials, see COR BJC. For telecom cable materials, see COR BTC. Sea cables (e.g. for subsea booster station power supply) and other special cables (e.g. for overland power transmission) are deemed to be COR coded as equipment; COR EYEB.

BEB Cable supports and transits

Included are such as

- cable ladders and trays,
- cable ladder/tray supports,
- transits.

Code BEB is deemed to cover for both electrical and instrument items.

BEC Lighting

Included are such as

- floodlights,
- lighting fixtures,
- lighting channels,
- floodlight and lighting fixture supports.

BED Junction Boxes

Included are such as

- electrical junction boxes,
- junction box supports/racks/stands.

For junction boxes for instrumentation, see COR BJD. For junction boxes for telecom, see COR BTB.

BEE Accessories

Included are such as

- starters,
- switches and push buttons,
- socket outlets,
- plugs,
- isolation transformers,
- electrical panel heaters for room heating.

BEZ Other electrical bulk

Includes bulk of COR BE type which do not fall within other BE codes.

BH HVAC bulk

HVAC bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorize HVAC bulk materials into commodity groups, with item content indicated.

For HVAC equipment, see COR EGG.

BHA Ducting

Included are such as

- ducts,
- plenum chambers,
- fittings, flanges and attachments,
- duct hatches,
- penetrations.

BHB Inline items and dampers

Included are such as

- dampers,
- sound attenuators,
- diffusors and hoods,
- supply and extract devices, traps,
- grilles, wire mesh and filters,
- measuring/sampling points.

BHC Duct supports, hangers

Included are such as: duct supports, frames and hangers.

BHD Insulation

Included is insulation for HVAC items.

BHE Sanitary piping and components (plumbing)

Included are such as

- sanitary piping incl. fittings and valves/cranes/taps (for e.g. sewage, potable water and drain),
- sanitary components like WC, urinals, sinks, tubs, drinking fountains, etc.

For other piping bulk, see under COR BL.

BHZ Other HVAC bulk

Includes bulk of COR BH type, which does not fall within other BH codes.

BJ Instrument bulk

Instrument bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorise the bulk materials into commodity groups with item content indicated.

Insulation materials for instrumentation are deemed to be covered for under COR BLD. For instrument and telecom equipment, see COR EJJ and ETR respectively.

BJA Instruments

Included are such as

- instruments for measuring/monitoring: level, pressure, temperature, flow, density, moisture, vibrations, noise, etc.,
- analyzers and controllers,
- detectors, indicators and transmitters.

BJB Instrument valves

Included are such as

- choke valves,
- control valves,
- actuated block valves,
- safety pressure valves,
- pressure reduction valves,
- pressure erupture valves.

Actuators are included where relevant. For manually operated piping valves, see COR BLB. For pipeline valves, see COR BYD.

BJC Cables and cable accessories

Included are such as

- cables for instrument,
- cable straps and glands,
- zener barriers, isolators and connectors,
- cable markings,
- termination items.

For electrical cables (for power, light and heat tracing), see COR BEA. Instrument cable trays, ladders and transits are deemed to be COR coded under BEB. For special signal transmission cables (sea, land), see COR EYEB.

BJD Junction boxes

Included are instrument junction boxes with supports/racks/stands/etc.

BJE Tubing

Instrument tubing including

- hydraulic and pneumatic tubes with fittings and valves,
- supply manifolds.

For air distribution header, see COR EJJA. Tubing insulation is deemed to be COR coded under BLD.

BJG Accessories

Instrument. accessories, including such as

- instrument enclosures,
- air filter/regulators,
- push buttons (for ESD, deluge, etc.).

Insulation materials for instrument are deemed to be covered for under COR BLD.

BJZ Other instrument bulk

Includes bulk of COR BJ type, which does not fall within other BJ codes.

BL Piping bulk

Piping Bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorize piping bulk materials into commodity groups, with item content indicated.

Sanitary piping materials (plumbing) are deemed to be COR coded under BHE.

BLA Pipework

Included are such as

- pipes with fittings and flanges,
- bolts, nuts and gaskets,
- mechanical joints/connectors/couplings,
- manifolds,
- filters and strainers,
- hoses and hose reels (for washdown purposes),
- expansion bellows,
- valve interlocks and spectacle blinds,
- spades.

For instrument tubing materials, see COR BJE. Line pipe for pipelines is to be COR coded under BY. For hoses and hose reels for firefighting, see COR BSB.

BLB Manually operated valves

Included are valves of types: ball/globe/gate/butterfly/needle and plug valves, and other manually operated valves.

For actuated valves and particular instrument valves, see COR BJB. For pipeline valves, see COR BYD.

BLC Supports

Included are fixed/sliding and spring supports with clamps, shoes, stops, etc. – all for piping.

Piperack materials are deemed to be COR coded under BN.

BLD Insulation

Piping insulation such as

- thermal insulation,
- acoustic insulation,
- fire insulation,
- personnel protection.

The code is deemed to also cover for insulation related to instrument and telecom.

Fire proofing materials are to be COR coded under BSA.

BLZ Other piping bulk

Includes bulk of COR BL type, which does not fall within other BL codes.

BM Surface protection bulk

Surface protection bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier/factory specifications.

Listed below are tertiary level codes, which categorise the bulk materials into commodity groups with item content indicated:

BMA Paint

Includes also anti-slip paint/coating.

BMB Coating

Included is corrosion/protection coating such as

- metallic coating (galvanizing, electroplating, sprayed hot metal),
- non-metallic coating, e.g.: lining, rubber, wax, plastics, neoprene, enamel, concrete (not fireproofing), etc.

For fireproofing materials, see COR BSA.

BMC Anodes

All types of anodes.

For electrical cathodic protection, see COR EEEU.

BMZ Other surface protection bulk

Includes bulk of COR BM type, which does not fall within other BM codes.

BN Structural bulk

Structural bulk includes all materials normally bought in lots conforming to standard mill/vendor/manufacturer/supplier specifications.

For materials for concrete structures, see COR BCM and BQ.

Listed below are tertiary level codes which categorize structural bulk materials primarily of steel, alloyed steel and aluminium into commodity groups, with item content indicated (function oriented):

BNA Primary, secondary and outfitting structures

Included are such primary and secondary structures as

- trusses and bulk heads,
- tubulars and pile materials,
- deck and deck plates with stringers and girders,
- mezzanine decks and in-deck tanks,
- external walkways/platforms/lay-down areas,
- riser balcony,
- nodes,
- flare supports,
- support beams below decks,
- major supports e.g. for pedestal cranes, mooring winches and similar,
- gantry crane support rails,
- drilling piperacks,
- permanent buoyancy tanks,
- skid beams,
- module footings and lifting padeyes.

Included are such outfitting structures as

- ladders, gangways and handrails,
- stairs and stair tower,
- access platforms/structures,
- wall supports and equipment supports above deck,
- exhaust duct support structure,
- piperacks (other than for drilling),
- runway beams,
- dropped object protection,
- infill structures,
- caissons.

For pipe supports, see COR BLC. For cable supports, see COR BEB.

BNC Temporary installation aids

Included are such as

- rigging platforms,
- bumpers and guides,
- pins and buckets,
- slings and shackles (when purchased),*
- spreader bars and lifting frames (when purchased).*

Items marked * may be included in lifting contractors scope and thus included for in e.g. his day rates.

BND Grillage/seafastening/load out

Includes materials for barge grillage, seafastening (external and internal) and load out (e.g. skidways).

Observe that for items under COR BNC and BND, the weight thereof should not be included in the dry weight for the permanent work, and that the weight and cost should be estimated and reported separately.

BNZ Other structural bulk

Includes bulk of COR BN type, which does not fall within other BN codes.

BQ Civil works bulk

Civil works bulk materials include all materials normally bought in lots conforming to standard quarry/batch plant/vendor/manufacturer/supplier specifications. The code BQ is relevant for GBS (and some other) substructures and for onshore civil works other than onshore buildings.

For materials for onshore buildings, see COR BC and particularly BCM. For steel structures, see COR BL.

Listed below are tertiary level codes, which categorise civil bulk materials into commodity groups with item content indicated:

BQA Concrete, cement, sand and aggregates

BQB Reinforcement bars/rods and pre-stressing cables

BQC Precast concrete elements

Included are such as

- reinforced elements and culverts,
- concrete manholes, head walls and catch basins,
- concrete curbs and gutters.

BQD Masonry

BQE Piles

BQF Timber/wood products

BQG Pipes and fittings (soil, drain, etc.)

BQH Ground materials

Included are such as

- base materials and ground insulation,
- geotextiles,
- earth retention (mattresses and gabions),
- scour and erosion protection,
- asphalt,
- humus, plants and trees.

BQJ Fencing materials, guard rails, steel manholes and sign posts

BQK Forms

BQL Embedment items

BQM Solid ballast

Includes all types of solid ballast.

BQZ Other civil works bulk

Includes bulk of COR BQ type, which does not fall within other BQ codes.

BS Safety bulk

Safety bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorise the bulk materials into commodity groups with item content indicated:

BSA Passive fire protection

The code includes passive fire protection (fire proofing), normally spray on types (e.g. Chartec, Mandolite, etc.) with or without mesh, fixture pins, etc.

BSB Safety appliances

Included are such as

- active firefighting devices, e.g.: portable fire extinguishers, fire hoses and reels, hydrants, sprinkler/deluge fitting, fire blankets, etc.,
- evacuation and rescue devices, e.g.: life buoys, survival suits, personnel baskets, gas masks, wire ladders, stretchers, torches, etc.,
- first aid devices, e.g.: first aid cabinets/kits, safety shower, eyebath, breathing apparatus, etc.

In order to clarify – due to previous varying practice – a reference is also given to COR ESS Safety/escape and firefighting equipment.

BT Telecommunication bulk

Telecommunication bulk materials include all materials normally bought in lots conforming to standard vendor/manufacturer/supplier specifications.

Listed below are tertiary level codes, which categorise the bulk materials into commodity groups with item content indicated.

For telecommunication equipment, see COR ETR.

BTA Telecommunication appliances

Included are telecommunication and signal components with fixtures, such as

- loudspeakers and acoustic hoods,
- telephones,
- portable UHF, VHF radios,
- flashing lights,
- navigation devices (signal lights, orientation lights, transponders, foghorns, etc.).

BTC Cable and cable accessories

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- Included are such as
- cables for telecommunication,
- cable straps and glands,
- zener barriers, isolators and connectors,
- cable markings,
- termination items.

For electrical cables (for power, light and heat tracing), see COR BEA. Telecommunication cable trays, ladders and transits are deemed to be COR coded under BEB. For special signal transmission cables (sea, land), see COR EYEC.

BTB Junction boxes

Included are telecommunication junction boxes with supports/racks/stands/etc.

BTZ Other telecommunication bulk

Includes bulk of COR BT type, which does not fall within other BT codes.

BY Pipeline bulk

Pipeline bulk materials hereunder include all materials normally bought in lots conforming to mill/vendor/supplier/manufacture specifications.

Riser materials are deemed to be COR coded under EYB.

Listed below are tertiary level codes, which categorise the materials for pipelines and flowlines (offshore and onshore) into commodity groups, with item content indicated.

BYA Rigid line pipe

Includes also bends, buckle arrestors, carrier and sleeve pipe, etc.

BYB Flexible line pipe**BYC Pipeline accessories**

Included are such as

- fittings and flanges,
- straps (e.g. for bundles),
- bellows and specials.

BYD Valves

Include pipeline valves.

For other valves, see e.g. COR codes BJ and BL.

BYZ Other pipeline bulk

Includes bulk of COR BY type, which does not fall within other BY codes.

BZ Consumables and first fill

Consumables and first fill, subcoded BZA and BZB respectively as tertiary level codes, include materials normally bought in lots conforming to standard vendor/manufacture/supplier specifications.

The materials to be included in BZA or BZB (depending of purpose) may be such as

- diesel, oil, petrol, kerosene, LPG,
- gas for diving, driving, protecting and welding, etc.,
- lubricants and grease,
- other oils: hydraulic liquids, etc.,
- methanol and glycol,
- chemicals and catalysts,
- inhibitors, flocculants, desiccants, etc.,
- drilling bulks (only to/for BZB),
- misc. deliveries/supplies: steam, water, etc.,
- office supplies: stationaries, etc.,
- protective clothing,
- welding consumables, etc.,
- civil plant bulk: tyres, filters, rippers, etc.,
- other.

Listed below are tertiary level codes with an outline of the code application:

BZA Consumables

Consumables defined herein include all consumables/materials/chemicals/gases/utility supply/parts, etc., required during the construction period (e.g. in the HUC – phase) to support and maintain plant, equipment and machinery prior to first fill.

Consumables covered for in the rates, in COR BDB and in COR X are excluded.

BZB First fill

First fill materials (e.g. for system fluid fill up) are defined herein as materials/chemicals etc. which are required and specified to be delivered as handover to the production and operation organisation.

C Construction overheads

Construction overheads are incurred costs to contractors, fabrication yards, and workshops, etc., associated with labour resources, services and commodities in support of the construction work, which cannot be classified under other codes within the code of resources (COR).

Contractor's direct labour «L» and indirect labour «M» are aptly contained within the COR. There are however a number of costs which are not directly assignable elsewhere.

Contractor's site engineering (fabrication engineering) and procurement services are deemed to be coded under COR K.

CA Contractor's organisation**CAA Construction management**

The code includes cost for contractor's management personnel and services, hereunder

- construction management,
- project control,
- contracts,
- quality assurance,
- HES management,
- etc.

CAB General site administration

Contractor's base/home office costs covering services to perform general administration hereunder

- personnel,
- payroll/accounting,
- secretarial services,
- insurances,
- permits,
- security,
- etc.

CAC Office expenses

Includes various office expenses contractor incurs during the contract period such as

- reproduction,
- telephone, telex, telefax and other communication services,
- office supplies and stationery,
- computer services,
- etc.

CAD Personnel expenses

Include various expenses (related to travel and relocation) contractor incurs during the contract period such as

- travel and allowances,
- relocation expenses and living allowances,
- vehicle rental and expenses,
- tax differential.

CAE Miscellaneous expenses

Miscellaneous personnel related expenses such as

- representation,
- meeting expenses,
- training and courses,
- teambuilding.

CB Site facilities

Site facilities include cost/proportionate costs for all investments/purchased/leased/hired/rented facilities related to the use of the site area.

Site facilities include

- construction facilities,
- material storage facilities,
- special commissioning plant/equipment,
- facility construction/expansion,
- accommodation and construction camp.

As outlined under the tertiary level codes:

CBA Construction facilities

Construction facilities include such as

- buildings/workshops/construction plant and offices (equipped),
- harbor facilities,
- docks and quays,
- barges for construction purposes,
- site tools and equipment:
 - cranes;
 - trucks;
 - forklifts;
 - welding machines;
 - etc.

CBB Material storage facilities

Includes facilities for storage of materials, such as

- storage buildings/halls – hot or cold,
- outdoor storage areas,
- areas for storage of contract objects.

CBC Special commissioning plant/equipment

Specialist plant and equipment for commissioning, testing and completion – relevant in the at/on/in and particularly the offshore phase – including such as

- hydrojetting equipment,
- pickling equipment,
- hot oil flushing equipment,
- specialist cleaning services,
- nitrogen/helium leak testing equipment,
- equipment for internal inspection of piping and similar,
- specialist containers,
- etc.

CBD Facility construction/expansion

Includes all investments or proportionate investments required to construct/expand existing site/yard/facilities in order to prepare for construction.

CBE Accommodation and construction camp

Accommodation and construction camp includes cost/proportionate costs for all investments/purchased/leased/hired/rented facilities to provide temporary lodging for construction workers (camp under contractors responsibility).

For camp under company's responsibility, see COR SD.

CC Service to company

Service to company is expense contractor incurs when company has resident personnel at contractor's yard/site. The expenses can be one or more of the following:

- company site office,
- reproduction,
- telephone, telex and telefax,
- office supplies and stationery,
- secretarial services,
- living accommodation,
- company site cars for company personnel,
- etc.

CD Camp running

Includes operation and catering in connection with contractor's accommodation and construction camp (see COR CBE), as outlined below:

CDA Catering

Catering comprises of the provision of beds and meals and associated service cost for contractor's camp. These services normally include housekeeping, watches (except plant security), hotel/motel operations, laundry, amenities and other related services.

CDB Camp operation

Includes camp running costs other than catering, comprising all labour, equipment, supervision, services and administration that is associated with the operation of contractor's camp. This may include maintenance services for water, power, sewers, communication, security, social activities, health and public order, camp cleaning and mail, courier services, maintaining shopping, bank and other services in order to meet the normal living standard requirements and the expected public welfare status.

CE Miscellaneous overhead costs

The contractor costs hereunder include for

- insurance – normal liability insurance (builder's risk),

- guarantees,
- financial costs,
- authorization and certification fees,
- licenses,
- port duties,
- other related costs.

CZ Other construction overheads

Includes costs which are construction overheads and which are not described in the previous COR C codes.

E Equipment

Process and utility equipment – designed, manufactured, prefabricated, cast, machined, assembled, erected from bulk materials. Normally constructed as a complete purchase order conforming to specifications and performance guarantee.

Equipment is reconciled with bulk materials to reflect current company practice with regard to definition of equipment and bulk materials, and to avoid double coding. But as practice has varied earlier, a reference is given to COR B Bulk materials.

As a main rule installation of equipment is to be COR coded under LR.

The descriptions of equipment/equipment packages contained herein are intended to provide *guidelines* for cost estimating and cost control purposes. For obvious reasons it is impossible to completely and accurately define each and every item of equipment conforming to detailed specifications and/or item specific attributes.

The second code letter in equipment (COR E) corresponds with the second letter code under engineering disciplines.

The third code letter in equipment (COR E) is used to split discipline into groups of equipment as required.

EA Architectural equipment

Architectural equipment hereunder includes primarily items of equipment which may be designed and manufactured by specialist vendors/suppliers and contractors, normally conforming to individual and project specific functional requirements, or found practical to define as equipment based on current company practice.

EAA Architectural equipment

Architectural equipment is subgrouped and coded as follows:

EAAB Kitchen equipment

Equipment/machinery in kitchens (galleys), pantries and messes. The equipment is deemed to be of a professional catering standard and normally wall or console mounted and may include such as

- kitchen ranges, hotplates, grills, boilers, baking-/frying oven, tilting frying pan, fryer, muffin machine, etc.,
- mixers, mills/grinders, chopping machines, cutters, kneading machines, slicing machines, toasters, food processors, etc.,
- potato peeling machines, rubbish mills (granulators), rubbish compressors,
- machine for milk making (of condensed milk), coffee-/tea-/mineral water machines, bain marie, cafeteria counters, etc.,
- refrigerators (note – see also references below), freezer-boxes, ice cube machines, soft drink coolers, heating lockers (also in the mess room),
- dish washing machines, pot washing machine/scrubs, etc.

Some particular references: Kitchen furniture and outfitting of a common "household appliance type" (e.g. cupboards, shelves, workbenches, tables, chairs, china, cutlery, etc.) are to be regarded as bulk and COR coded under BCE. For refrigeration/cooling machinery for provisions, see COR EAAR.

EAAD Actuated doors

Includes actuated doors as well as actuated hatches with actuators, push-buttons, etc.

For non-actuated doors, see COR BCD.

EAAE Laundry equipment

Includes laundry machines of a professional standard type:

- automatic washing machines, mop washing machines, etc.;
- spin and tumble dryers, pressers, drying aggregates, etc.;
- ironing machines, sewing machines, etc.

For furniture, etc., see COR BCE.

EAAR Refrigeration and freezing system equipment

Included are equipment (machinery) – discrete or packaged – for the refrigeration and freezing systems for provisions:

- compressors, pumps and fans with drive units, etc.;
- condensers, evaporators, cooling batteries, defrosting plant, etc.;
- separate equipment for insulation drying system – where relevant;
- separate control equipment for the above.

EA AV Central vacuum cleaner system equipment

Includes vacuum unit(s), dust collector(s) and special accessories. As these facilities may be delivered as a package, bulk items may also be included.

EAAZ Other architectural equipment

Includes other architectural equipment not included elsewhere under COR EAA.

ED Drilling equipment

Drilling equipment hereunder includes mainly packages, which are designed and manufactured by specialist vendors/suppliers and contractors normally conforming to individual and project specific functional requirements. Equipment hereunder is grouped into conventional groups, which contain several items of equipment, and may not always be applicable depending on construction and contracting philosophies.

Drilling equipment comprises required equipment to perform, support, control and maintain the drilling operations, as outlined in the following.

Some particular references: For drilling bulk, see COR BD. For BOP/BOP Accumulator equipment (subsea wells), see COR EUJJ.

EDB Drilling equipment

Drilling equipment is subgrouped and coded as follows:

EDBC Pipe handling equipment

Pipe handling equipment consists of equipment associated with the movement, handling and supply of pipes, conductors and casing to the piperack:

- within derrick for storing stands of pipe as they are removed from the drillstring;
- handling from the storage piperacks and feed to the derrick.

Equipment includes

- pipe handling winches,
- gantry cranes,
- catwalk and ramp,
- fully automated pipe handling systems.

The derrick is to be regarded as a contract type unit, which implies use of multiple COR codes.

EDBD Drilling risers

Temporary riser system deployed during drilling operations of subsea drilled wells. Forms the extensions from the subsea guide base to the drilling facilities.

Drilling risers are often hired equipment, and thus often placed under drilling and completion budgets (e.g. in the day rate for mobile drilling rigs).

For workover risers, see COR EUUP.

EDBE Cuttings disposal package

The cuttings disposal package includes

- shale shaker(s),
- settling tanks,
- containers for separating wellbore cuttings from drill mud.

Cleaned cuttings are either discharged through shale chutes or stored in containers for later removal.

For decanter centrifuge for cuttings, see COR ERCC.

EDBF Mud burner/mud burner package

Mud burner/mud burner package is used for the burning of oil contaminated mud as follows:

- for offshore projects the system comprises of a small boom structure, located near the flare boom at platform exteriors. The burner includes the boom structure, the structure supports, piping and valves and ignition system;
- for onshore projects the system normally comprises a mud burner pit where the flame front is directed into an open pit for burning and containment.

EDBG Drawworks/rotary table and drawworks package

The drawworks is the hoisting winch used for handling – raising and lowering of drillpipe, casing and tubing – within the derrick structure.

The rotary table is a chain or gear driven circular table unit mounted within the derrick drillfloor, which rotates the drillpipe and drillbit.

The drawworks package includes the hoisting mechanism – the crown and travelling blocks used for raising/lowering drillstrings. The travelling block is connected to the swivel/kelly and the kelly which is attached to the drillstring, is rotated by the rotary table. The drawworks (the hoisting winch) is connected to the crown/travelling blocks.

EDBI Cementing package

The cementing package comprises all equipment required for cementing casing strings within the borehole. Packages may be permanently installed or leased/rented for purpose.

The cementing package includes

- pump skid unit(s),
- transfer hoses,

- mixer units,
- measuring/control devices.

EDBJ Top drive units/packages

Top drive systems also called derrick drillers. I.e. overhead power swivels (overhead drilling systems) which perform the same operations as rig floor rotary table drilling with a kelly. The drive with integrated swivel is mounted directly on the drillstring allowing up to 90 feet stands to be drilled. The top drive is connected to the travelling block. Top drive units may be hydraulically or electrically driven.

EDBK Mud pump package

The mud pump package includes

- mud pumps and drivers for mixing and circulation,
- mud mixers and mixing plant,
- mud transfer/return lines/hoses.

EDBM Skid jacks

Hydraulic jacks used for skidding the derrick/derrick substructure to wellslot locations. The jacks include main skid jacks and transverse skid jacks to allow north/south and east/west movement.

EDBN Diverters

Diverter is a type of blowout preventer that is able to divert fluids from a well to a safe place away from the rig under conditions where the well cannot be shut-in.

EDBP Drilling panels

Drilling panels/drillers console form part of the drillers instrumentation and control system and contain panels/console with assemblies of gauges, indicators, controllers and alarms which monitor and allow control of drilling operations.

The drillers console monitors, displays and records such as

- mud variables,
- drilling variables,
- provides necessary and essential controls associated with the operation of blowout preventers and well shut-in,
- drawworks operation,
- mud system,
- derrick equipment.

EDBS Choke/production/injection and test manifolds

Choke/production/injection and test manifolds consist of header vessels for collection and distribution. Manifolds are fabricated from pipe, pipefittings and supports, and are assembled with actuated control valves and manual valves.

EDBT TFL Equipment

Includes equipment and tools for through flow line (TFL) servicing. TFL tools are similar to wireline tools except that no wirelines are attached. Tools are moved in and out of the well by pumping fluid behind them, which pushes them through flowlines.

TFL operations fall into three groups:

- well cleaning;
- downhole equipment installation and service;
- workover operations.

Platform equipment includes

- pump,
- tanks,
- manifold,
- lubricator,
- controls,
- tool handling equipment.

EDBU Wireline equipment

Includes wireline equipment and tools for

- well cleaning,
- downhole equipment installation and service,
- workover operations.

Equipment comprises

- the wireline drum,
- wire/cable,
- winches,
- lubricator,
- controls,
- tool handling equipment,
- wireline tools.

For wireline unit/wireline equipment related to surface completion, see COR EDWP.

EDBX Other drilling equipment packages

Includes packages not previously listed, i.e. other groups of drilling equipment delivered from suppliers and purchased as complete packages that may comprise several of the above items for incorporation into the drilling facilities.

EDBY Hoppers/mud guns/blenders

Hoppers/bins/pits/containers – used for mixing, storage and holding dry, liquid or mixed cement and mud required for drilling operations.

Mud guns – used for irregular agitation of drilling fluid in the mud pit/bin to assist in the separation of cuttings.

Blenders/agitators/mixers – used for mixing of drilling fluids – mud and cement during drilling operations.

EDBZ Other drilling equipment

Includes all other equipment not included elsewhere under COR EDB, purchased as individual items of equipment for incorporation into the drilling facilities.

EDW Wellhead equipment (surface completion)

Wellhead equipment hereunder includes all equipment, appurtenances/devices related to the surface completion of production and injection wells.

Codes hereunder also include equipment for wells, which are subsea drilled/predrilled and surface completed, e.g. for TLP, SPAR wells and other.

Some particular references: equipment for subsea completions are included within COR EUU codes.

COR EDW equipment is subgrouped and coded as follows:

EDWA X-mas trees

X-mas trees are a complex of valves and pipes installed at the wellhead to control the flow of high pressure wellstream and/or injection water – also called Christmas trees because the pipe/unit form several branches and are "outfitted" with valves and control mechanisms/devices.

EDWB Tubing shear ram

The shear ram is specially designed to cut through or shear drillpipe when the string is in the hole and where it is necessary to seal the bore completely and quickly against too high well pressure.

The tubing shear ram consists of a closure mechanism on a well's blow out preventer stack fit with chisel-like jaws that are hydraulic operated. When the ram is closed on the pipe the jaws or blade cut the pipe, permitting the upper section to be removed from the BOP stack.

EDWC Tubing shear ram/X-mas tree – extensions

This code covers the following extension types:

- shear ram extension – used for shear rams, which are either manually or hydraulically operated. The extension is a shaft system connected between upper rams and lower rams of the blow out preventer and actuators;
- X-mas tree extension – extensions used for X-mas tree mounting/placement/control/operation.

EDWD Wellhead, wellhead housing and extension

The wellhead is the terminal point of a producing well which consists of casing head, tubing, tubing string connection placed on top of the casing and attached to the X-mas tree.

The wellhead housing and extension is a complex of heavy, forged or cast steel hardware installed on top of and making a close seal with the surface string of casing or on the conductor pipe, giving access to a borehole for the purpose of drilling, controlling pressure in the hole and regulating flow of fluids.

EDWF Conductor housing, extensions and guides, hub connectors

Conductor housing with extension is the top of the casing/conductor set in a well – the part of the casing that protrudes above the surface and to which control valves and flow pipes are attached.

Included are also conductor guides and hub connectors where conductor guides are casing shoes/guide shoes fit to the lower-most joint of the casing which guides the casing down the hole preventing sticking. A hole in the centre allows drilling fluids to pass up into the casing while the casing is being lowered and cement to pass down and into the annular space when cementing.

EDWH Casing hanger

Forged/machined bracket supports inside the wellhead under the BOP stack, by which the BOP stack, by which casing strings are suspended, suspends casing strings.

EDWI Tubing hanger

Include tubing hanger(s) and tubing anchor(s):

- tubing hanger – forged/machined support bracket(s) inside the wellhead by which the tubing is suspended;
- tubing anchors – cylindrical metal blocks used to anchor tubing in place in a wellbore without the aid of packers in a multiple completion.

EDWJ Seal rings/seals

All seal rings/seals used within the wellhead system – resilient or other types, which seal between casing strings/casing hangers, housings and the BOP stack.

EDWK Guide base

Guide base is a fixture on top of the borehole serving as an anchorage on the seabed for guidelines extending down beneath a drilling platform. Guide bases hereunder are related to bases used in conjunction with surface completed wells, e.g. TLP wells; the guide base of the well spacer/drilling template where to production risers are connected.

EDWL Landing base

Landing bases/guides are used for/or as part of wellhead equipment – surface completion.

EDWM Diverter system equipment

An assembly of nipples and air actuated valves welded to a well's surface or to conductor casing for venting gas kicks. When a kick occurs, the blow out preventer is closed and the valves of the diverter system are opened to vent the gas harmlessly to the atmosphere.

EDWN Blow out preventer stack

The blow out preventer stack (BOP) is part of the drilling safety equipment installed on a wellhead after the conductor pipe has been run and set in a borehole. The BOP enables any flow from the well to be controlled by the driller. The preventer comprises doubling acting opposed pistons which when activated close the space between the casing and whatever is inside. The preventer stack is shaped to fit around drillpipe.

See also COR EDWQ.

EDWO Hydraulic connectors

Include all types of hydraulic connectors related to surface completions.

EDWP Wireline unit/wireline equipment

Wireline unit – an apparatus consisting of a winch, wire cable and tools or instruments for taking downhole samples, making measurements or operating tools within the hole – all related to surface completions.

For TFL equipment (through flowline equipment), i.e. tools, etc. similar to wireline equipment (tools), see COR EDBT. Wireline equipment for well cleaning, downhole equipment installation and workover operations, see COR EDBU.

EDWQ Wireline pressure retaining equipment

An annular preventer where the sealing element is a flexible rubber packer whose pressure can be regulated to facilitate internal movement inside the hole.

EDWX Other wellhead equipment packages

Includes packages not previously listed under COR EDW, i.e. other wellhead equipment delivered from suppliers and purchased as complete functional packages that may comprise several items of equipment for incorporation into the facilities.

EDWZ Other wellhead equipment

Other equipment not included elsewhere under COR EDW, required in support of surface completions and purchased as individual items of equipment, for incorporation into the facilities.

EE Electrical equipment

Electrical equipment includes equipment items and packages required for and associated with electrical power generation, transforming and distribution, power supply, control and regulation.

Conforming to the SCCS equipment definition, electrical equipment defined herein are units/items/equipment which normally are especially fabricated/manufactured conforming to separate design specifications and therefore are not considered to be part of bulk material, or found practical to define as equipment based on current company practice.

Some particular references: For electrical bulk, see COR BE. For instrument equipment, see COR EJJ. For navigation devices, see COR BTA.

EEE Electrical equipment

Electrical equipment is subgrouped and coded as follows:

EEEB Batteries

All permanently installed dedicated batteries with battery charger units used to supply power during emergency situations, in the event of power failures or used for e.g. starting.

Batteries may form part of uninterruptable power supply systems (UPS) for supply to telecommunications systems, instrumentation systems, etc. (see COR codes for UPS units).

EEEC Control equipment (panels, relay boxes)

Electrical control equipment includes control panels with installed components, e.g. instruments and relay boxes for such as

- process,
- process support,
- common process and utility systems,
- interface panels,
- local starter panels,
- push button stations,
- thyristor control panels,
- generator control panels,
- mimic panels,
- test panels,
- shut down panels,
- other equipment of similar function (electrical).

For instrumentation control panels, see COR EJJB.

EED DC Distribution boards

Includes all direct current (DC) circuit breaker distribution panel boards used for distributing direct current. The units may be connected to the normal distribution system or stay separately.

EEEE Emergency distribution panels

Emergency circuit breaker distribution panel boards includes all classified/rated panels up to 250 volt which are connected to and form part of the emergency power distribution system.

EEEG Generators

Generators – include main power and emergency power generators when such are defined as separate units not forming parts of composite packages/package units.

Generators herein comprise such as

- alternator unit,
- bases/frames,
- synchronizing and load sharing unit,
- controls related to the generator/alternator delivered separately with the unit.

For generator packages; i.e. generators with driver, etc. for main and emergency power, see COR EEEN and EEEO respectively. For separate drivers for the generators, see COR ERD.

EEEH Switchgear – up to 400 V

All switchgear up to 400 V, including supply and feeder units, protection relays and metering devices, purchased for installation within metal clad switchgear enclosures/boards/control centres.

EEEJ Switchgear – above 400 V and up to 1000 V

All high voltage switchboards from above 400 V and up to 1000 V for both normal and emergency systems, including supply and feeder units, protection relays and metering.

EEEE Switchgear – above 1000 V

All high voltage switchgear above 1000 V including supply and feeder units, protection relays and metering devices, purchased for installation within metal clad switchgear enclosures.

EEEL Motor control centres

Motor control centres (MCC) – metal clad switchgear enclosures equipped with motor starters, circuit breakers/switchgear, control relays, special components, meters, transformers, etc. which group electrical motor controls within a separate area or room.

EEEM Lighting and minor distribution panels

Lighting and power circuit breaker distribution panel boards used for power distribution of up to 250 V supply to (domestic) lighting circuits and power outlets.

EEEN Main power generator sets

Included is main power generator with driver, lube/seal oil skid and bulk and equipment (may be discrete items covered under COR EEE or other equipment) – all combined into a package, normally delivered by specialist supplier/manufacturer/constructor. As package design – as well as purchasing strategy and requirements – may vary, it is difficult and unpractical to define the total package content.

EEEO Emergency power generator sets

Analogous as previous code, for emergency generator with driver, etc.

EEEP Earthing bars

Earthing bars/systems, which form part of the earthing system.

EEEQ Uninterruptible power supply (UPS)

The UPS is a unit used to provide power for emergency/essential supply in the event of an emergency or power failure. The unit is equipped with such as: a rectifier (charger), an inverter, static switch and battery bank.

This code covers the platform (common) UPS power system for e.g. instrumentation and control system, emergency light, etc. other than dedicated UPS units (i.e. only for said equipment/systems). In the SCCS context, the following dedicated UPS units are coded under other COR codes such as

- UPS for HPU, see COR ERCT,
- UPS for telecom. (DC powering), see COR ETRL,
- UPS for the ESD-system, see COR EJJW,
- UPS for subsea equipment, see COR EUUL.

EEER Rectifiers and inverters

This code includes

- rectifiers – devices which convert alternating currents (AC) to direct current (DC) to provide power to; e.g. battery chargers, DC motors, variable speed drivers,
- inverters – a device that changes DC to AC (or vice versa), provides AC supply to circuitry from DC batteries source,
- frequency converters.

The code covers rectifiers, etc. not forming part of any UPS system (for UPS systems, see under COR EEEQ).

EEES Lightning arrestors

Lightning arrestors/masts/poles/systems – are used to conduct/lead lightning bolts caused during thunderstorms away from oil and gas processing facilities, to prevent ignition. Lightning arrestors normally consist of masts with copper conductors for direct earthing.

EEET Transformers

Power transformers as equipment hereunder include all transformers of large dimensional magnitude/capacity and/or transformers, which are manufactured to non-standard specifications.

Transformers (e.g. isolation transformers) included within bulk are intended to be standard “off-the-shelf” minor transformer units (see COR BEE).

EEEU Electrical cathodic protection

Includes all equipment items related to electrical impressed current cathodic protection systems, hereunder; control panels/systems, power supply, monitors, recorders and cathodes/anodes.

EEEV Bus ducts, bars and accessories

Bus duct, bus bars and accessories are the main isolated conductor bar system equipment used to connect suppliers and consumers – transformers and switchgear/boards.

EEEW Alarm equipment

Functional requirements of alarm equipment as electrical equipment, is to monitor and annunciate the condition of electrical supply to process and utility equipment, and comprises; alarm tableau and event recorder, etc.

EEEX Other electrical equipment packages

Includes packages not previously listed, i.e. other groups of electrical equipment delivered from vendors/manufacturers as complete functional packages that may comprise several of the above items of equipment for incorporation into the facilities.

EEEY Filters and compensation equipment

Includes filters and compensation equipment like neutral resistors, reactors, capacitors and other impedances.

Neutral resistors are a unit connected between earth and a transformer neutral point, to reduce the current by an earth fault downstream.

Reactors and other impedances will on an offshore installation normally be part of an equipment package.

EEEZ Other electrical equipment

Includes all other electrical equipment items not defined elsewhere under COR EEE, purchased as individual items of equipment for incorporation into the facilities.

EG Heating, ventilation and air conditioning (HVAC) equipment

HVAC systems provide forced ventilation to enclosed areas, remove hydrocarbon laden air and replenish with fresh air, provide heating (or cooling) for enclosed areas and air conditioning for quarters, amenities, offices and control rooms.

Conforming to the SCCS equipment definition, equipment or equipment packages hereunder are especially fabricated/manufactured conforming to separate design specifications or found practical to define as equipment based on current company practice.

Some particular references: For filters and filter coalescers, dampers and sound attenuators, HVAC traps, etc., see under COR BH. For weather louvres, see COR BCA.

EGG Heating, ventilation and air conditioning (HVAC) equipment

HVAC equipment is subgrouped and coded as follows:

EGGA Air handling

Includes air handling units and room fan units as follows:

- air handling units are manufactured units for single or multiple zones, which provide fan force-fed, conditioned, heated and/or cooled air. The units comprise such as
 - an insulated metal casing with supports,
 - fan section with shaft and impeller,
 - a cooling coil section,
 - a heating coil section,
 - a conditioning section,
 - a filter section with replaceable filters,
 - fan motor,
 - sound attenuator,
 - vibration isolators.
- room fan coil units, used for heating/cooling smaller enclosed areas, comprise such as
 - insulated cabinets,
 - discharge air grille,
 - cooling and heating coils,
 - filters/inlet grille,
 - fan unit,
 - fan motor.

EGGB Cooling units, refrigeration units

Includes units for HVAC cooling and refrigeration:

- cooling units – as air handling units used for cooling only, comprise such as
 - insulated casing/cabinet,
 - cooling coils,
 - fan section,
 - filters,
 - grilles,
 - fan motor.
 - cooling towers – under HVAC, are used in conjunction with cooling units, air-handling units and water chillers to provide chilled water. Towers use refrigeration processes;
- water chillers – as separate to cooling tower systems, use refrigeration processes to reject heat and provide chilled water to cooling units and air handling units;

- refrigeration units – in HVAC systems, are combined with or within cooling tower units, water chillers units or air handling units.

For larger industrial purposes the refrigeration units may be a separate installation comprising, such as

- a compressor unit,
- condenser,
- evaporator,
- expansion valve packaged as a separate unit.

EGGC Boilers and heaters

Boilers and heaters for providing hot water and heat for HVAC purposes, including such as

- electric water boilers – used to provide hot water for supply to air handling units and/or hot water radiators,
- gas fired water heating boilers – use gas to heat hot water for supply to heating systems – air handling units and/or hot water radiators,
- gas fired steam boilers – use gas to superheat water into steam for supply to heating systems – air handling units, heaters and/or radiators,
- electric convection heaters – wall or floor mounted major electric convection heaters with or without fans,
- electric radiation heaters – wall or ceiling mounted major electric heaters,
- gas fired radiation heaters – wall or ceiling mounted major radiation heaters.

For electric panel heaters for general room heating, see COR BEE. For domestic water heaters, see COR EGGI.

EGGD Terminal units

Terminal units are ducting terminal/end devices for connecting ductwork, to terminate ductwork or terminate for transfer to other systems.

EGGE Humidifiers/dehumidifiers

Equipment/systems/devices used to condition air to required humidity levels. These may form part of air handling units/other HVAC equipment or be a separate item of equipment.

EGGF Air conditioners

Air conditioners hereunder are self-contained air conditioning units used for industrial purposes and comprise such as

- air handling system,
- refrigerated cooler/heat pump heater,
- heating/cooling coils,
- humidifier/dehumidifier,
- filters,
- control units.

EGGG Heating and cooling coils

Heating and cooling coils comprise such as: fin coiled tubing units/coiled tubing to provide heat or chill to HVAC systems. The coils may be integral to other units or manufactured separately for inclusions into HVAC systems.

EGGH HVAC Fans

HVAC Fans may include

- axial fans – are placed and mounted in line within ductwork, as a primary or secondary fan to boost air flow through ducting systems,

- centrifugal fans – form part of the air handling unit (see COR EGGA), or alternatively as a separate primary fan unit to provide airflow through heating/cooling coils and humidity conditioning.

The fans comprise

- rotors/shafts,
- blades/impellers,
- drivers,
- casings/housings,
- mountings.

EGGI Domestic water heaters

Standard water heaters used to provide hot water to kitchens, laundries and messes, for sanitary purposes, etc.

EGGX Other HVAC packages

Includes HVAC packages not previously listed, i.e. other HVAC equipment/groups of equipment delivered from vendors/manufacturers as packages that may comprise several of the above items of equipment for incorporation into the facilities.

EGGZ Other HVAC equipment

Includes other HVAC equipment not included elsewhere under COR EGG, purchased as individual items of equipment for incorporation into the facilities.

EJ Instrumentation equipment

Instrument equipment includes equipment items and packages required for monitoring and control of the facilities.

This implies that the code also covers SAS equipment. SAS: safety and automation system – according to the NORSOK standard I-002, covers the following subsystems:

- process control system (PCS);
- process shut-down system (PSD);
- power distribution control system (PDCS) – see also particular reference;
- fire and gas system (F&G);
- emergency shut-down system (ESD);
- information management system (IMS);
- system links to various packages.

Conforming to the SCCS equipment definition, instrumentation equipment defined herein are units/items/equipment which normally are especially fabricated/manufactured conforming to separate design specifications and therefore are not considered to be part of bulk materials, or found practical to define as equipment based on current company practice. Instrument equipment has been reconciled with instrument bulk to avoid double coding.

Some particular references: For instrument bulk, see COR BJ. For electrical equipment, see COR EEE. For navigation devices (foghorns and other signalling devices), see COR BTA. For real time clock system, see COR ETRO. For the platform UPS system, see COR EEEQ. For UPS for ESD system, see COR EJJW.

EJJ Instrumentation equipment

Instrumentation equipment is subdivided and coded as follows:

EJJA Air distribution header

Includes the complete header for instrument air. The unit may also be of dual function type, i.e. both for instrument and service air.

For instrument air package, see COR EJJM. For instrument air supply manifolds and tubing, see COR BJE.

EJJB Control panels with instruments, controllers, etc.

Comprises all control panels with instruments, instrument controllers, I/O racks, signal conditioning units, relays, transducers, etc. (all installed components), delivered as complete units and used for such as

- process control,
- operations control,
- control of common process,
- control of process support,
- control of offsites and utility systems.

The code covers instrument control panels as well as local panels not forming part of an equipment package (see below).

Other equipment packages may have (local) control panels included, and these have to be COR coded with the package code. For drilling panels, see COR EDBP. For separate matrix and mimic panels, see COR EJJL. Electrical control panels are deemed to be COR coded under EEEEC.

EJJE Desks/consoles, operator stat., work stat., PC, VDU

This code covers various separate instrument equipment, i.e. not included in any panel or similar, such as

- desks/consoles (with installed components),
- operator stations (also temporary) and work stations,
- computers (incl. cabinet) and PCs (hardware and software).
- VDUs (Visual Display Units),
- bus communication, equipment for interface to packages/systems and other common separate instrument equipment.

For field cabinets, see COR EJJF. For logger, printer and copiers, see COR EJJK. For separate matrix and mimic panels, see COR EJJL.

EJJF Field termination and cross connection cabinets

Includes instrument equipment units with installed components, of the following types:

- field termination cabinets/assemblies;
- field remote I/O cabinets (RIOS);
- cross connection cabinets.

EJJH Oil metering package

The oil metering package is a metering package used for measuring the quantity of oil as well as LNG and condensate, which are delivered to/from a facility.

EJJI Gas metering package

The gas metering package is a metering package used for measuring the quantity of gas, which is delivered to/from a facility.

EJJJ Multiphase metering package

The multiphase metering package is a metering package used for measuring the quantity of petroleum liquids and gases, which are delivered together to/from a facility.

EJJK Loggers, printers and copiers

Includes separate loggers, printers and copiers in connection with the (instrumentation) monitoring and control function.

Printers and copiers used for general administrative purposes are to be COR coded under BCE.

EJL Matrix and mimic panels

Includes separate matrix and mimic panels for the instrumentation function.

Matrix and mimic panels installed in control panels or as part of an equipment package (local), are to be COR coded under EJJB or the package code.

EJJM Instrument air package

Included is the instrument air package, which may comprise equipment like compressor and driver, tanks, separators, coolers, etc. and bulks; all combined into a package, normally delivered by a specialist supplier/manufacturer. As package design – as well as strategy and requirements – may vary, it is difficult and impractical to define the total package content.

EJJU Dynamic positioning control system equipment (DP)

Includes separate control system equipment used for dynamic positioning (DP) by radar, transponder or satellite referencing. The system provides station keeping of a vessel by actuating thruster propellers.

EJJV Weight scales

Scales used for measuring bulks of or within; containers, packages, sacks, trucks, trailers, wagons, etc.

EJJW Hydraulic emergency shut-down system equipment

Includes equipment for the hydraulic control system used for emergency shut-down of process facilities in the event of a blow-out or system failure.

The system serves actuated valves which are hydraulically actuated, and includes separate HPU, UPS, etc. shut-down may be initiated automatically, controlled from the drillers' console/panel or from the main control room. The emergency shut-down system is required to have separate integrity requiring uninterruptible power supply (UPS) to the shut-down system.

See: Actuated valves are deemed to be coded as bulk under COR BJB. For drillers console/panel, see COR EDBP.

EJJX Other instrument equipment packages

Includes packages not previously listed, i.e. other groups of instrument equipment delivered from vendors/manufacturers, purchased as complete functional packages that may comprise several of the above items of equipment for incorporation into the facilities.

EJJY Vibrating/displacement measuring systems equipment

System equipment and devices used for combined packaging/displacement/mass measurement of dry low-density materials – pellets, powders, etc.

EJJZ Other instrument equipment

Includes other instrument equipment items not defined elsewhere under COR EJJ purchased as individual items of equipment for incorporation into the facilities.

ER Miscellaneous mechanical equipment

Miscellaneous mechanical equipment includes items of equipment, which cannot be placed elsewhere under SCCS cost codes. Equipment herein mostly includes discrete items which may form parts of packages defined elsewhere though which for estimating purposes are defined separately herein, and some relevant packages.

Some particular references: For miscellaneous package units, see COR ERX. For misc. mechanical equipment for solids, see COR ERN.

ERC Miscellaneous mechanical equipment

Miscellaneous mechanical equipment is subgrouped and coded as follows:

ERCA Regenerative filters

Regenerative filters are filters, which by reverse process or by cleaning have restored filtering properties.

Types of regenerative filters are such as

- filter in cartridge dust collectors,
- pressure filters,
- gravity filtration units,
- plate and press filters,
- wet pressure leaf filters,
- dry pressure leaf filters,
- rotary drum filters,
- rotary disk filters,
- wire mesh,
- sieves,
- particle filters.

Filters and strainers for piping and HVAC systems are deemed to be COR coded BLA and BHB respectively.

ERCB Non-regenerative filters

Non-regenerative filters are filters which cannot be regenerated and which require filter replacement.

Types of non-regenerative filters are

- particulate filters,
- cartridge filters,
- other types of replaceable filters.

ERCC Centrifuges

A motor driven machine used for separating substances which have different specific gravities by centrifugal forces, used for liquid/solid separation and dewatering.

Types of centrifuges are

- horizontal basket,
- vertical basket,
- solid bowl,
- sharples.

Decanter centrifuge – a large centrifuge used for separating cuttings – rock and fines from the drilling mud returning from downhole. The centrifuge has a cone shaped rotor and is equipped with a screw conveyor for discharge of cuttings.

Centrifuge packages are covered under COR ERCM.

ERCD Extractors

Includes equipment used for extraction, expelling air/vapours/residues from one environment to another. Process equipment used for extraction by means of solvent, into a fraction soluble in the solvent extract and an insoluble residue.

ERCE Cyclones

Cyclones, cyclone separators and hydrocyclones, included hereunder, are cone shaped vessels used for removing or separating substances, which have different specific gravity by induced centrifugal force.

Cyclones/cyclone separators separate solids/liquids and/or liquids/gases into components. Cyclones for dry separation may be connected to filters.

Hydrocyclones separate liquids/water and have been used for oily water treatment systems.

ERCF Mechanical separators/shakers

Mechanical separators/shakers hereunder include all types of separators (other than cyclone separators), shakers, hoppers and screens that mechanically separate different solid materials.

Separators/shakers hereunder do not include the shale shaker unit forming part of the cuttings disposal package under EDB or such equipment included under ERN codes within the code of resources.

ERCG Refrigeration units

Refrigeration units hereunder consider packages used for process cooling. The refrigeration unit consists of a refrigerant compressor, a condenser, an expansion valve and an evaporator. The refrigerant (ammonia or other) passes through a closed loop process, heat is extracted via the evaporator and expelled through the condenser.

For equipment in the refrigeration system for provisions, see COR EAAR.

ERCH Chemical feeders

Chemical feeders include dry chemical feeders used for dosing/conditioning products and liquid chemical feeders with valves, piping and controls, connected to storage tanks/vessels/bottles/bins for injecting chemicals into process streams and utility systems to achieve required qualities and/or specification.

ERCI Molecular sieves

Molecular sieves are used in gas processing systems to dehydrate and to remove carbon dioxide and sulphur compounds from natural gas. The molecular sieve is a bed of super-absorbent desiccant material, which is placed in layers in a service bed within vertical towers. The feedstock passes through the bed where impurities are removed.

ERCJ Mixers/agitators

Mixers/agitators include all types of mixers, agitators, kneaders and blenders used for mixing and conditioning of both fluids and solids to achieve required properties.

For mixers/agitators/blenders for drilling fluids, see COR EDBY. For mixers/kneaders, etc. in kitchen (galley), see COR EAAB.

ERCK Demisters

Demisters are installed in vertical columns/separators to screen/collect demist condensed vapour prior to vapour/gas outlet at column top. Condensed vapour falls to liquid level containment.

ERCL Trays

Trays are distillation tower/column internals installed at different levels within tower/column to collect/extract the different process stream fractions.

Tray assemblies typically consist of

- downcomers,
- weirs and seal plates,
- bubble caps,
- tray ring supports,
- perforated shower trays,
- disc trays,
- donut trays,
- structural packings and supports.

Several different types of plates/trays may be used

- bubble cap tray,
- ballast tray,
- jet tray,
- ripple tray,
- perforated tray,
- uniflex tray,
- turbogrid tray,
- float valve trays.

ERCM Centrifuge packages

Included are centrifuges (see ERCC) with other bulk and equipment (may be discrete items covered under ERC or other equipment) – all combined into centrifuge package(s), normally delivered by specialist supplier/manufacturer. As package design – as well as purchasing strategy and requirements – may vary, it is difficult and impractical to define the total package content.

ERCN Solid waste disposal units

Equipment used for disposal of solid waste. Toxic waste is stored in containers for later storage/disposal conforming to statutory requirements. Non-toxic waste which is not incinerated may be stockpiled for later disposal or

- shredded in a solid waste shredder to reduce size, or
- reduced in size by compression units.

For rubbish mills (granulators) or rubbish compressors in kitchen (pantry), see COR EAAB.

ERCP Incinerators

Incinerators are used for burning ordinary non-toxic wastes. The incinerator is an enclosed fireplace, with grating, firebrick-lined hearth, exhaust stack and burner system.

ERCQ Eductors and ejectors

Eductors and ejectors are equipment items with no moving parts which act as extractors/pumps and are actuated by the flow of high pressure motive fluids which create partial vacuums over intakes.

Ejector – operates with the entry of high pressure/high velocity motive gas/vapour or fluids via nozzles into a diffuser. The action creates a partial vacuum for extracting gases/vapours from vessels. Ejectors may be single stage or up to five stage units.

Eductor – a form of suction pump; a device using a high pressure jet of water to create a partial vacuum at an intake opening to draw liquid from a sump.

ERCR Trash racks/collectors

Trash racks/collectors include all trash (rubbish, refuse, garbage and other unwanted objects) storage, collection, and containment arrangements required for both fluid and solid waste.

Included are

- containers,
- collectors,
- racks,
- tanks,
- pits, etc.

To hold, store and collect trash prior to removal.

Container for cuttings disposal, see COR EDBE.

ERCS Lube and seal oil units

Lube and seal oil units are units used in conjunction with larger rotating machinery and equipment – such as gas turbine driven generators and compressors etc., where lube and seal oil is continuously circulated to rotor bearings, filtered, stored and cooled.

Lube and seal oil units consist of

- oil storage tank(s) (sump(s)),
- circulation pumps,
- heat exchanger(s) for cooling,
- oil filters,
- control systems for monitoring flow, pressure, viscosity and temperature.

Lube and seal oil units may be part of other packages.

ERCT Hydraulic units

Hydraulic power units (HPU) provide power for such as: automatic shutdown and control of process and offtake systems, power for remotely operated valves, shear rams and linear motion rams. Provide also power to hydraulically driven equipment, e.g. for jacking systems.

Hydraulic power units comprise of high pressure accumulators, storage vessels for hydraulic fluids and pumps.

Hydraulic power units may be required to have a separate essential integrity requiring emergency power backup with an uninterruptable power supply system (UPS). In this case the dedicated UPS system with UPS unit, rectifier, inverter, static switch, battery bank, etc. is to be included here.

For hydraulic units (HPU) for subsea facilities, see COR EUUK/EUUM. For hydraulic emergency shut-down system equipment, see COR EJJW.

ERCU Comminutors

A comminutor is a motor driven unit that reduces organic solids particle size in flowing sewage. The unit is equipped with cutters and screens.

For kitchen granulators (rubbish mills), see COR EAAB.

ERCV Trash stop gates

Gates used to stop or regulate the flow of trash and unwanted materials into intake systems.

ERCX Other miscellaneous mechanical equipment packages

Includes packages not previously listed, i.e. other groups of COR ERC type equipment delivered from vendors/manufacturers purchased as complete packages that may comprise several items of equipment for incorporation into the facilities.

ERCZ Other miscellaneous mechanical equipment

Includes other equipment of COR ERC type items not included elsewhere under COR ERC, which is purchased as individual items of equipment for incorporation into facilities.

ERD Drivers and power transmissions

Drivers and power transmissions includes all major drivers delivered complete with base frames/plates, power transmissions – gearing/reducers, starters, couplings, accessories and controls, as defined under this code.

This code applies for drivers, etc. primarily for generators and compressors requiring high effect and for driven units in hazardous areas.

Minor drivers; engines and motors within this manual are regarded to form part of each respective composite equipment unit, which normally will be delivered as a complete unit from vendors/manufacturers e.g. pump with driver, baseplate and coupling. For these, the other relevant COR E codes apply.

Drivers and power transmissions hereunder are not intended to cover complete packages (much used) which are included under COR ERX codes, or under other defined package COR E codes; e.g. for gas turbine driven main power generator set complete with generator, driver and lube/seal oil skid, see COR EEEN.

Drivers and transmissions are subgrouped and coded as follows:

ERDA Gas engines

Gas engines are reciprocating – piston designed engines which use natural gas as a fuel, with prime power ratings range from 85 kW to 600 kW or greater. The engines may be configured with from six to sixteen cylinders. Gas engines may be used as the power unit to drive generators used for main and/or emergency power generation.

Costs under this code include for such as

- natural gas engine set,
- fuel supply connections,
- aspiration units,
- engine supports.

ERDB Gearboxes and couplings

Gearboxes and couplings include all forms of power transmission systems, which are attached to major drivers and fixed to baseplates/frames to transmit power to rotating machinery/generator sets.

ERDC Steam turbines

Steam turbines hereunder include steam driven turbine unit, comprising such as

- casings,
- rotor shaft and blades,
- nozzles,
- governors,
- valves,
- bearings and inlet/outlet systems forming part of the turbine unit.

ERDD Diesel engines

Diesel engines are reciprocating piston designed engines which use diesel oil (or similar) as a fuel, with prime power ratings range from 50 kW to 700 kW or greater. The engines may be configured with from four to sixteen cylinders. Diesel engines may be used as the power unit to drive generators used for main and/or emergency power generation.

Diesel engines under this code include such as

- diesel engine set,
- fuel supply,
- aspiration units,
- engine supports.

ERDE Electrical motors

Electrical motors include all forms and types of larger major electrical motor drivers for all voltages, phases and frequency range, e.g. for driven units in hazardous areas.

Electrical motors hereunder do not include drivers which form an integrated part of a composite package which will normally be delivered as a complete unit, comprising e.g. pump, baseplate, driver and coupling as a minor pump package (see COR ERP).

ERDF Air driven motors/starters

Air driven motors are driven by compressed air supplied from compressors or as bleed air. These motors are used in hazardous areas and for driving air driven winches.

Air driven motors include such as

- casing,
- rotor/impeller,
- nozzles,
- governor,
- valves,
- bearings.

Air driven starters are used for starting major drivers – gas/diesel engines and gas turbines.

ERDT Gas turbines

Gas turbines hereunder include the gas driven turbine unit, which includes such as

- air inlet,
- air compressor,
- fuel nozzles,
- combustion chambers,
- gas turbine rotor and blades,
- exhaust duct,
- turbine housing/casing with support frames.

Gas turbine units provide the driver unit for main power generators, process gas compressors and other rotating equipment requiring high effect drivers.

ERDV Hydraulic motors/starters

Hydraulic motors are powered by hydraulic fluids and are used in hazardous areas, comprising such as

- housings,
- shaft/impeller,
- nozzles,

- valves,
- bearings.

Hydraulic starters are hydraulically powered starters used for starting major gas/diesel engines and gas turbines.

ERDZ Other drivers

Includes all other forms of major drivers, etc. not definable within the above COR ERD codes.

ERF Heaters, boilers, furnaces and flares

This equipment code comprises primarily all process heating and disposal-burning facilities based on the heat generation by organic fuels or electrical energy.

Some particular references: For mud burner, see COR EDBF. For incinerators, see COR ERCP. For waste heat recovery unit, see COR ERHW. For heaters and boilers in connection with HVAC (e.g. for hot water), see COR EGGC. For fresh water maker packages, see COR ERXD.

COR ERF equipment is subgrouped and coded as follows:

ERFA Direct fired heaters incl. stack and ducting

Direct fired heaters include process-heating equipment for direct heat transfer by means of heating the feed stock in tubular systems. Direct heat transfer is used to start or stabilize chemical reaction. The different heater types can be classified as

- circular and box type heater with direct up or down firing burners with or without a convection section for product preheating or steam generation,
- heaters with wall burners for radiant heat transience to product-containing tubes,
- reforming furnaces with or without a convection section,
- catalytic cracking furnaces.

Process heating equipment operating up to approximately 600 °C is called «Heater», whilst equipment designed for a higher temperature commonly is known as «furnace» (see COR ERFI). The fuel medium is fuel oil, diesel or gas.

ERFB Steam boilers incl. stack and ducting

Steam boilers are used to generate high or medium pressure steam in a direct-fired process. The medium – water – is fed through a tubular system, with pretreatment and condensate treatment usually incorporated in the overall boiler system. Direct firing burners fed by gaseous/liquid or fossil fuels produce heat.

ERFC Flare tips and accessories

Includes equipment for stacked flares. Stacked flares are understood as burning systems for waste gases at elevated levels which burn at a minimum height 50 m above ground level/deck and are normally guided by a pilot flame generator system.

The flare tip is a special waste gas burner with a pilot flame ignitor and necessary accessories. Other waste gas ignition devices in connection with stacked flares may be relevant and are to be included under this COR code.

ERFD Flares ground

Ground flaring is used for large quantities of condensates or liquid wastes of hydrocarbons or other combustible liquids. Ground flares can be burner tipped pipes or firebrick insulated vessels with special high temperature burners to crack toxic chemical compositions. Ground flaring requires large safety areas.

ERFE Electric heaters

Electric heaters are used for processes where an adjustable and sensitive direct heat transfer is required or where direct fired heaters cause hazards for the precinct.

ERFF Special heaters

Special heaters are usually heat transfer equipment used for controlled heating operations, where liquids or gases are exposed to sensitive heat transfer at medium temperatures.

ERFG Special boilers

Special boilers are used for low or medium direct heat transfer to a liquid medium where controlled heat is required.

ERFH Electrode boiler packages

Boiler packages supplied as complete unit where steam is directly generated by the use of electrodes placed within saline water solutions. The electrodes are powered directly with electricity.

ERFI Furnaces

Furnaces are understood as heat transfer facilities where the medium is in direct contact with the generated heat such as blasting furnaces and melting furnaces using gases e.g. oxygen or electric power for heat generation. Operating temperature is normally above 600 °C.

ERFX Other heater, furnace and boiler packages

Includes packages not previously listed, i.e. other equipment/groups of equipment of COR ERF type delivered from vendors/manufacturers purchased as packages that may comprise several of the above items of equipment for incorporation into the facilities.

ERFZ Other heating, burning and boiling equipment

Includes other equipment of COR ERF type not included elsewhere under COR ERF, purchased as individual items of equipment for incorporation into the facilities.

ERH Heat transfer equipment

Heat transfer equipment includes all types and forms of equipment items or package type equipment used for heat exchange; heating and cooling, to provide, extract and recover temperature differences. The heat is used for process heating and special heating purposes, as indicated.

Some particular references: For other heaters and coolers, see under COR ERF and EGG. For cooling towers, see COR ERXI.

Heat transfer equipment is subgrouped and coded as follows:

ERHA Shell and tube heat exchangers

Shell and tube heat exchangers are units used for heating a liquid by transferring the heat from another liquid or vapour. It is a commonly used type of industrial heat exchanger with a bundle of small diameter pipes (tubes) inside a long cylindrical steel shell. The tubes (50 to several hundred) run parallel to the shell and are supported equidistant by tube sheets. The space inside the shell not filled with tubes carries the cooling/heating medium.

Types of shell and tube heat exchangers are

- floating head,
- stationary tube,
- kettle type,
- fixed tube sheet – single tube pass – vertical heater or reboiler,
- floating head – four pass tube side – two pass shell side,

- two pass.

Shell and tube heat exchangers comprise such as

- shells of different types,
- heads of different types,
- tubes,
- baffles and support plates,
- nozzles,
- packings,
- tie rods and spacers.

ERHB Plate heat exchangers

Plate heat exchangers are relatively low-pressure exchangers, which use thin walled plates as heat transfer elements. Because of the thin walls, plate heat exchangers exhibit a much higher heat transfer coefficient than shell and tube exchangers, however, because of less robust construction there are pressure limits in application.

Plate heat exchangers comprise such as

- exchanger frame(s),
- moveable end covers,
- plates/plate packs,
- carrying and compression bars,
- entrance/outlet flanges.

ERHC Air cooled heat exchangers

Includes induced or forced draft unit air cooled heat exchangers which are often used in gas processing plants like NGL/LPG/LNG, for heat transfer from processes/refrigerant processes and expel to the environment.

The exchangers consist of

- axial flow fans,
- tube bundles,
- structural parts – plenum, frames, rings, support base,
- electric fans drive motor.

The fan is placed above the tube bundles.

For forced draft units – essentially identical to induced draft units – the fan is placed below tube bundles.

ERHD Quench coolers

Units for a process of rapid cooling from an elevated temperature by contact with liquids, gases or solids.

Includes heat exchangers for melting/cooling solids, gases related to electrolytic/metallurgical and thermal cracking processes comprising; fluid beds, solid beds and/or gases.

ERHE Misc. coolers and condensers

Heat exchangers/heat exchange system equipment for cooling and condensing of vapours/liquids, which properties and configuration does not form part of other heat exchangers types/groups defined under COR ERH.

Included are

- condensers – water cooled heat exchangers used for cooling and liquefying vapours may be horizontal or vertical with loop seals, comprising such as
 - cylindrical jackets,

- vapour section,
- vapour inlet,
- water section – water inlet/outlet,
- cooling tubes.
- horizontal film types cooler – water cooled heat exchangers used for cooling of fluids by water film/evaporation. The medium to be cooled is passed through a tube bundle/coil, and the cooling water enters above the coils. A distributor distributes water above coils providing a cooling film,
- heaters – storage tank heating coils, immersion heaters, bayonet type heat exchangers, etc.

ERHF Double pipe heat exchangers

Included are the following heat exchangers:

- double pipe finned exchanger – a type of shell and tube exchanger, comprising such as
 - a fixed internal finned (G-fin) pipe exchange section placed within a shell,
 - inlet/outlet flanges,
 - nozzles and supports.
- double pipe condenser – a tube bank heat exchanger consisting of double piping for cooling/condensing gases/vapours, comprising such as
 - two sets of pipe banks where the water set counter-currently cools/condenses the gas phase,
 - pipe bundles,
 - bundle supports/braces,
 - gas inlet/gas vapour outlet,
 - water inlet/outlet.

ERHG Core type heat exchangers

Included are heat exchangers of the following types:

- finned tube exchangers – small diameter pipe or tubing with attached metal fins attached to the outer circumference, for cooling water and other liquids or gases. finned tube exchangers cool by radiating from the fin-surface into the atmosphere in a manner similar to an automobile radiator;
- spiral type heat exchangers (different types).

For plate-fin type heat exchangers, see COR ERHJ.

ERHH Liquefaction heat exchangers (cryogenic)

Liquefaction heat exchangers included herein relate to the main heat exchangers used in LNG production processes. The exchangers (one per train) are extremely large units, which contain aluminium coiling for exchange.

ERHI Reboilers/evaporators

Includes particular equipment like

- reboiler – a heater associated with an extracting/distillation system that reheats a part of the bottom process stream drawn off the distillation column and then reintroduced to the column as vapour. Reboiling is a process of reworking part of the charge in a distillation column to improve fractionation. Reboilers may be naturally or forced circulation units and comprise of shells and tubes, inlets/outlets and saddles,
- evaporators – designed to concentrate water solutions by vaporizing some of the water.

ERHJ Compact heat exchangers

Includes heat exchangers of a plate-fin type. As the name indicates, the volume is small compared to other heat exchangers, e.g. about one to four compared to a shell and tube heat exchanger of similar capacity.

Compact heat exchangers are used e.g. for various gas cooling purposes (after separation due to clean medium requirements), aftercooling and may also be used for condensate cooling.

ERHW Waste meat recovery units

Waste heat recovery units are units used to recover heat from exhaust/flue gas. These are normally installed at the exhaust end of gas turbine drivers, furnaces, steam boilers or all other direct fired facilities to recover excess heat from the flue gas. Recovered heat is used for process heating and steam production and may form part of a combined cycle system.

Waste heat recovery units comprise of such as

- fabricated casing structure with supports,
- filters,
- finned tube heat exchanger units/coils,
- baffles and dampers,
- furnace convection sections.

ERHX Other heat transfer equipment packages

Includes packages not previously listed, i.e. other groups of COR ERH type equipment delivered from vendors/manufacturers purchased as complete packages that may comprise several of the above items of equipment.

ERHZ Other heat transfer equipment

Includes other COR ERH type equipment not included elsewhere under COR ERH, which is purchased from vendors/manufacturers as individual items of equipment for incorporation into facilities.

ERK Compressors, blowers and expanders

Compressors, blowers and expanders, hereunder include all types major of equipment required in the facility – main process, process support and utility systems, which:

- compress gases/vapours for treatment, conditioning and liquid extraction,
- compress gas/vapour for gas lift, reinjection and/or gas export,
- turbo expansion of gas within gas processing,
- blowers used in air supply to support processes and/or combustion,
- fans – industrial fans related to processing of non-liquids.

Compressors, blowers and expanders hereunder are intended to provide codes for individual items of equipment which form part of process systems and which may be purchased individually or as packages.

Due to varying practice, the drivers for COR ERK components may be purchased separately, i.e. not together with the driven unit. In this case COR ERK codes apply for the driven unit and COR ERD for the drivers.

In the case of a packaged solution, COR ERKK applies for compressors with gas turbine drivers (sets). For other packaged units with e.g. compressor/blower and driver, COR ERKX applies.

Some particular references: Blowers/fans for HVAC include both driven units and drivers, and are to be COR coded under EGGH. Compressors (incl. motor) in refrigeration systems are to be coded under respective system equipment E code; e.g. compressors in refrigeration and freezing system for provisions, are to be COR coded under EAAR.

COR ERK equipment is subgrouped and coded as follows:

ERKA Centrifugal compressors

Centrifugal compressors are single- or multi-stage compression units used for progressive compression of gasses/air to higher pressures, typically in gas recompression systems, gas compression within pipeline systems and/or compression for export.

Centrifugal compressors herein comprise such as

- casing,

- diaphragms,
- impeller,
- seals/packings,
- bearings and bearing housings,
- baffles,
- inlet nozzles,
- discharge connections and compressor auxiliaries.

ERKB Reciprocating compressors

Reciprocating compressors are positive displacement compressors, which may be single or multi-stage units used for compression of gas/vapours/air and comprise of such as

- casings,
- crankshaft and bearings,
- connecting rods,
- cylinders and pistons,
- valves,
- lube systems,
- manifolds and inlet/discharge sections.

ERKC Screw/rotary compressors

Includes compressors of screw or rotary type:

- screw compressors – used where high performance/small volume compression is required. Screw compressors comprise of such as
 - casings,
 - rotating screws,
 - screw shafts,
 - bearings,
 - seals and inlet/discharge sections.
- rotary compressors – compressors other than screw compressors, which have variable voids for compression of air/vapour/gases.

ERKD Axial compressors

Axial compressors are multi-stage compression units for compression of large volumes of gases/vapours/air to required pressures.

Axial compressors are driven turbine units, which comprise such as

- housing/casing with supports,
- a series of fixed stator blades,
- a rotor assembly with rotor blades,
- bearings,
- lube connections and inlet/discharge sections.

ERKE Fans

Fans – axial and/or centrifugal fans – hereunder relate to fans used in industrial processes requiring forced or induced airflow:

- centrifugal fans – normally the primary fan units used in industrial processes requiring air:
 - for drying,
 - to support combustion in kilns/furnaces,
 - for curing/baking materials in kilns
 - for pollution control systems,
 - for forced air feed to cyclones, to filters, etc.

- axial fans – industrial fan units for air supply or extraction in process and/or utility plant ducting systems and supply/extract systems in tunnels.

Fans hereunder do not include HVAC fans which are separately coded (see COR EGGH).

ERKF Blowers

Includes single stage impeller blowers – used to increase air supply to engines/furnaces/boilers/hearths/kilns to increase and enhance combustion. The units comprises such as

- casing/housing,
- shaft assembly with impeller and bearings,
- impeller housing,
- inlet/discharge guides/vanes/connections and controls.

ERKH Expanders

Includes turbo-expanders – used in gas processes. The unit reduces feed pressure to design demethaniser pressure in a near isentropic expansion, efficiently cools gas to demethaniser temperature and delivers shaft work to the compressor for partial recompression of sales gas. (Turbine or engine-driven compressors are used for final recompression).

ERKJ Diaphragm compressors

Diaphragm compressors are used for special purpose services requiring small volumes and low pressure.

The dual function unit may serve as a compressor e.g. for dosing of additives, or act on the vacuum side for e.g. extraction in connection with analysis.

The pulsating movement of an elastomeric membrane achieves the pressure change.

The diaphragm compressor is always delivered with driver (integrated unit), and the unit consists of such as

- driver,
- housing/casing with supports,
- internal piston/cylinder and eccentrics,
- membrane,
- bearings,
- valves and inlet/discharge sections.

ERKK Compressors/gas turbine driver sets

This code includes major compressors with gas turbine drivers (in sets); a solution widely applied for oil and gas facilities.

The sets are often delivered on a base plate with accessories. As the sets have a package character, it is difficult to define the total set components. This is due to different designs and varying purchasing strategy and requirements.

Compressor packages with other driver types are to be COR coded under ERKX.

ERKX Other compressor, blower and expander packages

Includes packages not previously listed, i.e. other groups of COR ERK type equipment delivered from vendors/manufacturers, purchased as complete functional packages that may comprise several of the above items of equipment for incorporation in the facilities.

ERKZ Other compressors, blowers and expanders

This code includes other types of compressors, blowers and expanders not defined elsewhere under COR ERK, which are purchased from vendors/manufacturers as individual items of equipment for incorporation into the facilities.

ERM Material and product handling equipment

Material and product handling equipment defined herein relates to equipment primarily used for

- material movement loading/discharging and handling,
- personnel movement/transport,
- maintenance, repair and movement of permanently installed equipment/items.

The equipment hereunder may be purchased as individual items of equipment or have a more packaged character.

Some particular references: feeders, elevators, conveyors, etc. for solids (e.g. processed bulks), see codes under COR ERN.

COR ERM equipment is subgrouped and coded as follows:

ERMA Pedestal cranes

Pedestal cranes are slewing/revolving cranes placed on fabricated steel pedestals/columns, which are placed on/within/or incorporated in deck structures/piers/jetties.

Pedestal cranes are typically used for platform service – movement of material onboard and offloading of material delivered by supply vessels. Pedestal cranes may be electrically and/or hydraulically operated/powered, and the cranes normally range from 6 to 50 tonnes lifting capacity.

Materials for support of pedestal cranes (e.g. in the deck and not part of crane manufacturer's delivery) are to be COR coded under BNA.

ERMB Hoists and trolleys

Hoists and trolleys are used for movement of material supplies and equipment for maintenance purposes within process related facilities.

Hoists – are used for raising and lowering of materials/machinery from one level to another, through decks and floors. Hoists may range from small manual chain hoists to larger electrical/hydraulic/air driven units with separate supporting columns, beams and slewing arm/support structures. Hoists hereunder include the hoisting unit, driver/s, reducer/s, couplings and separate hoist support structure.

Trolleys – are used for horizontal movement of materials/machinery upon decks/floors. Trolleys consist of a fabricated base/frame equipped with wheels, and/or rail systems where applicable. Trolleys are not equipped with separate driver units, though are moved by cables/brakes and winch systems, or manually moved.

ERMC Elevators, escalators and lifts

Elevators, escalators and lifts – are used for lifting/lowering goods and personnel from one elevation to another. May be enclosed within lift shafts, internally within buildings/structures or externally mounted.

The units comprise such as

- lift unit/capsule/platform/compartments,
- separate (non-integrated) lift shaft,
- cables and winches,
- hydraulic rams,
- braking systems and controls.

This code also covers industrial raisers – used temporarily during construction for raising/lowering goods and personnel, normally external to buildings/structures/facilities and comprises such as

- raiser tower structure,
- cage unit,
- gearing system,
- driver,

- brakes and control system.

ERMD Trucks, carts, forklifts, etc.

Includes transport equipment like:

- forklifts – used for transporting pallets/containers/bins etc. from one area to another and for raising/lowering from storage racks. These may be electric/diesel or LPG driven,
- carts – articulated wheeled carriages/trailers without driving units, used to load/carry material or equipment from one location to another,
- trucks – flat top bed truck normally over 1 tonne capacity used for movement of goods/materials and/or personnel from one location to another.

ERME Mobile cranes

Includes all forms and types of mobile cranes purchased for and which form part of the plant/process facilities' production and operations equipment. Includes track type cranes and wheel type cranes complete with booms and jibs.

ERMF Overhead cranes

Overhead cranes/overhead travelling bridge cranes – herein include all types and forms of electric overhead travelling cranes which form part of the permanent facilities, and which are used for production and operation of plants/facilities.

Overhead cranes comprise such as

- main crane bridge with bogies/rails and longitudinal drivers,
- transverse travelling trolley and driving system,
- the hoisting mechanism,
- cables, controls and operating enclosure.

ERMG Railroad and road loading equipment

Railroad and road loading equipment includes equipment for loading and discharging solids/liquids at export and receiving facilities. Included hereunder are

- portal cranes – overhead travelling cranes placed on portal supports which extend across truck/wagons beds for lifting/movement of containers/sacks/bins, etc.,
- loading system equipment – comprising
 - storage bins,
 - surge bins,
 - hoppers and related loading/unloading conveyors.
- discharging system equipment – comprising
 - equipment to collect bottom dumped/turned over solids for storage and distribution,
 - equipment for receiving liquids from railcars/tankwagons tanks/piping systems for transfer to storage systems.

ERMH Workshop machines

Includes workshop machines for maintenance and repair of the facility. The machines are normally delivered by specialised manufacturers, and include such as

- machines in mechanical workshop, e.g.: cleaning machines/stations, grit-blasting cabinets, etc.,
- machines in machine workshop, e.g.: lathes, milling machines, grinding machines, drilling machines, cutting/sawing machines, planing/shaping machines, presses, pipe bender, etc.,
- machines in welding workshop, e.g.: electrode heating cabinet and drying oven, welding machines, cutters, grinders, etc.,
- machines in PSV workshop: polishing machines, etc.,
- workshop machines located elsewhere.

Standard outfitting (shelves, work benches, bins, lockers, etc.) and furniture in workshops, laboratories and workshop offices are to be COR coded under BCE.

ERMK Winches

Used for pulling of trolleys, plant and equipment, machinery and/or materials. Winches may be hydraulic/air or electrically driven and comprise normally of

- winch drum,
- chains/cables,
- stoppers,
- gearing system,
- driver,
- braking system,
- mounting base/frame.

For mooring winches, see COR EVYJ.

ERMQ Packing, calibrating and measurement equipment

Packing/calibrating and measurement equipment comprises equipment for

- packing,
- weighing,
- calibrating and measurement

of processed bulk material for further export.

Included is bag/sack/container combined with filling, vibrating scales/volumetric measurement systems.

Feeder system equipment which include tanks/bins/hoppers/chutes and conveyors are not included herein – see COR ERN and ERT. For vibrating, displacement measuring systems equipment, see COR EJYJ.

ERMV Weighing screws

Weighing screws which may form part of packing/calibrating and measurement equipment or conveyor/feeder systems used for weighing of materials, directly or by calibrated volumetric flow.

For weight scales, see COR EJJV.

ERMU Product loading and vapour return arms

Product loading and vapour return arms are part of systems designed for loading/unloading of gaseous or liquid stocks and/or vapour return at quays, rail and/or road terminals (hose loading stations).

The equipment delivery may have a "package character" and may comprise

- arm structures/portals/supports/booms,
- lifting/lowering/movement and connection system,
- part of product transfer piping,
- part of vapour return piping,
- hoses and fittings.

ERMV Gantry and portal cranes

Gantry/portal cranes – used for material handling and operation of plants/facilities (e.g. for turrets). The cranes are similar to overhead travelling bridge cranes, normally electrically operated, and comprise such as

- main crane bridge,
- transverse travelling trolley and driving system,
- the hoisting mechanism,

- cables (on the crane),
- controls and operating enclosure,
- portal frames which support the elevated main crane bridge,
- bogies/rails at the portal frame base for longitudinal travel.

For portal cranes in connection with railroad and road loading, see COR ERMG.

ERMX Other material and product handling equipment packages

Includes packages not previously listed, i.e. other groups/assemblies of equipment of COR ERM type delivered by vendors/manufacturers, purchased as complete functional packages that may comprise several of the above items for incorporation into the facilities.

ERMZ Other material and product handling equipment

Includes other types of material and product handling equipment not included elsewhere under COR ERM, purchased from vendors/manufacturers as individual items of equipment for incorporation into the facilities.

ERN Mechanical equipment – solids

Mechanical equipment used in connection with solid materials – i.e. for such as: size reduction, conveying, grinding/milling, screening, classifying, feeding, blending, sifting and collection – all most relevant for onshore plants.

Some of the equipment hereunder consists of several items/units thus constituting an entity more like a system/package.

Some particular references: For railroad and road loading equipment for solids, see COR ERMG. For packing, calibrating and measurement equipment for processed bulk, see COR ERMQ. For weighing screws for solids, see COR ERM. For equipment related to provisions and food processing, see under COR EAA.

COR ERN equipment is subgrouped and coded as follows:

ERNA Belt conveyors

Includes all manufactured/fabricated/assembled material/components and services for belt conveyor units, hereunder:

- pulleys:
 - screw take-up;
 - snub;
 - bend;
 - tail;
 - gravity take-up and head pulley.
- idlers:
 - troughing;
 - return;
 - self-aligning and impact.
- holdbacks, brakes and belt scrapers;
- structural components:
 - stringers;
 - supports and braces;
 - A-frames;
 - walkways;
 - take-up towers;
 - legs;
 - conveyor frames/trusses;
 - covers;
 - head chutes;
 - tail chutes and hoppers.
- head pulley electric driver, reducer, base plate and couplings;

- conveyor electric's (on the machinery):
 - tripping switches;
 - cabling and lighting.
- conveyors belt and belt splicing.

ERNB Bucket elevators

Includes manufactured/fabricated bucket elevators, used for raising material from feeders via a series of fixed buckets rotating around head/tail shafts and discharging to higher levels. Elevators may be chain or belt driven and are normally fully enclosed. Bucket elevators include components such as

- chute sections; plated steel fabricated sections into head, tail, standard and infills,
- head pulley/shaft electric driver, reducer, base plate and coupling,
- buckets, pulleys, chains/belts, sprockets/hubs, shafts and take-ups.

ERNC Screw conveyors/reeders

Screw conveyors/feeders are manufactured enclosed units with driven rotating internal screws to raise stockpiled materials at vertical inclination to higher levels for loading/discharging to other transporters/processes. Screw conveyor components include such as

- drive assembly:
 - electric driver;
 - reducer and coupling;
 - head and tail bearings and supports.
- structural components:
 - A-frames;
 - flange feet/saddles;
 - conveyor trough and cover;
 - inlet flanges and spouts.

ERND Tube-flo conveyors

Tube-flo Conveyors are medium to small diameter tubular conveying units, which consist of a driven linked chain to which circular discs are connected. The material is conveyed in voids between moving discs. The conveyor components include such as

- drive box with:
 - electric driver;
 - reducer and couplings.
- chain and discs,
- inlet boxes with:
 - discharge gates and inspection hatches.
- tubing system:
 - straight tubes;
 - bends;
 - coupling and support clamps.

ERNE Multi-flo conveyors

Multi-flo conveyors are smaller general-purpose conveyors used for inclined raising of material from feeders/hoppers/bins. The system consists of a driven chain to which flights at different chain pitches are connected. Flights are near semi-circular plates, which fit into troughing sections. The material is transported in voids between flights. Multi-flo conveyor components include such as

- driver:
 - electric driver;
 - reducer and couplings.
- chain and flights,
- structural components:

- tail section;
- head section;
- intermediate sections and make-up sections;
- A-frames;
- supports;
- braces and accesses.

ERNF Jaw crushers

Includes eccentric and rotating jaw crushers as follows:

- eccentric jaw crusher – designed for primary and secondary crushing of e.g. rocks/ores, where an eccentric driven shaft moves one jaw/wearplate towards a fixed jaw/wearplate. The jaws are vertically troughed, and with continual movement the jaws crushes material to screen sizes, which exits the base of the jaw crusher;
- rotary jaw crusher – designed for primary crushing of e.g. rocks and/or ores. The material is discharged into the crusher pit where a rotating center section breaks/crushes the material to size, for later secondary/tertiary crushing.

ERNG Impact breakers

Impact breakers are designed for primary and secondary breaking of non-abrasive quarry rocks or similar material. Impact Breakers may be single or dual roll types. Oversized rock is passed into the breaker above rotors/hammers, where successive hammering throws screenings through discharge screens.

ERNH Twin rotor impactors

Twin rotor impactors are similar to impact breakers, but are used for size reduction of homogenous sedimentary material – clays, shales, and sandstones. Rotor shafts are equipped with hammers, which reduce the material to size.

ERNI Granulators

Ring type granulators are used for crushing bituminous/sub-bituminous coals, lignite, chemicals and medium hard minerals. The ring granulator consists of a shaft driven rotor assembly to which suspension shafts and crushing discs are attached. With the rotation of the rotor assembly, crushing discs roll above screen bars and progressively crush material, which exits below the granulator.

ERNJ Gravity impact crushers

This type crusher is a large rotating horizontal cylinder lined internally with screens. Under rotation the material is crushed, and under gravity impact undersized material is passed through the screens and exits to transporters under the crusher. Lifting shelves and deflectors as rejects discharges oversize. Feeding is through the centre of the crusher.

ERNK Hammermills

Hammermills are in every respect similar to impact breakers and are used for the same purposes. The main difference is that a series of hammers are connected to the rotor assembly. The hammers break the material to size.

ERNL Reversible impactors

Reversible impactors are used for secondary and tertiary crushing of stone, cement rock, aggregate, mineral ores and chemicals. Reversible impactors are similar to hammermills; the impactors has a rotor shaft assembly to which is attached a series of impact hammers. Size reduction is achieved by the rotor assembly rotation and chamber mounted breaker blocks, which allow undersize to screening to bypass. Reversibility is required when jamming occurs.

ERNM Roll crushers

Roll crushers are used for size reduction of coal and friable materials. The material is simply reduced to size by the rotation of a roll shaft; a forged steel shaft with formed teeth acting against wear plates.

ERNN Rod and ball mills

Includes rod and ball mills as follows:

- rod mill – used for size reduction/grinding of hard materials, similar to a gravity impact crusher. The mill is equipped with a number of solid steel rods, which exert gravity impact reduction on the material;
- ball mill – similar to rod mill, though uses large steel balls for size reduction under gravity impact on the material.

ERNO Vibrating packers

Vibrating packers are designed for manual packing of dry materials into containers. The packer is simply a vibrating base plate, which allows maximum packing of dry bulk material into minimum container space.

ERNP Vibrating screens

Vibrating screens are used for classifying materials after size reduction from secondary and tertiary crushing. Screens are inclined and elevated and may be arranged in single, double or triple decks. The feed passes through feed chutes onto the screen decks. The vibrating action is maintained by a vibrating unit and spring mountings. Oversize material passes over the decks for reject, and screened materials are discharged onto conveyors for transport.

ERNR Fines sifters and screens

Included is the following equipment:

- pressure sifters – are used for classifying very fine materials. A sifter contains a series of fine screens/sieves and trays and operates under pressure;
- rotary screens – are used in chemical industries. The screens are internally mounted within dust tight boxes, and the screens may contain up to six sieves. The feed passes through the screen box top onto the rotating screens. The material is progressively sifted outwardly to discharges.

ERNS Blenders

Includes blenders like

- auger blenders – rotating augers, which blend two or more dry materials – consist of casing, driver, reducer, casing, chutes and rotating augers,
- rotary drum blenders – drum type units for blending dry or semi dry materials. When the drum rotates, scoops within the drum blend the material. The blending does not cause size reduction.

ERNT Bin activators

Bin activators – vibrating bin discharge units placed below bins and hoppers, for providing positive continuous flow of dry materials to other transporters.

Includes packages not previously listed, i.e. other groups of COR ERN type equipment or equipment assemblies delivered by manufacturers/vendors, purchased as complete functional packages that may comprise several of the above items for incorporation into the facilities.

ERNZ Other solids mechanical equipment

Includes other COR ERN type equipment not included elsewhere under COR ERN which are purchased from manufacturers as individual items of equipment for incorporation into the facilities.

ERP Pumps

Pumps defined herein relate to all types and forms of pumps required in facility systems to transfer liquids/liquid slurry within/or from one system to another.

Pumps hereunder are normally delivered from manufacturers/vendors as complete functional pumping units, which comprise

- casings,
- couplings,
- drivers (normally electric motors),
- base plate/skids.

Some particular references: Pumps may be a part of complete package units covered elsewhere under COR E codes, and for these the COR codes for the package unit apply. For firewater pump package, see COR ERPJ.

Pumps are subgrouped and coded as follows:

ERPA Centrifugal pumps

Centrifugal pumps are commonly used in offshore facilities and industrial processing, where high pressure/high volume flows are required. Liquid pressure is increased by centrifugal force.

Types of centrifugal pumps are as follows:

- in-line process;
- chemical process;
- double suction;
- multi-stage;
- vertical turbine.

Centrifugal pumps comprise such as

- pump casing,
- impellers and shaft,
- bearings,
- stuffing/packing boxes,
- nozzles/diffusers,
- piping – inlet/discharge sections,
- couplings,
- motor,
- skid/base plate support.

ERPB Reciprocating pumps

Reciprocating pumps are positive displacement pumps, which may be single or multi-stage units.

Reciprocating pumps comprise such as

- casing(s),
- crankshaft(s),
- bearings,
- cylinders/pistons,
- valves,
- lubrication units,
- packing/stuffing boxes and seals,
- inlet/discharge sections,
- couplings,
- transmission,
- motor,

- skid/base plate support.

ERPC Rotary pumps

Rotary pumps comprise a series of special purpose units, typically with few rotating parts.

Types of rotary pumps are

- three-lobe,
- four lobe,
- sliding vane.

Rotary pumps comprise such as

- pump casings,
- shaft(s) and lobes or sliding vane unit,
- couplings,
- transmission,
- motor,
- skid/base plate support.

ERPD Special metering pumps

Special metering pumps include units, which both pump and measure flow and are used for different purposes like

- fuel loading pumps (diesel/petrol etc.),
- chemical injection/dosing pumps.

The pumps hereunder comprise such as

- pump unit (incl. motor),
- metering unit,
- piping/pipe fittings and valves,
- filters,
- hoses,
- structural units to house pump/meter units.

ERPE Gear pumps

Gear pumps are rotary pumps used for small volume flows requiring high-pressure liquid feed. Types of gear pumps are: external gear and internal gear, and these comprise of such as

- pump casing(s),
- gears and gear shafts,
- bearings,
- stuffing boxes,
- couplings,
- transmission,
- motor,
- skid/base plate support.

ERPF Diaphragm pumps

Diaphragm pumps are used for special purpose duty; for pumping corrosive liquids/slurries, etc. The pulsating movement of an elastomeric membrane achieves pressure increase. Diaphragm pumps comprise such as

- pump casing/body,
- internal piston/cylinder,
- inlet and discharge sections and eccentrics, which regulate flow of motive fluids.

ERPG Screw pumps

Screw pumps are rotary pumps used for pumping dense liquids/slurries. Types of screw pumps are – single screw and three-screw, and these comprise of such as

- pump casing/body screws and screw shaft(s),
- bearings,
- stuffing/packing boxes,
- couplings,
- transmission,
- motor,
- skid/base plate support.

ERPH Submerged pumps with non-submerged motors

A centrifugal pump placed within a sump. The pump unit-casing/impeller is submerged below liquid level. The liquid level is maintained by a float-switch. The motor/driver unit is placed on supports above the sump and is coupled to the impeller shaft by a connecting shaft.

Submerged pumps with non-submerged motors are used as e.g. bilge pumps and sump pumps, and comprise such as

- submerged pump casing,
- impeller and shaft,
- bearings,
- packing/stuffing boxes,
- baseplate/supports,
- discharge column,
- connecting drive shaft,
- coupling,
- transmission,
- motor and motor base plates/supports.

ERPI Submerged pumps with submerged motors

A centrifugal/turbine type pump assembly, which is completely submerged, and is used where other pumps can not facilitate the required pumping services.

Submerged pumps with submerged motors are used for ballast water, seawater lift and dewatering or other liquid extraction services, and comprise such as

- submerged pump and motor with housing,
- inlet strainer/filter,
- impeller bowls and impeller shaft.

ERPJ Fire water pump package

Included is fire water pump package, i.e. pump, driver (e.g. diesel engine), equipment, bulk and accessories – all combined into a package for fire water supply – normally delivered by specialist supplier/manufacture. As package design – as well as purchasing strategy and requirements – may vary, it is difficult and impractical to define the total package content.

ERPX Other pump packages

Includes packages not previously listed, i.e. other pumps, etc. delivered from suppliers/manufacturers and purchased as complete functional pump packages that may comprise several of the above items of equipment, for incorporation into the facilities.

ERPZ Other pumps

Includes all other pumps not previously listed under COR ERP, which is purchased from vendors/manufacturers as individual items of equipment, for incorporation into the facilities.

ERT Storage tanks/containment equipment – atmospheric

Storage tanks/containment equipment defined hereunder relate to all types of atmospheric

- tanks,
- hoppers,
- mud pits/pits,
- sumps,
- bins and containers.

Used for storage of product and/or for product transfer.

Some particular references: For pressurised vessels and columns, see COR ERV. Tanks integrated in the structure are to be regarded as structure; e.g. steel tank plating for integrated ship hull tanks is to be COR coded under BN.

ET type equipment is subgrouped and coded as follows:

ERTA Storage tanks – cylindric

Include single or double walled storage facilities for all types of atmospheric storage services and which are grouped into

- cone roof storage tanks – normally standard designs comprising of a fabricated, delivered, erected and outfitted tank(s) placed on foundations prepared by others.

The tanks consist of

- steel shell plates and structurals,
- tank bottom plates,
- fixed cone roof plates.

Tank outfitting includes

- manways,
- stairways,
- vents,
- inlet/outlet – flanges/devices,
- gauges,
- manholes,
- sumps and level/flow control systems.

- Floating roof storage tanks – normally standard designs (API-650 or similar) comprising of a fabricated, delivered, erected and outfitted tank(s) placed on foundations prepared by others.

The tanks consist of

- steel shell plates and structurals,
- tank bottom plates,
- floating pontoon roof.

Outfitting of roofs comprises

- manways,
- roof drains,
- hatches/wells,

- anti-rotation devices,
- seals/shoes,
- vents and roof support legs.

Outfitting of tanks comprises

- manways,
 - inlets/outlets,
 - stairways,
 - vents,
 - gauges,
 - manholes,
 - sumps and level/flow devices.
-
- Other cylindrical atmospheric storage tanks – hemispheric tanks and dome tanks.

ERTB Storage tanks – rectangular

Includes tanks of the following types:

- atmospheric storage tanks, which are fabricated, delivered and erected on prepared foundations. The storage tanks are rectangular or cubic and may be fabricated from stiffened steel plate, alloys, aluminum or glass reinforced plastics, used for storage of minor quantities of liquids or where plant layout considerations dictate rectangular (regular or irregular) storage tanks;
- storage tanks which are non-cylindrical and which may form part of vessel/facility structures' – water storage, day tanks, fuel storage, etc.

Tank structure/structurals often form part of structure/structural quantities.

ERTE Hoppers

Hoppers are storage bins/silos constructed in steel or concrete and used for temporary holding of solids/dry materials prior to discharge to other systems. Hoppers may be used as surge bins to regulate material flow from an irregular supplier to provide a regulated discharge flow.

ERTF Mud pits

Mud pits include for

- offshore drilling; containment pits for spent, returned and treated mud,
- onshore drilling; an excavated, lined open pit used to contain spent, returned and treated mud (may be civil works operation).

ERTG Sumps

Fabricated steel structures, placed/installed/erected at the lowest level of tanks/bins/structures/vessels, which allow complete collection and drainage.

Sumps may form part of/or be integrated within steel structures.

ERTJ Bins

Fabricated steel storage bins used for storing solids, liquids, slurries, dry chemicals and other, prior to mixing or dosing.

ERTK Containers

Includes workshop containers and all containers used for storage of equipment, material, goods and tools, etc.

ERTR Refrigerated storage tanks

Insulated storage tanks used for storage of liquid products at atmospheric pressure, which maintain atmospheric pressure by low temperature product storage. Boiled off vapours are reliquefacted/recycled.

ERTZ Other tanks

Includes all other tanks/units not included elsewhere under COR ERT, which stores or contains products/materials at atmospheric pressure, for incorporation into the facilities.

ERV Vessels and columns – pressurised

Pressurised vessels and columns included hereunder relate to

- vessels, columns and agitators which perform continuous flow process functions like separation, fractionation, reaction and distillation,
- vessels, columns/towers which condition gas/fluids prior to further processing,
- drums, tanks and mixers which support and form part of the process system,
- holders, spheres, bottles, units and tanks used for pressure storage.

Some particular references: For heaters and boilers, see COR ERF. For atmospheric tanks, see COR ERT. For misc. packaged units, see COR ERX.

Vessels and columns – pressurised are subgrouped and coded as follows:

ERVA Separators

Separators are fabricated pressure vessels used for separating process streams, which contain several components of different gravity. Types are

- horizontal separators – may be two phase (oil/gas) or three phase (oil/gas/water) and are typically used in the main processing separation trains for separating oil/NGL from gas and water,
- vertical separators – may be two phase or three phase and are used for the same purpose as horizontal separators. These are used where layout considerations/movement characteristics/stream compositions dictate use of vertical type separators. Not commonly used within offshore processing facilities.

Separators comprise

- cylindrical shells,
- heads,
- process stream inlets,
- vapour/gas outlets,
- oil/NGL outlets,
- impingement baffles,
- manways/holes,
- skirts/shoes.

See also under other COR ERV codes for other units having a separating function.

ERVB Contactors

An absorption tower/column, which forms part of gas dehydration systems used to reduce the dew point of gas in a gas treatment plant. The contacting agent enters through the top of the column and contacts the rising gas thus removing the water in the gas stream.

Contactors comprise

- cylindrical shell,
- heads,
- contacting agent inlet,
- dry gas outlet,

- liquid outlet,
- liquid distributor,
- bed, manways/holes and skirts.

ERVC Regenerators

Agent regenerators – reboiler/regeneration vessels, which remove absorbed water from the agent.

Regenerators comprise

- reboiler/regeneration vessel,
- heating coils/heating medium supply,
- the agent – still with installed reboiling coils,
- the still stack structure,
- water vapour outlet,
- agent inlets/outlets,
- manways in vessels,
- support skirts and shoes.

ERVD Settling tanks, knock-out drums and flash drums

Includes separators which operate at a lower pressure and which are related to systems other than for main process separation, i.e.:

- knock-out drum – a horizontal or vertical separator used to separate oil from gas by gravity. Oil and gas enter the knock-out drum where the denser oil is taken off at the bottom of the drum. The lighter gasses are flashed off from the top of the drum;
- flash drum – a drum or tower into which the heated outlet products of a preheater, exchanger system or conductor often go to release pressure. The purpose is to allow vaporisation and separation of the volatile portions for fractionation elsewhere.

Knock-out drums and flash drums comprise

- cylindrical shell,
 - heads,
 - nozzles,
 - manways,
 - skirts or saddles,
 - base rings,
 - lugs, insulation and tray support.
- Settling tanks/drums – tanks or enclosed pits which are pressurized in which materials/products e.g. slurries, with different densities are allowed to separate and settle by residence and gravity.

Settling tanks/drums may be cylindrical or rectangular and comprise of the drum structure-cylindrical or rectangular or other – inlets/outlets, manways and support structures.

ERVE Columns/towers

Columns/towers hereunder are used for product separation/fractionation, by adsorption, absorption and distillation:

- distillation columns/tower – the primary process unit used in the treatment of crude oil in a refinery in which no change in the chemical properties of the hydrocarbons take place. Fractional distillation is the standard method. Vacuum distillation enables selective fractions to be extracted which have narrow boiling point ranges and which are drawn off at various stages during distillation.

The complete distillation column/tower comprises

- column – cylindrical shell, heads, nozzles, manways, base rings, lugs insulation, skirt and tray support,

- column trays – (see COR ERCL),
 - condenser – unit which constantly condense vapours and return liquid to lower levels of the tower,
 - reboiler – an auxiliary of the tower designed to supply additional heat to the lower portion of the tower, preheat it by means of heat exchange the vapours (see COR ERHI). Residual liquid is separated or reinforced into the tower.
- packed column/tower – columns used in processes for absorption and adsorption and extraction of containments/acid gases and other from the process stream. Packed/fixed beds, sieves are installed/placed within columns. The beds require regeneration of absorbents/adsorbents to maintain required throughput and outlet product specification.

The complete packed column/tower comprise

- columns shell – cylindrical shell, heads, nozzles, manways, base rings, lugs, insulation, skirt and tray support,
- column trays – (see COR ERCL),
- column packing,
- combination tower – a tower designed for both flashing and fractionating operations.

For cooling towers, see COR ERXI. For columns/towers in connection with cracking, etc., see the following code.

ERVF Reactors

Includes columns/towers/vessels in which all or at least the major part of a reaction or conversion takes place:

- in catalytic cracking – the enlarged space in which hot oil is contacted and cracked with the catalyst, to make gasoline cuts and enables higher yields to be obtained than is possible by distillation. Catalytic cracking is a secondary refinery process in which a high boiling point feedstock is decomposed by heating and reaction with a catalyst to produce a more volatile product. Catalytic cracking is a basic process and a source of high-grade gasoline and olefins. The process gives a higher yield of lighter fractions than is possible by primary distillation or thermal cracking;
- in isomerisation – the vessel containing catalyst in which the hydrocarbon is isomerized. Isomerisation is understood as a restructuring of feed molecules into different spatial configuration resulting in higher octane number ratings;
- in alkylation plants – the vessel containing emulsified acid in which most of the alkylation occurs. Alkylation is the formation of a new substance, by replacing an atom of hydrogen in a compound, with an alkyl. Alkylation serves to reduce the polluting effect of motor vehicle exhaust gases, caused by burning olefins.

ERVG Scrubbers

Equipment units used for separation/cleaning:

- scrubbers – are vertical separators used to scrub/separate vapours/saturated gases. Gases enter an inlet, the rising gas/vapour is passed through demister sieves/filter where dense vapours/liquids are separated and fall to liquid containment. The dry/dryer gas passes through the outlet for further handling/processing/consumption;
- scrubbers – used for separation of containments in gas/air streams, use the same principle described above, used for cleaning prior to emission;
- scrubbers – a unit cleaning natural or artificial gas by removing undesirable substances such as sulphur compounds, ammonia, carbon, etc. Hydrogen sulphide is removed by washing gas in a scrubber containing soda ash or lime, or filtering gas through a mixture of ferrous and calcium hydroxide made porous.

ERVH Deaerators

Deaerators – form part of e.g. the water injection system and are vertical cylindrical vessels/columns/towers which are designed to operate under vacuum to extract air/oxygen from produced water and/or seawater prior to injection into reservoirs or process systems. Vacuum is created by sets of deaerator vacuum pumps.

Deaerators comprise

- cylindrical shell,
- heads,
- support skirts,
- water inlet from water filters,
- suction outlet at deaerator top to extract air,
- deaerated water outlet at base of column prior to oxygen scavenge/biocide dosing/injection into deaerated water.

ERVJ Coalescers

Coalescers/de-emulsifiers/dehydrators are horizontal separators placed after the last stage separator of the main oil/gas separation train to remove water by coalescence; the linking of globules in an emulsion caused by molecular attraction of the surfaces where globules combine and form one body. Separation is achieved by use of filters, electrostatic or by chemical affinity. The major coalescer types are

- filter separator coalescer – comprises large surface area wettable packing through which liquids coalesce, consolidate and separate out by gravity,
- electrostatic coalescer – comprises of electrode plates, transformer distributor by which liquids coalesce, consolidate and separate.

Coalescers comprise

- cylindrical shell,
- heads,
- support saddles,
- inlet from last stage separator,
- outlet for coalesced water,
- outlet for oil.

ERVK Dryers

This code covers

- packed towers/columns with desiccant absorbent dryer beds, packed within towers/columns used for gas drying, conditioning and treatment. The units comprise
 - cylindrical shell,
 - heads,
 - support skirts,
 - gas inlet,
 - dry gas outlet,
 - packers/tray supports,
 - liquid outlet,
 - manways.
- Other types of pressurised vessels and columns used for drying, extraction and treatment.

ERVL Receiver and surge drums, expansion – head tanks

Included hereunder are receiver drums, surge drums, expansion drums and header tanks, which operate under pressure:

- receiver drums/surge drums – normally horizontal vessels used for receiving and temporary residence storage of irregularly supplied volume flows. Liquids are further discharged at regulated flow rates to other processes/systems;
- expansion drums/tanks – horizontal or vertical vessels which allow expansion/contraction resulting from temperature variations. These are used in e.g. cooling and heating medium systems; i.e. as cooling and/or heating medium expansion tanks.

The drums comprise

- cylindrical shell,
- heads,
- nozzles,
- manways,
- skirts/shoes,
- base rings lugs and insulation.

Header tanks – elevated cylindrical/spheroidal tanks, which may be pressurised and/or which provide header pressure due to elevation. Stored liquids in tank provide a regulated pressurised distribution to consumers, e.g. firewater header tanks, process water header tanks, etc.

The tanks comprise

- cylindrical shell/or other,
- heads,
- nozzles,
- manways,
- skirts/shoes,
- lugs and level control devices.

ERVP Gas holders

Gas holders – permanently installed holders/bottles/vessels for containment of industrial gases like LPG, acetylene and other. Gas holders comprise

- manufactured bottles/vessels/holders,
- expansion systems,
- valves and fittings,
- metering/control devices.

See also separate COR codes for inert gas equipment.

ERVQ Spheres

This code covers spheres and spheroids:

- spheres – pressurized storage tanks used for produced product storage of LPG/NGL mixes. This tank type is a perfect sphere normally fabricated in steel/alloyed steel and comprises
 - sphere unit – plates,
 - spiral stairway,
 - sphere support legs/columns,
 - manways,
 - product inlet/discharge,
 - pressure/volume control systems.
- spheroids – pressurized storage tanks used for storage of produced products. May be of self-carrying plate shell structure design or of internally stiffened/supported shell structure design. Spheroids comprise the same components as above and any internal structural supports required.

ERVS Tote tanks

Storage tanks/topping tanks which require intermittent topping due to consumption of the stored liquids. Tote tanks are normally related to utility and support systems and comprise

- tank unit,
- inlet/discharge nozzles,
- supports and metering devices, e.g. methanol tote tanks.

ERV T Oxygen units

Permanently installed gas holders/bottles/units used to store oxygen for plant consumption. The units comprise

- pressure holders/bottles/units,
- supports,
- volume/pressure controls,
- charging/discharging systems.

ERV U Hydrogen units

Permanently installed gas holders/bottles/units used to store hydrogen for plant consumption. The units comprise

- pressure holders/bottles/units,
- supports,
- volume/pressure controls,
- charging/discharging systems.

ERV V Inert gas units

Permanently installed gas holders/bottles/units used to store inert gas for plant consumption. The units comprise

- pressure holders/bottles/units,
- supports,
- volume/pressure controls,
- charging/discharging systems.

For inert gas equipment/generator package in connection with safety/firefighting, see COR ESSH/ESSI.

ERV W Condensate control drums

Horizontal or vertical vessels – impingement separators used for stripping saturated gas streams into gas and liquid condensate. The drums comprise

- cylindrical shell,
- heads,
- gas inlet,
- stripping vanes,
- stripped gas outlet,
- vane tray/supports,
- condensate outlet,
- drain,
- manways,
- skirts/shoes,
- base rings and lugs.

ERV X Other vessel – and column packages

Includes other vessel and column packages, i.e. units which are manufactured, delivered, erected, installed, trayed/packed and tested as complete functional units/packages, other than previously listed under COR ERV codes.

ERV Z Other vessels and columns

Includes other pressurised vessels, columns, holders and tanks not included elsewhere under COR ERV, purchased as individual items of equipment for incorporation into the facilities.

ERX Miscellaneous package units

Packages hereunder relate to miscellaneous packages; i.e. packages not found relevant/correct to code under other COR E codes. Packaged units are in general conventionally designed, manufactured, fabricated, erected/assembled, tested and delivered by specialist contractors as completely self-contained functional packaged units.

Due to the many and varied "packaged unit" system designs and configurations, and varying purchasing strategy and requirements, packages below are impossible or impractical to further define or describe to meet any form of "standard package description".

The packages may thus comprise as applicable and as defined within other sections of the code of resource (COR):

- equipment items;
- bulk materials;
- other resources – labour, design engineering, packing, freight and other associated resources with the provision of packaged units.

In some recent floater projects small/medium sized modules – weighing hundreds of tonnes or more – have been termed packages. These are placed as contracts – and not as purchase orders – and thus not relevant for COR E coding.

Packages covered under COR ERX are subgrouped and coded as follows:

ERXA Oily water treatment packages**ERXD Fresh water maker packages****ERXE Potable water treatment packages****ERXF Sewage/waste water treatment packages****ERXG Catalyst packages****ERXH Helicopter fuel packages****ERXI Cooling towers****ERXJ Vacuum units packages****ERXQ Chemical treatment packages****ERXR Chemical injection packages****ERXU Nitrogen generation packages****ERXV Oxygen generation packages****ERXX Other misc. equipment packages****ES Safety/escape and firefighting equipment**

Safety, escape and firefighting equipment defined herein relates to equipment used in the facilities for

- personnel safety and evacuation,
- firefighting and loss prevention.

COR ESS equipment has been reconciled with safety bulk (see COR BS) to reflect current company practice and to avoid possible double coding of components.

Some particular references: For safety appliances, see COR BSB, e.g. for first aid outfitting, survival suites, portable fire extinguishers, hydrants, hoses and hose reels, etc.

ESS Safety/escape and firefighting equipment

ESS type equipment is subgrouped and coded as follows:

ESSA Lifeboats and davits

Lifeboats – include all types and forms used for personnel evacuation and safety; free fall lifeboats and non free fall lifeboats, with davits – devices/structures with winches used for holding/lowering/raising lifeboats from sea level – or supporting frames/guides for free fall lifeboat stations.

ESSB Pick-up boats and davits

Pick-up boats – or man-overboard boats – are smaller boats used in emergency situations, with davits – devices/structures/systems used for holding/raising/lowering pick-up boats/man overboard boats.

ESSD Escape equipment

Included are escape devices – sky chutes/stockings for fall through escape, winches/lines and other to enable escape from structures/buildings/facilities.

ESSF Ambulances

Equipped vehicles used in emergency situations to transport sick and injured to hospitals for further treatment.

ESSG Firetrucks

Equipped vehicles – trucks/tenders used for extinguishing fires and rescue of personnel from endangered areas.

ESSH Inert gas equipment

Inert gas equipment consists of stationary banks of bottles containing inert gas for fire fighting, which are connected to the inert gas system and actuated from the fire and gas control system. The fire is extinguished by introduction of the inert gas.

For inert gas units/bottles for plant consumption, see COR EDVV. For mobile fire extinguishers, see COR ESSP.

ESSI Inert gas generator package

Included is inert gas generator package, which include equipment and bulk (may be discrete items covered under COR ESS or other equipment) – all combined into package, normally delivered by specialist supplier/manufacturer. As package design – as well as purchasing strategy and requirements – may vary, it is difficult and impractical to define the total package content.

ESSJ Fixed Foam Unit

Foam unit used for extinguishing fires using foams – Aqueous Film Forming Foam (AFFF). The unit consists of the AFFF foam unit, controls and connected hoses/reels.

ESSK Dual Agent Unit

Dual Agent Units are fire-extinguishing units which are equipped with both fire water hoses/reels and AFFF hoses/reels in one combined unit, connected with controllers to supply piping system headers.

ESSL Dry Chemical Equipment

Dry chemical extinguishers (stationary) are used where inert gases/AFFF/water cannot be used to extinguish fires – typically fires related to electrical systems where dry inert and non-conductive powders provide an extinguishant.

Portable fire extinguishers are deemed to be COR coded under BSB. For mobile fire extinguishers, see COR ESSP.

ESSM Fire water system equipment

Equipment related to the fire water system might include such as

- fire water pump units,
- fire water header tank,
- control and distribution,
- local controls and panels,
- fire and gas system controls related to the fire water system.

Firewater pump packages are deemed to be COR coded under ERPJ. For firewater monitors, see COR ESSS.

ESSN Remote operated foam monitors

Monitors and control units for remote operation of the foam (AFFF) system through deluges/other systems.

ESSP Mobile fire extinguishers

Fire extinguishers hereunder relate to larger mobile bottle extinguisher units and trolleys, which are moved to fire fronts.

The bottle units may contain

- powder,
- carbon dioxide,
- water,
- inert gas.

ESSS Fire water monitors (towers)

Included is safety equipment like

- monitors connected to the fire water system, for monitoring firewater supply and distribution from tanks, dams, reservoirs, inlets to header tank/s, fire water header/ring main distribution system,
- observation towers for monitoring.

ESSW Rafts

Rafts used for life saving and personnel evacuation, include

- rigid rafts,
- inflatable rafts,
- self inflating rafts,
- floats, etc.

ESSX Other safety, escape and firefighting equipment packages

Includes other ESS type equipment packages not previously listed, i.e. equipment delivered from manufacturers/vendors as complete functional packages that may comprise several of the above items of equipment, for incorporation into the facilities.

For firewater pump package, see COR ERPJ.

ESSZ Other safety, escape and firefighting equipment

Includes other safety, escape and firefighting equipment not included elsewhere under COR ESS, purchased from vendors/manufacturers/suppliers as individual items of equipment, for incorporation into the facilities.

ET Telecommunication equipment

Telecommunication equipment includes all equipment defined for communication services such as

- internal and external communication,
- telemetry.
- computerized systems and signal systems,
- navigation, radar,
- personnel registration,
- environment monitoring.

Conforming to the SCCS equipment definition, telecommunication equipment defined herein are units/items/equipment which are especially fabricated/manufactured conforming normally to separate design specifications or defined as equipment based on company practice. Some of the equipment may have a package character.

Some particular references: For telecom items defined as bulks, see COR BT and particularly BTA for telecom appliances and BTC for cabling between telecom equipment and components.

ETR Telecommunication equipment

Telecommunication equipment is subgrouped and coded as follows:

ETRA Public address and alarm system equipment

Included is system equipment for

- public address – local public address system for broadcasting messages and directives throughout facilities and for broadcasting directives to personnel for general attention,
- alarm system – alarm system for distribution of visual/audible and other alarms and general announcements, used during emergency situations.

ETRB SOLAS/GMDSS radio and general radio system equipment

Included is system equipment for

- SOLAS radio – mandatory radio system conforming to the international convention for the safety of life at sea (SOLAS); convention and statutory requirements. The SOLAS convention has been replaced by the GMDSS convention (mandatory radio),
- general radio system – local plant/facilities radio systems, e.g. fireman's equipment and for support services.

ETRC Closed circuit television system equipment

All closed circuit television (CCTV) system equipment with surveillance cameras, videos, monitors and accessories used for surveillance of critical plant areas, of operations in general plant areas and offsites.

ETRD Drillers talk-back system equipment

Equipment for audible communication system used during drilling operations.

ETRE Entertainment system equipment

Included is system equipment for

- cinema – projectors, speakers, etc., for playing recorded films,
- video – for recording/playing films,
- antenna system – for receiving satellite programs or similar and distribution throughout cable networks to e.g. TVs/radios,
- audio systems for receiving/sending audio signals.

ETRF Distribution frames

Included are

- frames for cross connection of cables between central telecom. equipment and field equipment,
- distribution panels for distribution of telecommunication signals.

ETRG Emergency telephone

Mandatory telephone/system equipment required as a back-up system in the event of emergency situations or power failure.

ETRH Office intercommunication system equipment

Includes intercom systems equipment providing local audible communication between offices and between other areas.

Loudspeakers are deemed to be COR coded under BTA.

ETRI Crane telecom equipment

Dedicated telecom equipment enabling crane operators to communicate with such as: central control room, ships and operators on deck.

ETRL Batteries and power supply

Important telecom systems are to be DC (direct current) powered directly from dedicated battery supplies.

Included are dedicated batteries with rectifier/inverter and shut-down facilities (dedicated UPS).

Telecom systems not made for DC powering are normally powered from the platform UPS power system; for this UPS power system, see COR EEEQ.

ETRM Multiplexer and network switch

Included are multiplexer system equipment and network switches. The multiplexer enables effective and flexible usage of available bandwidth on external communication connections.

ETRN Navigation, positioning and distance measuring equipment

Equipment for navigation, positioning and distance measuring includes all communication equipment required related to vessel control and measuring systems for navigation and positioning.

For navigation devices (e.g. orientation lighting, for horns, etc.), see COR BTA.

ETRO Common telecom equipment

Included is equipment serving/supporting telecom systems (i.e. common for various telecom systems) such as

- particular maintenance equipment for telecom systems off ordinary workshops,
- telecom surveillance system (TSS) equipment for central presentation of alarms,
- real time clock system equipment – allowing uniform timekeeping and clocking of the telecommunication network systems.

ETRP PABX system equipment (including telephone)

The PABX system includes equipment, which provides internal/external switched line directed telephone services. The system equipment includes handsets and exchange units.

ETRQ Data communication network equipment

Includes the central data communication network equipment/computers to link terminals, personal computers and data peripherals together in a network. The network is interfaced and connected to the company network.

ETRR Radar system equipment, marine and aviation

Includes equipment for maritime surveillance radar and radio beacon systems.

Navigation devices as: orientation lighting, foghorns, visual signals, transponders, etc. are deemed to be coded under COR BTA.

ETRS Satellite and fibre-optical communication system equipment

Satellite communication systems equipment – includes; separate masts, parabolic antennas and satellite senders and receivers. Included is also equipment for fibre-optical communication systems.

ETRT Telemetry system equipment

Equipment related to transmission of selected data from points of origin to distant terminals by radio link. The system equipment comprises: connectors, antennas, senders/receivers for transmitting and receiving signals.

ETRU UHF/VHF radio (onboard)

Included hereunder are UHF/VHF radio systems equipment for transmitting and receiving audible signals within plant/facilities – mobile radios and fixed radios.

For portable UHF/VHF radios and telephones, see COR BTA.

ETRV Personnel registration/paging/tracking system equipment

Equipment used for registration of personnel, paging systems and tracking systems to identify personnel movement and location.

ETRW Environment monitoring system equipment

Equipment for environment monitoring systems, i.e. systems covering all types and forms of systems to monitor environmental conditions; sea state wave monitors, temperature monitors for air/sea/water, as well as monitors for air humidity, air pressure, emission and other environmental states.

ETRX Other telecom equipment packages

Includes packages not previously listed, i.e. other telecom equipment/groups of equipment delivered from vendors/manufacturers as complete functional packages that may comprise several of the previous items of equipment, for incorporation into the facilities.

ETRY Temporary telecom equipment

Temporary telecom equipment – includes purchased or leased/hired for the construction and hook-up phases for offshore and onshore facilities. I.e. equipment for temporary telecom systems like: PABX, PA networks and other communication systems.

ETRZ Other telecom equipment

Includes other telecom equipment not included elsewhere under COR ETR, purchased as individual items of equipment, for incorporation into the facilities.

EU Subsea equipment

Subsea equipment includes all manufactured/fabricated/machined equipment related to subsea development where the wellheads are placed on the seabed.

Some particular references: For drilling equipment, see COR EDB. Downhole separators and pumps are deemed to be coded under COR BDD. For wellhead equipment related to surface completion and "dry" x-mas trees, see COR EDW. Subsea spare parts are to be coded under the code for the respective subsea equipment requiring the spare parts.

EUU Subsea equipment

Subsea equipment is subgrouped and coded as follows:

EUUA Wellhead

The wellhead system equipment covers the wellhead housing with guide base, casing hangers, seal assemblies and associated equipment.

EUUB Tubing hanger system equipment

The tubing hanger is used to suspend the production string (tubing) and is linked to the wellhead system.

EUUC X-mas tree system equipment

The X-mas tree system equipment consists of X-mas tree and tree cap. The X-mas tree consists of wellhead connector, structural parts and intervention fixtures. It is also equipped with a wing outlet and a hub for connection to the workover riser system.

The X-mas tree system controls production and injection wells.

EUUD Flow control (chokes, etc.)

Manifolded wells may require subsea chokes for well control. Subsea chokes may be integral or of insert type, and are located on the X-mas tree or on the manifold. Special arrangements such as choke bridges with connectors, devices such as flow bends, diverters and fixed chokes are also to be included under this code.

EUUE Subsea station structure and appurtenances

Included is the subsea station structure purchased as a structural unit, with special equipment located on a subsea structure such as hinge arrangements, connectors, locking and guiding devices, flooding system and equipment fixtures. (E.g. like a HOST type subsea station structure).

Included hereunder is also the following station outfitting:

- equipment necessary for lifting operations such as padeyes, lifting frames, release mechanisms and other devices;
- levelling and piling related equipment such as hydraulic jacks, swaging pieces and pile guides;
- electrical outfitting for ordinary electric power supply and control functions, with isolation valves, connectors and cabling. ROV panels and subsea sensors may also be part of the installation.

For heavy-duty electric power distribution e.g. to subsea compressors, pumps and similar, see COR EUUO.

See also the following COR EUU codes for additional subsea station outfitting.

EUUF Protection structure

Includes protection structures for subsea stations, i.e. a structure to protect against dropped objects, anchor chains, trawl gear etc. or any other damages. The protection structure may also be designed as fully overtrawlable.

EUUG Pull-in and connection equipment

Equipment necessary to support and connect the flowline and control umbilical terminations to the subsea structure. Pull-in and connection structural equipment consists of porches with pull-in funnels, guiding and lock down devices and other types of anchoring and support equipment.

Included are also for diverless installations: hubs, seal plates and clamps used for tie-in of flowlines and control umbilicals. For diver assisted tie-ins of flowlines, misalignment tolerant flanges are included under this code.

For pipeline/umbilical end fittings, see COR EYC.

EUUH Manifold header, valves and piping

The manifold header with valves and piping is a fabricated assembly of carbon or duplex steel.

The manifold header may also consist of a valve block, with conduits and corresponding flanges for valves and piping. The manifold and piping may be integrated into the structure or designed as a separate retrievable module.

Valves may be manually, remotely or ROV-operated. They may be of the gate or ball valve type, and may be conventional or of insert type.

EUUI Pigging facilities

Includes permanently installed equipment/facilities for pigging, such as pig-launcher/receiver entry hubs/equipment and pigging crossover modules. Subsea pig-launchers and -receivers are run from a vessel and connected to the corresponding equipment on the X-mas tree or manifold.

EUUJ BOP/BOP accumulator equipment

The blow out preventer (BOP) is a high-pressure valve assembly, which is usually hydraulically operated and is fitted to the top of the casing. The BOP enables flow from the well to be controlled by the driller, preventing downhole pressure from damaging formation(s) to reach the wellhead area where wellstream may endanger personnel and equipment.

EUUK Topside control equipment

Includes control equipment installed on a platform, a production vessel or at an onshore facility. Surface control equipment normally includes a control room (master control station) with equipment to interface the platform/processing facilities control system, HPU, etc. Computers may form part of this system. SPCU (subsea power and communication unit) is also included.

For subsea located HPU, see COR EUUM. For workover control system, see COR EUUQ. For intervention control system, see COR EUUT.

EUUL Uninterruptable power supply

Included is the electrical supply module for subsea facilities located on the topside facilities. The uninterruptable power supply unit (UPS) may be a separate (dedicated) installation, or it may form part of the platform/processing facilities' integrated power supply, and includes batteries, rectifiers, inverters, etc.

For platform (common) UPS, see COR EEEQ.

EUUM Hydraulic power unit

The hydraulic power unit (HPU) for subsea facilities is normally a part of the topside control equipment (see COR EUUK), but may be located subsea as a part of the control distribution system. Subsea located HPU's are to be included hereunder.

EUUN Subsea control pods

The subsea control pods are normally located on the X-mas trees. For remote control of a manifold, a separate control pod may be used for that purpose.

EUUO Electrical distribution system equipment

This code covers the heavy-duty electric power distribution system on the subsea station to major consumers like compressors (for boosting or injection), pumps and similar. Included are equipment and cabling for the system on the station.

For ordinary electric power distribution and control at the subsea station, COR code EUUE applies. For electrical power supply cables to subsea compressors, pumps, etc., see COR EYEB.

EUUP Workover riser system equipment

The workover riser system is used for installation and retrieval of the X-mas tree system, and consists normally of equipment like lower riser package, emergency disconnect unit, workover riser and surface flow tree. Additional running tools may also be a part of the system.

EUUQ Workover control system equipment

The workover control system is used to control the workover riser system. The equipment consists of a topside supply and communication module.

For umbilicals, see codes under COR EYD.

EUUR Intervention system equipment and tools (ROT)

The intervention system (ROT system) may consist of a tool carrier connected to dedicated tools for pull-in and connection, for running of control pods and insert pieces. Alternatively, it may consist of a system with separate tools only.

For rented tools (from tool pool), see COR EUUV.

EUUS ROV/ROMV and tools

Included are remotely operated vehicles (ROV), remotely operated maintenance vehicles (ROMV) and necessary tooling which are purpose built for dedicated development projects.

For rented tools (from tool pool), see COR EUUV.

EUUT Intervention control system equipment

The control system for the intervention system normally consists of equipment like a topside supply and communication unit.

For umbilicals, see codes under COR EYD.

EUUU Test equipment

Components necessary for testing related to subsea, including test equipment, handling equipment, dummy structures, dedicated consumables, etc. shall be included under this code. Range of testing covers integration testing, shallow water testing and commissioning.

EUUV Tool pool (rented tools)

The tool pool includes tools normally to be used in different projects/fields for subsea purposes. The projects/operating divisions from a tool pool owned by one or more operators normally rent the tools.

For (project) dedicated tools see other COE EUU codes for these; e.g. EUUR and EUUS. For pipeline inspection tools, see COR EYAG. For PRS (pipeline repair system), see COR EYAH.

EUUW Subsea distribution equipment

The subsea distribution unit (SDU) allows for distribution from one large power cable/control umbilical/flowline to several minor lines.

The unit includes equipment like foundation structure, structure and protection structure, and may include transformer and other equipment. The unit may also include bulks (as a package solution).

EUUX Other subsea equipment packages

Includes subsea packages other than previously listed, i.e. subsea equipment delivered from manufacturers/vendors/suppliers as complete functional packages which may comprise several of the above items of equipment, for incorporation into the facilities.

EUUZ Other subsea equipment

Includes subsea equipment not previously listed under COR EUU, which is purchased from vendors/manufacturers/suppliers as individual items of equipment, for incorporation into the facilities.

EV Mooring and marine equipment**EVY Mooring and marine equipment**

Mooring and marine equipment hereunder provides codes primarily for

- mooring equipment related to mooring of floating and compliant production facilities such as:
 - tethers/tendons,
 - anchors,
 - chains,
 - cables, etc.
- marine equipment related to e.g. production vessels, storage vessels, TLPs, semi submersible production platforms, etc.

EVYA Tethers/tendons, tether couplings

Tethers/tendons for neutrally buoyant tether designs include large diameter medium to thick walled steel pipe:

- as standard lengths forming, when after tether couplings are welded, standard tether elements of uniform length for tether installation from coupled tethers lowered from internal mooring compartments;
- as welded pipes forming parts of/or the entire length of the tether string/tendon for external porch installation.

For non-neutrally buoyant tether designs, forged and machined standard tether elements for installation, coupling and lowering of tether strings from internal mooring compartments, are included.

Buoyant elements for e.g. SPAR tethers are also to be included hereunder.

Tether couplings are machined forgings/castings, which are welded to tether pipe to form standard tether elements or other couplings making up each tether string/tendon. Tether couplings consist of threaded coupling pins and threaded coupling boxes.

EVYC Tether cross – load bearings

Relevant for tension leg platform designs (e.g. TLPs and buoyant towers) where tethers consist of a series of coupled tether elements and where installation of tethers comprises the use of tether deployment tools to handle, lower, run and connect tethers from within column mooring compartments through tether conduits within the hull.

Tethers cross load bearings are required to transfer horizontal loads to the hull and prevent metal to metal contact. These bearings are purpose designed to be incorporated into each tether string and consist of machined forgings/castings, flex elements elastomeric bearings and conduit seals.

EVYD Tether tensioner/motion compensator

Tether tensioner/motion compensator assemblies are purpose designed dedicated tooling systems used for installation of tethers for e.g. TLP designs where installation (example from TLP); tether string make up is carried out from within column mooring compartments. After each corner tether string is made up and lowered, the tensioner/motion compensator engages the top of the tether string to ensure clearance above guide funnels. After TLP positioning the anchors are stabbed into foundation template receptacles. When all four initial anchors are stabbed, motion is compensated by positive tension whereupon the tensioner/motion compensators are brought into heave suppression mode for tether tie off.

EVYE Tether tie-off assembly

The tether tie-off assembly forms the upper termination of the tether string and transfers tether tension into the hull structure. The tie off assemblies required for each tether string comprise of machined forgings, load beams, load cells, main load rings, locking nuts, tension adjustment nuts and tension adjustment elements.

EVYF Torque tools and tether handling equipment

Torque tools are deployed during tether installation to provide required torque to tether tie off assemblies/tether strings. Torque tools are purpose manufactured for each dedicated project and are normally required in each mooring compartment.

Tether handling equipment consists of handling equipment installed within column mooring compartments and comprises of

- radial/polar cranes,
- racks,
- jigs,
- guides, etc.

Required to handle the standard tether elements, i.e. to move, lower and connect to form tether string make up.

EVYH Tether anchor latches

Tether anchor latches form the tether string/tendon connection point to seabed founded tether foundation template(s).

Anchor latches/bottom connectors are machined forgings/castings and comprise a tendon/tether string receptacle section integrated within foundation template(s) with inserts/abutment rings/mating latch assemblies and a tether string part forming the lower section of the tether string comprising a lower body, flex elements and flexshaft.

EVYI Tether deployment tools

Tether deployment tools hereunder relate to multi-function combination tether/tendon deployment systems for installing tethers/tendons from foundation template(s) receptacles to external TLP hull porches. Included are

- tendon handling equipment (tensioner/motion compensator units),
- externals to columns,
- skid rails,
- bending shoes,
- pull in wires/cables,
- pull in clamps payload wires/cables, etc.

EVYJ Mooring winches

Mooring winches installed/placed on vessels/platforms for the purpose of maintaining station keeping and include

- winches,
- driving units,
- stoppers,
- controllers,
- etc.

For mooring winches in connection with turrets, see COR EVYW.

EVYK Capstans

Capstans installed/placed on vessels for raising/lowering anchors, etc. and include

- capstans,
- driving units,
- stoppers,
- controllers,
- etc.

EVYL Mooring lines

Mooring lines (cables and anchor chains) hereunder are especially manufactured for purposes of mooring dedicated vessels and platforms and which form part of permanent installations. Included are also shackles/rings/connectors.

EVYM Anchors

Anchors hereunder are anchors which are especially manufactured for purposes of mooring/anchoring dedicated vessels/facilities.

EVYN Clump weights

Clump weights are used for mooring of guyed towers, etc. – installed at seabed with piles. The weights take up slack in mooring cables/chains and allow compliance.

EVYO Fenders

Elastomeric units/devices/structures used to prevent collision damage between structures and vessels.

EVYP Anchor pendant buoys

Buoys used to mark anchor locations for later pick-up and removal.

EVYQ Signal buoys

Signal buoys used for navigational purposes and/or for sea state monitoring.

EVYR Protection mattresses

Mattresses placed near platforms, over pipelines and other subsea structures to prevent erosion, protect and provide foundational stability.

EVYS Fairleads

Fairleads are mechanical/structural units with rollers, normally installed/placed on substructures acting as a guide for anchor chains/cables.

EVYT Thruster packages

Thruster packages are propeller plants for manoeuvring/propulsion to location/station keeping of flotation production platforms/vessels and storage vessels (in SCCS context).

A thruster package may include

- propeller with drive unit, and transmission (where relevant),
- tunnels (ducts) and nozzles with grating/grids,
- manoeuvring and control unit,
- etc.

But as package design – as well as purchasing strategy and requirements – may vary, it is difficult to define the total package content.

EVYU Tank cleaning/crude oil washing equipment

Includes system equipment installed within/or part of vessels used for tank cleaning and crude oil washdown of primarily oil storage tanks after offtake (include e.g. dedicated pumps, heaters, wash-down units, etc.).

EVYV Accommodation ladders/gangways

Hereunder as equipment – outfitting structural appurtenances purchased as complete units fabricated to specification by specialist fabricators and does not form part of a fabrication contract.

EVYW Turret equipment

Turret equipment hereunder includes all equipment installed within or which supports the operating function of the turret system:

- bearings;
- bogies;
- winches;
- chain tables;
- manifolds/sviwel;
- turning machines;
- controls;
- control decks, etc.

For gantry crane over turret, see COR ERMV.

EVYX Other mooring and marine equipment packages

Includes other mooring and marine equipment packages, i.e. units delivered from suppliers and purchased as complete packages, not covered by other COR EVY codes.

EVYZ Other mooring and marine equipment

Includes mooring and marine equipment items not identified under other EVY codes, which by function is related to this group of equipment.

EY Transfer and control equipment

The COR codes hereunder relate to equipment/devices deployed to

- perform transfer functions,
- control and support operations during production,
- support during intervention,
- provide service and control.

Some particular references: For drilling risers, see COR EDBD. For workover risers, see COR EUUP.

Transfer and control equipment is subgrouped and coded as follows:

EYA Pipeline inspection and repair tool

EYAA Slug catcher

A vessel or a system of fabricated pipes, pipe fittings, valves and supports placed on land, on offshore facilities or subsea used to catch accumulated slugs of liquid condensate or residues in e.g. gas pipeline systems. Slugs are forced/transported by pigs to the slug catcher.

EYAB Pig launchers/pig receivers

Pressure vessels installed at both ends of pipeline transmission systems to

- launch pigs under high pressure through the system for scraping, cleaning, slug removal or inspection,
- receive pigs at receiving facilities.

For subsea pigging facilities, see equipment under COR EUUI.

EYAC Intelligent pigs

Intelligent pigs are deployed within pipeline systems to monitor/record/transmit internal pipeline conditions regarding e.g. corrosion and roundness. Pigs are sent from launchers and received in pig receivers.

EYAD Sealing pigs

Temporarily deployed elastomeric sealing pigs placed within pipeline to stop flow through pipeline during e.g. intervention, tie-in and connection of fittings.

EYAE Batch pigs

Pigs, which are sent through pipelines to catch slugs, improve flow and empty the lines when required.

EYAF Scraper pigs

Pigs, which are sent through pipelines to scrape walls from wax/residue/formation build up and increase throughput.

EYAG Pipeline inspection tools

Dedicated tools/inspection devices or systems deployed to inspect pipeline systems.

Includes tools, etc. for visual inspection as follows:

- external inspection with remote operated vehicle systems;
- internal inspection video cameras/sleds and cables.

For intelligent pigs (for measurement of e.g. roundness), see COR EYAC. For PRS, see COR EYAH.

EYAH Pipeline repair system

The system is for repair of damage to pipelines – transport lines and flowlines – during operation or installation; in a project it might be decided to have the system as a back up when laying pipelines in case of possible damage to the lines. The system is owned by a pool. Pool membership for e.g. a project and any other PRS costs are to be entered under this code.

EYAI Welding bladders

Elastomeric bladders/systems used to isolate pipeline systems during hyperbaric welding/tie-in operations.

EYAJ Expansion bellows

Expansion bellows – manufactured expansion bellows used in solids processing in association with kilns, heating systems, boilers, etc.

EYB Risers**EYBA Production risers**

Permanent risers – manufactured/fabricated/forged pipe sections (rigid or flexible) which extend from a subsea well spacer/drilling template to the surface facilities wellhead area or connecting production wells between X-mas trees and subsea guide bases/riser bases connectors. Production risers transfer wellstream.

EYBB Injection risers

Permanent risers – manufactured/fabricated/forged pipe sections (rigid or flexible) which extend from a subsea well spacer/drilling template and to the surface facilities wellhead area or connecting injection wells between X-mas trees and subsea guide bases/riser connectors. Injection risers transfer water and gas for injection/reinjection.

EYBC Import/export risers

Forms part of the pipeline transmission system, where rigid or flexible pipes are installed between pipeline end and import/export manifold(s) installed on subsea facilities e.g. topside. Import/export risers transfers normally oil, gas and condensate.

Import/export risers may be

- J – tube pull through,
- seal tube pull-in,
- pre-installed in substructures,
- post-installed over/within substructures,
- connected to pipeline end manifold or well spacer/drilling template receptacle.

EYBD Buoyancy elements/modules

This code covers

- elements/modules which are manufactured or fabricated and which provide required buoyancy for below surface systems – risers, loading hawsers, cables, markers and other,
- buoyancy modules which are bolt/welded onto floating or suspended structures to provide additional buoyancy.

EYC End fitting/terminations**EYCA Pipeline**

All types and forms of end fittings/terminations for pipelines.

EYCB Umbilical

All types and forms of end fittings/terminations for umbilicals.

EYCC Risers

All types and forms of end fittings/terminations for risers.

EYD Umbilicals**EYDA Umbilicals – static**

Manufactured umbilicals for static conditions, for remote control of unmanned platforms, subsea production systems and other subsurface facilities.

EYDB Integrated service umbilicals – static

Manufactured control umbilicals for static conditions, with integrated service lines for chemicals and/or gas, for remote control/servicing of unmanned platforms, subsea production systems or other subsurface facilities.

Also included hereunder are integrated production umbilicals (IPUs) for static conditions. This is an umbilical similar to an integrated service umbilical, but with a flowline in the centre.

The umbilicals may also include electrical power cable.

EYDC Umbilicals – dynamic

Manufactured umbilicals for dynamic conditions, for remote control of unmanned platforms, subsea production systems and other subsurface facilities.

Dynamic umbilicals serve normally as "risers".

EYDD Integrated service umbilicals – dynamic

Manufactured control umbilicals for dynamic conditions, with integrated service lines for chemicals and/or gas for remote control/servicing of unmanned platforms, subsea production systems or other subsurface facilities. The umbilicals may also include electrical power cable.

Also included hereunder are integrated production umbilicals (IPUs) for dynamic conditions. This is an umbilical similar to an integrated service umbilical, but with a flowline in the centre.

EYE Special cables

This code covers long distance transmission cables located on the seabed or on land:

- sea cables – i.e. submerged electric power and/or signal/control cables (also fibre-optical cables) from land facilities shore approach or other platforms for control of/supply to
 - unmanned platforms, platforms without power generation,
 - subsea facilities, subsea valve stations and booster stations,
 - overseas facilities (e.g. for power export/import).
- land cables – i.e. electric power and/or signal/control cables (also fibre-optical cables) trenched or installed above ground (on poles) from a gas power plant, grid connection or a land based control room, to another land based facility or to shore approach (for further transmission to offshore facilities; see undersea cables above).

Special cables are separated into 3 subtypes as follows:

EYEA Direct electrical heating cable**EYEB Power cables****EYEC Fiber optical cable**

The special cables are normally purchased from specialist vendors/manufacturers based on project specifications.

Standard cables for e.g. platform topsides and onshore plants are deemed to be bulk materials and are to be COR coded under BE, BJ and BT as relevant.

EYX Other transfer and control equipment packages

Includes packages not previously listed, i.e. other groups of COR EY type equipment delivered from vendors/manufacturers, purchased as complete functional packages that may comprise several of the above items of equipment for incorporation into the facilities.

EYZ Other transfer and control equipment

Includes other transfer and control equipment not defined elsewhere under COR EY, purchased as individual items of equipment for incorporation into the facilities.

H Owner's personnel

This primary code relates to all costs incurred to company for the provision of owner's personnel resources and services required for both project and construction management to manage, administer, control, co-ordinate and supervise a development project. A widely applied term for the code is (owner's/operator's) project team – PT.

Owner's personnel as defined hereunder may be comprised of

- company only directed management containing a task force of company personnel and or augmented with consultant/contractor personnel in an integrated team,
- company personnel and consultant/contractor personnel under a normal and separate contractual agreement such as a project services contractor (PSC), often working as an integrated task force,
- construction management contractor engaged under a separate and formal contractual agreement with company to perform discrete portions of construction management work.

Some particular references: For EPCS contract personnel (engineering, procurement and construction supervision) – often applied in onshore projects – see COR K. For owner's personnel overheads, see COR Q. For insurance and other general costs, see COR A. If company personnel performs engineering (other than covered for under COR HEA), COR K codes apply.

HA Project management

Project management includes costs for owner/operator/contracted personnel and services for all senior level managers and their direct supporting staff not otherwise forming part of functional departments or groups, hereunder such as

- project director,
- project manager,
- construction manager,
- mech. completion and commissioning manager,
- engineering manager,
- procurement/contracts manager (and legal advisers),
- project control manager,
- administration manager/business manager,
- QA-manager,
- HSE manager.

Project management is subdivided as outlined under the tertiary level codes following:

HAA Project managers

Project managers include company/operator and/or contracted managers whose duties relate to the entire project irrespective of functional department leadership. Depending on project type organisation project managers may constitute

- project director,
- project manager,
- construction manager,
- mech. completion and commissioning manager,
- engineering manager,
- procurement/contracts manager (and legal advisers),
- project control manager,
- QA-manager,
- administration manager/business manager,

- health, safety, and environment (HSE) manager,
- personal secretaries to the foregoing.

HAB Quality assurance

The quality assurance function is responsible to ensure that development – construction of projects conforms to design codes, drawings, engineering specifications and statutory requirements. Includes all staff categories associated with the quality assurance function.

HAC Health, safety and environment (HSE)

The HSE function includes all staff personnel categories related directly to prevention against loss of life, accident, fire or other, and to follow up health and environmental topics.

HB Project administration

Project administration relates to costs for owner/operator/contracted personnel, goods and services incurred by company to provide general project administration, financing and accounting services, document control and data processing, as outlined under the tertiary level codes following:

HBA Administration

Administration relates to the provision of personnel and services to perform general project administration. Includes such as

- personnel,
- security,
- agreement of travel and housing,
- permits,
- licenses,
- project vehicles and transport,
- payroll, insurance, catering,
- administration of temporary accommodation,
- other required administration services.

HBB Finance and accounting

Finance and accounting include the provision of personnel and/or services to perform such as

- project financing,
- project accounting,
- accounts payable,
- commitment monitoring,
- project financial reporting,
- statutory required financial reporting,
- other related activities.

HBC Data processing

Includes all personnel related to all data processing (information technology – IT) which are of owner's specific responsibility.

HBD Document control

Document control includes all personnel/services associated with registration, administration, updating and storage of owner documentation, i.e. for

- filing systems for correspondence,
- accounts,
- contracts,
- drawings,

- specifications,
- datasheets,
- microfilm,
- other systems for storage and retrieval of documents.

For engineering contractor's document control, see COR KAE.

HC Procurement

The procurement function includes owner/operator/contractor personnel and associated services for the purpose of

- formulating,
- preparing,
- compiling,
- issuing,
- evaluating,
- awarding contracts, purchase orders and monitor these.

As well as services for

- frame agreement handling,
- expediting,
- traffic,
- logistics,
- vendor control,
- material control,
- inspection.

Procurement is subdivided as outlined under the tertiary level codes below.

For procurement performed in contractor's organisation, see COR KB.

HCA Contracting and legal

Contracting and legal includes personnel/services to formulate, compile, prepare, issue, evaluate, award and monitor contracts. This may imply such as compiling construction/fabrication contracts from design drawings and specifications conforming to the intent, purpose, philosophies and requirements of a project.

In addition contracting and legal includes preparation of general and special conditions of contract conforming to statutory requirements.

HCB Purchasing

Purchasing includes personnel/services to compile purchase orders from design drawings and specifications, conforming to intent, purpose, philosophy and requirements. The work includes purchase order formulation, compilation, preparation, issuance, evaluation of vendors/suppliers, award of purchase order and follow up after award.

HCC Expediting/traffic/logistics

Expediting:

Includes personnel and services to perform the expediting function; receiving of bulk and equipment from vendors/suppliers/manufacturers at different geographic locations, ensure customs clearance, statutory conformance and co-ordinate with traffic/logistics deliveries.

Traffic/logistics:

Personnel and services to co-ordinate land/sea/air delivery from vendors/suppliers/manufacturers/fabricators at different geographic locations to central project locations – construction sites, fabrication sites and/or storage bases.

Also included are co-ordination and logistics involved with movement of personnel, goods and services to work locations.

HCD Material control/inspection

Personnel and services required ensuring conformance to project specifications by vendors/suppliers/manufacturers/fabricators/constructors. Includes visual, non-destructive, destructive, dimensional and functional inspection and control related to materials.

HD Project control

The project control function includes owner/operator/contracted personnel/services for such as

- estimates/budgets preparation and maintenance,
- monitor trends and control costs,
- planning and scheduling,
- preparing project cost/schedule/resource reports,
- assist in contract formulation and evaluation.

As outlined under the tertiary level codes following:

HDA Estimating

Personnel and/or services required preparing such as: trends, control estimates, variation order check estimates, bid check estimates, forecasts and project budgets.

HDB Cost control

Personnel and/or services required to code, control, monitor, report actual costs/expenditures, commitments, trends and forecasts.

HDC Planning and scheduling

Personnel and/or services required planning and scheduling each project or parts thereof at different levels of detail. The work may include network analysis, resource scheduling, contract schedules, construction schedules and master schedules.

HDD Reporting

Personnel and/or services required to prepare project cost/schedule/resource reports, e.g. the project monthly report, weekly/biweekly reports, etc. Includes also preparation of periodical project progress reports comparing actual progress against planned progress.

HDE Miscelanous project control

Includes miscelanous project control functions not covered by the previous codes, like

- risk co-ordination and reporting,
- design change co-ordination and reporting,
- contract formulation and evaluation,
- quantity surveying.

HE Supervision and surveillance

Supervision and surveillance relates to owner/contracted personnel resources/services required to perform engineering supervision and construction supervision, as outlined under the tertiary level codes below.

The engineering and construction supervision function may, according to form of contract, scope and content, entail Company site personnel or comprise an integrated task force of company/contractor personnel to fulfil the objectives.

For personnel under an engineering procurement and construction supervision (EPCS) contract, see COR K.
For company MC and commissioning personnel, see under COR HF.

HEA Engineering supervision

Engineering supervision relates to personnel required to supervise, control, co-ordinate and monitor contractor design and engineering activities.

HEB Construction supervision

Construction supervision relates to personnel required to supervise, control, co-ordinate, monitor construction and ensure conformity to design specifications and drawings for fabrication and construction contracts.

HF MC and commissioning personnel

Included are owner/operator personnel and/or services – project personnel and personnel from operations – and contracted personnel hired under company's direction, to plan and carry out mechanical completion (MC) and commissioning of the facilities. The personnel/services are subcoded as follows:

HFA Mechanical completion personnel

HFB Commissioning personnel

For assistance by construction contractors personnel during completion and commissioning, other COR codes apply; e.g. COR L and M with subcodes.

HZ Other owner's personnel costs

To be included are costs for COR H type personnel not covered by the previous COR H codes.

For owner's personnel overheads, see COR Q.

K Engineering manpower

Engineering manpower includes all categories of personnel resources for all disciplines and functions required performing the engineering tasks. Engineering in a project context may start with the approval of a plan for development and operation (PDO) or similar statutory approval and may include traditionally

- conceptual engineering,
- basic engineering,
- pre-engineering,
- detailed engineering,
- follow-up engineering.

Terminology, start and purpose may vary between companies at different locations.

Compared to the SCCS May-92 version COR K has been expanded to cover for consequences of new technology and project development as follows:

- COR K includes both for design engineering and fabrication engineering due to extensive use of computer aided design/manufacturing (CAD/CAM);
- procurement is included as most engineering contractors now perform procurement (e.g. in E&P contracts);
- personnel under engineering, procurement and construction supervision contracts (EPCS) – most applied in onshore projects – is to be coded under COR K.

The above is also reflected in the SCCS SAB code (under SAB 2).

This implies that site engineering and procurement personnel (for a fabrication/construction contract) are to be COR coded under K.

The traditional engineering function is required to perform all technical and functional definition work required and sufficient to enable fabricators/contractors to bid/tender for work scope and subsequently construct parts of, or complete facilities.

Engineering scope under COR K includes but is not limited to

- acquisition of soils and test data,
- perform surveys,
- prepare maps,
- facility design,
- heat/material balances,
- calculations to ensure conformance with design codes and criteria,
- prepare drawings (for design and fabrication),
- flowsheets and diagrams,
- facility equipment selection/equipment lists,
- prepare specifications,
- define construction methods/hook-up and commissioning,
- marine and lifting operations,
- logistics,
- prepare weight estimates and weight control reports,
- material take-off,
- participate in vendor-/supplier-/manufacturer-/fabricator-/constructor evaluation, selection, qualification and compilation/formulation of contracts and purchase orders,
- perform procurement activities – as applicable.

Engineering will normally be carried out under a formal contractual agreement between company/operator/owner with a contractor, but may be performed totally or partly by company engineering personnel.

Some particular references: Engineering covered by an equipment purchase order, is to be regarded as inclusive in the respective COR E code for the equipment. Engineering for insulation is to be COR K coded under the discipline for the insulated items; e.g. engineering for architectural and building/HVAC/piping/mechanical equipment insulation, see under COR KC/KH/KL/KR respectively. For model building, see COR SFH.

KA Engineering management and administration

Engineering management and administration include personnel required to administer, manage, monitor and control work normally performed by the contracted engineering organisation. The work pertains to contracted scope of work with company/owner/operator and requires a management organisation to perform

- general management,
- contract management,
- project control,
- administration functions,
- document control,
- data processing (IT),
- quality management.

As outlined under the tertiary level codes following:

KAA Management

Include costs for the following top-level contractor managers:

- project manager for the following types of contracts; engineering contracts, E&P, EPC, EPCI, EPCIC and EPCS contracts;
- engineering manager;
- procurement manager;
- construction supervision manager.

Departmental/discipline leaders/managers are to be COR coded under the respective department/discipline. For construction site management, see COR CAA.

KAB Contract management

Contract management includes engineering contractor personnel involved with negotiation and fulfilment of contracted scope of work obligations with company.

The work relates to initial negotiations, handling of variations to contracted scope of work and close-out of the contract. Company may require contracts department to participate in formulation and evaluation, etc. of other contracts for the project.

KAC Project control

Project control hereunder relates to personnel primarily for progress control and reporting of engineering contractor scope of work to company/operator/owner.

The scope includes

- man-hour/manpower planning and reporting,
- planning and scheduling and reporting of actual progress compared to planned,
- cost estimating and control,
- cost reporting.

Further, company may require project control to prepare project documentation such as

- cost estimates ranging from study estimates, control estimates, detailed estimates to design change estimates,
- plans and schedules – prepare detailed and summary plans and schedules for construction of facilities, prepare resource schedules, analysis, identify critical paths, etc.

KAD Administration

Administration includes all personnel required in direct support of engineering personnel to provide

- personnel services,
- accounting,
- financing,
- payroll,
- travel,
- accommodation,
- office services,
- vehicles,
- all related administrative services.

KAE Document control

Document control includes all costs/services associated with engineering's maintaining and storage/filing of

- correspondence,
- accounts documentation,
- contracts,
- drawings,
- specifications,
- datasheets,
- microfilm,
- other systems for storage and retrieval of documents.

KAF Data processing (IT)

Engineering contractor/organisation personnel engaged with electronic data processing/information technology (IT), for such as

- hardware and peripheral installations and maintenance,
- co-ordination of e.g. procurement/purchasing activities,
- software development,
- user support services.

KAG Quality management

Engineering contractor/organisation personnel required ensuring that all design and engineering activities conform to procedures, design codes, rules, regulations and statutory requirements.

KB Procurement

The procurement function includes contractor/organisation personnel and associated services for the purpose of

- formulating,
- evaluating,
- preparing,
- compiling,
- issuing,
- awarding contracts and purchase orders and monitor these.

As well as services for

- maintenance of frame agreements,
- expediting,
- traffic,
- logistics,
- vendor control,
- material control,
- inspection.

Earlier, company performed almost all project procurement. In new projects engineering contractor's procurement scope – depending on contract type and strategy – is often rather comprehensive. Thus for a more detailed description of procurement work, a reference is given to COR HC with subcodes.

For procurement manager, see COR KAA.

The COR K codes below represent the more classical engineering disciplines. Included are discipline leaders, package engineers and discipline personnel.

KC Architectural and building

Engineering contractor/organisation personnel required to

- design and engineer buildings,
- perform architectural design and engineering both for exterior/interior of buildings and facilities.

Architectural:

Personnel required carrying out the architectural engineering and design of facilities and buildings to conform to design codes, rules, regulations and statutory requirements. Architectural design relates to the esthetical forming of buildings/structures and facilities both as

- exterior design:
 - forming;
 - color;

- finishing;
- fixtures;
- texture;
- placement in terrain;
- adjacent areas;
- landscaping, etc.
- interior design:
 - forming;
 - colors;
 - finishes;
 - furniture;
 - drapery;
 - fabrics;
 - floor coverings;
 - insulation;
 - architectural equipment, special fixtures, etc.

The work includes such as

- prepare architectural drawings,
- prepare specifications,
- materials selection and sizing,
- contact with manufacturers/vendors/suppliers,
- provide input to reports of project nature,
- co-ordinate with other disciplines.

Building:

Personnel required carrying out the design and engineering of buildings – hereunder such as

- administrative, industrial and residential work to conform to design codes, rules, regulations and statutory requirements,
- acquisition of climatic/environmental data,
- perform surveys,
- acquire soils test data,
- design engineering,
- prepare specifications,
- prepare drawings/diagrams/sketches,
- selection and sizing of materials,
- prepare material take-off,
- provide input to other reports as applicable:
 - weight;
 - construction/manufacture/installation/erection/assembly.
- co-ordinate with other disciplines.

For (general) civil engineering, i.e. engineering for other than buildings, see COR KQ.

KD Drilling

Drilling engineering includes all required contractor/organisation personnel to perform such as

- facilities design:
 - design;
 - prepare specifications;
 - produce drawings, flowsheets and diagrams;
 - select and size drilling equipment;
 - prepare selected input for reports regarding weight, function, equipment list, fabrication/installation.
- set up and supervise drilling programs from spud to completion during drilling operations, evaluate performance to ensure compliance with company operating and maintenance procedures, as well as develop drilling crew training programs and provide technical assistance to drilling supervisor/toolpusher,

- co-ordinate with other disciplines to ensure optimal drilling facilities design.

KE Electrical

Engineering contractor/organisation personnel required performing such as

- design,
- prepare specifications,
- produce drawings,
- prepare loadlists,
- prepare single line diagrams and schematics,
- selection and sizing of electrical equipment,
- develop bulk material listings,
- provide input for preparation of selected reports:
 - weight;
 - equipment list;
 - function;
 - fabrication/installation.
- co-ordination with other disciplines.

KF Reservoir

Engineering contractor/organisation personnel – normally Company personnel – required to acquire reservoir and other sub-surface information and investigate, interpret and evaluate this information to develop methods to exploit the petroleum reservoir.

The work involves sciences such as: petrophysics, petrochemistry, geology, geophysics, geochemistry and reservoir simulation.

The scope includes but is not limited to

- area and seismic studies,
- arrange for well tests,
- core and rock sampling,
- determination of reservoir pressure, temperature, gas oil ratio, oil water contact, oil column, etc.
- determine reservoir location, area size, thickness, depth to reservoir, porosity, permeability, communication between structures, productivity, etc.,
- establish oil and gas characteristics (viscosity, density, chemical properties, etc.),
- develop reservoir models (e.g. in 3D) and perform reservoir simulations,
- determine production strategy including need for injection, well location, etc.,
- present estimates for reserves, recovery factor and production profiles and advice on reservoir management,
- co-ordination with other disciplines.

For geoscience related to foundations, pipelines, etc., see COR KG.

KG Geoscience

Engineering contractor/organisation personnel required to carry out activities related to geosciences in connection with foundations (e.g. for marine substructures, pipelines, buildings, onshore equipment, etc.) – hereunder such as

- geophysics,
- geology,
- geochemistry and related skills required for the purposes of obtaining and evaluating data for use by other disciplines in design and engineering to enable facilities to be constructed,
- arrange/obtain soils test, surveys, design and engineering of foundations,
- prepare specifications,
- arrange/perform studies,
- perform scaled/modeled testing which may be required,

- chemical analysis,
- co-ordination with other disciplines,
- all other activities related to geoscience for foundations.

For geoscience in connection with reservoirs, see COR KF.

KH HVAC

Engineering contractor/organisation personnel required for the design and engineering of HVAC (heating, ventilation and air condition) systems required on/at facilities, for such as

- design,
- prepare specifications,
- prepare drawings of ducting, insulation, etc.,
- prepare loadlists,
- prepare diagrams and schematics,
- selection and sizing of equipment and bulk,
- provide input for preparation of selected reports:
 - weight;
 - equipment list;
 - function;
 - fabrication/installation.
- co-ordination with other disciplines.

HVAC engineering does also cover engineering for sanitary systems (plumbing).

KJ Instrumentation

Engineering contractor/organisation personnel required for the design and engineering of instrumentation systems, for such as

- control philosophy determination,
- control systems design; for e.g. process control and data acquisition systems and for supervisory control and data acquisition systems,
- layout,
- design engineering,
- prepare drawings, diagrams and specifications,
- assist in developing P&ID's (process and instrumentation diagram),
- input to fire and gas detection systems,
- ESD system (emergency shut-down),
- selection and sizing of equipment, preparation of bulk registers,
- input to selected reports for
 - weight control,
 - equipment list,
 - function,
 - fabrication/manufacture/installation.
- co-ordination with other disciplines.

For engineering related to telecommunication, see COR KT.

KL Piping

Engineering contractor/organisation personnel required for the design and engineering of piping systems, for such as

- systems design,
- design engineering,
- layout,
- prepare drawings and diagrams,
- assist in developing P & ID's (process and instrumentation diagram),

- selection and sizing of
 - piping material,
 - valves,
 - specials,
 - wye-sonnection,
 - tees,
 - bends,
 - insulation,
 - supports and hangers, etc.
- prepare material take-off,
- provide input for selected reports:
 - weight,
 - function,
 - fabrication/manufacture/installation.
- co-ordination with other disciplines.

For engineering in connection with sanitary systems (plumbing), COR KH applies.

KM Material technology

Engineering contractor/organisation personnel required performing design and engineering related to material technology, including such as

- metallurgy,
- investigation of metals workability, ductility, machining properties, welding ability, etc.,
- specification of welding requirements and heat treatment,
- preparation of material data sheets, specifications and test procedures,
- qualification of manufacturers of materials,
- definition and specification of material protection, hereunder corrosion protection/surface treatment, for such as
 - coating systems, metallizing and anodes,
 - paint and applications for the purpose of corrosion protection and/or architectural finishes,
 - acquisition of climatic/environmental data,
 - specification of pretreatment/preparation, specification of type and applied thickness of applications,
- co-ordination with other disciplines.

KN Structural

Engineering contractor/organisation personnel required for structural (steel and metal) design and engineering of the facilities, for such as

- structural design engineering to ensure conformance to design codes and criteria,
- analysis of soils tests and survey data,
- analysis of environmental and climatic data,
- selection of material and sizing of structural components,
- prepare bulk registers,
- provide input to other reports:
 - weight;
 - function;
 - fabrication/installation/erection/construction.
- co-ordination with other disciplines.

For design and engineering of concrete building structures and other civil structures, see COR KC and KQ respectively.

KO Operation and maintenance

Engineering contractor/organisation personnel – usually personnel from company's operations organisation – required in engineering to secure that all aspects of experience and know-how related to operation and maintenance are communicated and utilised.

The code covers also operation and maintenance personnel during operation/production (see SCCS SAB prefix O).

KP Process

Engineering contractor/organisation personnel required for process design and engineering of the facilities. Included are such as

- analysis of environmental and climatic data,
- systems design,
- establish heat and material balances,
- design engineering,
- selection and specification of processes,
- evaluation of patented processes and licenses,
- prepare P&IDs (process and instrumentation diagrams), PFD (process flow diagram), UFD (utility flow diagram) for all systems,
- process and utility equipment selection and sizing,
- input to layout,
- ensure conformance with design codes, rules, regulations and statutory requirements,
- provide input to other reports:
 - weight,
 - function,
 - equipment lists,
 - fabrication/manufacture/installation/erection/construction.
- co-ordination with other disciplines.

KQ Civil engineering

Engineering contractor/organisation personnel required for design and engineering of

- earthworks,
- roads,
- bridges,
- railways,
- site civil works,
- structural excavation,
- concrete structures,
- dams, basins and ponds,
- sewage, water supply and reticulation,
- all other related activities.

The work includes such as

- analysis of climatic/environmental/survey/soils data,
- perform surveys,
- produce maps, plot plans, situation plans and plant layout,
- prepare detailed fabrication/construction drawings, diagrams and sketches, materials selection and sourcing,
- prepare material take-off of required materials-imported, cut to fill and cut to spoil, geotextiles and ground insulation and all other required materials,
- ensure conformance with ruling design codes, rules, regulations and statutory requirements,
- provide input to other reports; construction, bills of materials, etc.
- co-ordination with other disciplines.

For architectural and building engineering, see COR KC.

KR Mechanical

Engineering contractor/organisation personnel required for mechanical design and engineering, for such as

- systems design,
- heat/material balances,
- design engineering,
- layout,
- prepare drawings and diagrams,
- assist in developing P&IDs (process and instrumentation diagrams), PFD (process flow diagram), UFD (utility flow diagram),
- selection and sizing of mechanical equipment and bulk (e.g. equipment insulation) for
 - process,
 - utility,
 - process support,
 - well related facilities,
 - safety,
 - material handling and other.
- prepare equipment lists (normally) and provide input to other reports:
 - weight;
 - function;
 - fabrication/manufacture/installation/construction.
- co-ordination with other disciplines.

KS Health, safety and environment (HSE)

Engineering contractor/organisation personnel required performing engineering HSE activities, hereunder such as

- plan,
- develop HSE programs/strategies,
- acquisition of necessary studies and data,
- initiation of internal studies,
- specify requirements and ensure conformance with ruling design codes, regulations and statutory requirements,
- inspection and monitoring of the HSE development and reporting incl. HSE statistics,
- co-ordinate with other disciplines.

For safety engineering in particular, the work includes such as

- acquisition of climatic/environmental data,
- design engineering of safety systems incl. fireproofing,
- area safety classification,
- prepare drawings/diagrams/schematics,
- selection and sizing of equipment and bulk,
- prepare fire and gas registers,
- prepare input to ESD (emergency shut-down) systems,
- assist in developing input to P&IDs (process and instrumentation diagrams),
- define personnel evacuation systems,
- provide input to
 - equipment list,
 - weight reports,
 - safety reports,
 - construction/fabrication/manufacture/installation.
- ensure conformance with design codes, rules, regulations and statutory requirements,
- co-ordinate with other disciplines.

KT Telecommunication

Personnel required for the design and engineering of telecommunication systems, for such as

- systems design,
- layout,

- design engineering,
- prepare drawings and diagrams,
- prepare specifications,
- selection and sizing of equipment,
- prepare bulk registers,
- input to selected reports for
 - weight control,
 - equipment list,
 - function,
 - fabrication/manufacture/installation,
- co-ordination with other disciplines.

For instrumentation engineering, see COR KJ.

KU Subsea

Engineering contractor/organisation personnel required performing the design and engineering of subsea production systems, for such as

- well related systems,
- production stations,
- control systems,
- tooling systems,
- support systems.

The work includes such as

- systems design,
- structural design,
- preparation of specifications and drawings,
- equipment and materials sizing and selection,
- determine surface facilities interfaces,
- performance and endurance testing of systems,
- develop installation methods and procedures,
- ensure conformance with design codes, rules, regulations and statutory requirements,
- co-ordination with other disciplines.

KV Marine engineering

Engineering contractor/organisation personnel resources required for the marine design and engineering in connection with

- marine structures – hereunder fixed, compliant or floating/buoyant structures, in co-operation with the structural discipline as applicable,
- marine operations – hereunder barges, tugs, pipelay vessels, crane vessels, support vessels, etc.

The work includes such as

- design conforming to climatic/environmental conditions and codes,
- preparation of specifications,
- calculation for purpose-centres of gravity, meta-centre, etc.,
- determine loadbearing capacities,
- design of seafastening/grillage,
- acquisition of survey data as required,
- selection for purpose of hired/rented vessels,
- design of mooring systems, towing,
- provide input for preparation of reports for: weight, COG (centre of gravity), equipment list, function, fabrication/construction/installation,
- ensure conformance with design codes, rules, regulations and statutory requirements,
- co-ordination with other disciplines.

For marine contractor's engineering for own scope, see COR X with subcodes.

KW Weight and quantity control

Engineering contractor/organisation personnel required performing weight and quantity control functions.

The weight control work implies such as

- compilation of weight estimates – dry/operating/lift/temporaries,
- establish weight budgets,
- calculation of centers of gravity, etc.,
- prepare periodical weight reports,
- establish weight control and reporting requirements for others and monitor their performance,
- participate in weighing of – equipment/units/preassemblies/modules/structures/complete facilities as applicable,
- co-ordinate with all other disciplines to obtain weight related information.

Quantity control may imply

- establish structures for material quantities, norms and rates,
- collect and control numbers per quantity item,
- participate in contract formulation and evaluation related to material quantities,
- establish requirements to and monitor handling and reporting of material quantities by others,
- prepare necessary reports regarding material quantities,
- analyze quantity development and update material quantity structures, registers, etc.
- co-ordinate with other disciplines to obtain material quantity related information.

KY Pipelines

Engineering contractor/organisation personnel resources required performing the design and engineering of pipeline systems, hereunder

- flowlines,
- interfield pipelines,
- trunk pipelines (transport pipelines).

The work includes such as

- initiation and acquisition of surveys for pipeline route selection,
- analysis of soil conditions,
- pipeline design,
- prepare specifications for materials and construction/installation equipment,
- prepare maps,
- determine pipeline routing,
- prepare schematics and drawings for tie-in,
- design and calculate span-corrections, crossings and fill/backfill,
- co-ordinate work with other interrelated disciplines.

KZ Multidiscipline

Included is engineering contractor/organisation personnel of a multidiscipline character, engaged in engineering. As education, knowledge and experience will vary, it is difficult to define all personnel under this code. An outline may be

- project engineers,
- general field engineers,
- construction specialists in engineering teams (e.g. under EPC and EPCS contracts), such as
 - project completion and commissioning specialists,
 - construction methods specialists,

- construction inspection personnel.
- particular insulation engineering; e.g. in connection with modifications and onshore projects, when a specialist engineering contractor performs all insulation engineering for a multiple of disciplines; e.g. for such as piping, architectural/building, HVAC, etc.

For personnel from company's operation and maintenance organisation, see COR KO.

Engineering for insulation is normally to be COR K coded under the discipline for the insulated item, e.g. insulation engineering for architectural and building/HVAC/piping/mechanical equipment, are to be coded under COR KC/KH/KL/KR respectively.

For model building, see COR SFH.

L Direct labour

Resource codes tabled in this section relate to labour which are directly involved in construction work, i.e. prefabrication, fabrication, machining, preparation, assembling, erecting, finishing and testing of a constructed facility.

Direct labour includes all crafts/trades/disciplines, which directly contribute to the construction of a facility. This includes both those that through their crafts perform activities – fabricate, erect and install, etc. – and the working foremen who are of direct support to achieve this.

Direct labour disciplines have been seen in connection with bulk and engineering disciplines to obtain analogous discipline “content”. Thus the second code letter in direct labour (COR L) correspond with the second letter code under Bulk (COR B) and engineering disciplines (COR K); e.g. piping direct labour (COR LL), piping bulk (COR BL) and piping engineering (COR KL).

For indirect labour, i.e. construction personnel performing construction assistance and supporting services to direct labour constructing the contract object, COR code M applies. Indirect labour includes such as administrative foremen, personnel for organised transportation, rigging, scaffolding, etc.

For direct labour included for in all inclusive unit rates, i.e. rates covering two or more resources, see COR S Unit work.

Use of consumables is normally covered for in the direct labour man-hour rates.

LC Architectural and building direct labour

This code covers architectural and building direct labour work in connection with construction of offshore facilities, e.g. living quarter, and onshore buildings such as: office buildings, control rooms, shelters, warehouses, laboratory buildings, sheet metal clad machine houses, transformer and switchgear stations, parkdecks and underground storage buildings as well as gate-houses and valves stations.

This code includes all labour for direct construction work related to such as

- walls,
- floors,
- ceilings,
- doors and windows (non-actuated),
- furniture and accessories including arts,
- signs,
- insulation,
- prefabricated modules (rooms/compartments),
- particular onshore building materials,
- other architectural and building bulk.

For further outline of material items/details for the work, see COR BC. For actuated doors and kitchen equipment, see under COR EAA.

For general civil direct labour (other than related to onshore buildings), see COR LQ. Battery limit of the direct labour of this code against the general civil direct labour shall be the basic foundation concrete slab as well

as a tie-in point measured 1 meter off the subject building for all utility systems leading into and out of the construction object.

Exclusions are:

Administration of construction work, materials, supply and erection/dismantling of scaffolding and organised transport. Organised supply of such as: lifting and hoisting equipment, grading and excavation equipment, bulk materials and/or other equipment/material necessary. Organised supply of tools and machinery (except small handtools), as well as auxiliary equipment such as concrete batch plants that may be deemed necessary in order to accomplish the aforementioned objectives. Further excluded from this code is the excavation and backfill, as well the landscaping around the onshore buildings together with the paving of the access ways to these (see other codes).

LD Drilling labour

Drilling direct labour normally will form a part of a drilling service contract, let to specialised contractors. Alternatively operators may have their own drilling crew to carry out the drilling and completion of wells both onshore and offshore. A reference to COR BD is given for materials for the work.

Exclusions are:

Administration of the labour, materials, organised transport, supply and erection/dismantling of scaffolding, organised supply of such as: lifting and hoisting equipment, transformers, generators, transport vehicles as well as other heavy tools etc. necessary to perform the operations (see other codes).

LE Electrical direct labour

Direct labour for electrical work includes all labour for direct construction work related to such as

- cable and cable accessories for power, light and heat tracing (incl. pulling, installation, interconnection to equipment and bulk components, termination, testing and calibrating),
- cable supports and transits (also for instrument/telecom),
- lighting,
- junction boxes,
- accessories,
- other electrical bulk.

For further outline of material items/details for the work, see COR BE.

Exclusions are:

Administration of the labour, materials, erection/dismantling of scaffolding, organised supply of hoisting equipment, cranes etc., organised transport of cable drums, cables and other materials to location. Electrical equipment setting and/or installation are excluded. Further exclusions are all earthworks as digging of cable trenches, installing concrete ducting, backfilling of trenches and concrete works for cable entries into buildings and machine/equipment foundations (see other codes).

LH HVAC direct labour

Direct labour for HVAC shall be understood as inclusive of all labour for direct construction work related to such as

- ducting,
- inline items and dampers,
- duct support and hangers,
- insulation,
- sanitary piping and components (plumbing),
- other HVAC bulk.

For further outline of material items/details for the work, see COR BH.

Exclusions are:

Administration of construction work, materials, equipment installation, supply and erection/dismantling of scaffolding, organised transport, organised supply of lifting and hoisting equipment, transformers and welding machines as well as all other heavy tools or auxiliary erection equipment etc., necessary for this type of work (see other codes).

LJ Instrument direct labour

Direct labour for instrument work includes all labour for direct construction work related to such as

- instruments,
- instrument valves (inclusive actuators, where relevant),
- cables and cable accessories (incl. pulling, installation, interconnection to equipment and bulk components, termination, testing and calibrating),
- junction boxes,
- tubing,
- accessories,
- other instrument bulk.

For further outline of material items/details for the work, see COR BJ.

Installation of instrument valves in piping systems is deemed to be covered for under COR LL. Installation of cable supports and transits is deemed to be COR coded LE. Insulation of instrument items is deemed to be covered for under COR LL.

Exclusions are:

Administration of the labour, materials, erection/dismantling of scaffolding, organised supply of hoisting equipment, cranes and heavy tools, organised transport of cable drums, cables and other materials to location, as well as instrument or computer equipment setting and/or installation. Further exclusions are all earthworks, as digging of cable trenches, installing concrete ducting, backfilling of trenches and civils works for cable entries into buildings and machine/equipment foundations (see other codes).

LL Piping direct labour

Direct labour for piping shall be understood as inclusive of all direct labour operations connected to the prefabrication, site fabrication and installation of piping materials such as

- pipework,
- manually operated valves,
- supports,
- insulation,
- other piping bulk.

For further outline of material items/details for the work, see COR BL.

This code is deemed also to include for instrument valve installation in piping systems and insulation of instrument items.

Exclusions are:

Administration of labour, materials, supply and erection/dismantling of scaffolding, organised transport, organised supply of lifting and hoisting equipment, pipelaying machinery, transport vehicles, transformers and welding machines, annealing equipment as well as other heavy tools etc. necessary to meet operational objectives. Further exclusions are all earthworks, as digging of piping trenches, crossings, drilling/pressing operations, installing concrete ducting or anchoring, backfilling of trenches and landscaping (see other codes).

LM Surface protection direct labour

Direct labour for surface protection shall be understood as inclusive of all direct labour operations connected to the surface protection of equipment, piping, steel and all other systems that require such services. This

code comprises the preparation of the surface prior to painting/coating (cleaning and priming), and installation/application of

- paint,
- coating (metallic and non-metallic),
- anodes,
- other surface protection bulk.

For further information of material items/details for the work, see COR BM.

Exclusions are:

Administration of the construction labour, materials, organised transport, supply and erection/dismantling of scaffolding, organised supply of lifting and hoisting equipment, transport vehicles, tools and machinery except small handtools, as well as auxiliary equipment necessary for the work (see other codes).

LN Structural direct labour

Direct labour for structural work (primarily in steel and aluminium) shall be understood as inclusive of all direct labour operations connected to the prefabrication, site fabrication and installation of structural items such as

- primary and secondary structures,
- outfitting structures,
- temporary installation aids, *
- grillage, seafastening and load out, *
- other structural bulk.

For further outline of material items/details for the work, see COR BN.

Observe that for items marked *, the weight thereof should not be included in the dry weight for the permanent work, and that the weight and cost (and man-hours) should be estimated and reported separately.

Exclusions are:

Administration of the construction labour, materials, organised transport, supply and erection/dismantling of scaffolding, organised supply of such as: lifting and hoisting equipment, transformers and welding machines as well as other heavy tools, etc. necessary for the work (see other codes).

LQ Civil works direct labour

Direct labour for civil works shall be understood as inclusive of all direct operations connected to the accomplishment of site-grading, dredging, blasting, excavations and earthworks, trenching, drill-pressing depositing, site drainage, site improvements such as asphaltting, paving, fencing, etc., sheet and foundation piling, formwork, reinforcing steel and mesh, embedded items, all types of concrete works and structures, landscaping and seeding as well as all demolition works. For an outline of materials for the work, see COR BQ.

The code LQ is relevant for GBS (and some other) substructures and for onshore civil works other than related to onshore buildings.

Exclusions are:

Administration of the construction labour, materials, organised transport, supply and erection/dismantling of scaffolding. Organised supply of such as: lifting and hoisting equipment, transport, grading and excavation equipment. Organised supply of tools and machinery (except small handtools), as well as auxiliary equipment such as concrete batch plants that may be deemed necessary in order to accomplish the aforementioned objectives. Further excluded from this code is the construction of buildings except for the earthwork and potential piling works, which are subject of the more general site operations. Not included are also major roads, railways and similar construction objectives (see other codes).

LR Mechanical direct labour

Direct labour for mechanical erection/work shall be understood as inclusive of all direct labour operations connected to the installation of equipment normally supplied by others, outfitting equipment with mechanical parts on site, preservation and/or dismantling, repairing or changing of parts of such equipment and testing.

This implies as a main rule work in connection with equipment as defined under COR E:

- architectural equipment;
- drilling equipment;
- miscellaneous mechanical equipment;
- drivers and power-transmissions;
- electrical equipment;
- heaters, boilers, furnaces and flares;
- HVAC equipment;
- heat transfer equipment;
- instrumentation equipment;
- compressors, blowers and expanders;
- transfer and control equipment;
- material and product handling equipment;
- mechanical equipment – solids;
- pumps;
- telecommunication equipment;
- safety/escape and firefighting equipment;
- storage tanks/containment equipment – atmospheric;
- subsea equipment;
- vessels and columns – pressurized;
- wellhead equipment – (surface completion);
- miscellaneous package units;
- mooring and marine equipment.

For more detailed information of the equipment work items, see COR E.

Exclusions are:

Administration of the construction labour, materials, organised transport, supply and erection/dismantling of scaffolding, rigging, organised supply of such as: lifting and hoisting equipment, transformers and welding machines as well as all other heavy tools or auxiliary erection equipment etc. necessary for the work (see other codes).

LS Safety direct labour

Safety direct labour includes all labour for direct construction work related to such as

- passive fire protection,
- safety appliances (active fire fighting devices, evacuation and rescue devices and first aid devices).

For further outline of material items/details for the work, see COR BS. Code LS does not include work with safety equipment (for definition, see COR ESS).

Exclusions are:

Administration of the construction labour, materials, organised transport, supply and erection/dismantling of scaffolding, organised supply of such as lifting and hoisting equipment, machinery, transformers as well as all other heavy tools or auxiliary erection equipment etc. necessary for this type of operation (see other codes).

LT Telecommunication direct labour

Direct labour for telecommunication work includes all labour for direct construction work related to such as

- telecommunication appliances,

- cables and cable accessories (inclusive pulling, installation, interconnection to equipment and bulk components, termination, testing and calibrating),
- junction boxes,
- other telecommunication bulk.

For further outline of material items/details for the work, see COR BT.

Installation of cable supports and transits is deemed to be COR coded LE.

Exclusions are:

Administration of the labour, materials, erection/dismantling of scaffolding, organised supply of hoisting equipment, cranes and heavy tools, organised transport of cable drums, cables and other materials to location. Telecommunication equipment setting and/or installation are excluded. Further exclusions are all earthworks, as digging of cable trenches, installing concrete ducting, backfilling of trenches and civil works for cable entries into buildings and machine/equipment foundations (see other codes).

LY Onshore pipeline direct labour

Direct labour for onshore pipeline shall be understood as inclusive of all direct labour operations connected to the prefabrication, site fabrication and installation of pipeline bulk materials. This will include all welding operations such as welders' test, material annealing operations, welding operations and post-welding material treatment. Further are included such as: lifting and fitting of pipeline, installation of fittings, field bending, cutting, bevelling and machining of flanges, installation of valves, flanges, gaskets as well as bolting of flanged installations, pressure testing and non-destructive testing of performed welding operations, repair operations inclusive testing as necessary. For an outline of material items/details for the work see COR BY.

For pipeline unit work (i.e. work on an all-inclusive unit rate basis for a multiple of resources), see COR SC.

Exclusions are:

Administration of the labour, materials, organised transport, supply and erection/dismantling of scaffolding, organised supply of such as: lifting and hoisting equipment, sidebeam and other pipelaying machinery, transport vehicles, transformers and welding machines, annealing equipment as well as other heavy tools, etc. necessary to meet operational objectives. Further exclusions are all earthworks, such as digging of pipeline trenches, crossings, drilling/pressing operations, installing concrete ducting or anchoring, backfilling of trenches and landscaping (see other codes).

LZ Other direct labour

Includes direct labour which does not fall within other COR L codes.

M Indirect labour

Indirect labour means all construction personnel performing construction assistance and supporting services to direct labour constructing the contract object.

Thus this cod represent required resources (and subsequent costs) for work which do not become physical part of the installation, but which are required for the orderly completion of the installation.

Indirect labour typically cannot normally be assigned to discrete activities and represents labour required which is of a more general nature. Indirect labour relates to contractor's indirect labour requirements, both to support contractor's work and provided to company for assistance.

Indirect labour is normally covered for in the hourly rates for direct labour in contracts, but may – in particular cases – be charged directly. Some of the categories (or parts thereof) may also be listed under preliminaries in contracts.

Indirect labour consists of the following subcoded categories:

- foremen/supervision;
- quality control;

- scaffolding;
- cleaning;
- transport;
- rigging;
- material control and storage;
- fire guards;
- safety;
- dimensional control;
- weighing;
- temporary construction services;
- other indirect labor;

as outlined under the codes below.

MA Foremen/supervision

This code shall comprise the general supervision and administration staff and utilities to be required when exercising direct labour on place of construction, fabrication, installation and/or any other place where direct labour is used for operation.

Foremen are hereunder understood as administrative foremen for direct labour. Note that working foremen for the same are deemed to be regarded as direct labour.

MB Quality control

This code shall comprise all labour, supervision and administration that can be associated with the establishing, maintaining and controlling the quality of workmanship exercised by the application of direct labour on a place of construction, installation or maintenance where such labour is part of the operation.

This may include such activities as visual inspection, non-destructive and destructive testing, general quality survey, document control and approvals, as well as all other means of quality control activities that must be applied to an operation necessary to assure that its safety and standard is in conformity with applicable laws, specification and drawings.

MC Scaffolding

This code shall comprise all labour, supervision and administration that can be associated with the erection, dismantling and maintenance of scaffolding as required by the work.

MD Cleaning

This code shall comprise all labour, supervision and administration that can be associated with the supply and maintenance of cleaning services as required by the work. This may include the supply of services for general site cleaning, waste removal, maintenance of waste container and sewer pits, seasonal snow removal services, office and camp cleaning, as well as hand-over cleaning before commissioning if this is not part of another contract.

ME Transport

This code shall comprise all labour, supervision and administration that can be associated with the supply of transport services at sea, land and in the air as required by the work. This may include the supply of services for general site transport associated with the moving of material from stock to place of installation, unloading of goods at dock or railway facilities, module transport, supply of heavy lifting equipment, or other mobile equipment to suit job requirements, personnel transport to and from jobsite.

Freight/freight forwarding for transport of materials, equipment, etc. from supplier/subcontractor to construction site, is to be coded under COR AEC.

MF Rigging

This code shall comprise all labour, supervision and administration that can be associated with the supply of rigging services as required by the work. Rigging is to be understood as hauling equipment, or modules

and/or parts thereof from storage, and placing them onto their resting structures or foundations by means of hoisting equipment. It will include necessary shimming and bolting operations, as well as alignment of said equipment according to drawings and specifications. Final alignment, for example, of rotating equipment (motor, fans, turbines, pumps, gearboxes etc) will be covered under mechanical labour.

MG Material control

This code shall comprise all labour, supervision and administration that can be associated with the establishing, maintaining and controlling the quality and quantity of incoming/outgoing materials, consumables and equipment supplied to/from the place of storage (including storing) to a place of construction, fabrication, installation or maintenance where such material/equipment is needed. This may include such activities as visual inspection, logging, reporting and handling of discrepancies as set forth in the relevant material handling documentation. This material control and storage shall assure that all received/delivered goods are in correct quantity and condition, and the assigned documentation in compliance with the contractual requirements.

MH Fire guards

This code shall comprise all labour, supervision and administration as well as all equipment that is associated with fire fighting and protective measures.

MK Safety

This code shall comprise all labour, supervision and administration that are associated with site safety protective measures regarding plant or construction, installation or maintenance. This shall also be understood as to control and maintain the safety standards as set forth in the applicable laws and procedures issued by the official authorities.

ML Dimensional control

This code shall comprise all labour, supervision and administration that can be associated with the dimensional control with regard to tolerance, length and direction of components or modules or installations built. This may include such activities as visual inspection, measurements, logging, reporting and handling of discrepancies as set forth in the relevant material handling documentation.

MM Weight control

This code shall comprise all labour, equipment, supervision and administration that can be associated with the control of weight of components, module or materials, equipment and or other built-ins. This may include such activities as actual scaling, theoretical calculations, logging, reporting and handling of discrepancies as set forth in the relevant material handling documentation.

Included is also use of indirect labour in connection with submergence and/or inclination tests.

For engineering weight control, see COR KW.

MN Temporary construction services

These services include labour, supervision and administration that can be associated with the organised supply of temporary facilities required by the construction work.

Included are erection/installation and dismantling/removal of temporary facilities related to such as

- light,
- el. power,
- communication,
- water,
- compressed air,
- ladders, gangways, etc.,
- protective covers,
- etc.

For scaffolding, see COR MC.

MZ Other indirect labour

Includes indirect labour which does not fall within other COR M codes.

Q Owner's personnel overheads

This primary code relates to all overhead costs incurred by company for the direct support of owner's project personnel function further defined under COR H. Included is:

- Such costs are related to tangible costs and expenses which are required to provide:
 - offices;
 - buildings;
 - rental of buildings/offices;
 - data processing equipment;
 - peripherals and run-time expenses;
 - office expenses for such as reproduction, etc.;
 - telephone;
 - telex;
 - supplies and stationery.
- Additionally costs required to be paid for:
 - representation;
 - meetings;
 - team building;
 - seminars, training and courses.
- Personnel related costs:
 - business travel;
 - relocation expenses;
 - living allowances;
 - tax disbursements;
 - vehicles;
 - vehicle rental and operating expenses.
- Costs for management services (studies, audits, etc.).

Some particular references: For insurance and other particular cost incurred to company required to develop projects, see COR A with subcodes.

QA Office administration

Office administration includes costs related to company's general services such as

- clerical staff,
- personnel services,
- janitorial services,
- canteen services,
- security,
- cleaning,
- other services of general use.

Includes also costs for local authority provided services for electricity, water, sewage and related.

QB Office facilities

Office facilities includes costs to company for the provision of either purchased/leased/hired/rented or otherwise acquired office facilities required for owner's personnel at all required project locations.

For rental of buildings and facilities for special purposes, see COR ADB. Company site offices, etc. may be covered for under e.g. a construction contract; for these offices, see COR CC. For accommodation of owners' personnel at project work locations, see COR QEB.

QC Data processing

Includes all investments/purchased/leased/hired/rented acquisition related costs and operating costs for EDP (information technology – IT), and data processing required by owner's organisation. Provision of EDP and PC hardware and peripherals (printers, scanners, etc.), software, CPU time access costs, consumables and other EDP related costs.

For acquisition of data from others, e.g. of seismic data, geophysical data, weather data, etc., see COR ADC. For EDP printer/plotter paper, see COR QDC.

QD Office expenses

Office expenses relate to costs for reproduction services, telecommunications, office supplies, office stationary and consumables, necessary for owner's personnel. Further details are outlined under the tertiary level codes following:

QDA Reproduction

Reproduction includes the provision of reproduction devices/equipment such as photocopiers and combined copier/telefax, blueprint copiers, photographic and other equipment and/or services for the purposes of reproduction.

QDB Telecommunications

Telecommunications include all forms of telecommunication equipment and/or devices, hereunder

- telephones,
- telefaxes,
- telexes,
- intercoms,
- public addresses,
- broadcasting systems,
- other forms of telemetric communication systems.

Costs include both acquisitions by purchase/lease or hire and operational costs/expenses.

QDC Office supplies and stationery

Office supplies and stationery include the purchase of all equipment, devices and consumables required by owner's organisation:

- photocopy paper;
- writing pads and paper;
- printed forms;
- EDP printer/plotter paper;
- pens, pencils and staplers;
- etc.

QE Personnel expenses

Personnel expenses are costs incurred for the relocation of owner's personnel, hereunder for such as

- business travel,
- travel to location,
- expenses associated with relocation,
- allowances for living and relocation establishment,
- taxation difference disbursements and
- costs for vehicle acquisition and maintenance.

As outlined under the tertiary level codes below.

For other, particular personnel related to costs e.g. for health, medical and social care, etc., see COR AF with subcodes.

QEA Business travel

Business travel includes travel by owner's personnel required as directly related to a project, for such as

- meetings with contractors/consultants,
- site visits to vendors/suppliers/manufacturers/fabricators/constructors,
- costs related to attendance of topical conferences/seminars and meetings.

The costs include

- air/sea/land travel costs,
- per diems,
- accommodation expenses,
- associated costs.

For travel in connection with personnel relocation and representation, see COR QEB and QFA respectively.

QEB Relocation expenses and living allowances

Relocation expenses are costs for transfer of project assigned staff to work locations. Costs associated with relocation are for such as

- travel to location,
- relocation establishment costs,
- temporary living allowances until more permanent accommodation is made available.
- permanent accommodation for owner's personnel at project work locations (e.g. sites).

Living allowances are expenses paid to project assigned staff, which are living in temporary accommodation at project location, and travel intermittently between own home location and work site.

Site accommodation for owner's personnel may be covered for under e.g. constructions contract; for this, see COR CC.

QEC Tax differential

Tax differentials are disbursements paid by company to compensate for different salary levels combined with different taxation systems between different locations and countries, which provide a disfavourable personal income to owner's employees.

QED Vehicle rental and expenses

Vehicles and vehicle expenses include cost for acquisition, purchase/lease/hire/rent of vehicles used by owner's personnel. Included are also costs for operating and maintaining the vehicles.

Company site cars may be covered for under e.g. construction contracts; for these cars, see COR CC.

QF Miscellaneous expenses

Miscellaneous expenses hereunder are costs/expenses incurred by owner's organisation for

- representation of operators/companies/contractors and authorities,
- expenses related to meetings both external to project and internal such as team building,
- training of personnel and training courses.

As outlined under the tertiary level codes following:

QFA Representation

Representation are costs to company required e.g. to entertain and arrange site visits to “own” sites by other companies/organisations and/or authorities, and further to represent company at conferences/seminars or meetings.

The costs may include: travel, fees, accommodation and other related costs.

QFB Meeting expenses

Meeting expenses include charges and fees payable for topical conferences, seminars, teambuilding or meetings attended by owner organisation personnel. Include also costs for video-conferences/meetings.

QFC Training and courses

Training and courses include incurred costs for general and specific training/courses, required to be attended by owner's personnel for both general and professional topical knowledge.

For other, particular training and courses (which company is obliged to pay for), e.g. offshore safety courses, see COR AFC.

QH Management services

Management services are costs for services rendered to company to carry out discrete work activities under separate agreements with owner's management though related to the projected scope of work.

The services include but may not be limited to

- technical studies,
- project impact assessment studies,
- market surveys and studies,
- 3rd. party verifications,
- external audits,
- legal advice and other related costs.

For special studies (required by statutory bodies or as a part of licence agreements) hereunder also warranty surveyor services, see COR AAC.

QZ Other owner's personnel overheads

To be included are costs for COR Q type overheads not covered by the previous COR Q codes.

For particular costs for company, see also COR A with subcodes.

R Engineering overheads

This primary code relates to all overhead costs incurred by engineering organisation for the direct support of the engineering personnel function further defined under COR K – engineering manpower.

- Such costs are related to tangible costs and expenses which are required to provide
 - offices,
 - buildings,
 - rental of buildings/offices,

- data processing equipment,
- peripherals and run-time expenses,
- office expenses for such as reproduction, telephone, telex and telefax,
- supplies and stationery.
- Additional costs required to be paid for
 - representation,
 - meetings,
 - team building,
 - seminars, training and courses.
- Personnel related costs:
 - business travel;
 - relocation expenses;
 - living allowances;
 - tax disbursements;
 - vehicles;
 - vehicle rental and operating expenses.
- Other costs:
 - costs for model tests;
 - engineering studies and verifications;
 - service to company.

RA General office administration

General office administration includes costs related to engineering organisation's general services such as

- clerical staff,
- personnel services,
- janitorial services,
- canteen services,
- security,
- cleaning,
- other services of general use.

Includes also costs for local authority provided services for electricity, water, sewage and related.

RB Office facilities

Office facilities include costs for the provision of either purchased/leased/hired/rented or otherwise acquired office facilities required for engineering personnel at all required project locations.

RC Data processing

Includes all investments/purchased/leased/hired/rented acquisition related costs and operating costs for EDP (information technology – IT) – data and data processing required by the engineering organisation; provision of EDP and PC hardware and peripherals (printers, scanners, etc.), software, CPU time access costs, consumables and other EDP related costs.

For EDP printer/plotter paper, see COR RDC.

RD Office expenses

Office expenses relate to costs for reproduction services, telecommunications, office supplies, office stationary and consumables for the engineering personnel, as outlined under the tertiary level codes following:

RDA Reproduction

Reproduction includes the provision of reproduction devices/equipment such as photocopiers and combined copier/telefax, blueprint copiers, photographic and other equipment and/or services for the purposes of reproduction.

RDB Telecommunications

Telecommunications include all forms of telecommunication equipment and/or devices, hereunder

- telephones,
- telefaxes,
- telexes,
- intercoms,
- public addresses,
- broadcasting systems,
- other forms of communication systems.

The costs include both acquisitions by purchase/lease, hire and operational costs and expenses.

RDC Office supplies and stationery

Office supplies and stationery include the purchase of all equipment, devices and consumables required by the engineering organisation:

- photocopy paper;
- writing pads and paper;
- printed forms;
- EDP printer/plotter paper;
- pens, pencils, staplers;
- calculators,
- drawing equipment and supplies;
- etc.

RE Personnel expenses

Personnel expenses are costs incurred for the relocation of engineering personnel, hereunder for

- business travel,
- travel to location,
- expenses associated with relocation,
- allowances for living and relocation establishment,
- taxation difference disbursements,
- costs for vehicle acquisition and maintenance.

As outlined under the tertiary level codes following:

REA Business travel

Business travel includes travel by the engineering organisation required as directly related to a project, for such as

- meetings with contractors/consultants/company,
- site visits to vendors/suppliers/manufacturers/fabricators/constructors,
- costs related to attendance of topical conferences/seminars and meetings.

The costs include

- air/sea/land travel costs,
- per diems,
- accommodation expenses,

- associated costs.

For travel in connection with personnel relocation and representation, see COR REB and RFA respectively.

REB Relocation expenses and living allowances

Relocation expenses are costs for transfer of project assigned staff to work locations. The costs associated with relocation are for such as

- travel to location,
- relocation establishment costs,
- temporary living allowances until more permanent accommodation is made available,
- permanent accommodation for engineering personnel at other project work locations.

Living allowances are expenses paid to project assigned staff, which are living in accommodation at other project locations, and travel intermittently between own home location and work site.

REC Tax differential

Tax differentials are disbursements paid by company to compensate for different salary levels combined with different taxation systems between different locations and countries, which provide a disfavourable personal income to engineering employees.

RED Vehicle rental and expenses

Vehicles and vehicle expenses include costs for acquisition, purchase/lease/hire/rent of vehicles used by the engineering personnel. Included are also costs for operating and maintaining the vehicles.

RF Miscellaneous expenses

Miscellaneous expenses hereunder are costs/expenses incurred by the engineering organisation for

- representation of operators/companies/contractors and authorities,
- expenses related to meetings both external to project and internal such as teambuilding,
- training of personnel and training courses.

As outlined under the tertiary level codes following:

RFA Representation

Representation costs are costs required to entertain and arrange site visits to "own" sites by other companies/organisations and/or authorities, and for representing company/engineering contractor at conferences/seminars or meetings.

The costs may include for travel, fees, accommodation and other related costs.

RFB Meeting expenses

Meeting expenses include charges and fees payable for topical conferences/seminars/meetings attended by the engineering personnel. Included are also costs for video conferences/meetings.

RFC Training and courses

Training and courses include incurred costs for general and specific training/courses, required to be attended by engineering personnel for both general topical knowledge and by statutory requirement.

RG Service to company

Service to company includes costs for services provided by engineering contractor at own premises to company.

The services may include such as

- office space for company personnel,
- lodging,
- IT services,
- secretarial services,
- copying,
- telephone, telex, telefax,
- cars for company personnel,
- other costs related to service to company.

RH Engineering studies and verifications

All costs related to studies and/or verifications or similar required by owner or by engineering contractor which are covered by any established formal contractual agreement, though which are required in order to proceed with engineering contractor's scope of work. The studies/verifications may be done by external organisations.

RM Model tests

Model tests include all costs associated with such as: scaled test model construction irrespective of required scale and type of model, refurbishment of: jigs, model tanks, and simulators, as well as data recording, monitoring and interpretation, modifications and reports relating to findings during the model tests.

For model building (visualisation models), see COR SFH.

RZ Other engineering overheads

To be included are costs for COR R type overheads not covered by the previous COR R codes.

S Unit work

COR S codes are generally used for work priced in unit rates on an all-inclusive basis – which implies that several resources may be covered for in the rate.

These all-inclusive rates are normally based on costs for measurable units like m³, m², m, tonne, etc.

The unit rates may cover costs for various resources such as: labour, supervision including administration, materials, plant and equipment, necessary transportation and testing, and services. Due to the nature of the work, contracts and local traditions, the resources covered for in the unit rates may vary and thus the unit works scope and rate.

COR S coding is generally not used when labour and materials can be separated, in these cases other resource codes are to be used (COR B, L etc.).

COR S work may be under company's direct responsibility (some codes are only relevant for company), and it is to greater extent related to land based installations with civils, etc.

Normally engineering design for civil type contracts is not included in the all-inclusive unit rates; thus civil coding is generally regarded exclusive engineering unless otherwise indicated. Should therefore some engineering be included, this should preferably be transferred to the respective engineering COR code by means of normalising final measured units.

SA Civil work

This code covers civil works other than land based structures (see COR SB) and includes unit work of the following categories:

- site preparation;
- foundations;
- pile driving/piling;
- trenching and backfilling for piping and cables;

- landscaping.

As outlined under the tertiary level codes following. For major civil work contracts also covering total areas, e.g. utility area, process area, offsite etc. the area sections of the contracts should be COR coded SA.

SAA Site preparation

Site preparation includes all costs associated with such as

- grading,
- leveling,
- structural excavation,
- water course construction,
- open drains,
- cutting to fill,
- cutting to spoil,
- import of selected materials for fill,
- fencing and gates.

In order to provide a prepared site.

The work for which there may be a number of speciality contractors, include provision of required plant and construction equipment, materials, labour and supervision in order to carry out site preparation activities according to engineering design specifications provided by others.

SAB Foundations

COR SAB include foundations for administrative and industrial buildings and structures.

The work will normally include

- structural excavation for footing/support structures,
- formwork,
- reinforcement bar fixing,
- concrete pour,
- removal of temporary materials,
- backfill and compaction to buildings and structures.

The costs will normally be for the supply of

- plant,
- construction equipment,
- labor,
- supervision,
- permanent and temporary materials.

The work is to be completed according to engineering design specification provided/prepared by others (company).

SAC Pile driving/piling

Pile driving/piling includes supply of labour, supervision, materials, plant and equipment necessary to carry out piling (drilled/cast piles) and pile driving (driven concrete/steel piles) activities by use of special pile driving equipment.

SAD Trenching and backfilling for piping and cables

Trenching and backfilling for piping and cables includes supply of labour, supervision, plant, material and construction equipment to trench across land and backfill to fit the environment for the purpose of installation of pipework and/or cables for various purposes.

The work normally includes

- survey of route(s) where relevant,
- clearing and grubbing,
- earthwork and trenching,
- culvert drainage,
- backfill of mass,
- landscape reinstatement.

SAE Landscaping

Landscaping includes labour, supervision, materials, plant and equipment for such as

- leveling,
- refilling and greening of plant area after construction,
- removal of surplus and debris.

SB Land based structures

This code includes particular structures related to land based installations of the following categories:

- buildings;
- roads;
- bridges;
- jetties and quays;
- tunnels and caverns;
- dams/reservoirs/ponds;
- specialized concrete structures;
- tank erection.

As outlined under the tertiary level codes following:

SBA Buildings

Buildings relates to permanent buildings, normally carried out as a complete design and construct contract activity in which houses, buildings and similar, etc. are built to an agreed per unit all-inclusive rate of materials, plant, equipment, labour and supervision.

SBB Roads

Roads relate to the supply of labour, supervision, plant, material and equipment to construct access roads, main roads, of all design and classes. These roads will normally be off plot roads that not form an integral part of major earthwork and site preparation contracts.

SBC Bridges

Bridges includes all bridge construction by (normally) specialized contractor for all types of bridge/crossing constructions other than onshore pipeline crossings (see COR SCF) and railway bridges (see COR SBG). The work may include engineering design and will normally include the supply of labour, plant, supervision, material and equipment to construct complete bridges.

SBD Jetties and quays

Jetties and quays include all construction, often by specialised contractor, for all types of these constructions. The work may include engineering design and will normally include the supply of labour, supervision, plant, material and equipment to construct complete jetties and quays.

SBE Tunnels and caverns

Tunnels and caverns includes all construction, normally by specialised contractor, for all types of tunnel and cavern constructions other than railway tunnels (see COR SBG) or pipeline tunnels (see COR SCF). The

work may include engineering design and will normally include the supply of labour, supervision, plant, material and equipment to construct complete tunnels and caverns.

SBF Dams/reservoirs/ponds

This code includes all costs related to construction and outfitting of all types of dams/reservoirs/ponds of any purposes (for water regulation, water supply, etc.).

The work may include

- structural excavation,
- removal of mass,
- formwork,
- concrete work,
- removal of temporary materials,
- landscape reinstatement.

Further this work may include a number of speciality contractors which will provide and install special water treatment plant equipment and reticulation. The cost may include engineering design and will normally include supply of plant, labour, supervision, construction equipment, permanent and temporary materials in order to complete construct the dam/reservoir/pond.

SBG Railways

Railway construction includes all construction, often by specialised contractor, for all types of railway construction. The work may include engineering design and will normally include the supply of labour, supervision, plant, material and equipment to construct complete railway systems. Railway construction may also include formation work, structural excavation, tunnels and bridges/crossings.

SBH Specialized concrete structures

This code covers construction of specialized concrete structures related to such as

- access tunnels,
- bridges,
- protection structures, etc.

A contract may include engineering and design, and the work will normally include supply of plant, construction equipment, labour, supervision, permanent and temporary materials and, if required, supply and installation of prefabricated elements.

This code is only to be used for work issued at an agreed per unit all-inclusive rate of materials and labour (unit work basis). Reference is made to bulk material and labour's code of resources (COR B, L, etc.) for use for any other contractual agreement.

SBI Tank erection

Tank erection includes all construction normally by specialised contractor, for all types of storage tanks. For caverns, see COR SBE. The work may include design engineering and will normally include the supply of labour, plant, material and equipment to construct, install/erect storage tanks.

COR SBI is deemed not applicable for offshore projects.

SC Pipelines

This code includes pipelines/flowlines related unit work of the following categories

- onshore pipelaying,
- pipeline coating,
- pipeline insulation,
- pipeline heating,

- trenching and backfilling for onshore pipelines,
- onshore pipeline crossings,
- tie-in of pipelines onshore,
- pipeline RFO.

As outlined in the tertiary level codes following.

The codes under COR SC are relevant for onshore pipelines and/or offshore pipelines as indicated.

Scope of work for an onshore pipeline contract will often cover several of the tertiary level codes (reflected in the compensation section) and the costs should be allocated accordingly. Design engineering is normally performed by others, unless otherwise indicated.

SCA Onshore pipelaying

Onshore pipelaying include supply of labour, supervision, material (linepipe is often company provided) and construction equipment to install and complete the pipeline.

SCB Pipeline coating

Pipeline coating relates to both corrosion coating and weight coating (concrete), and may be relevant for both onshore and offshore pipelines. Corrosion coating may be internal and/or external coating, but internal coating is normally delivered with the linepipe from the steel mill.

For corrosion coating, the work includes

- receipt of linepipe,
- handling,
- shotblasting,
- priming and wrapping to required thickness of coatings.

Corrosion coating may be any of a number of types – asphalt enamel, neoprene, epoxy, etc.

For weight coating, the work includes

- receipt and handling,
- installation of anodes, normally delivered by others,
- coating by reinforced concrete to required thickness,
- stockpiling of coated linepipe,
- loading onto pipecarriers for further transportation.

The costs will normally be for the supply of

- site facilities,
- construction equipment,
- labor,
- supervision,
- temporary and permanent materials.

This code is only to be used for work issued at an agreed per unit all-inclusive rate of material and labour. Reference is made to bulk material and labour' code of resources (COR B, L, etc.) for use for any other contractual agreement.

SCC Pipeline insulation

For pipeline insulation – most relevant for offshore pipelines/flowlines – the work includes such as

- receipt and handling of linepipe,
- cleaning,
- priming/coating where relevant,
- application of insulation (and protection when relevant) according to specification,

- stockpiling of insulated linepipe,
- loading on to pipecarriers for further transportation.

The costs will normally be for supply of

- site facilities,
- construction equipment,
- labor,
- supervision,
- temporary and permanent materials.

SCD Pipeline heating

Pipeline heating – most relevant for offshore pipelines/flowlines – will normally include heating (by el. cable or piping with heating medium) and may include corrosion protection and insulation.

The work and the costs may include similar as described under COR SCC plus installation of cable or heating pipe, accessories, strapping and ditto materials.

SCE Trenching and backfilling for onshore pipelines

Trenching and backfilling for onshore pipelines includes supply of labour, supervision, plant, material and construction equipment to trench across land and backfill to fit the environment for the purpose of pipeline installation.

The work includes such as

- survey of route(s),
- clearing and grubbing,
- earthwork and trenching,
- culvert drainage,
- installation of weights to avoid upfloating,
- backfilling of mass,
- landscape reinstatement.

SCF Onshore pipeline crossings

Onshore pipeline crossings are constructions – mainly bridges, tunnels, supports and similar – to allow the pipeline(s) to pass barriers like

- rivers,
- fjords,
- ponds/pools,
- trenches and ravines,
- roads,
- railways, etc.

The work may include design engineering and will normally include the supply of labour, supervision, plant, material and equipment to construct complete crossings.

SCG Tie-in of pipelines onshore

Tie-in of pipelines onshore includes tie-in

- to offshore pipelines at shore approach,
- to onshore facilities, or
- to onshore wellsites.

Tie-in may be a welded joint, a mechanical flanged connection, or coupling/connector where relevant.

The work will normally include the supply of labour, supervision, material and equipment to complete the tie-in.

SCH Pipeline RFO

Pipeline RFO – ready for operation – covers precommissioning/commissioning of on-/offshore pipelines and flowlines (infield pipelines), primarily on unit work basis.

The work will normally include such as

- flooding,
- hydrotesting,
- dewatering,
- cleaning and gauging,
- pigtracking,
- transportation, logistics and services.

The work may include engineering and will normally include supply of materials (including consumables and chemicals), labour, supervision, plant/equipment and vessels to complete RFO.

SD Temporaries contracts

This code covers facilities and services required to support workers and staff during the construction period of an onshore plant/land based installation, priced at an all-inclusive basis.

The facilities and services – ordered by and under the responsibility of company – include: construction camp, construction camp operation, construction camp catering and site services, as outlined under the tertiary level codes following:

SDA Construction camp

The camp is required to support construction workers and staff during the construction period. Scope of work for construction of the camp includes such as

- design (optional),
- procurement of prefabricated units and materials,
- transport and erection of units at site,
- site preparation including provision of foundations,
- sewage/water supply,
- treatment and reticulation within camp perimeters,
- supervision and provision of construction equipment, etc.

Further included are

- preparation for and supply of power and reticulation within perimeters,
- parking areas,
- laydown areas,
- caravan parks,
- associated facilities such as water, sewage, power, amenities, etc.

The scope may also include temporaries like

- offices, buildings,
- warehouses,
- workshops,
- welfare center including sport room,
- cinema,
- kiosk,
- health center,
- hospital, etc.

All complete furnished and fitted.

Permanent camps – also called operation centres are not considered to be relevant for code SDA.

SDB Construction camp operation

Camp operation includes such as

- staff to carry out operations according to project requirements,
- camp administration,
- liaise authorities – camp police,
- camp security,
- firefighting personnel for the camp,
- maintenance personnel,
- waste disposal,
- materials/consumables required during construction period to maintain operations,
- other camp running costs.

SDC Construction camp catering

Catering in connection with the construction camp includes provision of such as

- food and beverages for the purpose of providing meals,
- consumables,
- catering personnel,
- cleaning staff,
- amenities,
- etc.

For catering in connection with flotel and living quarter, see COR XP.

SDD Site services

Site services include miscellaneous services for the site personnel (i.e. contractors, subcontractors, vendors, company etc.) during the construction period, priced at an all-inclusive basis.

Site services may include such as

- post and courier services,
- site security and police services,
- service by priest,
- fireguards and firefighting personnel,
- protection ombudsman/main shop steward (“verneombud/hovedtillitsmann”),
- site cars,
- temporary power equipment, power and water running cost,
- common communication facilities/equipment rental,
- miscellaneous rentals of equipment, necessary appliances, etc. (incl. running costs),
- other site related services during the construction period.

SE Drilling and services

COR SE includes tertiary level codes for turnkey drilling operations including necessary drilling related services and separate drilling related services, as outlined below, priced at an all-inclusive basis.

SEA Drilling and drilling services

Normally issued as turnkey contracts to specialised contractor for drilling operations and not included under “drilling, production and operations” activities.

The costs include supply of

- drilling crews,
- drilling services,
- drilling rigs,
- operating costs for rigs,
- materials,
- consumables and temporary materials.

The work is intended for

- exploration/appraisal wells commenced after approval of a plan for development and operation though prior to production start. Includes: drilling, completion and well testing, logging, etc.
- drilling of disposal wells for effluent discharge,
- drilling of wells into natural aquifers – artesian basins to provide water for consumption/injection.

SEB Separate drilling – and downhole services

This includes specialist personnel (including necessary equipment) related to services such as

- drilling services,
- downhole services,
- logging,
- core sampling,
- mud specialties,
- stimulations, etc.

Above are considered as services during field development/construction stage prior to handover to operator's organisations – drilling and production budgets.

SF Miscellaneous unit work

| COR SF includes unit work of the following categories:

- electrical power transmission;
- electrical/instrument installation;
- piping erection;
- insulation;
- fireproofing;
- painting and application;
- scaffolding;
- model building.

As outlined under the tertiary level codes following.

Model building may be relevant both for offshore and onshore project, the remaining are deemed not applicable for offshore projects.

SFA Electrical power transmission

This code relates to supply and erection of towers/masts/poles/pylons for carrying overhead high-voltage electric transmission cables including provision of all associated components, outfitting and cabling, covered for as unit work.

The work normally includes

- ground preparation and excavation,
- construction of foundations,
- construction and erection of the pylons and cable pull,
- testing.

The cost may include for engineering and will normally include for

- supply of plant facilities,
- transportation,
- labour and supervision,
- construction equipment,
- permanent and temporary materials.

SFB Electrical/instrument installation

Electrical/instrument Installation unit work may be carried out as a complete land based design and construct activity in which materials, manpower and facilities are built in to an agreed per unit all inclusive rate.

This code is only to be used for work issued at an agreed per unit all-inclusive rate of materials and labour. Reference is made to bulk material and labour's code of resource (COR B, L, etc.) for use for any other contractual agreement.

SFC Piping erection

Piping erection as unit work is predominantly related to land based process industry, where a contract/subcontract is issued for supply of

- materials,
- labor and supervision,
- plant and equipment to erect process, utility and service piping at the facilities.

Normally used at existing facilities for upgrading/retrofitting and other purposes.

SFD Insulation

Insulation as unit work may consider supply and installation of

- required thermal or acoustic insulation,
- piping insulation with heat tracing or enclosed insulation,
- reflective insulation such as films, fabrics or other.

The work is normally performed by a specialised contractor at construction site (land based), and the cost includes supply and transport of materials, equipment, labour and supervision for the application. For pipeline insulation, see SCC.

This code is only to be used for work issued at an agreed per unit all-inclusive rate of materials and labour. Reference is made to bulk material and labour's code of resource (COR B, L, etc.) for use for any other contractual agreement.

SFE Fireproofing

Fireproofing as unit work may consider supply and application/installation of

- passive fireproofing (spray-on),
- firewalls.

The work is normally performed by a specialised contractor at construction site (land based), and the cost includes supply and transport of materials, equipment, labour and supervision for the application/installation. Insulation and fireproofing may be combined in one contract/subcontract and should be split according to the contract compensation section, for final cost reporting purposes.

This code is only to be used for work issued at an agreed per unit all-inclusive rate of materials and labour. Reference is made to bulk material and labour's code of resource (COR B, L, etc.) for use for any other contractual agreement.

SFF Painting and application

Painting and application as unit work include all applied protective coatings, coverings, sprayed coating and other applications required to provide surface protection for land based facilities. For fireproofing, see COR SFE.

A specialised contractor normally performed the work, and cost includes supply and transport of materials, equipment, labour and supervision for the application.

This code is only to be used for unit work issued at an agreed per unit all-inclusive rate of materials and labour. Reference is made to bulk material and labour's code of resources (COR B and L, etc.) for use for any other contractual agreement.

SFG Scaffolding

Scaffolding as unit work is predominantly related to land based process industry, when a contract/subcontract is issued for supply, installation, maintenance and removal of scaffolding.

A specialised contractor at the construction site normally performs the work.

The cost normally include rental of scaffolds, materials and equipment/tools, transportation, labour and supervision.

SFH Model building

Model building include specialised personnel, materials and equipment for construction of scaled models of whole or part of facilities – onshore and/or offshore.

SZ Other unit work

Includes costs for unit work, which are not described in the previous COR S codes.

X Marine operations and logistics

The code for marine operations and logistics includes all cost related to marine operations, helicopter transport, etc. The costs may include for

- contractors engineering and administration,
- mobilisation of vessel and equipment,
- certification of vessel and equipment,
- maintenance and modification of vessel and equipment,
- harbor fees,
- pilot fees,
- towing in the harbor,
- duties, insurance, loading/discharging expenses,
- preparation for sailing,
- dayrates of vessel and equipment including crew, both for standby and operational time periods,
- helicopter transport of crew to and from an offshore position of vessel,
- fuel, lubricants and consumables,
- provision of documentation and back-up materials (videos, etc.),
- demobilization of vessel and equipment.

XA Survey vessels

Includes all types of certified vessels hired for the purpose of seabed, route survey and soil investigation work including operating through all phases of e.g. a project.

The vessels may include helideck, cranes, ROV (remotely operated vessel) support, photo laboratory, different purpose of control rooms and workshops, dynamic positioning and reference systems, in addition to equipment and facilities for direct performance of the work.

The scope include all cost related to hire of vessel, inclusive mob/demob, crew and specialist operators in addition to provision and operation of a ROV and diving personnel and equipment when required.

Reference is made to the different categories of vessels:

- survey vessels;
- soil survey vessels;
- air diving, ROV operating vessels;
- shallow water survey vessels;
- 2D seismic vessels;
- 3D seismic vessels.

XB Drilling vessels

Includes all types of floating vessels hired for drilling, completion and workover of wells during all development phases and may also be used for inspection, services, repair and abandonment of subsea installations.

The vessels are normally equipped with helicopter-deck, purposed control equipment, SCR system, etc. in addition to all necessary equipment and facilities for direct performance of the work.

The costs include such as hire of drilling vessel inclusive mob/demob, crew and all required categories of drilling labours and operators, diving personnel and equipment, and additional, separate work boat(s) as required.

The code excludes bulk items used for the operation which are to be coded according to COR – drilling bulk and unit work (turn key drilling under COR S).

Reference is made to the different categories of vessels:

- drilling vessels/ships;
- deepwater drilling vessels/ships;
- semi submersibles 1st generation;
- semi submersibles 2nd generation;
- semi submersibles 3rd generation;
- semi submersibles 4th generation;
- semi submersibles 5th generation;
- jack-ups (< 70 m water depth);
- jack-ups (70 m to 100 m water depth);
- jack-ups (> 100 m water depth);
- drilling barges;
- tender assisted drilling barges/vessels;
- completion/workover vessels;
- other drilling facilities/vessels.

XC Lifting vessels

Lifting vessels relates to the lifting operations and includes lifting vessel with crew and items mentioned under X – Marine operations and logistics. Special studies of slings, testing of vessel, etc. are normally also included.

Reference is made to the different categories of vessels:

- inshore crane barges (lifting cap. < 600 tonnes);
- inshore crane barges (lifting cap. > 600 tonnes);
- crane barges – SSCV (lifting cap. < 3 000 tonnes);
- crane barges – SSCV (lifting cap. 3 000 tonnes to 10 000 tonnes);
- crane barges – SSCV (lifting cap. > 10 000 tonnes).

The code only includes lifting vessels. All remaining vessels required for the lifting operation, such as guard vessels, anchor-handling tugs, supply vessels, etc. should be coded according to the respective Code of Resources. But if only cost for spreads is available, see COR XX.

XD Pipelaying vessels – S-lay

Relates to all types of certified vessels and/or barges used for S-pipelaying operations. The vessels may also be used for pull-in operations and installation of mechanical protection of the pipelines.

The code only includes the pipelaying vessel. All remaining vessels required for the pipelaying operation, such as survey vessels, ROV spread, guard vessels, anchor-handling tugs, supply vessels, pipecarriers, etc. should be coded according to the respective code of resources. But if only cost for spreads is available, see COR XX.

XE Flexible pipeline-/cablelaying vessels

Relates to special vessels hired for installation and pull-in operations of flexible pipelines and cables.

This code only includes the pipe- or cablelaying vessel. All remaining vessels required for the installation operation, such as survey vessels, ROV spread, guard vessels, anchor-handling tugs, supply vessels, etc. should be coded according to the respective code of resources. If only costs for spreads are available, see COR XX.

Reference is made to the different categories of vessels:

- flexible pipeline laying vessels;
- cable laying vessels.

XF Trenching vessels

Trenching vessels and/or barges relate to pipeline-, umbilical-, flowlines- and/or power cable-trenching operations and include vessel with crew and items mentioned under X – Marine operations and logistics. Special studies/performance tests, etc. are also included.

Reference is made to the different categories of vessels:

- **plowing vessels** – different kinds of plows normally dragged after a barge that make use of anchors to move forward;
- **water jetting vessels** – a jet-sled dragged behind a barge/vessel. The jetting principle is that high-pressure, high-velocity water jet cut the pipeline trench and put the bottom material into suspension with seawater. The introduction of air into the suspension hydro-pneumatically lifts the spoil from the trench. When the suspension stabilises, the sea bottom particles settle and air rises to the surface;
- **mechanical trenchers** – mechanical cutters such as Heeremas Eager Beaver or Digging Beaver, Kvaerner Trencher, etc.

XG Dredging vessels

Dredging vessels relates to dredging operations and include vessel with crew and items mentioned under X – Marine operations and logistics. The dredging vessels can deliver the spoil either to be discharged via one of the suction pipes and deposited accurately on the seabed, or via pipeline to a shore terminal or to a barge alongside.

Reference is made to the different categories of vessels:

- suction hopper dredger;
- cutter suction dredger.

XH Gravel/rock dumping vessels

Gravel/rock dumping vessels relates to gravel/rock dumping operations and include vessel with crew and items mentioned under X – Marine operations and logistics. Transit time, loading time, etc. is also included hereunder.

The vessels are normally used for pipeline stabilisation and protection work, which can include pipeline burial, free span correction and backfilling.

The gravel/rock can be dumped in different ways depending of type of vessel:

- **rock dumping vessels** – self-propelled vessels either with large bottom doors or with hydraulic driven shovels for discharging;
- **pipeline bury barges/vessels** – normally barges with no propulsion but with large bottom doors;
- **fallpipe dumping vessels** – self-propelled DP vessels dumps the gravel/stones through a fallpipe system which is positioned over the pipeline/dumping area.

XI Multi-functional support vessels – MSV

Multi-functional vessels mainly relates to offshore construction operations. It includes vessel with crew and items mentioned under X – Marine operations and logistics. Diving consumables, re-designing of diving equipment, etc. are also included.

These vessels can also be used for other operations like offshore hook-up activities, firefighting, lifting operations, survey operations, etc.

XJ Towing vessels

Towing vessels or tugs are vessels needed for towing operations and include vessel with crew and items mentioned under X – Marine operations and logistics.

Reference is made to the different categories of vessels:

- harbor tugs (< 4 000 hp) ;
- barge tugs (4 000 hp to 6 000 hp) ;
- tow-tugs (6 000 hp to 12 000 hp) ;
- anchor handling tugs – AHT (6 000 hp to 12 000 hp);
- main tow-tugs (> 12 000 hp).

XK Barges**Barges:**

Flat top barges, jacket launch barges, etc., which have no propulsion machinery and have to be towed. Crews are normally not included within barge hire.

Reference is made to the different categories of vessels:

- barges (100 m x 30 m – 10 000 tonnes);
- barges (100 m x 40 m – 15 000 tonnes);
- barges (120 m x 40 m – 20 000 tonnes);
- barges (25 000 tonnes);
- barges (30 000 tonnes);
- barges (60 000 tonnes).

XL Supply vessels/pipe-carriers

Supply vessels relate to the supply operations and include vessel with crew and items mentioned under X – Marine operations and logistics.

Reference is made to the different categories of vessels:

- supply vessels;
- pipecarriers.

XM Piling vessels/barges

Purpose built vessels/barges for piling operations. The vessel uses a hammer, either hydraulic or steam driven to penetrate the piles into the sea bottom. Piling vessel/barges include vessel with crew and items mentioned under X – Marine operations and logistics. Tests, etc. are also included.

XN Pile driving equipment

Usually two types – either hydraulic or steam driven piling hammers.

XO Flotels

A flotel is a floating accommodation unit positioned alongside or close to a fixed offshore installation during operation. It includes the floating unit with marine operating crew and items mentioned under X – Marine operations and logistics. (For catering, see COR XP.)

Reference is made to the different categories of vessels:

- flotel – semi submersibles (< 300 beds);
- flotel – semi submersibles (300 beds to 500 beds);
- flotel – semi submersibles (> 500 beds);
- flotel – ships;
- flotel – barges.

XP Catering (flotel and LQ)

This code covers catering in connection with use of flotel and/or Living Quarter offshore for the project personnel. The costs include for such as

- catering personnel,
- cleaning staff,
- consumables,
- food and beverages,
- room cleaning and laundry services,
- amenities,
- etc.

XQ Pipelaying vessels – J-lay

Relates to all types of certified vessels and/or barges used for J-pipelaying operations. The vessels may also be used for pull-in operations and installation of mechanical protection of the pipelines.

The code only includes the pipelaying vessel. All remaining vessels required for the pipelaying operation, such as survey vessels, ROV spread, guard vessels, anchor-handling tugs, supply vessels, pipecarriers, etc. should be coded according to the respective code of resources. But if only cost for spreads is available, see COR XX.

XR Pipelaying vessels – reel

Relates to all types of certified vessels and/or barges used for reel – pipelaying operations. The vessels may also be used for pull-in operations and installation of mechanical protection of the pipelines.

The code only includes the pipelaying vessel. All remaining vessels required for the pipelaying operation, such as survey vessels, ROV spread, guard vessels, anchor-handling tugs, supply vessels, pipecarriers, etc. should be coded according to the respective code of resources. But if only cost for spreads is available, see COR XX.

XS Heavy transport vessels**Heavy lift carriers:**

These vessels are self-propelled. The loading operation can be done in two different ways:

- skidded or lifted onboard;
- the vessel can be lowered so that the loading can be floated on to the deck and the vessel is then deballasted.

Heavy lift carriers include vessel with crew and items mentioned under X – Marine operations and logistics. Stabilisation tests, etc. are also included.

Reference is made to the different categories of vessels:

- heavy lift carriers (100 m x 30 m – 10 000 tonnes);
- heavy lift carriers (120 m x 40 m – 15 000 tonnes);
- heavy lift carriers (converted VLCC).

XT Diving support vessels

Diving support vessels mainly relates to diving operations. It includes vessel with crew and items mentioned under X – Marine operations and logistics. Diving consumables, re-designing of diving equipment, etc. are also included.

These vessels can also be used for other operations like offshore hook-up activities, firefighting, lifting operations, survey operations, etc.

Reference is made to the different categories of vessels:

- diving support vessels – DSV;
- air diving vessels.

XU Helicopters

Helicopters used for transportation of persons and small items of e.g. equipment to and from offshore platforms, rigs and ships. Aircraft with crew, fees, fuel and consumables are normally included within the helicopter hire.

XV Support base

Includes onshore support base – also termed supply base – for offshore works, and in some cases also applied for inshore works. The support base provides services with regard to materials for offshore installation:

- receipt of materials;
- handling and storage;
- delivery (e.g. to supply ships).

The storage may be hot or cold and in-house or outdoor localised. The cost covers for area hire, base personnel, utilities, etc.

Company normally orders the use of the support base for a project and is often owner of the support base.

XX Spreads

Vessels in COR X should preferably be estimated/costed separately. But when only costs for spreads are available, the XX-codes apply.

The vessels in a spread may vary in numbers and type dependent on e.g. field location, contractual matters, other projects, etc.

The spreads are categorised according to use as shown in the tertiary level codes following. The costs cover items mentioned under X – Marine operations and logistics.

XXA Lifting spread

In addition to the lifting vessel, the spread may include: transport vessel, tugs etc. The lifting vessel category should be indicated in the estimate/costs set up.

XXB Pipelaying spread

In addition to the pipelay vessel, the spread may include: pipecarriers, supply vessels, survey vessels, ROV spread, anchor-handling tugs, guard vessels etc. The pipelay vessel category should be indicated in the estimate/cost set up.

XXC Flexipipe-laying spread

In addition to the lay-vessel, the spread may include similar support vessels as mentioned under COR XXB.

XXD Cablelaying spread

In addition to the lay-vessel, the spread may include similar support vessels as mentioned under COR XXB.

XXZ Other spread

Includes costs for spreads other than described in the previous XX-codes.

XY Misc. vessels and equipment

Miscellaneous vessels and equipment include vessels not described in any of the other vessel categories and different kinds of offshore vessel related equipment that may be used.

The vessels mentioned include vessel with crew and items mentioned under X – Marine operations and logistics. Any tests, transit time, loading time, etc. are also included. Equipment is meant to be special equipment used onboard vessels.

For vessel code categorisation, use following tertiary level codes:

XYA Standby/rescue AHTS vessels

XYB Standby/rescue vessels

XYC Firefighting vessels

XYD Crew boats

XYE Well stimulation vessels

XYF Grouting vessels

XZ Other vessels and equipment

Includes costs for COR X type vessels and vessel related equipment not included in previous X-codes.

Y Land based plant and equipment

This primary code relates to all costs associated with the provision of all plant, machinery and equipment priced separately, required for civil works, general construction and supporting services for landbased projects, hereunder for such as

- earthworks,
- structural excavation,

- piling,
- compacting,
- craneage/lifting,
- trucks and vehicles,
- railway tracklaying equipment,
- tunneling equipment,
- hoists and winches,
- welding, cutting and bending equipment,
- air compressors,
- generators,
- concreting equipment,
- spreaders and pavers, and
- other land based plant and equipment.

Land based plant and equipment is subgrouped and coded as follows:

YA Track type tractors

YAA	Track tractor (600 hp to 800 hp)
YAB	Track tractor (400 hp to 600 hp)
YAC	Track tractor (250 hp to 400 hp)
YAD	Track tractor (180 hp to 250 hp)
YAE	Track tractor (120 hp to 180 hp)
YAF	Track tractor (90 hp to 120 hp)
YAG	Track tractor (70 hp to 90 hp)
YAH	Track tractor (50 hp to 70 hp)
YAI	Bulldozer blades – universal and straight
YAJ	Bulldozer blades – special purpose
YAK	Rippers – single/multi-shank
YAL	Rippers – linkage/hydraulic
YAM	Ripper-scarifiers
YAN	Backhoe arrangements
YAO	Winches and hydraulic controls
YAP	Towed scrapers
YAY	Operating spare parts
YAZ	Other track type tractors

YB Motor graders

YBA	Motor grader (200 hp to 300 hp)
YBB	Motor grader (160 hp to 200 hp)
YBC	Motor grader (140 hp to 160 hp)
YBD	Motor grader (120 hp to 140 hp)
YBE	Motor grader (100 hp to 120 hp)
YBF	Scarifier attachments
YBY	Operating spare parts
YBZ	Other motor graders

YC Excavators

YCA	Track type – backhoe (250 hp to 400 hp)
YCB	Track type – backhoe (180 hp to 250 hp)
YCC	Track type – backhoe (140 hp to 180 hp)
YCD	Track type – backhoe (100 hp to 140 hp)
YCE	Track type – backhoe (80 hp to 100 hp)
YCF	Track type – backhoe (60 hp to 80 hp)
YCG	Track type – backhoe (40 hp to 60 hp)
YCH	Track type – backhoe (< 40 hp)
YCI	Wheel type – backhoe (180 hp to 250 hp)
YCJ	Wheel type – backhoe (140 hp to 180 hp)

YCK	Wheel type – backhoe (100 hp to 140 hp)
YCL	Wheel type – backhoe (80 hp to 100 hp)
YCM	Wheel type – backhoe (60 hp to 80 hp)
YCN	Wheel type – backhoe (40 hp to 60 hp)
YCO	Wheel type – backhoe (< 40 hp)
YCP	Track type – front shovel (250 hp to 400 hp)
YCQ	Track type – front shovel (180 hp to 250 hp)
YCR	Track type – front shovel (140 hp to 180 hp)
YCS	Face shovel attachments
YCT	Power shovel attachments
YCU	Dragline attachments
YCV	Clamshell attachments
YCW	Combination tractor/backhoe
YCY	Operating spare parts
YCZ	Other excavators
YD	Skidders
YDA	Motor skidder (150 hp to 200 hp)
YDB	Motor skidder (120 hp to 150 hp)
YDC	Motor skidder (100 hp to 120 hp)
YDD	Motor skidder (80 hp to 100 hp)
YDY	Operating spare parts
YDZ	Other skidders
YE	Pipelayers
YEA	Pipelayers (400 hp to 500 hp)
YEB	Pipelayers (300 hp to 400 hp)
YEC	Pipelayers (200 hp to 300 hp)
YED	Pipelayers (150 hp to 200 hp)
YEE	Pipelayers (100 hp to 150 hp)
YEF	Midwestern sideboom – track tractors
YEG	Midwestern sideboom – compactors
YEH	Midwestern sideboom – wheel loaders
YEY	Operating spare parts
YEZ	Other pipelayers
YF	Wheel tractor scrapers
YFA	Standard scraper (500 hp to 600 hp)
YFB	Standard scraper (400 hp to 500 hp)
YFC	Standard scraper (300 hp to 400 hp)
YFD	Standard scraper (200 hp to 300 hp)
YFE	Tandem powered scraper (500 hp to 600 hp)
YFF	Tandem powered scraper (400 hp to 500 hp)
YFG	Tandem powered scraper (300 hp to 400 hp)
YFH	Tandem powered scraper (200 hp to 300 hp)
YFI	Elevating scraper (400 hp to 500 hp)
YFJ	Elevating scraper (300 hp to 400 hp)
YFK	Elevating scraper (200 hp to 300 hp)
YFL	Elevating scraper (100 hp to 200 hp)
YFM	Tandem powered elevating scraper (400 hp to 500 hp)
YFN	Tandem powered elevating scraper (300 hp to 400 hp)
YFY	Operating spare parts
YFZ	Other wheel tractor scrapers
YG	Off-highway trucks
YGA	Diesel powered (800 hp to 900 hp)

YGB	Diesel powered (700 hp to 800 hp)
YGC	Diesel powered (600 hp to 700 hp)
YGD	Diesel powered (500 hp to 600 hp)
YGE	Diesel powered (400 hp to 500 hp)
YGF	Diesel powered (300 hp to 400 hp)
YGG	Diesel/electric (900 hp to 1100 hp)
YGH	Diesel/electric (800 hp to 900 hp)
YGI	Diesel/electric (700 hp to 800 hp)
YGJ	Diesel/electric (600 hp to 700 hp)
YGY	Operating spare parts
YGZ	Other off-highway trucks
YH Off-highway tractors	
YHA	Diesel powered (800 hp to 900 hp)
YHB	Diesel powered (700 hp to 800 hp)
YHC	Diesel powered (600 hp to 700 hp)
YHD	Diesel powered (500 hp to 600 hp)
YHE	Diesel powered (400 hp to 500 hp)
YHY	Operating spare parts
YHZ	Other off-highway tractors
YI Wheel tractors	
YIA	Wheel tractor (300 hp to 400 hp)
YIB	Wheel tractor (200 hp to 300 hp)
YIC	Wheel tractor (150 hp to 200 hp)
YID	Bulldozer blades
YIE	Scarifier attachments
YIY	Operating spare parts
YIZ	Other wheel tractors
YJ Compactors	
YJA	Sheepsfoot (300 hp to 350 hp)
YJB	Sheepsfoot (250 hp to 300 hp)
YJC	Sheepsfoot (200 hp to 250 hp)
YJD	Towed sheepsfoot
YJE	Driven grid/mesh drum
YJF	Towed grid/mesh drum
YJG	Driven smooth steel drum
YJH	Towed smooth steel drum
YJI	Driven multi-tiered roller
YJJ	Towed multi-tiered roller
YJK	Driven heavy pneumatic roller
YJL	Towed heavy pneumatic roller
YJM	Driven vibratory tamping foot
YJN	Towed vibratory tamping foot
YJO	High speed tamping foot
YJP	Chopper wheels
YJQ	Portable plate vibrators
YJR	Portable tampers
YJY	Operating spare parts
YJZ	Other compactors
YK Wheel loaders	
YKA	Wheel loader (500 hp to 700 hp)
YKB	Wheel loader (400 hp to 500 hp)
YKC	Wheel loader (300 hp to 400 hp)

YKD	Wheel loader (200 hp to 300 hp)
YKE	Wheel loader (150 hp to 200 hp)
YKF	Wheel loader (100 hp to 150 hp)
YKG	Wheel loader (80 hp to 100 hp)
YKH	Wheel loader (60 hp to 80 hp)
YKI	Wheel loader (< 60 hp)
YKJ	Wheel loader buckets
YKK	Combination wheel loader/backhoe
YKY	Operating spare parts
YKZ	Other wheel loaders
YL	Track loaders
YLA	Track loader (250 hp to 300 hp)
YLB	Track loader (200 hp to 250 hp)
YLC	Track loader (150 hp to 200 hp)
YLD	Track loader (100 hp to 150 hp)
YLE	Track loader (80 hp to 100 hp)
YLF	Track loader (60 hp to 80 hp)
YLG	Track loader (< 60 hp)
YLH	General purpose buckets
YLI	Multi purpose buckets
YLJ	Side dump buckets
YLY	Operating spare parts
YLZ	Other track loaders
YM	Cranes
YMA	Track type crane (> 2000 tonnes)
YMB	Track type crane (1500 tonnes to 2000 tonnes)
YMC	Track type crane (1000 tonnes to 1500 tonnes)
YMD	Track type crane (800 tonnes to 1000 tonnes)
YME	Track type crane (600 tonnes to 800 tonnes)
YMF	Track type crane (400 tonnes to 600 tonnes)
YMG	Track type crane (200 tonnes to 400 tonnes)
YMH	Track type crane (100 tonnes to 200 tonnes)
YMI	Track type crane (5 tonnes-100 tonnes)
YMJ	Wheel type crane (> 150 tonnes)
YMK	Wheel type crane (100 tonnes to 150 tonnes)
YML	Wheel type crane (80 tonnes to 100 tonnes)
YMM	Wheel type crane (60 tonnes to 80 tonnes)
YMN	Wheel type crane (40 tonnes to 60 tonnes)
YMO	Wheel type crane (20 tonnes to 40 tonnes)
YMP	Wheel type crane (10 tonnes to 20 tonnes)
YMQ	Wheel type crane (< 10 tonnes)
YMR	Sheerleg type crane
YMS	Tower type crane
YMT	Gantry/portal type crane
YMU	Pedestal type crane
YMV	Booms, jibs and accessories – track crane
YMW	Booms, jibs and accessories – wheel crane
YMX	Booms, jibs and accessories – other crane
YMY	Operating spare parts
YMZ	Other cranes
YN	Forklifts
YNA	Forklifts – electrical
YNB	Forklifts – gas driven
YNC	Forklifts – diesel driven

YND	Rough terrain forklifts
YNE	Rough terrain telescopic handlers
YNF	Forklift attachments to loaders
YNG	Other forklift attachments
YNY	Operating spare parts
YNZ	Other forklifts
YO	Trucks and vehicles
YOA	Dumper truck (> 20 m³)
YOB	Dumper truck (15 m³ to 20 m³)
YOC	Dumper truck (10 m³ to 15 m³)
YOD	Dumper truck (5 m³ to 10 m³)
YOE	Dumper truck (< 5 m³)
YOF	Low loader truck (> 100 tonnes)
YOG	Low loader truck (80 tonnes to 100 tonnes)
YOH	Low loader truck (50 tonnes to 80 tonnes)
YOI	Low loader truck (20 tonnes to 50 tonnes)
YOJ	Low loader truck (< 20 tonnes)
YOK	Multi rubber tyred vehicles – module transport
YOL	Flat bed semi trailer (> 50 tonnes)
YOM	Flat bed semi trailer (30 tonnes to 50 tonnes)
YON	Flat bed semi trailer (10 tonnes to 30 tonnes)
YOO	Flat bed truck (> 15 tonnes)
YOP	Flat bed truck (10 tonnes to 15 tonnes)
YOQ	Flat bed truck (5 tonnes to 10 tonnes)
YOR	Flat bed truck (< 5 tonnes T)
YOS	Container trucks and semi-trailers
YOT	Dry bulk tankers
YOU	Liquid bulk tankers
YOV	Gas tankers
YOW	Service trucks and vehicles
YOY	Operating spare parts
YOZ	Other trucks and vehicles
YP	Draglines
YPA	Track type dragline (> 20 m³)
YPB	Track type dragline (10 m³ to 20 m³)
YPC	Track type dragline (8 m³ to 10 m³)
YPD	Track type dragline (5 m³ to 8 m³)
YPE	Track type dragline (< 5 m³)
YPF	Wheel type dragline (> 5 m³)
YPG	Wheel type dragline (< 5 m³)
YPH	Walking dragline
YPK	Dragline booms, buckets and accessories
YPY	Operating spare parts
YPZ	Other draglines
YQ	Pile driving equipment
YQA	Track type purpose built piling machines
YQB	Wheel type purpose built piling machines
YQC	Mountable booms, weights and accessories
YQD	Piling hammers – diesel
YQE	Piling hammers – steam
YQF	Piling hammers – air
YQG	Piling hammers – hydraulic
YQH	Pile extractors
YQI	Pile frames and leaders

YQJ	Earth boring equipment
YQY	Operating spare parts
YQZ	Other piling equipment
YR	Tracklaying equipment
YRA	Tamping machines
YRB	Alignment machines
YRC	Ballasting wagons
YRD	Prime mover/locomotives
YRE	Combination tracklayers
YRF	Sleeper wagons
YRG	Crane jigs
YRH	Track welding equipment
YRI	Hydraulics jacks and jigs
YRJ	Pneumatic jacks and hammers
YRK	Tank wagons
YRL	Rail wagons
YRY	Operating spare parts
YRZ	Other tracklaying equipment
YS	Tunnels and cavern equipment
YSA	Full face boring machines
YSB	Raisers and lifts
YSC	Drilling machines and equipment
YSD	Pneumatic jacks and hammers
YSE	Winches and hoists
YSF	Air supply and extract systems
YSG	Power supply and lighting systems
YSH	Dewatering systems
YSI	Mucking wagons and equipment
YSK	Drill bits and tools
YSY	Operating spare parts
YSZ	Other tunnels and cavern equipment
YT	Hoists and winches
YTA	Jacking towers and equipment
YTB	Pneumatic winches
YTC	Electric winches
YTD	Hydraulic winches
YTE	Personnel hoists
YTF	Goods hoists
YTG	Builders hoists
YTY	Operating spare parts
YTZ	Other hoists and winches
YU	Welding, cutting and bending equipment
YUA	Alignment jigs
YUB	Automatic orbital welding machines
YUC	Automatic orbital cutters
YUD	End preparation mills and grinders
YUE	Pipeline bending machines
YUF	AC/DC – welding equipment
YUG	MIG/MAG – welding equipment
YUH	TIG – welding equipment
YUI	Automatic welding equipment
YUJ	Gas welding/brazing equipment

YUK	Gas bottles and cutting equipment
YUL	Plate rollers, benders and cutters
YUM	Ovens and heaters
YUN	Plasma cutting equipment
YUU	Power hacksaws
YUY	Operating spare parts
YUZ	Other welding, cutting and bending equipment
YV	Air compressors
YVA	Portable air compressor (1200 cfm to 1500 cfm)
YVB	Portable air compressor (900 cfm to 1200 cfm)
YVC	Portable air compressor (600 cfm to 900 cfm)
YVD	Portable air compressor (400 cfm to 600 cfm)
YVE	Portable air compressor (200 cfm to 400 cfm)
YVF	Portable air compressor (100 cfm to 200 cfm)
YVG	Portable air compressor (< 100 cfm)
YVH	Stationary air compressor (> 3000 cfm)
YVI	Stationary air compressor (2000 cfm to 3000 cfm)
YVJ	Stationary air compressor (1500 cfm to 2000 cfm)
YVK	Stationary air compressor (1000 cfm to 1500 cfm)
YVL	Stationary air compressor (500 cfm to 1000 cfm)
YVM	Stationary air compressor (< 500 cfm)
YVQ	Compressor hoses, fittings and accessories
YVY	Operating spare parts
YVZ	Other air compressors
YW	Generators
YWA	Diesel motor generator sets (800 kVA to 1000 kVA)
YWB	Diesel motor generator sets (600 kVA to 800 kVA)
YWC	Diesel motor generator sets (400 kVA to 600 kVA)
YWD	Diesel motor generator sets (200 kVA to 400 kVA)
YWE	Diesel motor generator sets (100 kVA to 200 kVA)
YWF	Diesel motor generator sets (50 kVA to 100 kVA)
YWG	Diesel motor generator sets (< 50 kVA)
YWH	Natural gas motor generator sets (400 kVA to 600 kVA)
YWI	Natural gas motor generator sets (200 kVA to 400 kVA)
YWJ	Natural gas motor generator sets (100 kVA to 200 kVA)
YWK	Natural gas motor generator sets (50 kVA to 100 kVA)
YWL	Natural gas motor generator sets (< 50 kVA)
YWM	Petrol motor generator sets (> 10 kVA)
YWN	Petrol motor generator sets (7 kVA to 10 kVA)
YWO	Petrol motor generator sets (4 kVA to 7 kVA)
YWP	Petrol motor generator sets (2 kVA to 4 kVA)
YWQ	Petrol motor generator sets (< 2 kVA)
YWR	Gas turbine generator sets (> 10 MVA)
YWS	Gas turbine generator sets (7 MVA to 10 MVA)
YWT	Gas turbine generator sets (4 MVA to 7 MVA)
YWU	Gas turbine generator sets (2 MVA to 4 MVA)
YWV	Gas turbine generator sets (< 2 MVA)
YWY	Operating spare parts
YWZ	Other generators
YX	Concreting equipment
YXA	Concrete batching plant (> 100 m³/hr)
YXB	Concrete batching plant (80 m³/hr to 100 m³/hr)
YXC	Concrete batching plant (60 m³/hr to 80 m³/hr)
YXD	Concrete batching plant (40 m³/hr to 60 m³/hr)

YXE	Concrete batching plant (20 m ³ /hr to 40 m ³ /hr)
YXF	Concrete batching plant (10 m ³ /hr to 20 m ³ /hr)
YXG	Concrete batching plant (< 10 m ³ /hr)
YXH	Concrete mixers (> 750 l)
YXI	Concrete mixers (500 l to 750 l)
YXJ	Concrete mixers (300 l to 500 l)
YXK	Concrete mixers (200 l to 300 l)
YXL	Concrete mixers (100 l to 200 l)
YXM	Concrete mixers (< 100 l)
YXN	Concrete transporters (> 14 m ³ /hr)
YXO	Concrete transporters (10 m ³ /hr to 14 m ³ /hr)
YXP	Concrete transporters (8 m ³ /hr to 10 m ³ /hr)
YXQ	Concrete transporters (6 m ³ /hr to 8 m ³ /hr)
YXR	Concrete transporters (4 m ³ /hr to 6 m ³ /hr)
YXS	Concrete transporters (< 4 m ³ /hr)
YXT	Storage silos, hoppers and screens
YXU	Concrete pumps (> 100 m ³ /hr)
YXV	Concrete pumps (60 m ³ /hr to 100 m ³ /hr)
YXW	Concrete pumps (20 m ³ /hr to 60 m ³ /hr)
YXX	Concrete pumps (< 20 m ³ /hr)
YXY	Operating spare parts
YXZ	Other concreting equipment
YY	Spreaders and pavers
YYA	Asphalt paver (> 3 m)
YYB	Asphalt paver (2,5 m to 3,0 m)
YYC	Asphalt paver (2,0 m to 2,5 m)
YYD	Asphalt paver (< 2,0 m)
YYE	Concrete paver (> 3 m)
YYF	Concrete paver (2,5 m to 3,0 m)
YYG	Concrete paver (2,0 m to 2,5 m)
YYH	Concrete paver (< 2,0 m)
YYI	Screed paver/finisher (> 3 m)
YYJ	Screed paver/finisher (2,5 m to 3,0 m)
YYK	Screed paver/finisher (2,0 m to 2,5 m)
YYL	Screed paver/finisher (< 2,0 m)
YYM	Asphalt finisher (> 3 m)
YYN	Asphalt finisher (2,5 m to 3,0 m)
YYO	Asphalt finisher (2,0 m to 2,5 m)
YYP	Asphalt finisher (< 2,0 m)
YYY	Operating spare parts
YYZ	Other spreaders and pavers
YZ	Other land based plant and equipment
YZA	Quarry products crushers and screens
YZB	Bins and hoppers
YZC	Weigh scales
YZD	Conveying systems
YZE	Mobile crusher plants
YZF	Mobile drilling rigs
YZG	Fixed drilling rigs
YZH	Augers and borers
YZI	Scarifiers/dosers
YZJ	Landing equipment
YZK	Surface treatment equipment
YZL	Heaters/coolers
YZM	Fixed wing aircraft
YZN	Helicopters

YZO	4WD vehicles
YZP	Cars, station wagons and utility vehicles
YZQ	Crew busses
YZR	Scaffolding and scaffolding systems
YZS	Containers
YZT	Skylifts/conveying system
YZU	Snow removal machinery
YZV	Sanding and sweeping machinery
YZW	Water and salt spraying machinery
YZY	Operating spare parts
YZZ	Other

Annex A (Informative) SCCS Codes

A.1 PBS Codes

A		Offshore field installations	
AA		Topsides	
AAA		Drilling area	
	AAAA	Derrick	
	AAAB	Mudhandling and drilling utilities	
	AAAC	Pipehandling	
AAB		Wellhead and riser area	
	AABA	Wellhead area	
	AABB	Riser area	
AAC		Process and utilities	
	AACA	Process	
	AACB	Process support	
	AACC	Electrical power	
	AACD	Platform utilities	
AAD		Living quarter	1)
AAE		Helideck	
AAF		Flare	6)
AAG		Deck appurtenances	
	AAGA	Lifeboat stations	
	AAGB	Cranes	
	AAGC	Mooring winches	3)
	AAGD	Other deck appurtenances	
AAH		Deck structure	2)
	AAHA	Open truss	
	AAHB	Plated/plate girder	
	AAHC	Concrete beams	
	AAHD	Load transfer frame (LTF)	
AB		Substructures	
ABA		Jacket	
ABAA		Jacket structure	
	ABAAA	Leg tubulars	
	ABAAB	Bracing tubulars	
	ABAAC	Bracing nodes	
	ABAAD	Pile sleeves/mudmats	
	ABAAE	Pile guides	
	ABAAF	Conductor framing	
	ABAAG	Leg nodes	
	ABAAH	Bucket foundations	
ABAB		Outfitting	
	ABABA	Installation system	
	ABABB	Flooding and grouting	
	ABABC	Walkways/ladders	
ABAC		Temporary outfitting	
	ABACA	Auxiliary buoyancy	
	ABACB	Floating and up-ending control system	
	ABACC	Lift appurtenances	
	ABACD	Systems for bucket foundations	
ABAD		Piles	
ABAE		Risers/ J-tubes and caissons	4)
	ABAEA	Production risers	
	ABAEB	Export risers	
	ABAE C	J-tubes	
	ABAE D	Caissons	

ABB		Gravity base structure – GBS	
	ABBA	Concrete structure	
	ABBAA	Skirts	
	ABBAB	Lower domes	
	ABBAC	Cells	
	ABBAD	Cells/shafts	
	ABBAE	Upper domes	
	ABBAF	Shafts	
	ABBAG	Top shafts	
	ABBAH	Solid ballast	
	ABBAJ	Riegel	
	ABBB	Mechanical outfitting	
	ABBBA	Ballast water and installation systems	
	ABBBB	Drilling	
	ABBBBC	Storage and reticulation	
	ABBBBD	Utilities	
	ABBBBE	Structural outfitting	
	ABBC	Risers/J-tubes	4)
	ABBCA	Production risers	
	ABBCB	Export risers	
	ABBCC	J-tubes	
ABC		Jack-up	
	ABCA	Structure/hull	
	ABCB	Legs	
	ABCC	Outfitting	
	ABCCA	Hull outfitting	
	ABCCB	Topside related systems	
	ABCD	Base	
	ABCE	Rigid risers	
	ABCEA	Production risers	
	ABCEB	Export risers	
ABD		Compliant tower	
	ABDA	Structure	
	ABDAA	Leg tubulars	
	ABDAB	Bracing tubulars	
	ABDAC	Bracing nodes	
	ABDAD	Pile sleeves/mudmats	
	ABDAE	Pile guides	
	ABDAF	Conductor framing	
	ABDAG	Leg nodes	
	ABDB	Outfitting	
	ABDBA	Installation system	
	ABDBB	Flooding and grouting	
	ABDBC	Walkways/ladders	
	ABDC	Temporary outfitting	
	ABDCA	Auxilliary buoyancy	
	ABDCB	Floating and up-ending control system	
	ABDCC	Lift appurtenances	
	ABDD	Mooring items	3)
	ABDDA	Mooring lines	
	ABDDB	Anchors/piles	
	ABDE	Foundation/piles	
	ABDF	Risers/J-tubes and caissons	4)
	ABDFA	Production risers	
	ABDFB	Export risers	
	ABDFC	J-tubes	
	ABDFD	Caissons	
ABK		Semi submersible	
	ABKA	Structure	
	ABKAA	Columns	
	ABKAB	Pontoons	
	ABKAC	Nodes	
	ABKAD	Bracings	

ABKB	ABKBA	Outfitting	
	ABKBB	Ballast/bilge	
	ABKBC	Storage and reticulation	
	ABKBD	Utility systems	
	ABKBE	Structural outfitting	
		Propulsion/DP system	
	ABKC	Mooring items	3)
	ABKCA	Mooring lines	
	ABKCB	Anchors/piles	
		Tension leg substructure – TLP	
ABL	ABLA	Structure	
	ABLAA	Columns	
	ABLAB	Pontoons	
	ABLAC	Nodes	
	ABLAD	Bracings	
	ABLB	Outfitting	
	ABLBA	Ballast/bilge	
	ABLBB	Storage and reticulation	
	ABLBC	Utility systems	
	ABLBD	Structural outfitting	
	ABLBE	Propulsion/DP system	
ABLC		Tethering system	
	ABLCA	Tether equipment	
	ABLCB	Tethers	
	ABLCC	Anchor base/foundations	
	ABLD	Mooring items for positioning	3)
	ABLDA	Mooring lines	
	ABLDB	Anchors/piles	
	ABLE	Rigid risers	
	ABLEA	Production risers	
	ABLEB	Export risers	
ABM		Ship type substructure (monohull)	5)
	ABMA	Structure/hull	
	ABMB	Ship outfitting	
	ABMBA	Equipment for cargo	
	ABMBB	Ship equipment	
	ABMBC	Equipment for crew and passengers	
	ABMBD	Machinery main components	
	ABMBE	Systems for machinery main components	
	ABMBF	Ship common systems	
	ABMBG	Other (vacant – SFI main group 9)	
ABMC	ABMBH	Topside related systems	
		Fixed turret	
	ABMCA	Structure	
	ABMCB	Outfitting	
	ABMCC	Mooring equipment	
	ABMD	Disconnectable turret system	
	ABMDA	Structure	
	ABMDB	Outfitting	
	ABME	Other turrets	
	ABMF	Mooring items	
ABN	ABMFA	Mooring lines	
	ABMFB	Anchors/piles	
		Barge type substructure	5)
	ABNA	Structure/hull	
	ABNB	Ship outfitting	
	ABNBA	Equipment for cargo	
	ABNBB	Ship equipment	
	ABNBC	Equipment for crew and passengers	
	ABNBD	Machinery main components	
	ABNBE	Systems for machinery main components	
	ABNBF	Ship common systems	
	ABNBG	Other (vacant – SFI main group 9)	

	ABNBH	Topside related systems	
ABNC		Fixed turret	
	ABNCA	Structure	
	ABNCB	Outfitting	
	ABNCC	Mooring equipment	
ABND		Disconnectable turret system	
	ABNDA	Structure	
	ABNDB	Outfitting	
ABNE		Other turrets	
ABNF		Mooring items	
	ABNFA	Mooring lines	
	ABNFB	Anchors/piles	
ABP		Multicolumn deep floater	
	ABPA	Structure	
	ABPB	Outfitting	
	ABPC	Mooring items	3)
	ABPCA	Mooring lines	
	ABPCB	Anchors/piles	
	ABPD	Rigid risers	
	ABPDA	Production risers	
	ABPDB	Export risers	
ABQ		Single column deep floater	
	ABQA	Structure	
	ABQAA	Column section	
	ABQAB	Truss section	
	ABQB	Outfitting	
	ABQC	Tethering system	
	ABQCA	Tether equipment	
	ABQCB	Tethers	
	ABQCC	Anchor bases/foundations	
	ABQD	Mooring items	3)
	ABQDA	Mooring lines	
	ABQDB	Anchors/piles	
	ABQE	Rigid risers	
	ABQEA	Production risers	
	ABQEB	Export risers	
ABR		Circular barge type substructure	
	ABRA	Structure	
	ABRB	Outfitting	
	ABRBA	Hull outfitting	
	ABRBB	Topside related systems	
	ABRC	Mooring items	3)
	ABRCA	Mooring lines	
	ABRCB	Anchors/piles	
ABS		Artificial seabed	
AC		WELLS	
ACA		Standard drilled wells	
	ACAA	Oil producer	
	ACAB	Gas producer	
	ACAC	Water producer	
	ACAD	Gas injector	
	ACAE	Water injector	
	ACAF	Water and gas injector	
	ACAG	Exploration well	
ACB		Branch drilled wells	
	ACBA	Oil producer	
	ACBB	Gas producer	
	ACBC	Water producer	
	ACBD	Gas injector	
	ACBE	Water injector	
	ACBF	Water and gas injector	
	ACBG	Exploration well	
ACC		Completion	

AD	ACCA	Standard producers
	ACCAA	Standard completion
	ACCAB	Gravel packed completion
	ACCAC	Open hole completion
	ACCAD	Smart well completion
	ACCAE	Well stimulation
	ACCAF	Downhole separation
	ACCB	Branched producers
	ACCBA	Standard completion
	ACCB	Gravel packed completion
	ACCB	Open hole completion
	ACCB	Smart well completion
	ACCB	Well stimulation
	ACCB	Downhole separation
	ACCC	Standard injectors
	ACCCA	Water injector
	ACCCB	Gas injector
	ACCCC	Water and gas injector
	ACCD	Branched injectors
	ACCD	Water injector
	ACCD	Gas injector
	ACCD	Water and gas injector
	Subsea production systems	
	Production station	
	ADAA	Template structure
	ADAAA	Multi-well/manifold template without protection structure
	ADAA	Single satellite without protection structure
	ADAA	Multi-well/manifold template with integrated protection structure
	ADAA	Single satellite with integrated protection structure
	ADAA	Multi-well protection structure
	ADAA	Single satellite protection structure
	ADAB	Manifold/piping area
	ADAC	Subsea completion system
	ADACA	Wellhead system
	ADACB	X-mas tree system
	ADAD	Production control and monitoring system
	ADADA	Topside (surface) production control system
	ADADB	Subsea production control and monitoring system
	ADAE	Workover system
	ADAF	Intervention system
	Manifold station	
	ADBA	Template structure
	ADBAA	Manifold template without protection structure
	ADBAB	Manifold template with integrated protection structure
	ADBAC	Manifold protection structure
	ADBB	Manifold/piping area
	ADBC	Control system
	Subsea separation/booster station/injection station	
	ADDA	Structure
	ADDB	Separation equipment
	ADDC	Pumping equipment
	ADDD	Compression equipment
	ADDE	Manifold/piping area
	ADDF	Subsea completion system
	ADDG	Power equipment
	ADDH	Control system
	Umbilical system	
	ADEA	Umbilicals
	ADEB	Umbilical protection
	ADEC	Crossings
	ADECA	Umbilical/cable crossing
	ADECB	Pipeline crossing
	ADED	Umbilical risers

	ADEE	Umbilical distribution – control distribution unit (CDU)
	ADEL	Shore approach
ADF		Tools system
ADK		Infield pipelines
	ADKA	Pipelines
	ADKAA	Single line
	ADKAB	Bundled line
	ADKB	Expansion loops
	ADKD	Pipeline protection
	ADKE	Crossings
	ADKEA	Umbilical/cable crossing
	ADKEB	Pipeline crossing
	ADKF	Risers
	ADKG	Riser base
	ADKGA	Structure
	ADKGB	Manifold/piping area
	ADKGC	Control system
	ADKH	Flowline distribution – pipeline end module (PLEM)
	ADKL	Shore approach
ADL		Power cables for subsea facilities
	ADLA	Cables for subsea facilities
	ADLB	Cable protection
	ADLC	Crossings
	ADLCA	Umbilical/cable crossing
	ADLCB	Pipeline crossing
	ADLD	Risers
	ADLE	Power distribution – power control distribution unit (PCDU)
	ADLL	Shore approach
ADM		Hybrid risers and riser towers 7)
AE		Transport systems
AEA		Pipeline systems
	AEAA	Pipelines
	AEEAA	Production/trunk line
	AEEAB	Injection line
	AEAB	Expansion loops
	AEAC	Pipeline protection
	AEAD	Crossings
	AEEADA	Umbilical/cable crossing
	AEEADB	Pipeline crossing
	AEAE	Conventional risers
	AEEAEA	Production/trunk line
	AEEAEB	Injection line
	AEAF	Riser bases
	AEEAFA	Structure
	AEEAFB	Outfitting
	AEAG	Umbilical/cable system
	AEEAGA	Umbilicals/cables
	AEEAGB	Umbilical protection
	AEEAGC	Crossings
	AEEAGCA	Umbilical/cable crossing
	AEEAGCB	Pipeline crossing
	AEEAGD	Umbilical risers
	AEEAGE	Shore approach
	AEAH	Valve stations/connection points
	AEEAHA	Y-connection
	AEEAHB	T-connection
	AEEAHC	ESD valve station
	AEAJ	Booster stations
	AEEAJA	Structure
	AEEAJB	Outfitting
	AEEAJC	Test facilities
	AEAK	Surface control facilities
	AEAL	Shore approach

	AEALA	Tunnel	
	AEALB	Beach	
AEB		Local offshore systems	8)
	AEBA	Articulated loading platform – (ALP)	
	AEBB	Ugland-Kongsberg Offshore Loading System – (UKOLS)	
	AEBBC	Single anchor leg mooring – (SALM)	
	AEBD	Catenary anchor leg Mooring – (CALM)	
	AEBE	SPAR buoy	
	AEBF	Single anchor leg storage – (SALS)	
	AEBG	Exposed location single buoy mooring – (ELSBM)	
	AEBH	Catenary anchor leg rigid arm mooring – (CALRAM)	
	AEBJ	Single buoy storage – (SBS)	
	AEBK	Fixed towers – (FT)	
	AEBL	Submerged turret loading system – (STL)	
	AEBM	Single anchor loading system – (SAL)	
AEC		Offshore surface storage system	5)
	AECA	Structure/hull	
	AECB	Ship outfitting	
		Equipment for cargo	
	AECBA	Ship equipment	
	AECBB	Equipment for crew and passengers	
	AECBC	Machinery main components	
	AECBD	Systems for machinery main components	
	AECBE	Ship common systems	
	AECBF	Other (vacant – SFI main group 9)	
	AECBG	Loading system	
	AECC	Submerged turret loading system – STL	
		Other loading systems	
	AECCA		
	AECDB		
AED		Offshore subsea storage system	
	AEDA	Structure	
	AEDB	Outfitting	
AEE		Umbilicals/cables for remote platform control	
	AEEA	Umbilicals/cables	
	AEEB	Risers	
	AEEC	Cable protection	
	AEEF	Crossings	
		Umbilical/cable crossing	
	AEEDA	Pipeline crossing	
	AEEDB	Shore approach	
	AEED		
AEE		Power cables land – platform	
	AEFA	Cables	
	AEFB	Risers	
	AEFC	Cable protection	
	AEFD	Crossings	
		Umbilical/cable crossing	
	AEFDA	Pipeline crossing	
	AEFDB	Shore approach	
	AEFE		
AEG		Power cables platform – platform	
	AEGA	Cables	
	AEGB	Risers	
	AEGC	Cable protection	
	AEGD	Crossings	
		Umbilical/cable crossing	
	AEGDA	Pipeline crossing	
	AEGDB		
AEH		Power cables for overseas supply/import	
	AEHA	Cables	
	AEBB	Cable protection	
	AEBH	Crossings	
		Umbilical/cable crossing	
	AEHCA	Pipeline crossing	
	AEHCB	Shore approach	
	AEHD		
AEJ		Bridges	
	AEJA	Structure	

AW	AEJB	Outfitting
	AEJC	Support structure (tower)
AWA	Offshore wind park	
	Windmill	
	AWA	
	A	WTG – wind turbine generator
	AWA	
	B	WTG foundation
	AWABA	WTG foundation fixed
	AWABB	WTG foundation floating
	AWABBA	WTG foundation floating structure
	AWABBB	WTG foundation mooring
AWB	Substation	
	AWB	
	A	Substation topside
	AWB	
	B	Substation foundation
	AWBBA	Substation foundation fixed
	AWBBB	Substation foundation floating
	AWBBBA	Substation foundation floating structure
	AWBBBB	Substation foundation mooring

Notes:

- 1) For ship/barge type concepts the living quarter shall be regarded as part of the PBS
- 2) Only the plain structure without any other functional content shall be coded under this PBS
- 3) Mooring winches shall, when physically located on the substructure, be PBS-coded under
- 4) Preinstalled parts are part of substructure.
- 5) See the detailed description of substructure for relation to the SFI Group System.
- 6) In case of a separate flare platform, the flare should be coded as topside (AAF) and the support structure as substructure (e.g. ABA/ABB).
- 7) 'Hybrid risers and riser towers' to cover both infield and transport purposes.
- 8) Includes mooring where appropriate and applicable

B	Landbased installations	
	BA	Utilities
	BAA	Electrical power systems
	BAAA	Electrical power supply
	BAAB	Electrical power generation
	BAAC	Electrical power distribution
	BAAD	Emergency power system
	BAAE	Earthing system
	BAAF	Plant lighting system
	BAB	Instrument systems
	BABA	Process data acquisition and control
	BABB	General instruments
	BABC	Computer systems
	BABD	Environmental control systems
	BABE	Emergency shut down
	BABF	Marine systems
	BAC	Communication systems
	BACA	Telephone and intercommunication
	BACB	Telex and telefax systems
	BACC	Radio communication system
	BACD	CCTV and security systems
	BAD	Cooling systems
	BADA	Seawater cooling
	BADB	Freshwater cooling
		Air
	BADC	Cooling
	BAE	Water systems
	BAEA	Freshwater supply
	BAEB	Demineralized water system
	BAEC	Potable water system
	BAF	Steam systems

	BAFA	High pressure steam – HP
	BAFB	Medium pressure steam – MP
	BAFC	Low pressure steam – LP
	BAFD	Condensate system
BAG		Heating systems
	BAGA	Hot oil heating
	BAGB	Electrical heating
	BAGC	Medium heating
BAH		Chemical injection systems
	BAHA	Dehydration
	BAHB	Chlorination
	BAHC	Ammonia
	BAHD	Other chemical injection facilities
BAI		Air systems
	BAIA	Instrument air
	BAIB	Plant air
	BAIC	Inert gas
BAJ		Fuel systems
	BAJA	Liquid fuels
	BAJB	Gaseous fuels
		Solid
	BAJC	Fuels
	BAJD	Mixed fuels
BAK		Waste disposal systems
	BAKA	Effluent treatment package
	BAKB	Sewage system
	BAKC	Ballast water
	BAKD	Drain system
BAL		Fire and safety systems
	BALA	Fire water system
	BALB	Sprinkler and deluge system
	BALC	Chemical fire fighting system
	BALD	Mobile fire fighting
	BALE	Fire and gas monitoring systems
	BALF	Fire fighting training area
BB		Offsite
BBA		Product storage
	BBAA	Gas storage
	BBAAA	Above ground storage
	BBAAB	Underground storage
	BBAB	Liquid storage
	BBABA	Above ground storage
	BBABB	Underground storage
	BBAC	Solids (bulk) storage
	BBACA	Warehouse or sheltered storage
	BBACB	Silo/container storage
	BBACC	Open air storage
BBB		Product metering
	BBBA	Volumetric flow metering
	BBBB	Weight metering
BBC		Product loading
	BBCA	Liquifacted gas loading
	BBCB	Crude oil/destillate loading
	BBCC	Chemical liquids loading
	BBCD	Bulk loading
BBD		Transportation and packing
	BBDA	Pipeways
	BBDAA	Pipeways product
	BBDAB	Pipeways flare systems
	BBDB	Conveyor belt systems
	BBDC	Blending systems
	BBDD	Chemical and catalyst handling
	BBDE	Bulk packing systems
	BBDF	Liquid packing systems

BC	BBE	Flare, vent and blowdown
	BBEA	High pressure process
	BBEB	Low pressure system
	BBEC	Liquid burner system
	BCA	Site
		General site
	BCAA	Civil 1 – site preparation
	BCAB	Civil 2 – main civil works
	BCAC	Civil 3 – landscaping
	BCB	Buildings
	BCBA	Administration buildings
	BCBB	Control rooms and utility buildings
BD	BCBC	Laboratories
	BCBD	Warehouses
	BCBE	Other building facilities
	BCC	Jetties and shore installations
	BCCA	Product jetties
	BCCB	Other jetties
	BCCC	Shore improvements
	BCD	External facilities
	BCDA	Access from main road
	BCDB	Electric power
	BCDC	Telephone/telemetry
	BCDD	Freshwater supply
BD	BCDE	Heliport
	BCDF	Remote control of other facilities
	BDA	Transport systems
		Pipeline
	BDAA	Route preparation
	BDAB	Trenching/backfill
	BDAC	Pipeline installation
	BDACA	In trench
	BDACB	Above ground
	BDAD	Route restoration
	BDAE	Drainage system
	BDAEA	In tunnel
	BDAEB	In sump
	BDAEC	In open landscape
	BDAF	Crossings
	BDAFA	Road crossing
	BDAFB	Rail crossing
	BDAFC	River crossing
	BDAFD	Fjord crossing
	BDAFE	Ravine crossing
	BDAFF	Piperacks/pipetracks
	BDAG	Facilities
	BDAGA	Metering station
	BDAGB	Pig station
	BDAGC	Flare/venting station
	BDAGD	Valve station
	BDAGE	Booster station
	BDAGG	Control centre
	BDB	Railway
	BDBA	Civil works – formation
	BDBAA	Quarry
	BDBAB	Clearing and grubbing
	BDBAC	Formation works
	BDBAD	Drainage systems
	BDBAE	Earth retention
	BDBAF	Restoration
	BDBB	Civil works – structures
	BDBBA	River/fjord crossings
	BDBBB	Road crossings

	BDBBC	Tunnels
	BDBBD	Loading facilities
	BDBBE	Receiving facilities
	BDBBF	Station buildings
BDBC		Trackwork
	BDBCA	Tracklaying
	BDBCB	Ballasting/alignment
	BDBCC	Signals/control systems
	BDBCD	Track access prevention
BDBD		Rolling stock operation facilities
	BDBDA	Mechanical service and repair workshops
	BDBDB	Stock yards/storage yards
	BDBDC	Buildings and services
	BDBDD	Permanent accommodation
BDBE		Railway utilities
	BDBEA	Electrical power supply and distribution
	BDBEB	Overhead power lines
	BDBEC	Lighting systems
	BDBED	Instrumentation and central control systems
	BDBEE	Communication systems
	BDBEF	Water supply
	BDBEG	Fuel supply systems
	BDBEH	Lube systems
	BDBEI	Effluent disposal systems
BDC		Roads
	BDCA	Civil works – formation
	BDCAA	Quarry
	BDCAB	Clearing and grubbing
	BDCAC	Formation works
	BDCAD	Drainage systems
	BDCAE	Earth retention
	BDCAF	Restoration
BDCB		Civil works – structures
	BDCBA	River/fjord crossings
	BDCBB	Rail crossings
	BDCBC	Tunnels
	BDCBD	Loading facilities
	BDCBE	Receiving facilities
BDCC		Road completion
	BDCCA	Sub-base/base courses
	BDCCB	Tarmac paving
	BDCCC	Concrete paving
	BDCCD	Signals/signs
	BDCCE	Safety systems
	BDCCF	Power supply and lighting
	BDCCG	Communications
BDCD		Maintenance facilities
	BDCDA	Plant and equipment workshops
	BDCDB	Storage yards/warehouses
	BDCDC	Buildings and services
	BDCDD	Permanent accommodation
BDD		El. power transmission line
	BDDA	Route preparation
	Bddb	Trenching/culverts/backfill
	BDDC	Power pylons/poles
	BDDD	Cable installation
	BDDDA	In trench
	BDDDB	Above ground
BDDE		Route restoration
BDDF		Crossings
	BDDFA	Road crossing
	BDDFB	Rail crossing
	BDDFC	River crossing

	BDDFD	Fjord crossing
	BDDFE	Ravine crossing
	BDDG	Switch yard
	BDDGA	Buildings/foundations
	BDDGB	Outfitting
	BDDH	Transformers, rectifiers and converters
BE		Drilling facilities
	BEA	Wellhead
	BEB	Derrick
	BEC	Mudhandling
	BED	Pipehandling
	BEE	Drilling utilities
BF		Onshore wells
	BFA	Drilling
	BFAA	Fixed drilling rig
	BFAB	Mobile drilling rig
	BFB	Downhole completion
	BFBA	Fixed drilling rig
	BFBB	Mobile drilling rig
BG		Temporary facilities
	BGA	Construction camp
	BGB	Utility construction
	BGC	Office buildings
	BGD	Warehouses and workshops
	BGE	Communication
BK		Process – hydro carbons – gas/oil
	BKA	Process – pretreatment and separation
	BKAA	Receiving facilities
	BKAB	Pretreatment facilities
	BKAC	Separation facilities
	BKB	Process – LPG/NGL
	BKBA	Fractionation
	BKBB	Product treatment
	BKC	Process – crude refining
	BKCA	Crude distillation
	BKCB	Coking
	BKCC	Visbreaking
	BKCD	Fluid catalytic cracking
	BKCE	Hydrocracking
	BKCF	Hydrotreating
	BKCG	Catalytic reforming
	BKCH	Isomerisation
	BKCI	Alkylation
	BKCJ	MTBE (methyl tertiary butyl ether)
	BKCK	Deasphalting
	BKCL	Treating
	BKCM	Wax/oil separation
	BKCN	Lube treatment
	BKCO	Grease production
	BKCP	Asphalt blowing
	BKCQ	Coke calcining
	BKD	Process – LNG (liquefied natural gas)
	BKDA	Precooling step
	BKDB	Heavy hydrocarbon extraction and stabilization
	BKDC	Liquefaction/sub-cooling
	BKDD	Nitrogen removal
	BKDE	Refrigerant make-up
BL		Process – thermoplastics
	BLA	Ethylene
	BLAA	Cracking, quenching and oil fractionation
	BLAB	Crack gas compression and sour gas removal
	BLAC	Demethanizing and C3/C4 separation
	BLAD	Ethylene/ethane separation

BLB		Propylene
	BLBA	Polymerisation reactor
	BLBB	Catalyst deactivation
	BLBC	Separation
	BLBD	Drying and pelletizing
BLC		Polyvinylchloride (PVC)
	BLCA	Addition of hydrochloric acid to acetylene
	BLCB	Addition of chlorine to ethylene followed by cracking
	BLCC	Combined use of ethylene and acetylene in "balanced" schemes
	BLCD	PVC production
BLD		Polystyrole
BM		Process – alcohol
	BMA	Methanol
	BMAA	Receiving, desulphurisation and mercury removal
	BMAB	Catalytic reforming and synthesis gas compression
	BMAC	Methanol synthesis
	BMAD	Product purification
BN		Process – gas to liquids
	BNA	Receiving facilities/feed gas treatment
	BNB	Oxygen production
	BNC	Synthesis gas production
	BND	Fischer-Tropsch synthesis
	BNE	Separation/upgrading
BQ		Process – bioprotein
BT		Process – electrical power generation
	BTB	Receiving facilities
	BTB	Catalytic reforming
	BTC	Power plant
	BTD	NOx removal
	BTE	CO₂ recovery plant
	BTEA	Pretreatment
	BTEB	Separation
	BTDC	Compression/drying

A.2 SAB Codes

E	Exploration
P	Planning
D	Development
O	Operation
S	Shutdown and decommissioning
R	Removal
1	Management
11	Project management
12	Construction management
13	External services
2	Engineering and procurement
21	Engineering
211	Pre-engineering
212	Design engineering
213	Fabrication engineering
22	Procurement
23	Construction supervision
3	Material deliveries
31	Equipment
311	Company provided equipment
312	Contractor provided equipment

	313	Surplus equipment
32		Bulk
	321	Company provided bulk
	322	Contractor provided bulk
	323	Surplus bulk
33		Spare parts
4		Construction
41		Onshore construction
	411	Mobilisation
	412	Civil work
	413	Fabrication of major assemblies
	4131	Prefabrication
	4132	Installation/assembly/erection
414		Other fabrication
	4141	Prefabrication
	4142	Installation/assembly/erection
415		Modification
	4151	Stripping/dismantling
	4152	Refitting
	4153	Revamp
	4154	Relocate
	416	Vendor assistance
	417	Commissioning
	4171	Commissioning
	4172	Startup
418		Weighing, seafastening and load-out
42		Atshore construction
	421	Mobilisation
	422	Civil work
	423	Activities related to major assemblies
	4231	Prefabrication
	4232	Installation/assembly/erection
424		Other fabrication activities
	4241	Prefabrication
	4242	Installation/assembly/erection
425		Modification
	4251	Stripping/dismantling
	4252	Refitting
	4253	Revamp
	4254	Relocate
	426	Vendor assistance
	427	Commissioning
43		Inshore construction
	431	Mobilisation
	432	Civil work
	433	Activities related to major assemblies
	4331	Prefabrication
	4332	Installation/assembly/erection
434		Other fabrication activities
	4341	Prefabrication
	4342	Installation/assembly/erection
435		Modification
	4351	Stripping/dismantling
	4352	Refitting
	4353	Revamp
	4354	Relocate
	436	Vendor assistance
	437	Commissioning

44	Offshore construction
441	Mobilisation
442	Civil work
443	Activities related to major assemblies
4431	Prefabrication
4432	Installation/assembly/erection
444	Other fabrication activities
4441	Prefabrication
4442	Installation/assembly/erection
445	Modification
4451	Stripping/dismantling
4452	Refitting
4453	Revamp
4454	Relocate
446	Vendor assistance
447	Commissioning
4471	Commissioning
4472	Startup
448	Non-working hours (lunch, standby, etc)
5	Operations
51	Landbased operations
511	Lifting
512	Transport
513	Pipeline operations
514	Cable operations
515	Other landbased operations
52	Offshore operations
521	Survey
522	Seabed preparation
5221	Trenching
5222	Dredging
5223	Back filling
5224	Rock dumping
523	Installation
5231	Lifting
5232	Piling
5233	Grouting
5234	Mating
524	Pipeline operations
5241	Pipelaying
5242	Tie-in
5243	Hydrotesting
5244	RFO
525	Umbilical and cable operations
5251	Laying
5252	Pull-in and connection
5253	Testing
526	Transport
5261	Towing
5262	Heavy lift transport
527	Subsea structure operations
5271	Testing
5272	Installation
5273	Commissioning
528	Particular abandonment operations
5281	Cutting of structures
5282	Toppling
5283	Removal/lifting
5284	Transport and dumping

53	Logistics
531	Supply base/terminal
532	Supply and distribution
533	Personnel transport
534	Flotel/LQ/camps
54	Drilling and completion
541	Onshore drilling and completion
5411	Fixed rig drilling
5412	Mobile rig drilling
542	Offshore drilling and completion
5421	Predrilling
5422	Subsea drilling
5423	Platform drilling
6	Unit work activities
7	General

A.3 COR Codes

A	General costs
AA	Statutory costs, licences and permits
AAA	Authorization and certification fees
AAB	Environmental charges and fees
AAC	Special studies
AAD	Patented process licences
AAE	Licences and permits
AB	Financing and related costs
ABA	Financial costs
ABB	Depreciation
ABC	Currency impact
AC	Insurance
AD	Purchases and rentals
ADA	Land acquisition
ADB	Buildings and facilities
ADC	Data purchases
AE	Material related costs
AEA	Capital spares
AEB	Commissioning spares
AEC	Freight
AED	Custom charges, fees and duties
AF	Personnel related costs
AFA	Health, medical and social care
AFB	Security
AFC	Training and courses
AG	Taxes
AGA	Value added taxes
AGB	Investment taxes
AH	Product related costs
AHA	Sales and marketing
AHB	Production fees, royalties and costs
AHC	Tariffs and transport charges
AHD	Contributions
AJ	Research and development
AK	Vendor rep. costs (ATS)
AV	Contingency
AW	Project reserve
AZ	Other general costs
B	Bulk materials
BC	Architectural and building bulk
BCA	Walls
BCB	Floors

	BCC	Ceilings
	BCD	Doors and windows
	BCE	Furniture and accessories including arts.
	BCF	Signs
	BCG	Insulation
	BCH	Prefabricated modules
	BCM	Particular onshore building materials
	BCZ	Other architectural and building bulk
BD		Drilling bulk
	BDA	Conductors and casings
	BDB	Drilling fluids and consumables
	BDC	Tubing
	BDD	Downhole completion devices and accessories
	BDZ	Other drilling bulk
BE		Electrical bulk
	BEA	Cables and cable accessories
	BEB	Cable supports and transits
	BEC	Lighting
	BED	Junction boxes
	BEE	Accessories
	BEZ	Other electrical bulk
BH		HVAC bulk
	BHA	Ducting
	BHB	Inline items and dampers
	BHC	Duct supports, hangers
	BHD	Insulation
	BHE	Sanitary piping and components (plumbing)
	BHZ	Other HVAC bulk
BJ		Instrument bulk
	BJA	Instruments
	BJB	Instrument valves
	BJC	Cables and cable accessories
	BJD	Junction boxes
	BJE	Tubing
	BJG	Accessories
	BJZ	Other instrument
BL		Piping bulk
	BLA	Pipework
	BLB	Manually operated valves
	BLC	Supports
	BLD	Insulation
	BLZ	Other piping bulk
BM		Surface protection bulk
	BMA	Paint
	BMB	Coating
	BMC	Anodes
	BMZ	Other surface protection bulk
BN		Structural bulk
	BNA	Primary, secondary and outfitting structures
	BNC	Temporary installation aids
	BND	Grillage/seafastening/load out
	BNZ	Other structural bulk
BQ		Civil works bulk
	BQA	Concrete, cement, sand and aggregates
	BQB	Reinforcement bars/rods and pre-stressing cables
	BQC	Precast concrete elements
	BQD	Masonry
	BQE	Piles
	BQF	Timber/wood products
	BQG	Pipes and fitting (soil, drain, etc.)
	BQH	Ground materials
	BQJ	Fencing materials, guard rails, steel manholes and sign posts
	BQK	Forms

		BQL	Embedment items
		BQM	Solid ballast
		BQZ	Other civil works bulk
BS			Safety bulk
		BSA	Passive fire protection
		BSB	Safety appliances
BT			Telecommunication bulk
		BTA	Telecommunication appliances
		BTC	Cables and cable accessories
		BTD	Junction boxes
		BTZ	Other telecommunication bulk
BY			Pipeline bulk
		BYA	Rigid line pipe
		BYB	Flexible line pipe
		BYC	Pipeline accessories
		BYD	Valves
		BYZ	Other pipeline bulk
BZ			Consumables and first fill
		BZA	Consumables
		BZB	First fill
C			Construction overheads
CA			Contractor's organisation
		CAA	Construction management
		CAB	General site administration
		CAC	Office expenses
		CAD	Personnel expenses
		CAE	Miscellaneous expenses
CB			Site facilities
		CBA	Construction facilities
		CBB	Material storage facilities
		CBC	Special commissioning plant/equipment
		CBD	Facility construction/expansion
		CBE	Accommodation and construction camp
CC			Service to company
CD			Camp running
		CDA	Catering
		CDB	Camp operation
CE			Miscellaneous overhead costs
CZ			Other construction overheads
E			Equipment
EA			Architectural equipment
	EAA		Architectural equipment
		EAAB	Kitchen equipment
		EAAD	Actuated doors
		EAAE	Laundry equipment
		EAAR	Refrigeration and freezing system equipment
		EA AV	Central vacuum cleaner system equipment
		EAAZ	Other architectural equipment
ED			Drilling equipment
	EDB		Drilling equipment
		EDBC	Pipe handling equipment
		EDBD	Drilling risers
		EDBE	Cuttings disposal package
		EDBF	Mud burner/mud burner package
		EDBG	Drawworks/rotary table and drawworks package
		EDBI	Cementing package
		EDBJ	Top drive units/packages
		EDBK	Mud pump package
		EDBM	Skid jacks
		EDBN	Diversers
		EDBP	Drilling panels
		EDBS	Choke/production/injection and test manifolds

		EDBT	TFL equipment
		EDBU	Wireline equipment
		EDBX	Other drilling equipment packages
		EDBY	Hoppers/mud guns/blenders
		EDBZ	Other drilling equipment
	EDW		Wellhead equipment – (surface completion)
		EDWA	X-mas trees
		EDWB	Tubing shear ram
		EDWC	Tubing shear ram/X-mas tree – extensions
		EDWD	Wellhead, wellhead housing and extension
		EDWF	Conductor housing, extensions and guides, hub connectors
		EDWH	Casing hanger
		EDWI	Tubing hanger
		EDWJ	Seal rings/seals
		EDWK	Guide base
		EDWL	Landing base
		EDW	
		M	Diverter system equipment
		EDWN	Blow out preventer stack
		EDWO	Hydraulic connectors
		EDWP	Wireline unit/wireline equipment
		EDWQ	Wireline pressure retaining equipment
		EDWX	Other wellhead equipment packages
		EDWZ	Other wellhead equipment
EE			Electrical equipment
	EEE		Electrical equipment
		EEEB	Batteries
		EEEC	Control equipment (panels, relay boxes)
		EEED	DC distribution boards
		EEEE	Emergency distribution panels
		EEEG	Generators
		EEEH	Switchgear – up to 400 V
		EEEJ	Switchgear – above 400 and up to 1000 V
		EEEK	Switchgear – above 1000 V
		EEEL	Motor control centres
		EEEM	Lighting and minor distribution panels
		EEEN	Main power generator sets
		EEEO	Emergency power generator sets
		EEEP	Earthing bars
		EEEQ	Uninterruptible power supply (UPS)
		EEER	Rectifiers and inverters
		EEES	Lightning arrestors
		EEET	Transformers
		EEEU	Electrical cathodic protection
		EEEV	Bus ducts, bars and accessories
		EEEW	Alarm equipment
		EEEX	Other electrical equipment packages
		EEEY	Filters and compensation equipment
		EEEZ	Other electrical equipment
EG			Heating, ventilation and air conditioning (HVAC) equipment
	EGG		Heating, ventilation and air conditioning (HVAC) equipment
		EGGA	Air handling
		EGGB	Cooling units, refrigeration units
		EGGC	Boilers and heaters
		EGGD	Terminal units
		EGGE	Humidifiers/dehumidifiers
		EGGF	Air conditioners
		EGGG	Heating and cooling coils
		EGGH	HVAC fans
		EGGI	Domestic water heaters
		EGGX	Other HVAC packages
		EGGZ	Other HVAC equipment
EJ			Instrumentation equipment
	EJJ		Instrumentation equipment

	EJJA	Air distribution header
	EJJB	Control panels with instruments, controllers, etc.
	EJJE	Desks/consoles, operator stat., workstat., PC, VDU
	EJFF	Field termination and cross connection cabinets
	EJHH	Oil metering package
	EJJI	Gas metering package
	EJJJ	Multiphase metering package
	EJJK	Loggers, printers and copiers
	EJJL	Matrix and mimic panels
	EJJM	Instrument air package
	EJJU	Dynamic positioning control system equipment (DP)
	EJJV	Weight scales
	EJJW	Hydraulic emergency shut-down system equipment
	EJJX	Other instrument equipment packages
	EJJY	Vibrating/displacement measuring systems equipment
	EJJZ	Other instrument equipment
ER		Mechanical equipment
	ERC	Miscellaneous mechanical equipment
	ERCA	Regenerative filters
	ERCB	Non-regenerative filters
	ERCC	Centrifuges
	ERCD	Extractors
	ERCE	Cyclones
	ERCF	Mechanical separators/shakers
	ERCG	Refrigeration units
	ERCH	Chemical feeders
	ERCI	Molecular sieves
	ERCJ	Mixers/agitators
	ERCK	Demisters
	ERCL	Trays
	ERCM	Centrifuge packages
	ERCN	Solid waste disposal units
	ERCP	Incinerators
	ERCQ	Eductors and ejectors
	ERCR	Trash racks/collectors
	ERCS	Lube and seal oil units
	ERCT	Hydraulic units
	ERCU	Comminutors
	ERCV	Trash stop gates
	ERCX	Other misc. mechanical equipment packages
	ERCZ	Other miscellaneous mechanical equipment
	ERD	Drivers and power transmissions
	ERDA	Gas engines
	ERDB	Gearboxes and couplings
	ERDC	Steam turbines
	ERDD	Diesel engines
	ERDE	Electrical motors
	ERDF	Air driven motors/starters
	ERDT	Gas turbines
	ERDV	Hydraulic motors/starters
	ERDZ	Other drivers
	ERF	Heaters, boilers, furnaces and flares
	ERFA	Direct fired heaters incl. stack and ducting
	ERFB	Steam boilers incl. stack and ducting
	ERFC	Flare tips and accessories
	ERFD	Flares ground
	ERFE	Electric heaters
	ERFF	Special heaters
	ERFG	Special boilers
	ERFH	Electrode boiler packages
	ERFI	Furnaces
	ERFX	Other heater, furnace and boiler packages
	ERFZ	Other heating, burning and boiling equipment

ERH	Heat transfer equipment
ERHA	Shell and tube heat exchangers
ERHB	Plate heat exchangers
ERHC	Air cooled heat exchangers
ERHD	Quench coolers
ERHE	Misc. coolers and condensers
ERHF	Double pipe heat exchangers
ERHG	Core type heat exchangers
ERHH	Liquefaction heat exchangers (cryogenic)
ERHI	Reboilers/evaporators
ERHJ	Compact heat exchangers
ERHW	Waste heat recovery units
ERHX	Other heat transfer equipment packages
ERHZ	Other heat transfer equipment
ERK	Compressors, blowers and expanders
ERKA	Centrifugal compressors
ERKB	Reciprocating compressors
ERKC	Screw/rotary compressors
ERKD	Axial compressors
ERKE	Fans
ERKF	Blowers
ERKH	Expanders
ERKJ	Diaphragm compressors
ERKK	Compressors/gas turbine driver sets
ERKX	Other compressors, blowers and expander packages
ERKZ	Other compressors, blowers and expanders
ERM	Material and product handling equipment
ERMA	Pedestal cranes
ERMB	Hoists and trolleys
ERMC	Elevators, escalators and lifts
ERMD	Trucks, carts, forklifts, etc.
ERME	Mobile cranes
ERMF	Overhead cranes
ERMG	Railroad and road loading equipment
ERMH	Workshop machines
ERMK	Winches
ERMQ	Packing, calibrating and measurement equipment
ERMR	Weighing screws
ERMU	Product loading and vapour return arms
ERMV	Gantry and portal cranes
ERMX	Other material and product handling equipment packages
ERMZ	Other material and product handling equipment
ERN	Mechanical equipment – solids
ERNA	Belt conveyors
ERNB	Bucket elevators
ERNC	Screw conveyors/feeders
ERND	Tube-flo conveyors
ERNE	Multi-flo conveyors
ERNF	Jaw crushers
ERNG	Impact breakers
ERNH	Twin rotor impactors
ERNI	Granulators
ERNJ	Gravity impact crushers
ERNK	Hammermills
ERNL	Reversible impactors
ERNM	Roll crushers
ERNN	Rod and ball mills
ERNO	Vibrating packers
ERNP	Vibrating screens
ERNR	Fines sifters and screens
ERNS	Blenders
ERNT	Bin activators
ERNU	Feeders

ERP	ERNV	Classifiers
	ERNW	Dust collectors
	ERNX	Other mechanical equipment – solids packages
	ERNZ	Other solids mechanical equipment
		Pumps
	ERPA	Centrifugal pumps
	ERPB	Reciprocating pumps
	ERPC	Rotary pumps
	ERPD	Special metering pumps
	ERPE	Gear pumps
ERT	ERPF	Diaphragm pumps
	ERPG	Screw pumps
	ERPH	Submerged pumps with non-submerged motors
	ERPJ	Fire water pump packages
	ERPI	Submerged pumps with submerged motors
	ERPX	Other pump packages
	ERPZ	Other pumps
		Storage tanks/containment equipment – atmospheric
	ERTA	Storage tanks – cylindric
	ERTB	Storage tanks – rectangular
ERV	ERTE	Hoppers
	ERTF	Mud pits
	ERTG	Sumps
	ERTJ	Bins
	ERTK	Containers
	ERTR	Refrigerated storage tanks
	ERTZ	Other tanks
		Vessels and columns – pressurised
	ERVA	Separators
	ERVB	Contactors
ERX	ERVC	Regenerators
	ERVD	Settling tanks, knock-out drums and flash drums
	ERVE	Columns/towers
	ERVF	Reactors
	ERVG	Scrubbers
	ERVH	Deaerators
	ERVJ	Coalescers
	ERVK	Dryers
	ERVL	Receiver and surge drums, expansion-head tanks
	ERVP	Gas holders
ES	ERVQ	Spheres
	ERVS	Tote tanks
	ERVT	Oxygen units
	ERVU	Hydrogen units
	ERVV	Inert gas units
	ERVW	Condensate control drums
	ERVX	Other vessel and column packages
	ERVZ	Other vessels and columns
		Miscellaneous package units
	ERXA	Oily water treatment packages
ES	ERXD	Fresh water maker packages
	ERXE	Potable water treatment packages
	ERXF	Sewage/waste water treatment packages
	ERXG	Catalyst packages
	ERXH	Helicopter fuel packages
	ERXI	Cooling towers
	ERXJ	Vacuum units packages
	ERXQ	Chemical treatment packages
	ERXR	Chemical injection packages
	ERXU	Nitrogen generation packages
ES	ERXV	Oxygen generation packages
	ERXX	Other misc. equipment packages
		Safety/escape and firefighting equipment

ET	ESS	Safety/escape and firefighting equipment
	ESSA	Lifeboats and davits
	ESSB	Pick-up boats and davits
	ESSD	Escape equipment
	ESSF	Ambulances
	ESSG	Firetrucks
	ESSH	Inert gas equipment
	ESSI	Inert gas generator package
	ESSJ	Fixed foam unit
	ESSK	Dual agent unit
	ESSL	Dry chemical equipment
	ESSM	Fire water system equipment
	ESSN	Remote operated foam monitors
	ESSP	Mobile fire extinguishers
	ESSS	Fire water monitors (towers)
	ESSU	Sprinkler/deluge systems equipment
	ESSW	Rafts
	ESSX	Other safety, escape and/ or firefighting equipment packages
	ESSZ	Other safety, escape and firefighting equipment
EU	ETR	Telecommunication equipment
	ETRA	Public address and alarm system equipment
	ETRB	SOLAS/GMDSS radio and general radio system equipment
	ETRC	Closed circuit television system equipment
	ETRD	Drillers talk-back system equipment
	ETRE	Entertainment system equipment
	ETRF	Distribution frames
	ETRG	Emergency telephone
	ETRH	Office intercommunication system equipment
	ETRI	Crane telecom equipment
	ETRL	Batteries and power supply
	ETRM	Multiplexer and network switch
	ETRN	Navigation, positioning and distance measuring equipment
	ETRO	Common telecom equipment
	ETRP	PABX system equipment (incl. telephone)
	ETRQ	Data communication network equipment
	ETRR	Radar system equipment, marine and aviation
	ETRS	Satellite and fibre-optical communication system equipment
	ETRT	Telemetry system equipment
	ETRU	UHF/VHF radio (onboard)
	ETRV	Personnel registration/paging/tracking system equipment
	ETRW	Environment monitoring system equipment
	ETRX	Other telecom equipment packages
	ETRY	Temporary telecom equipment
	ETRZ	Other telecom equipment
EU	EUU	Subsea equipment
	EUUA	Wellhead system equipment
	EUUB	Tubing hanger system equipment
	EUUC	X-mas tree system equipment
	EUUD	Flow control module/choke module
	EUUE	Subsea station structure and appurtenances
	EUUF	Protection structure
	EUUG	Pull-in and connection equipment
	EUUH	Manifold header, valves and piping
	EUUI	Pigging facilities
	EUUJ	BOP/BOP accumulator equipment
	EUUK	Topside control equipment
	EUUL	Uninterruptible power supply
	EUUM	Hydraulic power unit
	EUUN	Subsea control module
	EUUO	Electrical distribution system equipment
	EUUP	Workover riser system equipment

EV	EVY	EUUQ	Workover control system equipment
		EUUR	Intervention system equipment and tools (ROT)
		EUUS	ROV/ROMV and tools
		EUUT	Intervention control system equipment
		EUUU	Test equipment
		EUUV	Tool pool (rented tools)
		EUUW	Subsea distribution equipment
		EUUX	Other subsea equipment packages
		EUUZ	Other subsea equipment
			Mooring and marine equipment
			Mooring and marine equipment
		EVYA	Tethers/tendons, tether couplings
		EVYC	Tether cross-load bearings
		EVYD	Tether tensioner/motion compensator
		EVYE	Tether tie-off assembly
		EVYF	Torque tools and tether handling equipment
		EVYH	Tether anchor latches
		EVYI	Tether deployment tools
EY	EYA	EVYJ	Mooring winches
		EVYK	Capstans
		EVYL	Mooring lines
		EVYM	Anchors
		EVYN	Clump weights
		EVYO	Fenders
		EVYP	Anchor pendant buoys
		EVYQ	Signal buoys
		EVYR	Protection mattresses
		EVYS	Fairleads
		EVYT	Thruster packages
		EVYU	Tank cleaning/crude oil washing equipment
		EVYV	Accommodation ladders/gangways
		EVYW	Turret equipment
		EVYX	Other mooring and marine equipment packages
		EVYZ	Other mooring and marine equipment
			Transfer and control equipment
			Pipeline inspection and repair tools
		EYAA	Slug catcher
		EYAB	Pig launchers/pig receivers
		EYAC	Intelligent pigs
		EYAD	Sealing pigs
		EYAE	Batch pigs
		EYAF	Scraper pigs
		EYAG	Pipeline inspection tools
		EYAH	Pipeline repair system
		EYAI	Welding bladders
		EYAJ	Expansion bellows
	EYB		Risers
		EYBA	Production risers
		EYBB	Injection risers
		EYBC	Import/export risers
	EYC	EYBD	Buoyancy elements/modules
			End fittings/termination
		EYCA	Pipeline
		EYCB	Umbilical
	EYD	EYCC	Risers
			Umbilical
		EYDA	Umbilicals – static
		EYDB	Integrated service umbilicals – static
	EYE	EYDC	Umbilicals – dynamic
		EYDD	Integrated service umbilicals – dynamic
			Special cables
		EYEA	Direct electrical heating cable
		EYEB	Power cables

	EYEC	Fiber optical cable
	EYX	Other transfer and control equipment packages
	EYZ	Other transfer and control equipment
H		Owner's personnel
HA		Project management
	HAA	Project managers
	HAB	Quality assurance
	HAC	Health, safety and environment (HSE)
HB		Project administration
	HBA	Administration
	HBB	Finance and accounting
	HBC	Data processing
	HBD	Document control
HC		Procurement
	HCA	Contracting and legal
	HCB	Purchasing
	HCC	Expediting/traffic/logistics
	HCD	Material control/inspection
HD		Project control
	HDA	Estimating
	HDB	Cost control
	HDC	Planning and scheduling
	HDD	Reporting
	HDE	Misc. project control
HE		Supervision and surveillance
	HEA	Engineering supervision
	HEB	Construction supervision
HF		MC and commissioning personnel
	HFA	Mechanical completion personnel
	HFB	Commissioning personnel
HZ		Other owner's personnel costs
K		Engineering manpower
KA		Engineering management and administration
	KAA	Management
	KAB	Contract management
	KAC	Project control
	KAD	Administration
	KAE	Document control
	KAF	Data processing (IT)
	KAG	Quality management
KB		Procurement
KC		Architectural and building
KD		Drilling
KE		Electrical
KF		Reservoir
KG		Geoscience
KH		HVAC
KJ		Instrumentation
KL		Piping
KM		Material technology
KN		Structural
KO		Operation and maintenance
KP		Process
KQ		Civil engineering
KR		Mechanical
KS		Health, safety and environment (HSE)
KT		Telecommunication
KU		Subsea
KV		Marine engineering
KW		Weight and quantity control
KY		Pipelines
KZ		Multidiscipline

L		Direct labour
LC		Architectural and building direct labour
LD		Drilling labour
LE		Electrical direct labour
LH		HVAC direct labour
LJ		Instrument direct labour
LL		Piping direct labour
LM		Surface protection direct labour
LN		Structural direct labour
LQ		Civil works direct labour
LR		Mechanical direct labour
LS		Safety direct labour
LT		Telecommunication direct labour
LY		Onshore pipeline direct labour
LZ		Other direct labour
M		Indirect labour
MA		Foremen/supervision
MB		Quality control
MC		Scaffolding
MD		Cleaning
ME		Transport
MF		Rigging
MG		Material control and storage
MH		Fire guards
MK		Safety
ML		Dimensional control
MM		Weighing
MN		Temporary construction services
MZ		Other indirect labour
Q		Owner's personnel overheads
QA		Office administration
QB		Office facilities
QC		Data processing
QD		Office expenses
	QDA	Reproduction
	QDB	Telecommunications
	QDC	Office supplies and stationery
QE		Personnel expenses
	QEA	Business travel
	QEB	Relocation expenses and living allowances
	QEC	Tax differential
	QED	Vehicle rental and expenses
QF		Miscellaneous expenses
	QFA	Representation
	QFB	Meeting expenses
	QFC	Training and courses
QH		Management services
QZ		Other owner's personnel overheads
R		Engineering overheads
RA		General office administration
RB		Office facilities
RC		Data processing
RD		Office expenses
	RDA	Reproduction
	RDB	Telecommunications
	RDC	Office supplies and stationery
RE		Personnel expenses
	REA	Business travel
	REB	Relocation expenses and living allowances
	REC	Tax differential

	RED	Vehicle rental and expenses
RF		Miscellaneous expenses
	RFA	Representation
	RFB	Meeting expenses
	RFC	Training and courses
RG		Service to company
RH		Engineering studies and verifications
RM		Model tests
RZ		Other engineering overheads
S		Unit work
SA		Civil work
	SAA	Site preparation
	SAB	Foundations
	SAC	Pile driving/piling
	SAD	Trenching and backfilling for piping and cables
	SAE	Landscaping
SB		Landbased structures
	SBA	Buildings
	SBB	Roads
	SBC	Bridges
	SBD	Jetties and quays
	SBE	Tunnels and caverns
	SBF	Dams/reservoirs/ponds
	SBG	Railways
	SBH	Specialized concrete structures
	SBI	Tank erection
SC		Pipelines
	SCA	Onshore pipelaying
	SCB	Pipeline coating
	SCC	Pipeline insulation
	SCD	Pipeline heating
	SCE	Trenching and backfilling for onshore pipelines
	SCF	Onshore pipeline crossings
	SCG	Tie-in of pipelines onshore
	SCH	Pipeline RFO
SD		Temporaries contracts
	SDA	Construction camp
	SDB	Construction camp operation
	SDC	Construction camp catering
	SDD	Site services
SE		Drilling and services
	SEA	Drilling and drilling services
	SEB	Separate drilling and downhole services
SF		Miscellaneous unit work
	SFA	# Electrical power transmission
	SFB	# Electrical/instrument installation
	SFC	# Piping erection
	SFD	# Insulation
	SFE	# Fireproofing
	SFF	# Painting and application
	SFG	# Scaffolding
	SFH	Model building
SZ		Other unit work
X		Marine operations and logistics
XA		Survey vessels
XB		Drilling vessels
XC		Lifting vessels
XD		Pipelaying vessels – S-lay
XE		Flexible pipeline-/cablelaying vessels
XF		Trenching vessels
XG		Dredging vessels
XH		Gravel/rock dumping vessels

XI		Multi-functional support vessels
XJ		Towing vessels
XK		Barges
XL		Supply vessels/pipe carriers
XM		Piling vessels/barges
XN		Pile driving equipment
XO		Flotels
XP		Catering (flotel and LQ)
XQ		Pipelaying vessels – J-lay
XR		Pipelaying vessels – reel
XS		Heavy transport vessels
XT		Diving support vessels
XU		Helicopters
XV		Support base
XX		Spreads
	XXA	Lifting spread
	XXB	Pipelaying spread
	XXC	Flexipipe-laying spread
	XXD	Cablelaying spread
	XXZ	Other spreads
XY		Misc. vessels and equipment
	XYA	Standby/rescue AHTS vessels
	XYB	Standby/rescue vessels
	XYC	Firefighting vessels
	XYD	Crew boats
	XYE	Well stimulation vessels
	XYF	Grouting vessels
XZ		Other vessels and equipment
Y		Landbased plant and equipment
YA		Track type tractors
	YAA	Track tractor (600 hp to 800 hp)
	YAB	Track tractor (400 hp to 600 hp)
	YAC	Track tractor (250 hp to 400 hp)
	YAD	Track tractor (180 hp to 250 hp)
	YAE	Track tractor (120 hp to 180 hp)
	YAF	Track tractor (90 hp to 120 hp)
	YAG	Track tractor (70 hp to 90 hp)
	YAH	Track tractor (50 hp to 70 hp)
	YAI	Bulldozer blades – universal and straight
	YAJ	Bulldozer blades – special purpose
	YAK	Rippers – single/multi-shank
	YAL	Rippers – linkage/hydraulic
	YAM	Ripper-scarifiers
	YAN	Backhoe arrangements
	YAO	Winches and hydraulic controls
	YAP	Towed scrapers
	YAY	Operating spare parts
	YAZ	Other track type tractors
YB		Motor graders
	YBA	Motor grader (200 hp to 300 hp)
	YBB	Motor grader (160 hp to 200 hp)
	YBC	Motor grader (140 hp to 160 hp)
	YBD	Motor grader (120 hp to 140 hp)
	YBE	Motor grader (100 hp to 120 hp)
	YBF	Scarifier attachments
	YBY	Operating spare parts
	YBZ	Other motor graders
YC		Excavators
	YCA	Track type – backhoe (250 hp to 400 hp)
	YCB	Track type – backhoe (180 hp to 250 hp)
	YCC	Track type – backhoe (140 hp to 180 hp)
	YCD	Track type – backhoe (100 hp to 140 hp)

	YCE	Track type – backhoe (80 hp to 100 hp)
	YCF	Track type – backhoe (60 hp to 80 hp)
	YCG	Track type – backhoe (40 hp to 60 hp)
	YCH	Track type – backhoe (< 40 hp)
	YCI	Wheel type – backhoe (180 hp to 250 hp)
	YCJ	Wheel type – backhoe (140 hp to 180 hp)
	YCK	Wheel type – backhoe (100 hp to 140 hp)
	YCL	Wheel type – backhoe (80 hp to 100 hp)
	YCM	Wheel type – backhoe (60 hp to 80 hp)
	YCN	Wheel type – backhoe (40 hp to 60 hp)
	YCO	Wheel type – backhoe (< 40 hp)
	YCP	Track type – front shovel (250 hp to 400 hp)
	YCQ	Track type – front shovel (180 hp to 250 hp)
	YCR	Track type – front shovel (140 hp to 180 hp)
	YCS	Face shovel attachments
	YCT	Power shovel attachments
	YCU	Dragline attachments
	YCV	Clamshell attachments
	YCW	Combination tractor/backhoe
	YCY	Operating spare parts
	YCZ	Other excavators
YD		Skidders
	YDA	Motor skidder (150 hp to 200 hp)
	YDB	Motor skidder (120 hp to 150 hp)
	YDC	Motor skidder (100 hp to 120 hp)
	YDD	Motor skidder (80 hp to 100 hp)
	YDY	Operating spare parts
	YDZ	Other skidders
YE		Pipelayers
	YEA	Pipelayer (400 hp to 500 hp)
	YEB	Pipelayer (300 hp to 400 hp)
	YEC	Pipelayer (200 hp to 300 hp)
	YED	Pipelayer (150 hp to 200 hp)
	YEE	Pipelayer (100 hp to 150 hp)
	YEF	Midwestern sideboom – track tractors
	YEG	Midwestern sideboom – compactors
	YEH	Midwestern sideboom – wheel loaders
	YEY	Operating spare parts
	YEZ	Other pipelayers
YF		Wheel tractor scrapers
	YFA	Standard scraper (500 hp to 600 hp)
	YFB	Standard scraper (400 hp to 500 hp)
	YFC	Standard scraper (300 hp to 400 hp)
	YFD	Standard scraper (200 hp to 300 hp)
	YFE	Tandem powered scraper (500 hp to 600 hp)
	YFF	Tandem powered scraper (400 hp to 500 hp)
	YFG	Tandem powered scraper (300 hp to 400 hp)
	YFH	Tandem powered scraper (200 hp to 300 hp)
	YFI	Elevating scraper (400 hp to 500 hp)
	YFJ	Elevating scraper (300 hp to 400 hp)
	YFK	Elevating scraper (200 hp to 300 hp)
	YFL	Elevating scraper (100 hp to 200 hp)
	YFM	Tandem powered elevating scraper (400 hp to 500 hp)
	YFN	Tandem powered elevating scraper (300 hp to 400 hp)
	YFY	Operating spare parts
	YFZ	Other wheel tractor scrapers
YG		Off – highway trucks
	YGA	Diesel powered (800 hp to 900 hp)
	YGB	Diesel powered (700 hp to 800 hp)
	YGC	Diesel powered (600 hp to 700 hp)
	YGD	Diesel powered (500 hp to 600 hp)
	YGE	Diesel powered (400 hp to 500 hp)
	YGF	Diesel powered (300 hp to 400 hp)

	YGG	Diesel/electric (900 hp to 1100 hp)
	YGH	Diesel/electric (800 hp to 900 hp)
	YGI	Diesel/electric (700 hp to 800 hp)
	YGJ	Diesel/electric (600 hp to 700 hp)
	YGY	Operating spare parts
	YGZ	Other off-highway trucks
YH		Off-highway tractors
	YHA	Diesel powered (800 hp to 900 hp)
	YHB	Diesel powered (700 hp to 800 hp)
	YHC	Diesel powered (600 hp to 700 hp)
	YHD	Diesel powered (500 hp to 600 hp)
	YHE	Diesel powered (400 hp to 500 hp)
	YHY	Operating spare parts
	YHZ	Other off-highway tractors
YI		Wheel tractors
	YIA	Wheel tractor (300 hp to 400 hp)
	YIB	Wheel tractor (200 hp to 300 hp)
	YIC	Wheel tractor (150 hp to 200 hp)
	YID	Bulldozer blades
	YIE	Scarifier attachments
	YIY	Operating spare parts
	YIZ	Other wheel tractors
YJ		Compactors
	YJA	Sheepsfoot (300 hp to 350 hp)
	YJB	Sheepsfoot (250 hp to 300 hp)
	YJC	Sheepsfoot (200 hp to 250 hp)
	YJD	Towed sheepsfoot
	YJE	Driven grid/mesh drum
	YJF	Towed grid/mesh drum
	YJG	Driven smooth steel drum
	YJH	Towed smooth steel drum
	YJI	Driven multi-tyred roller
	YJJ	Towed multi-tyred roller
	YJK	Driven heavy pneumatic roller
	YJL	Towed heavy pneumatic roller
	YJM	Driven vibratory tamping foot
	YJN	Towed vibratory tamping foot
	YJO	High speed tamping foot
	YJP	Chopper wheels
	YJQ	Portable plate vibrators
	YJR	Portable tampers
	YJY	Operating spare parts
	YJZ	Other compaction equipment
YK		Wheel loaders
	YKA	Wheel loader (500 hp to 700 hp)
	YKB	Wheel loader (400 hp to 500 hp)
	YKC	Wheel loader (300 hp to 400 hp)
	YKD	Wheel loader (200 hp to 300 hp)
	YKE	Wheel loader (150 hp to 200 hp)
	YKF	Wheel loader (100 hp to 150 hp)
	YKG	Wheel loader (80 hp to 100 hp)
	YKH	Wheel loader (60 hp to 80 hp)
	YKI	Wheel loader (< 60 hp)
	YKJ	Wheel loader buckets
	YKK	Combination wheel loader/backhoe
	YKY	Operating spare parts
	YKZ	Other wheel loaders
YL		Track loaders
	YLA	Track loader (250 hp to 300 hp)
	YLB	Track loader (200 hp to 250 hp)
	YLC	Track loader (150 hp to 200 hp)
	YLD	Track loader (100 hp to 150 hp)
	YLE	Track loader (80 hp to 100 hp)

YM	YLF	Track loader (60 hp to 80 hp)
	YLG	Track loader (< 60 hp)
	YLH	General purpose buckets
	YLI	Multi purpose buckets
	YLJ	Side dump buckets
	YLY	Operating spare parts
	YLZ	Other track loaders
		Cranes
	YMA	Track type crane (> 2000 tonnes)
	YMB	Track type crane (1500 tonnes to 2000 tonnes)
	YMC	Track type crane (1000 tonnes to 1500 tonnes)
	YMD	Track type crane (800 tonnes to 1000 tonnes)
	YME	Track type crane (600 tonnes to 800 tonnes)
	YMF	Track type crane (400 tonnes to 600 tonnes)
	YMG	Track type crane (200 tonnes to 400 tonnes)
YN	YMH	Track type crane (100 tonnes to 200 tonnes)
	YMI	Track type crane (5 tonnes to 100 tonnes)
	YMJ	Wheel type crane (> 150 tonnes)
	YMK	Wheel type crane (100 tonnes to 150 tonnes)
	YML	Wheel type crane (80 tonnes to 100 tonnes)
	YMM	Wheel type crane (60 tonnes to 80 tonnes)
	YMN	Wheel type crane (40 tonnes to 60 tonnes)
	YMO	Wheel type crane (20 tonnes to 40 tonnes)
	YMP	Wheel type crane (10 tonnes to 20 tonnes)
	YMQ	Wheel type crane (< 10 tonnes)
	YMR	Sheerleg type crane
	YMS	Tower type crane
	YMT	Gantry/portal type crane
	YMU	Pedestal type crane
	YMV	Booms, jibs and accessories – track crane
YO	YMW	Booms, jibs and accessories – wheel crane
	YMX	Booms, jibs and accessories – other crane
	YMY	Operating spare parts
	YMZ	Other cranes
		Forklifts
	YNA	Forklifts – electrical
	YNB	Forklifts – gas driven
	YNC	Forklifts – diesel driven
	YND	Rough terrain forklifts
	YNE	Rough terrain telescopic handlers
	YNF	Forklift attachments to loaders
	YNG	Other forklift attachments
	YNY	Operating spare parts
	YNZ	Other forklifts
		Trucks and vehicles
	YOA	Dumper truck (> 20 m ³)
	YOB	Dumper truck (15 m ³ to 20 m ³)
	YOC	Dumper truck (10 m ³ to 15 m ³)
	YOD	Dumper truck (5 m ³ to 10 m ³)
	YOE	Dumper truck (< 5 m ³)
	YOF	Low loader truck (> 100 tonnes)
	YOG	Low loader truck (80 tonnes to 100 tonnes)
	YOH	Low loader truck (50 tonnes to 80 tonnes)
	YOI	Low loader truck (20 tonnes to 50 tonnes)
	YOJ	Low loader truck (< 20 tonnes)
	YOK	Multi rubber tyred vehicles – module transport
	YOL	Flat bed semi trailer (> 50 tonnes)
	YOM	Flat bed semi trailer (30 tonnes to 50 tonnes)
	YON	Flat bed semi trailer (10 tonnes to 30 tonnes)
	YOO	Flat bed truck (> 15 tonnes)
	YOP	Flat bed truck (10 tonnes to 15 tonnes)
	YOQ	Flat bed truck (5 tonnes to 10 tonnes)
	YOR	Flat bed truck (< 5 tonnes)

	YOS	Container trucks and semi-trailers
	YOT	Dry bulk tankers
	YOU	Liquid bulk tankers
	YOV	Gas tankers
	YOW	Service trucks and vehicles
	YOY	Operating spare parts
	YOZ	Other trucks
YP		Draglines
	YPA	Track type dragline (> 20 m ³)
	YPB	Track type dragline (10 m ³ to 20 m ³)
	YPC	Track type dragline (8 m ³ to 10 m ³)
	YPD	Track type dragline (5 m ³ to 8 m ³)
	YPE	Track type dragline (< 5 m ³)
	YPF	Wheel type dragline (> 5 m ³)
	YPG	Wheel type dragline (< 5 m ³)
	YPH	Walking dragline
	YPK	Dragline booms, buckets and accessories
	YPY	Operating spare parts
	YPZ	Other draglines
YQ		Pile driving equipment
	YQA	Track type purpose built piling machines
	YQB	Wheel type purpose built piling machines
	YQC	Mountable booms, weights and accessories
	YQD	Piling hammers – diesel
	YQE	Piling hammers – steam
	YQF	Piling hammers – air
	YQG	Piling hammers – hydraulic
	YQH	Pile extractors
	YQI	Pile frames and leaders
	YQJ	Earth boring equipment
	YQY	Operating spare parts
	YQZ	Other piling equipment
YR		Tracklaying equipment
	YRA	Tamping machines
	YRB	Alignment machines
	YRC	Ballasting wagons
	YRD	Prime mover/locomotives
	YRE	Combination tracklayers
	YRF	Sleeper wagons
	YRG	Crane jigs
	YRH	Track welding equipment
	YRI	Hydraulics jacks and jigs
	YRJ	Pneumatic jacks and hammers
	YRK	Tank wagons
	YRL	Rail wagons
	YRY	Operating spare parts
	YRZ	Other tracklaying equipment
YS		Tunnels and cavern equipment
	YSA	Full face boring machines
	YSB	Raisers and lifts
	YSC	Drilling machines and equipment
	YSD	Pneumatic jacks and hammers
	YSE	Winches and hoists
	YSF	Air supply and extract systems
	YSG	Power supply and lighting systems
	YSH	Dewatering systems
	YSI	Mucking wagons and equipment
	YSK	Drill bits and tools
	YSY	Operating spare parts
	YSZ	Other tunnels and cavern construction equipment
YT		Hoists and winches
	YTA	Jacking towers and equipment
	YTB	Pneumatic winches

	YTC	Electric winches
	YTD	Hydraulic winches
	YTE	Personnel hoists
	YTF	Goods hoists
	YTG	Builders hoists
	YTY	Operating spare parts
	YTZ	Other hoists and winches
YU		Welding, cutting and bending equipment
	YUA	Alignment jigs
	YUB	Automatic orbital welding machines
	YUC	Automatic orbital cutters
	YUD	End preparation mills and grinders
	YUE	Pipeline bending machines
	YUF	AC/DC – welding equipment
	YUG	MIG/MAG – welding equipment
	YUH	TIG – welding equipment
	YUI	Automatic welding equipment
	YUJ	Gas welding/brazing equipment
	YUK	Gas bottles and cutting equipment
	YUL	Plate rollers, benders and cutters
	YUM	Ovens and heaters
	YUN	Plasma cutting equipment
	YUO	Power hacksaws
	YUY	Operating spare parts
	YUZ	Other welding, cutting and bending equipment
YV		Air compressors
	YVA	Portable air compressor (1200 cfm to 1500 cfm)
	YVB	Portable air compressor (900 cfm to 1200 cfm)
	YVC	Portable air compressor (600 cfm to 900 cfm)
	YVD	Portable air compressor (400 cfm to 600 cfm)
	YVE	Portable air compressor (200 cfm to 400 cfm)
	YVF	Portable air compressor (100 cfm to 200 cfm)
	YVG	Portable air compressor (< 100 cfm)
	YVH	Stationary air compressor (> 3000 cfm)
	YVI	Stationary air compressor (2000 cfm to 3000 cfm)
	YVJ	Stationary air compressor (1500 cfm to 2000 cfm)
	YVK	Stationary air compressor (1000 cfm to 1500 cfm)
	YVL	Stationary air compressor (500 cfm to 1000 cfm)
	YVM	Stationary air compressor (< 500 cfm)
	YVQ	Compressor hoses, fittings and accessories
	YVY	Operating spare parts
	YVZ	Other air compressors
YW		Generators
	YWA	Diesel motor generator sets (800 KVA to 1000 KVA)
	YWB	Diesel motor generator sets (600 KVA to 800 KVA)
	YWC	Diesel motor generator sets (400 KVA to 600 KVA)
	YWD	Diesel motor generator sets (200 KVA to 400 KVA)
	YWE	Diesel motor generator sets (100 KVA to 200 KVA)
	YWF	Diesel motor generator sets (50 KVA to 100 KVA)
	YWG	Diesel motor generator sets (< 50 KVA)
	YWH	Natural gas motor generator sets (400 KVA to 600 KVA)
	YWI	Natural gas motor generator sets (200 KVA to 400 KVA)
	YWJ	Natural gas motor generator sets (100 KVA to 200 KVA)
	YWK	Natural gas motor generator sets (50 KVA to 100 KVA)
	YWL	Natural gas motor generator sets (< 50 KVA)
	YWM	Petrol motor generator sets (> 10 KVA)
	YWN	Petrol motor generator sets (7 KVA to 10 KVA)
	YWO	Petrol motor generator sets (4 KVA to 7 KVA)
	YWP	Petrol motor generator sets (2 KVA to 4 KVA)
	YWQ	Petrol motor generator sets (< 2 KVA)
	YWR	Gas turbine generator sets (> 10 MVA)
	YWS	Gas turbine generator sets (7 MVA to 10 MVA)
	YWT	Gas turbine generator sets (4 MVA to 7 MVA)

	YWU	Gas turbine generator sets (2 MVA to 4 MVA)
	YVV	Gas turbine generator sets (< 2 MVA)
	YWY	Operating spare parts
	YWZ	Other generator sets
YX		Concreting equipment
	YXA	Concrete batching plant (> 100 m ³ /hr)
	YXB	Concrete batching plant (80 m ³ /hr to 100 m ³ /hr)
	YXC	Concrete batching plant (60 m ³ /hr to 80 m ³ /hr)
	YXD	Concrete batching plant (40 m ³ /hr to 60 m ³ /hr)
	YXE	Concrete batching plant (20 m ³ /hr to 40 m ³ /hr)
	YXF	Concrete batching plant (10 m ³ /hr to 20 m ³ /hr)
	YXG	Concrete batching plant (< 10 m ³ /hr)
	YXH	Concrete mixers (> 750 l)
	YXI	Concrete mixers (500 l to 750 l)
	YXJ	Concrete mixers (300 l to 500 l)
	YXK	Concrete mixers (200 l to 300 l)
	YXL	Concrete mixers (100 l to 200 l)
	YXM	Concrete mixers (< 100 l)
	YXN	Concrete transporters (> 14 m ³ /hr)
	YXO	Concrete transporters (10 m ³ /hr to 14 m ³ /hr)
	YXP	Concrete transporters (8 m ³ /hr to 10 m ³ /hr)
	YXQ	Concrete transporters (6 m ³ /hr to 8 m ³ /hr)
	YXR	Concrete transporters (4 m ³ /hr to 6 m ³ /hr)
	YXS	Concrete transporters (< 4 m ³ /hr)
	YXT	Storage silos, hoppers and screens
	YXU	Concrete pumps (> 100 m ³ /hr)
	YXV	Concrete pumps (60 m ³ /hr to 100 m ³ /hr)
	YXW	Concrete pumps (20 m ³ /hr to 60 m ³ /hr)
	YXX	Concrete pumps (< 20 m ³ /hr)
	YXY	Operating spare parts
	YXZ	Other concreting equipment
YY		Spreaders and pavers
	YYA	Asphalt paver (> 3 m)
	YYB	Asphalt paver (2,5 m to 3,0 m)
	YYC	Asphalt paver (2,0 m to 2,5 m)
	YYD	Asphalt paver (< 2,0 m)
	YYE	Concrete paver (> 3 m)
	YYF	Concrete paver (2,5 m to 3,0 m)
	YYG	Concrete paver (2,0 m to 2,5 m)
	YYH	Concrete paver (< 2,0 m)
	YYI	Screed paver/finisher (> 3 m)
	YYJ	Screed paver/finisher (2,5 m to 3,0 m)
	YYK	Screed paver/finisher (2,0 m to 2,5 m)
	YYL	Screed paver/finisher (< 2,0 m)
	YYM	Asphalt finisher (> 3 m)
	YYN	Asphalt finisher (2,5 m to 3,0 m)
	YYO	Asphalt finisher (2,0 m to 2,5 m)
	YYP	Asphalt finisher (< 2,0 m)
	YYY	Operating spare parts
	YYZ	Other spreaders and pavers
YZ		Other landbased plant and equipment
	YZA	Quarry products crushers and screens
	YZB	Bins and hoppers
	YZC	Weigh scales
	YZD	Conveying systems
	YZE	Mobile crusher plants
	YZF	Mobile drilling rigs
	YZG	Fixed drilling rigs
	YZH	Augers and borers
	YZI	Scarifiers/dosers
	YZJ	Landing equipment
	YZK	Surface treatment equipment
	YZL	Heaters/coolers

YZM	Fixed wing aircraft
YZN	Helicopters
YZO	4WD vehicles
YZP	Cars, station wagons and utility vehicles
YZQ	Crew busses
YZR	Scaffolding and scaffolding systems
YZS	Containers
YZT	Skylifts/conveying system
YZU	Snow removal machinery
YZV	Sanding and sweeping machinery
YZW	Water and salt spraying machinery
YZY	Operating spare parts
YZZ	Other
