

Supplier's documentation of equipment

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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 Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.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 and Gas Association, The Federation of Norwegian Industry, Norwegian Shipowners' Association and The Petroleum Safety Authority Norway.

NORSOK standards are administered and published by Standards Norway.

Supplier's documentation of equipment

1 Scope

This NORSOK standard specifies the documentation process and deliverables for petroleum industry equipment.

This NORSOK standard defines life cycle documentation such as

- describing/evaluating a bid,
- engineering a plant which the equipment shall be a part of,
- receiving, handling, preserving, installation and commissioning,
- start, operation, maintenance, decommissioning and removal,
- verifying that the delivery is according to specified requirements.

This NORSOK standard gives an overall description of different types of documents and a way to group these. It describes deliverables at different phases of a delivery. Further detailing is foreseen, where suitable.

This NORSOK standard applies to documentation on any media.

This standard is based on NS 5820 and will replace the standard within the petroleum industry.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NS-EN ISO 12100, *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology*

NORSOK Z-008, *Risk based maintenance and consequence classification – Rev. 3, June 2011*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1

as built

last revision of a life cycle information item updated to reflect the true status of completed work

Note 1 to entry: A limited amount of information stored on various types of media.

3.2

can

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

- 3.3
certificate**
document which confirms that a product conforms to a given standard or specification information prepared for a special purpose, e.g. to describe, specify, report or verify
- 3.4
certificate of conformity**
document issued under the rules of a certification system, indicating that adequate confidence is provided that a duly identified product, process or service is in conformity with a specific standard or other normative document
- 3.5
contractor**
provider of one or more of the following services directly to customer: Engineering (E), Procurement (P), Construction (C), Installation (I) and Hook-up (H)
- 3.6
customer/client**
contract party which in its own name or on behalf of others, issues an inquiry or places an order
- 3.7
DFI, design, fabrication and installation résumé**
documents only applicable for permanently installed load bearing structures to provide a concentrated summary containing the most relevant data from the design, fabrication and installation phase, including which areas are the most critical and a general description of the installation at the start of the operational phase
- 3.8
dispatch dossier**
documents relevant for handling, transportation and preparation prior to commissioning and start up
- Note 1 to entry: To be physically shipped with the equipment.
- 3.9
document**
A limited amount of information stored on various types of media
- 3.10
documentation**
information prepared for a special purpose, e.g. to describe, specify, report or verify
- 3.11
final documentation/documentation for operation**
documentation that consists of the latest revision of the documentation required to operate maintain the delivery
- 3.12
International System of Units
SI**
system of units, based on the International System of Quantities, their names and symbols, including a series of prefixes and their names and symbols, together with rules or their use, adopted by the General Conference on Weights and Measures (CGPM)
- [SOURCE: ISO 80000-1:2009, *Quantities and units-Part 1: General*]
- 3.13
LCI, Life cycle information**
all information necessary in all phases of the project execution and equipment life span including both information delivered to customer and information retained on behalf of customer
- 3.14
may**
verbal form used to indicate a course of action permissible within the limits of this NORSOK standard

3.15**native format**

original editable file format used to produce and update the document/drawing

3.16**packaged units**

system consisting of equipment, components, instruments and structure elements pre-assembled into a functional unit on a transportable skid or frame

3.17**recipient**

person or organization who receives, unpacks and installs the equipment

Note 1 to entry: The recipient may also take responsibility for intermediate storage, preservation and preparation of the equipment and documentation prior to take over by user.

Note 2 to entry: The recipient to be defined by the customer.

3.18**retained documentation**

documentation which is not submitted to the customer, but available on request for information purposes for an agreed period of time

Note 1 to entry: This does not include supplier or contractor internal documents which can be reviewed on suppliers or contractors premises.

3.19**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

3.20**should**

verbal form used to 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

3.21**standard documents**

documents which supports standard equipment/products, and general documents that support tailor made equipment/products

Note 1 to entry: The information should not include any plant/project specific identification/information.

3.22**standard equipment and tools**

Manufacturer's equipment/unit typically ordered from manufacturer's catalogue

Note 1 to entry: Standard equipment is identified with a unique type/model identification built up by the manufacturer. Standard equipment may include reused part numbers from previous delivery without being a part of a standard catalogue.

3.23**sub-contractor**

provider of services directly to Contractor(s)

3.24**sub-supplier**

provider of services directly to Supplier(s)

3.25**supplier**

party that is responsible for the product, process and/or service and is able to ensure that quality assurance is exercised

Note 1 to entry: The definition may apply to manufacturers, distributors, importers, assemblers, service organizations, etc.

3.26**traceability**

ability to trace the history, application or location of an item or activity, or similar items or activities, by means of recorded identification

3.27**user**

person or organization responsible for the equipment in operation

Note 1 to entry: The user to be defined by the customer.

3.28**user documentation**

all documentation required to lift, handle, install, operate and maintain the equipment

3.29**verification of conformity**

confirmation, by examination of evidence, that a product, process or service fulfils specified requirements

3.30**verifying documentation**

documentation which confirms that verification has taken place and that certain defined requirements or results have been achieved

4 Abbreviations

CDRL	contractor document requirement list
CMDL	contractor master document list
DFI	design, fabrication and installation
DFO	documentation for operation
DN	nominal diameter
DRL	document requirement list
EN	European Standard
ENS	Engineering Numbering System (ENS): defines clear and unambiguous document and tag coding in order to ensure that the user obtains documentation and equipment with the required document and tag code during all phases.
FAT	factory acceptance test
FRB	fabrication record book
HSE	health, safety and environment
IEC	International Electro technical Commission
IOM	installation, operation and maintenance
ISO	International Organization for Standardization
MRB	manufacturing record book
MSDS	material safety data sheet
NDE	non destructive examination
NDT	non destructive test
NS	Norwegian Standard
SDRL	supplier document requirement list
SMDL	supplier master document list
SPIR	spare parts interchangeability register
WPS	welding procedure specification

5 General guideline

5.1 General

The figure below describes relevant information required in the different project phases and when the information shall be started and released.

The figure emphasizes the importance of establishing a maintenance philosophy early, as this is the basis for determination of relevant content and information in all project phases.

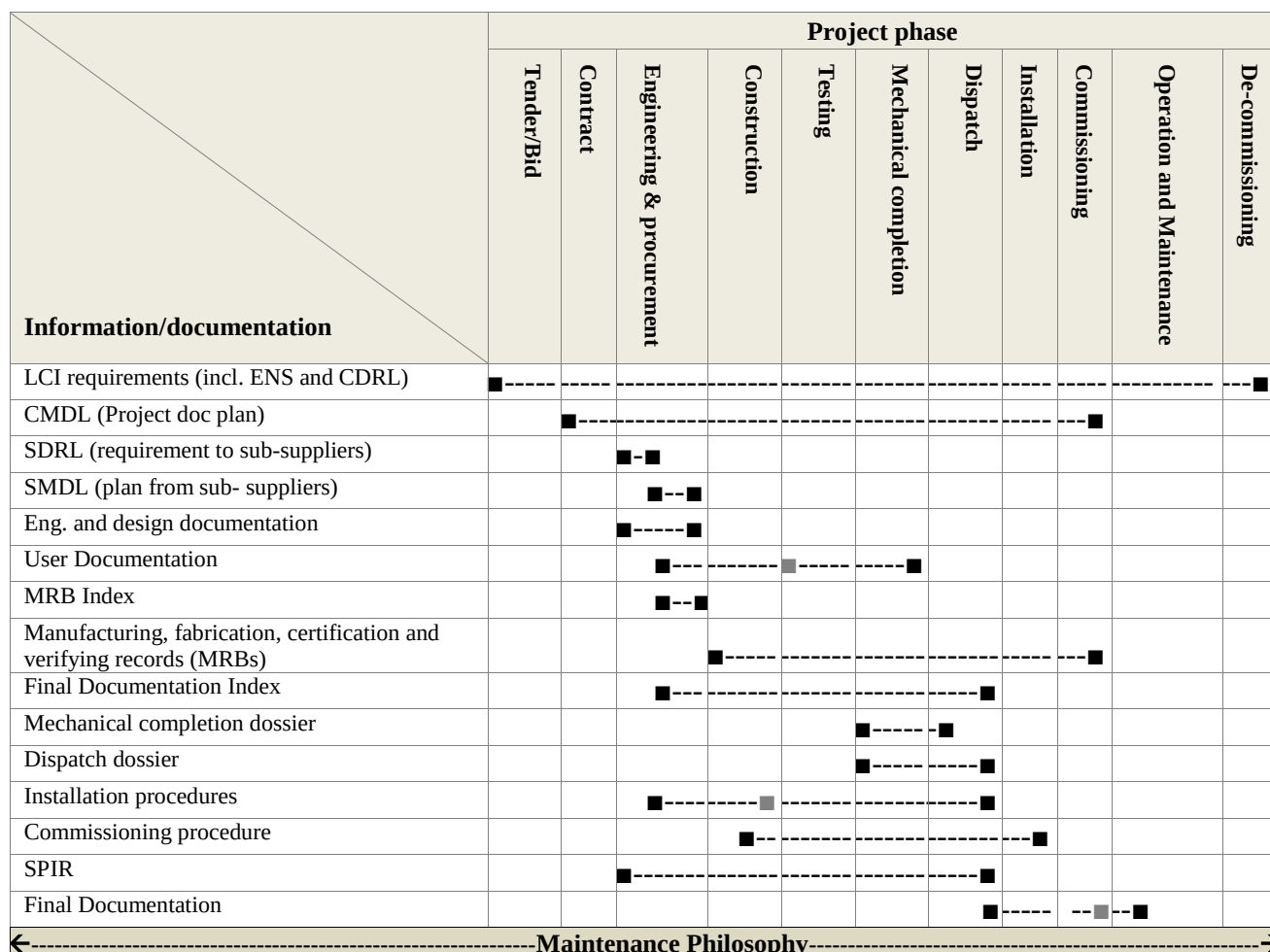


Figure 1 — Life cycle information

5.2 Acceptance of documentation

Documents not clearly marked “preliminary” or “for information only” etc. are binding.

The customer shall give an acceptance code to the documents submitted for review and acceptance. The following acceptance codes shall be used:

- Code 1: Accepted;
- Code 2: Accepted with comments incorporated. Revise and resubmit. For Code 2 documents the work can continue;
- Code 3: Not accepted. Revise and resubmit;
- Code 4: For information only. For Code 4 the documents shall not be resubmitted;

e) Code 5: Interface frozen.

Parts of final documentation shall be updated to "Final" or "As built" as agreed upon between the parties.

For equipment specially designed to suit the customer's plant the supplier shall await the customer's acceptance before the documents concerned can be released for manufacturing.

The customer's acceptance code for received documentation shall be submitted to the supplier within 10 working days after receipt, or within the time frame the parties agree upon.

10 working days shall also apply to all revisions for both the customer and the supplier.

5.3 Alteration of accepted documentation

If one of the parties wishes to alter documentation or data, which have been accepted, or if review is delayed, negotiations shall take place.

Critical errors in documents shall be corrected even if the customer has accepted the documentation.

5.4 Document lists

5.4.1 The document requirements and documents agreed upon between the different parties are handled by different types of lists.

5.4.2 The different lists applicable are included in the recommended process diagram in Figure 2.

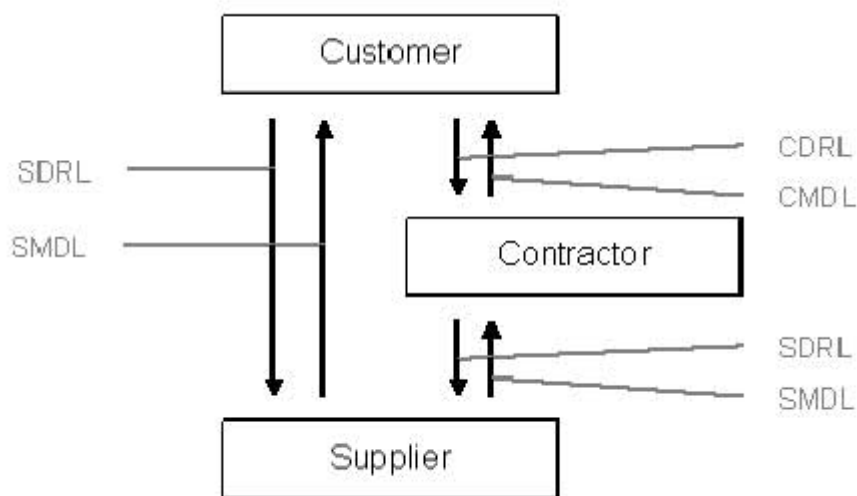


Figure 2 — Document lists

5.4.3 The master document list (CMDL, SMDL) shall contain:

- document title and number;
- documents submittal dates;
- documents to be included in the bid;
- documents to be submitted for acceptance, review or information to the customer;
- documents to be retained by supplier or contractor;

- f) documents to be included in the final documentation;
- g) early access documentation.

Documentation not needed for operation and maintenance shall be retained by supplier or contractor.

NOTE The content of the master document list may be based on Annex B.

5.4.4 The document list shall cover technical and other relevant documents to be submitted to the customer. The standard procedure for working out a document list is as follows:

- a) the customer shall in his inquiry state his requirements to the documentation, or refer to this NORSOK standard and let the supplier make a proposal;
- b) the supplier shall in his bid comment and adjust the document list proposed by the customer, or prepare his own proposal if requested in the inquiry;
- c) the customer and the supplier shall during the contract negotiations agree upon a document list, which shall be a part of the order;
- d) the document list shall be kept updated until the delivery is completed.

5.5 Documentation of standard equipment and tools

If the scope and design of the equipment is the supplier's standard and complete standard documentation is available at the time of the bid, this shall be accepted as a complete basis for the customer's engineering, operation and maintenance.

A condition for accepting standard documentation is that it complies with the intentions of this NORSOK standard.

Documentation for other than the supplied equipment shall not be part of the delivery.

If the standard documentation covers several equipment models or versions, equipment lists or other project documentation must give reference to proper models used for the installation or delivery:

- a) brochures catalogues, data sheets and product general arrangement and interface drawings for the particular equipment: These should give sufficient information about performance, function, consumption, main dimensions, weight and materials;
- b) installation, operation and maintenance manuals: These cover all handling, installation, preparation, operation, maintenance, special tools and spare parts in a comprehensive manner.

6 Bid documentation

6.1 General

A description of documentation following the principles in this NORSOK standard shall be included in the bid.

In the proposed document lists (see Annex B) types of documents, which shall be included in the bid, are noted.

If other documentation is requested this shall be specified in the inquiry.

The bid documentation shall be in reasonable proportion to the value/complexity of a possible delivery. The documentation shall be limited to information necessary to determine whether the equipment is technically acceptable.

6.2 Design and operation

The bid shall include the necessary product descriptions, brochures and catalogues which concern design and operation of the equipment. This may be functional description, calculation, data sheets, curves, tables, flow diagrams or general arrangement drawings.

The supplier shall include a list of information needed from customer including due dates, e.g. available space in control room, soil-data, production volumes and pressures.

6.3 Data concerning installation, operation and maintenance

The bid shall state if the supplier requires that this personnel shall take part in or supervise the installations, commissioning or start-up.

When reasonable from the scope and complexity of the delivery, the customer may require information about:

- a) consumption data;
- b) personnel requirements and estimated time for installation, preparation, commissioning and operation;
- c) maintenance philosophy and description of maintenance documentation.

6.4 Exemptions from specifications and other requirements in the inquiry

The bid shall contain a list stating all deviations from the requirements in the inquiry, and proposed alternative requirements.

6.5 Reference list

The bid should contain a list of references of earlier deliveries of similar equipment.

6.6 Production plan

The bid shall contain a production plan for the main activities connected with engineering, purchase and production. The customer and supplier shall during the contract negotiations agree upon the level of detailing and delivery date for the production plan and this shall be a part of the order.

6.7 Quality plan

The bid shall include a proposed quality plan from the supplier. The customer and the supplier shall during the contract negotiations agree upon the level of detailing for the quality plan.

6.8 Health, safety and environment (HSE)

The bid shall include a proposed HSE plan from the supplier, if relevant for the type of delivery. The customer and the supplier shall during the contract negotiations agree upon the level of detailing for the HSE plan.

7 Engineering documentation

7.1 General

The documentation shall enable the customer to perform the detailed engineering of all his systems which concern or depend on the product or system to be delivered. Such documentation shall be included in the document list.

The supplier may combine different information types in the same drawing or document.

If all documentation cannot be completed within the time limit, the customer and the supplier can agree the issuing of preliminary versions.

Customer's requirements shall be followed and no deviation will be accepted without an accepted deviation request.

7.2 Master equipment list

The master equipment list shall be prepared for all types of assembled equipment. The list should include, but not be limited to, the following information:

- manufacture of equipment;
- part number/material number (complete designation);
- reference to catalogue and/or data sheets;
- tag number¹⁾

7.3 Data sheets

The supplier shall complete the data sheets for tagged equipment specified by the customer, or provide relevant manufacturer's standard data sheets / product bulletins.

7.4 Calculations, curves and tables

Performance, characteristics and functional parameters shall be described by calculations, curves and tables according to what is customary for equipment and to the extent such data are of importance for interfaces to plans or systems.

7.5 Flow diagrams

Deliveries, which include treatment of one or multiple process flows, shall be described by flow diagrams.

Both the main process and auxiliary systems shall be described. Process parameters affecting the customer's installation shall be stated and tag number on relevant equipment shall be shown.

7.6 Piping and instrumentation diagrams

Instrumented processes and systems shall be described on diagrams. Diagram and symbols standards (if available), and tag number shall be according to customer's requirements.

Piping and instrumentations diagrams shall mainly show

- equipment and components, with tagging as specified by the customer,
- pipelines with dimensions, nominal pressure, temperature and materials,
- valves and connections,
- instrumentation, including safety devices, control and monitoring equipment,
- signal lines, sufficient to describe the function,
- interfaces showing the limits of responsibility between supplier and customer,

1) Equipment subject to inspection, certification or maintenance.

- heat-tracing cables and insulation for pipelines, valves, instruments, vessels, etc.

7.7 Consumption data

If utilities consumption is not fully described, a document stating the normal and maximum consumption of the equipment or unit shall be prepared.

The following data may apply:

- electric power (current, voltage frequency);
- other power sources (oil, gas, air, hydraulic, fluid etc.);
- cooling/heating medium;
- other types of consumption affecting the customer's installations or utilities arrangement.

7.8 Data for health, safety and environment

Information shall be given concerning health, safety and environment, e.g.:

- chemical substances that may be hazardous to personnel or environment. For all these chemicals data sheets shall be available during installation, operation and maintenance;
- substances that in connection with maintenance, discarding or similar, require special precautions for safe destruction;
- noise;
- vibration;
- radiation and/or radioactivity;
- dust;
- ergonomics in operation and maintenance;
- risk and criticality analyses.

7.9 General arrangement

General arrangement drawings shall be prepared for all packaged units. A general arrangement drawing includes overall dimensions, installation details, weight, and indicates location of connections / service supply.

General arrangement drawings shall contain the following information:

- main dimensions;
- foundation data;
- location and identification of main components;
- necessary space for disassembly and maintenance;
- total weight.

General arrangement drawings shall be prepared for all packaged units, and include in addition to above:

- total weight, wet and dry and in operation condition;

- location of centre of gravity;
- possible thermal expansion;
- weight centre of gravity and main dimensions of disassembled units/components over 50 kg. Lifting lugs for disassembling and their location shall be shown;
- identification and location of all external pipe connections as well as requirements for flexible connections. Locations shall be dimensioned and tolerances shown. If necessary, in separate drawings;
- identifications and location of all external electrical and control and monitoring connections (may be given in separate drawings describing the electrical arrangement and instrumentation).

7.10 Foundation drawings

If the general arrangement drawing (see 7.9) does not give sufficient information about the foundation, a separate foundation drawing shall be prepared.

The following information shall be included in such a drawing:

- the outer dimensions and footprint of the support frame or foundation supports;
- the size, grade and location of the foundation bolts and torque where this is necessary;
- forces and moments transferred to load bearing structures, both under normal operation and extreme conditions;
- details for adjustment and alignment.

7.11 Pipe connections

The supplier shall prepare a list of all external pipe connections with reference to the location in the general arrangement drawing.

This list shall state:

- purpose of the connection;
- dimension (DN);
- nominal pressure (PN), materials, flange standard, thread standard;
- maximum acceptable load from external connections;
- thermal expansion of heat affected nozzles.

7.12 Block diagram

The block diagram shall show the relation between the main functions or the main components in the system or installation. This diagram shall identify interface between the customer's and the supplier's responsibilities.

7.13 Termination diagram for external connections

The diagram shall identify all connections to the customer's power supply and control system.

Separate diagrams shall be made for hydraulic, pneumatic and electrical connections.

7.14 Single line diagram

The single line diagram shall show the main circuits and components in the electrical distribution system.

The drawing shall contain identification of and main data for the components, marked as specified by the customer.

7.15 Instrument index

The supplier shall prepare an index of all instruments included in the delivery.

The index shall include all measuring elements, transmitters, final control element (valves, etc.), indicators and positioners (switches, etc.).

The instrument index shall contain the following information:

- the component's identification number;
- description of the component hook-up;
- component type;
- the component supplier manufacturer;
- reference to data sheets, process and instrumentation diagram (P&ID), installation drawings, loop drawings, etc., to the extent such documentation is within suppliers scope of supply.

The instrument index shall be made according to the customer's specified format, content and numbering, if such are provided.

7.16 Installation drawings for instruments

If the customer shall install instruments, detailed drawings for installation and connection shall be prepared by the supplier.

Each drawing should cover only one instrument type. The drawings shall cover electrical, pneumatic and hydraulic instrument units.

7.17 Logic diagram

The supplier shall describe his internal system and specify requirements for external control functions. The description shall be sufficiently detailed to ensure that the customer can specify and prepare documentation for all external inputs.

Modes of operation like starting, shutdown, alarm and trip functions shall be indicated in a table.

7.18 Loop diagram

The supplier should work out loop diagrams for control loops and monitoring loops. These shall cover all internal connections for the delivery.

The diagrams shall cover electrical circuits in the loop and refer to pneumatic and/or hydraulic supply and contain as a minimum the following information:

- instrument with identification number and the terminal number of the connection;
- reference to all cables in a loop;

- all connections in junction boxes, control panels, marshalling/control cabinet stating connection elements and references to terminals.

Each diagram should only show loops having functional interface and a part list for components having identification numbers,

If the delivery includes control and monitoring loops and connections to these the supplier shall prepare a complete loop diagram including connections to and from control and monitoring systems.

7.19 Cable list

The cable list shall contain data for all types of cables included in the delivery, and shall include cable number, length, size, number of wires, cable gland sizes, etc.

7.20 Functional description

The equipment shall be described with regard to all modes of operation. This should include start-up, operation, shutdown, alarm and trip as relevant for the system or type of equipment.

7.21 Circuit diagrams

If relevant for operation, faultfinding or maintenance purposes, circuit diagrams shall be prepared for feeders and control circuits.

Reference shall be made to the supplier's equipment and terminal marking.

The power circuit shall be shown to the extent necessary for the understanding of the circuit functions.

Contactors and terminal blocks shall be included.

All marking in the circuit diagrams shall be in accordance with the marking of the equipment.

The principles of the circuit diagrams shall be in accordance with relevant IEC standards.

8 Documentation for dispatch, receipt, storage and installation

8.1 General

The supplier shall supply the documentation needed to enable the customer to evaluate the dispatch and make plans for receipt, storage and installation of the equipment.

8.2 Documentation available to the customer prior to dispatch

Documentation for preservation, packing and transportation method shall be available to the customer prior to dispatch of the equipment.

8.3 Documentation available to recipient prior to delivery

The following documentation shall be available to the recipient prior to delivery of the equipment:

- procedure for receiving inspection required by the supplier;
- requirements for storage and preservation;
- procedures and necessary documentation for installation.

8.4 Documentation available to recipient at delivery (dispatch dossier)

The following documentation shall be available to the recipient no later than at delivery of the equipment:

- packing lists;
- instructions for transport, handling, lifting and preservation;
- instructions for unpacking, if special precautions are required during unpacking;
- completed forms for mechanical completion. This applies only if the order includes a clause stating that the supplier shall complete forms forming a part of the customer's system for mechanical completion;
- certificate of conformity;
- preservation log, if this is specified in the order;
- certificate for lifting equipment;
- material certificates if welding is required at receipt.

9 Installation, operation and maintenance (IOM) information

9.1 General

IOM documents shall, in an organized manner, provide sufficient information to install, operate and maintain the equipment in a safe, economical and functionally correct manner according to the agreed maintenance philosophy.

NOTE Examples of structure, content and layout of IOM documents can be used to clarify and agree documentation scope of supply prior to contract award. The use of standard or specially prepared documentation shall be agreed upon.

The IOM documents shall cover all equipment in the delivery, including sub suppliers delivery.

References to drawings shall be given where this is necessary.

IOM documents shall have a detailed table of content.

NOTE The IOM documents should be used as basis for training material to the project.

9.2 Standard IOM information

The supplier's standard IOM documents shall be used if it fulfills the intentions of this NORSOK standard.

9.3 Specially prepared IOM information

If the supplier does not have a standard for IOM, documentation shall be prepared to fulfill the intentions of this NORSOK standard.

NOTE Annex A gives an example of detailed structure and requirement for a typical IOM document.

10 Manufacturing, test and verifying documentation

10.1 General

The supplier shall prepare the necessary documents to demonstrate that the requirements with respect to design, calculation, production, testing and possible specified traceability requirements for materials and fabrication, are fulfilled. This information is presented in MRBs and in DFI resume.

The MRB contains product specific information and the DFI resume contains process verifying information.

The documentation shall be stored according to contract regulations and national law.

If the customer requires manufacturing and/or verifying documentation submitted, this shall be agreed upon and stated in the document list.

10.2 Manufacturing record book

Manufacturing record book is a collection of verifying documents and drawings required to document that the equipment or material is in compliance with all Company and authoritative regulations.

For type approved, or certified equipment, the document requirements may be reduced.

If the documentation normally contained in MRB is issued separately, a reference to such documents is sufficient in the MRB.

MBR may include

- introduction and MRB index,
- list of certificates,
- analyses, tests, calculations, curves and tables,
- balancing certificates,
- calibration certificates,
- certificates needed for re-certification of equipment,
- certificates of conformance,
- documentation for CE marking,
- final inspection,
- final test/acceptance with customer representative,
- Instrument calculations (safety and relief valves),
- lifting certificates,
- manufacturing reports,
- material certificates,
- material testing and control,
- material traceability list,

- mechanical/structural calculations and analyses,
- NDE drawings, sketches and other NDE doc.,
- nonconformance reports,
- painting reports,
- performance / functional test reports,
- photos of equipment/inspections ;
- pressure test certificates,
- telecommunication test report(s), FAT reports, Vendor reports, MC&C reports,
- testing/acceptance after installation,
- third party verification reports,
- type Cert.'s/EX Certificates/Product Cert.'s. issued by third party,
- weight certificates,
- weld summary index and NDE log,
- welding reports,
- welding procedure qualification records (where applicable).

10.3 Design, fabrication and installation résumé

DFI résumés shall be prepared for load bearing structures in order to document proper operational capabilities related to stress and fatigue.

The main objective of the DFI résumé is to provide the operations organization with a concentrated summary containing the most relevant data from the design, fabrication and installation phase, including which areas are the most critical and a general description of the installation at the start of the operational phase.

10.4 Certificates

A certificate of conformity covering the complete scope of supply is required. Rules and regulations may require one or more of the following certificates:

- certificates needed for recertification;
- Ex- certificates;
- material certificates;
- calibration certificates;
- product certificates issued by a third party;
- lifting certificates;
- other certificates, specified by the customer.

10.5 Test procedures and reports

Test procedures and reports may include:

- material testing and control,
- manufacturing test and control,
- final test/acceptance with the customer or his representative present,
- final inspection, preservation, packing and dispatch,
- third party verification,
- testing/acceptance after installation.

11 Preparation and handling of documentation

11.1 Formats

The medium for the documentation, the number of copies and the way of submittal shall be agreed upon with the customer.

Documents or drawings may be supplied in a compiled electronic format.

Documents and drawings shall be supplied in a native format when needed for further editing by the customer.

For 3D models, view or surface models to be supplied at an agreed format.

11.2 Document review

In every part of the supply chain, documentation shall be reviewed and approved by the supplier.

Documents to be reviewed by the customer are identified on the document lists as review documents.

Other documents are for information only.

If not agreed otherwise in contract, each party should be given 10 working days.

11.3 Document quality

The documentation shall be made in a way which makes it easy to read and suitable for use.

11.4 Units

Units shall be in accordance with the SI-system. Dimensions shall be given in millimeters.

Any exceptions shall be specified, e.g. pipe sizes.

11.5 Language

If nothing else is agreed, the language shall be English.

11.6 Identification

It shall be possible to identify all documents by a unique document number. All documents shall be revision controlled.

When a collection of documents is grouped to a common package, this package shall have its own document number.

11.7 Document transmission

Documentation transmittal shall have a covering letter identifying each single document in the transmittal.

11.8 Final documentation

All documentation marked as final documentation in the supplier and contractor document requirement list (SDRL/CDRL), will be delivered as stand-alone documents in “as-built” revisions.

Annex A **(informative)**

Structure of IOM information

A.1 IOM documentation guideline

The IOM documentation should describe how the IOM information is structured and how it should be used. Address and telephone number for contacts for assistance should also be given.

A.2 Main data

Information for the complete equipment showing all data necessary for the understanding of the equipment's mode of operation should be given. Information regarding health, environment and safety should be emphasized.

Other data may be

- restrictions in guarantee,
- performance data,
- restrictions in use,
- main connections and requirements on connected systems,
- weight and outline dimensions.

A.3 Technical description

Design and function should be described to facilitate a better understanding of the different parts of the operating and maintenance instructions.

If the complete equipment package consists of several systems, the main system should be described first, followed by descriptions of each subsystem and their interconnections.

A.4 Preparation

All preparations to be made from the moment the installation is completed and until the equipment is ready for normal operation, should be described. The description should include tests, adjustments, calibrations and necessary inspections. The sequence of the activities should be stated as well as all tools, auxiliary equipment, consumables and spare parts that may be needed. If necessary, references to detailed technical information (e.g. performance and operational data) in other parts of the user manual should be made.

A.5 Operation instructions

A.5.1 Start, normal operation, stop and emergency stop

The information should be given in a logical sequence and should include all operations and observations which the operator should undertake. These may be as follows:

- check list for prestart preparations;
- prestart settings and precautions;
- the starting sequence should include all modes of operation (manual, automatic, remote control, etc.);
- observations which should be made during the starting sequence;
- precautions concerning interruption of the starting sequence;
- operations and observations during normal operation;
- normal stop;
- emergency stop;
- start after emergency stop.

A.5.2 Disturbance of operation

Description of the various forms of disturbance of operation that may occur, how they can be identified and the consequences they may have for the operation, should be given.

A.5.3 Corrective measures

A description should be available of the necessary actions after a disturbance has occurred. For actions which cannot be taken by the operator, it may be necessary to refer to the maintenance instructions.

The manual should state all requirements for reports to the supplier in the form of registrations and observations.

A.5.4 Hazards and protective measures

A description should be given of all known hazards that may occur during operation. This also applies to hazards which are due to lack of observation of the supplier's procedures as well as to external causes, e.g. lack of cooling water, loss of electrical power, etc.

The manual should give detailed information about protective measures, how to reduce the consequences to a minimum and what procedures to follow in the event of an accident.

Product data sheets for chemical substances should be attached.

A.5.5 Qualification requirements and training program for operators

The supplier should state the qualifications required of the operator and the training programs that can be offered.

A.6 Maintenance

A.6.1 General

Maintenance includes all inspections, measurements, adjustments and operations carried out directly on the equipment in order to ensure safe, reliable and economical operation.

Maintenance documentation should cover the maintenance which can normally be done by the user. The maintenance which is not expected to be done by the user can be included as well.

If the maintenance documentation should be the basis of a maintenance system for the complete plant where the equipment is a part, then the customer should state all necessary information and specify all special requests in the inquiry and order documentation.

A.6.2 Structure and content

Instructions should contain a minimum of elements and should be constructed as follows:

- introduction, scope and possible limitations of the instruction;
- a list of drawings or other necessary supplementary documentation;
- necessary safety precautions before and during maintenance;
- detailed description of the procedure to be followed with references to relevant supplementary documentation;
- necessary data and arrangement for lifting;
- list of necessary tools and equipment;
- recommended spare parts and consumables;
- control and measurement points with limits during maintenance and after completion prior to restart; requirements for special skills and minimum crew for the maintenance.

A.6.3 Maintenance instructions

A.6.3.1 General

The maintenance instructions should be divided as given in A.6.3.2 to A.6.3.7.

A.6.3.2 Routine inspection

This part of the maintenance consists of the regular inspections carried out by the operation and/or maintenance personnel.

The inspections consist of what can be measured, seen, heard or felt without interfering the equipment during operation and non-operation.

The supplier should give instructions concerning inspection points based on his own experience and equipment criticality based on input from the selected monitoring system.

A.6.3.3 Periodic maintenance

It should cover all planned and expected maintenance based on equipment criticality, operation time, calendar time or certain operational observations. This type of maintenance may e.g. include

- cleaning,
- lubrication schedule,
- adjustments,
- calibrations,
- replacement of wear parts,
- replenishments.

A.6.3.4 Corrections and minor repairs

The most comprehensive maintenance possible on site should be described, e.g.:

- replacement of broken parts;
- repairs which can be done on site or in a normally equipped maintenance shop;
- dismantling parts of or the whole equipment for shipment to a special repair or overhaul shop.

A.6.3.5 Major repair and modifications

It is not normally required that this should be covered by the instructions at the user's disposal. However, the supplier should keep and upon request provide instructions concerning overhaul and repairs at special shops.

If agreed, the supplier should also keep all documentation for modification or rebuilding of the equipment.

A.6.3.6 Fault finding and correction of irregularities

For heavy machinery, complicated equipment or if the equipment is considered critical for the total operation of the plant, the supplier should include a fault finding diagram in his documentation.

The diagram should list possible faults and irregularities, and refer to possible causes. The diagram should cover faults which may be discovered during operation and maintenance. Furthermore it should be described how the fault is to be corrected, by referring to other maintenance instructions if necessary.

The supplier should prepare a registration form where the results of measurements and observations can be noted systematically in order to give the supplier a better basis for diagnosis when the user requests supplier's assistance.

A.6.3.7 Storing, preservation and maintenance of preservation

The description of the preparations for storage should include preservation and other protection against external influences.

The description of maintenance during storage should include preventive and corrective measures to ensure equipment's operational capability, and describe how the equipment is prepared for operation after storage.

The supplier should also state how spare parts are to be stored and preserved.

A.7 Spare parts list

Identified components which may require replacement should be listed in a spare parts list. The components should be identified and described so that the necessary spare parts can be obtained. The customer may specify the use of his own spare parts form.

The spare parts list should include:

- reference to drawings (drawing number and position number);
- the supplier's catalogue/parts number;
- for standardized parts: the real manufacturer's name and catalogue/parts number.

A.8 Additional documents and drawings

Only documents and drawings referred to in the user manual and not listed in the document lists, should be included.

Annex B (informative)

Document requirement list

Recommended document types to be used during project execution.

NA=Not Applicable

Table B.1 — Document requirement list

Clause	Document type	Note	With bid	After order acceptance	Final documentation
5.4	Document list	Agreed upon at order	X	X	NA
4.5	Documentation of standard equipment		X	NA	X
6.2	Design and operation	E.g. product description, brochures and catalogues	X	NA	NA
6.3	Data concerning installation, operation and maintenance	E.g. consumption data environment data and spare parts	X	NA	NA
6.4	Exceptions from specifications and other requirements in the inquiry		X	NA	NA
6.5	Reference list		X	NA	NA
6.6	Production plan		X	X	NA
6.7	Quality plan		X	X	NA
6.8	HSE-plan		X	X	NA
7.2	Master equipment list		NA	X	X
7.3	Data sheets	To be specified for the separate subject areas, e.g. mechanical, electrical and instrument	NA	X	X

Clause	Document type	Note	With bid	After order acceptance	Final documentation
7.4	Calculations, curves and tables	E.g. for performance, characteristics and functional parameters	NA	X	X
7.5	Flow diagrams		NA	X	X
7.6	Pipe- and instrument diagrams		NA	X	X
7.7	Consumption data	E.g. for electrical power and other energy, cooling/heating medium	NA	X	X
7.8	Data for health, environment and safety	E.g. dangerous fluids, noise and radiation	NA	X	X
7.9	General arrangement	This category may also be used for other types of drawings	NA	X	X
7.10	Foundation drawings		NA	X	X
7.11	Pipe connections		NA	X	NA
7.12	Block diagram for measuring and control system		NA	X	X
7.13	Termination diagram for external connections		NA	X	X
7.14	Single line diagram		NA	X	X
7.15	Instrument index		NA	X	X
7.16	Installation drawings for instruments		NA	X	X
7.17	Logic diagram		NA	X	X
7.18	Loop diagram		NA	X	X
7.19	Cable list		NA	X	X
7.20	Functional description		NA	X	X
7.21	Circuit diagrams		NA	X	X

Clause	Document type	Note	With bid	After order acceptance	Final documentation
8.2	Documentation available for the customer prior to dispatch	E.g. about packing and dispatch	NA	NA	NA
8.3	Documentation available for recipient prior to delivery	E.g. for receiving inspection, handling, storing and installation	NA	NA	NA
8.4	Documentation available for recipient at delivery	E.g. for package lists, instructions for unpacking, mechanical completion preservation log and certificates	NA	NA	NA
9.1	Table of contents for IOM information	Applies only to table of contents	NA	X	NA
9.2	Standard IOM	To be approved for use without modifications	NA	X	X
9.3	Specially prepared IOM information		NA	X	X
10.2	Manufacturing record book (MRB)	If the customer wants manufacturing records, this has to be agreed upon.	NA	X	X
10.3	Design, fabrication and installation resume (DFI)		NA	X	X
10.4	Certificates	E.g. certificates for recertification	NA	NA	X
10.5	Test procedures and reports	E.g. third party verification	NA	X (procedure)	X (reports)

Bibliography

- [1] NORSOK Z-001, *Documentation for operation (DFO)*. Rev. 4, Mar. 1998
- [2] ISO 15926, *Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities*

