



Exploration & Production

GENERAL SPECIFICATION

Drilling & Wells

GS EP FP 330

**Manufacturing specification for new seamless OCTG
carbon & low alloy material**

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1. Scope

This General Specification completes the definition of the material described in the PO issued by the Company and specifies the technical supplementary delivery conditions for steel pipes (casing, tubing, plain-end casing liners and pup joints), couplings, coupling stock and accessories for the use within the TOTAL group.

This Specification is applicable to [ISO 11960/API SPEC 5CT](#) material grades and other agreed proprietary grades of material.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
ISO 8501-1	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness – Part 1 : rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings
ISO 13678	Petroleum and natural gas industries – Evaluation and testing of thread compounds for use with casing, tubing, line pipe and drill stem elements
ISO/TS 29001	Petroleum, petrochemical and natural gas industries – Sector specific quality management systems – Requirements for product and service supply organization
ISO 11960	Petroleum and natural gas industries — Steel pipes for use as casing or tubing for wells
API SPEC 5CT	Specification for Casing and Tubing
ISO 15156/NACE MR0175	Petroleum and Natural Gas Industries –Materials for use in H ₂ S-containing environment in oil and gas production.
NACE TM0177	Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H ₂ S Environments

Professional Documents

Reference	Title
Not applicable	



Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP FP 350	Mill Inspection Activities of New seamless OCTG

3. Purchaser

3.1 Information to be supplied by the Purchaser

The Purchaser should consult the relevant Company standard before selection of the manufacture is made.

The Manufacturer of the OCTG seamless casing and tubing shall be licensed to [API SPEC 5CT](#) and an [ISO TS 29001](#) certification, or a Purchaser approved equivalent.

When enquiring or placing orders for pipe to be manufactured in accordance to this TOTAL specification the Purchaser shall specify the following details as described in 3.2.

3.2 Requirements to be specified on PO / enquiry

- I. Standard [ISO 11960](#) or [API SPEC 5CT](#) or agreed proprietary specification.
 - II. Seamless or electric-welded
 - III. Quantity
 - IV. Specified outside diameter
 - V. Specified mass (weight) or wall thickness
 - VI. Grade and type where applicable
 - VII. Type of pipe or couplings
- Casing:
 - Threaded or plain-end
 - Threaded & coupled or integral joint
 - Type of connection
 - With or without couplings



- Special clearance couplings
 - Liners:
 - Non-upset, external-upset or integral joint
 - Threaded or plain-end
 - Type of connection
 - With or without couplings
 - Special clearance couplings
 - Tubing:
 - Non-upset, external-upset or integral joint
 - Threaded, plain-end, or other connection
 - With or without couplings
 - Special bevel couplings
 - Special clearance couplings
 - Couplings:
 - Type of connection
 - Special bevel
 - Special clearance
- VIII. Range length
- IX. Drift (special if required)
- X. Marking requirements
- XI. Thread and storage compound
- XII. Thread protectors
- XIII. Coatings – (internal / external)
- XIV. Packaging instructions
- XV. Quality assurance requirements – (TPI inspection level as per the relevant Company standard)
- XVI. Delivery date and shipping instructions
- XVII. Any deviations from the following minimum requirements

4. Manufacturing requirements

The following requirements shall be **supplied** in addition to PSL 1 of [ISO 11960](#) / [API SPEC 5CT](#) latest revisions, for the supply of OCTG to be used in TOTAL's wells.

4.1 Material

4.1.1 Material Types and level's

The following grade types and Product Specification Levels (PSL) plus the addition requirements as stated in this document are acceptable as the minimum to TOTAL unless otherwise advised.

Table 1

Grade	Type	PSL	Comments
J55	-	1	
K55	-	1	
N80	Q	2	Only Type Q shall be supplied unless agreed by the Purchaser
L80	1	2	
L80	13Cr	3	
C90	1	3	Only type 1 shall be supplied unless agreed by the Purchaser.
C95	-	2	
T95	1	3	Only type 1 shall be supplied unless agreed by the Purchaser.
P110	-	2	
Q125	1	3	Only type 1 shall be supplied unless agreed by the Purchaser.

Where proprietary grades of steel are proposed as an alternative to the ISO/API as stated above. The Manufacturer shall submit their manufacturing process specification for approval before use. Any revisions to the agreed specifications should be submitted to TOTAL before commencement of production.

4.1.2 Mechanical properties

All Grades :

Material with yield or tensile strengths different than [ISO 11960/API SPEC 5CT](#) shall be manufactured to all the ISO/API requirements that apply or as per the agreed Manufacturing Process Specification.

4.1.3 Charpy V-notch tests - General requirements

All grades and groups shall be impact tested in accordance with [ISO 11960/API SPEC 5CT](#) annex 1 SR16.

The test temperature shall be 21 °C (70 °F) for Grades J55 and K55 and 0 °C (32 °F) for all other grades, or a lower temperature by agreement between Purchaser and Manufacturer.

4.1.4 Sulfide stress-cracking (SSC) test and retest

Grades C90 and T95:

For known (pre-qualified) Manufacturers with a Company known production route, requirements are according to [ISO 11960/API SPEC 5CT standard](#).

For an unknown Manufacturer (not pre-qualified), he shall be asked for a qualification process for each heat to demonstrate that the product

- Meets or exceeds the 90 % YSmin threshold for three specimens, one each from the ends of three different pipes selected from the start, middle and end of the heat/heat treatment lot.



- Method A of [NACE TM0177](#) shall be used for the SSC test. Two retest specimens may be carried out if only one of the initial samples fails. If one of the retest specimens fails, the heat treatment lot shall be rejected.

By agreement between Company and Manufacturer, the number of specimens per heat/heat treatment lot required may be reduced to no less than one with a process control plan that is sufficient to ensure that the product meets or exceeds the 90 % YSmin threshold.

Grade L80 13Cr (*Production qualification of new Manufacturers before use*):

For non pre-qualified Manufacturer, Company will request the Manufacturer for each heat to demonstrate that the product meets or exceeds for each heat the 90 % YSmin threshold using test Method A in accordance with [NACE TM0177](#). Three specimens will be tested during the first fabrication campaign..

The test solution shall be according to b.2. of Section B.3.5.4 of [ISO 15156](#) with a pH of 3.5 and a partial pressure of H₂S of 10 kPa (1.5 psi). No crack is permissible.

Grade C90 Modified 13Cr:

The above requirements for L80 13Cr shall also be used for this family of alloys and grade.

Retest for all grades:

A SSC test shall be deemed to be invalid and a replacement test performed only when an assignable cause is identified. Assignable causes include test specimen machining defects and/or testing errors.

4.1.5 Hardenability

Grade L80 Type 1:

A full-body as-quenched sample shall be taken in accordance with a documented procedure to confirm sufficient hardening for each size, mass, chemical composition, and austenitize and quench combination. To be in compliance with this general specification and [ISO 11960/ API SPEC 5CT](#) PSL 2, the mean hardness numbers obtained during the documented procedure shall equal or exceed the hardness corresponding to 90 % minimum martensite, as determined by the following equation:

$$\text{HRC}_{\min} = 58 \cdot (\% \text{ carbon}) + 27$$

Grades C90 and T95:

The mean hardness numbers obtained as specified above shall equal or exceed the hardness corresponding to a minimum of 95 % martensite as determined by the following equation:

$$\text{HRC}_{\min} = 59 \cdot (\% \text{ carbon}) + 29$$

For pipes with a wall thickness of 30 mm (1.181 in) or larger, an alternative requirement may be used by agreement between Manufacturer and Purchaser.

4.1.6 Hardness testing

Hardness test — Grades N80Q, L80 Type 1, C95, P110 and Q125:

The Manufacturer shall apply a process control plan which has been demonstrated to the satisfaction of the Purchaser as sufficient to ensure that each pipe body, each upset and each coupling has mechanical properties conforming to the requirements of this General Specification and International Standard. If this condition is not fulfilled, each pipe body, each



upset and each coupling shall be surface-hardness-tested. Hardness minimum and maximum values, when not specified in this general specification or international standard, shall be in accordance with the Manufacturer's specifications or by agreement between the Purchaser and the Manufacturer.

Sampling and test specimen location — Non-upset pipe, Grades C90 and T95:

A test ring shall be cut from both ends of each pipe.

4.1.7 Straightening

Grades C90 and T95:

Product, when necessary, shall be either cold rotary straightened followed by stress relief at 30 °C to 56 °C (86 °F to 212 °F) below the final specified temper temperature, or hot rotary straightened with an exit temperature not more than 165 °C (300 °F) below the final specified temper temperature.

When necessary, light gag straightening shall be permitted but shall be highlighted to the Purchaser.

Grades C95 and P110:

Gag press straightening or hot rotary straightening [400 °C (750 °F) minimum at end of rotary straightening unless a higher minimum temperature is specified on the purchase agreement] is acceptable. If hot rotary straightening is not possible, the pipe may be cold rotary straightened provided it is then stress-relieved at 510 °C (950 °F) or higher.

4.1.8 Frequency of tensile testing

Grades N80Q :

The frequency of testing shall be the same as for Grade L80 Type 1.

All other grades:

As per [ISO 11960 / API SPEC 5CT](#) unless other wise specified by the Purchaser.

4.2 Hydrostatic test

Grades J55 and K55:

Alternative test pressures shall be used for sizes above Label 1: 9 5/8".

All other grades shall be tested at the international standard requirement unless alternative is specified by the Purchaser

4.3 Drift testing

Unless specified on the purchase agreement the drift shall conform to [ISO 11960 / API SPEC 5CT](#).

All pipes 7 5/8" and below, regardless of application shall be drifted full length using a 1067 mm (42") long drift

All pipes above 7 5/8" regardless of application shall be drifted full length using a 305 mm (12") long drift.

Nylon or chromium plated drifts shall be used for 13Cr pipes.



Alternate drift sizes shall be quoted on the purchase agreement. If there is a need to modify the OD tolerance to meet the alternative drift requirements then it shall be agreed with the Purchaser before hand.

Drifting of the full length of the pipe is mandatory and depending on the process route an arms length drifting of each connection. If the field pin is crimped by nature of thread design then it will require to be drifted.

4.4 Non Destructive Examination – NDE

4.4.1 Test Method

Automatic non-destructive examination by both electro-magnetic and ultrasonic techniques shall be performed on pipes and coupling stock with yield strengths 80,000 psi and above, unless wall thickness prohibits the normal functioning one of one the above – in this case it shall be highlighted to the Purchaser and the reasons noted. The pipe shall be inspected in accordance with the requirements of [ISO 11960/API SPEC 5CT](#) Annex A.3 (SR2) unless otherwise agreed between the Purchaser and the Manufacturer.

Grade N80Q and pipes with yield strengths below 80,000 psi shall be tested by using either automatic electromagnetic or ultrasonic techniques. The pipe shall be inspected in accordance with the requirements of [ISO 11960/API SPEC 5CT](#) Annex A.3 (SR2) unless otherwise agreed between the Purchaser and the Manufacturer.

Grades J55 and K55 pipe shall be inspected in accordance with the requirements of [ISO 11960 / API SPEC 5CT](#) Annex A.2 (SR1) unless otherwise agreed between the Purchaser and the Manufacturer.

Where magnetic particle inspection is used for verification of defect removal, prove-up by the wet or dry method unless specified in the purchase agreement.

The “blind area” at the end of the pipes due to the automatic N.D.E shall be inspected through magnetic particle inspection wet or dry method for detection of longitudinal and transverse defects inside and out or alternatively the “blind area” should be cropped 20 Inches (508 mm) from each pipe end.

4.4.2 Calibration & Repeatability Checks

Calibration of non-destructive examination equipment shall be with the reference standard using the same size, material type / grade and weight as the pipes coupling stock to be processed.

Prior to any production run, a repeatability check of the automatic non-destructive examination equipment shall be performed to demonstrate a consistent repeatable response from the reference indicators. Repeatability checks shall be performed by passing the reference standard through the system, at the normal production feed speed at a minimum of 8 times. It should be demonstrated that full coverage of the reference standard is achieved.

Where Purchaser has continual production in the mill this may be relaxed to periodical proof testing, weekly or monthly depending on the material criticality and agreement between Purchaser and Manufacturer.

The temperature of the reference standard shall be +10 °C/-10 °C of production material.



4.4.3 Wall Thickness Examination

Ultrasonic testing shall be used for wall thickness examination, unless otherwise agreed with the Purchaser.

The wall thickness examination shall cover 100% of the pipe body surface covered by automatic system unless otherwise agreed between the Purchaser and the Manufacturer.

The remaining wall thickness of all areas dressed by grinding shall be individually verified.

4.4.4 Records of Tests

Paper chart or electronic data records shall be available for all automatic non-destructive inspection and calibration operations and shall be identifiable to the actual pipe tested.

4.5 Traceability

The Manufacturer shall establish and follow procedures for maintaining heat and/or lot identity until all required heat and/or lot tests are performed and conformance with specification requirements has been shown.

The serial number shall be marked on products as specified below. It is the responsibility of the Manufacturer to maintain the identification of material until it is received by the Purchaser.

Each length of pipe shall be uniquely numbered so that test data can be related to individual lengths. In addition, when supplementary requirement A.7 (SR12) is specified, the number shall identify the sequence in which the lengths were tempered in order to allow re-test in accordance with A.7.3 (SR12.3).

Each length of coupling stock, coupling and pup joint or accessory material shall be uniquely numbered so that test data can be related to individual lengths. When cut from material that has been heat-treated full length, the pieces shall be marked with the serial number of the full length piece. When heat-treated in coupling blank or individual lengths, each heat-treat lot shall be uniquely numbered.

Additionally, when coupling, pup joint or accessory materials in coupling blanks or individual lengths are heat-treated as a unit in a continuous process-run, the pieces within the lot shall be sequentially numbered in the order in which they are heat-treated.

4.6 Surface preparation

4.6.1 Contamination

The internal and external surfaces of the supplied pipes shall be free from loose mill scale, dirt, oil, grease or other foreign material which may be detrimental to the satisfactory inspection, coating, running or in-service operations.

4.6.2 13Cr Materials

The internal surface of 13Cr material shall be blast cleaned to [ISO 8501-1](#) grade Sa2½. Any blasting media that may cause surface iron contamination shall not be used. Pickling of 13Cr material is not permitted as an alternative to internal blast cleaning.

A Purchaser approved anti-corrosion coating/oil film shall be applied to the internal surface immediately after blast cleaning:

- DFW 90 (Fuchs)



- Synergen 718S (Agma)

The coating/oil layer shall be uniform in appearance and thickness. Any other coating shall be approved by TOTAL before use. Specific care during manufacture and transport is required to prevent external iron contamination. Manufacturer shall detail the precaution taken at bid stage.

4.6.3 End Finishing

The approved proprietary connections used by TOTAL shall only receive surface treatments that are acceptable to the connection licensor.

Where there is the option to have phosphatation on the field end of the connection this will be applied as a standard option.

Pin threads shall be abrasive-blasted unless processed by any appropriate technique, including primary machining, which has been agreed between the Purchaser and Manufacturer to be sufficient to avoid the presence of material susceptible to detaching or causing galling during make-up.

Box threads shall be abrasive-blasted unless processed by any appropriate technique, including primary machining, which has been agreed between the Purchaser and Manufacturer to be sufficient to avoid the presence of material susceptible to detaching or causing galling during make-up.

13Cr steel couplings shall be copper plated or the connection licensor's approved alternative. A process acceptable to the Connection Licensor shall be used, where applicable.

Where an alternative is recommended by the licensor this alternative shall be presented to TOTAL before application and use.

Mill make-up:

The Purchaser shall approve the type of mill end thread compound used for T&C connections. The mill end of the proprietary T&C connections shall be assembled with a torque/turn monitoring graph. The assembly shall be fully traceable by using test charts/electronic records, pipe numbers, etc.

The applied thread compound on the mill end to the T&C connection shall conform with the proprietary T&C connections procedures and to [ISO 13678](#) unless otherwise specified on the purchase agreement or from the following.

TIFFORA PG - applicable to API connections and Semi Premium connections only.

The mill end make up torque shall be in conformance with the proprietary T&C connections procedures and will be aimed towards the maximum torque unless other wise agreed with the customer. All connections after make up shall be arms length drifted with the appropriate drft size and length as indicated in 4.3.

For all connections, the field ends (pin and coupling) with exposed machined areas shall be 100% coated with storage compound.

The approved storage compounds are as follows:

- JET MARINE IMPERITOR – for all zones
- Rust-Veto AS – Not to be used for sub Sahara or tropical zones

Unless otherwise specified on the purchase agreement the above storage compounds shall only be used.



The use of “Dope-free” or “Dope-less” products shall be qualified by TOTAL HQ before use.

4.7 Thread and Pipe protection

The thread protector's design should conform to [ISO 11960](#) annex I. and documented proof of conformity should be submitted to TOTAL before use.

Where closed end protectors have been specified in the purchase agreement a 5 mm weep hole shall be present in each closed-end type protector to allow venting of the pipe bores.

For connections less than 5 ½” closed end non lift-able protectors shall be used.

For connections of any size that have flush or semi-flush connections, closed-end non-lift-able type thread protectors shall be used.

All 13Cr products will be furnished with closed end protectors and depending on the outside diameter the protectors will lift-able or non lift-able as previously indicated. Any composite protector shall have the steel reinforcement non-exposed.

All 13Cr pipe products shall be furnished with either “bump rings” (3 per pipe length) or placed in a non metallic transport frame as stated in the purchase agreement.

4.8 Pipe Coating

Standard mill varnish / matt black finish shall be applied to the external surface of pipes unless otherwise specified in the purchase agreement. The coating layer shall be uniform in appearance and thickness. The thickness of the coating should have no detrimental effect on storage, running or in-service operations.

4.9 Certification requirements

Certification and the traceability shall be in accordance with [ISO 11960/API SPEC 5CT](#) Annex A.9 (SR15) and EN 10204 for all materials, unless otherwise specified in the purchase agreement.

4.10 Marking

All marking shall be in conformance with the following and [ISO 11960/API SPEC 5CT](#) plus any additional requests stated on the purchase agreement.

- At the pin end, two meters from the threaded connection, one ring (100 mm wide) of blue paint and one ring of yellow (100 mm wide) paint, with a space of 30 mm between the rings.

4.11 Third Party Inspection

The protocols and scope of work for the third party inspection representative is described in [GS EP FP 350](#).

A level of inspection shall be quoted in the purchase agreement. If no inspection level is quoted then level 3 will apply unless otherwise advised.

As described in the above referenced General specification adequate notice should be given and good line of communication should be established between the Manufacturer and the TPI.



Bibliography

GS EP FP 331

Seamless Carbon and low alloy OCTG Pipes purchased from stock