



Exploration & Production

GENERAL SPECIFICATION

PIPELINES - RISERS

GS EP PLR 241

**Fabrication of Super Duplex stainless steel
Small bore tubes for umbilical**

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1. Scope

This specification defines the Company's requirements for the manufacture and supply of bare Superduplex stainless steel small bore tubes to be used for the umbilical manufacturing.

This specification is applicable to **seamless** tubes up to 2" (60.3 mm) OD in UNS number S32750/32760/39274.

This Specification shall **always** be used in conjunction with a Project Particular Specification (P.P.S.) detailing the additional tests and requirements or the possible modifications to the present specification, based on the particular design conditions of the umbilical Project (see § 4).

Due to manufacturing and laying processes, small bore tubes shall be suitable for cold forming operations induced by spooling, un-spooling, straightening and bending.

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.

The order of precedence of the applicable documents shall be:

- The Purchase Order/Requisition
- The Particular Specification
- The present General Specification
- The codes and standards in reference.

Applicable Codes and Standards that are to be used in conjunction with this specification are stated in paragraphs hereafter.

Unless otherwise specifically indicated in writing by the COMPANY, the SUPPLIER shall work in accordance with the requirements specified herein and the applicable requirements of the latest editions at date of CONTRACT award of the referenced Codes and Standards, whenever asked in the present specification.

Where this specification states no overriding requirements, the referenced Codes and Standards shall apply in full.

Standards equivalent to those referred to herein shall not be substituted without written approval from the COMPANY. Approval of equivalent standards will not, in any way, remove responsibility from SUPPLIER to meet the requirements of the Standards referred to and amended herein, in the event of conflict.

The SUPPLIER shall equip himself with copies of all the reference specifications referred to in this specification and shall make them readily available to all fabrication, testing and inspection personnel involved on the work.

Standards

Reference	Title
ISO 9000	Quality system, model for Q.A. in design, development, production, installation and servicing
ISO 14001	Environmental Management Systems - Specification with guidance for use or equivalent
ASTM A 789/A 789 M	Standard specification for seamless and welded ferritic/austenitic stainless steel tubing for general service
ASTM A 790/A 790 M	Standard specification for seamless and welded ferritic/austenitic stainless steel pipe

Professional Documents

Reference	Title
ASTM A 370	Standard test methods and definitions for mechanical testing of steel products
ASTM G 48 A	Standard test methods for pitting and crevice corrosion resistance of stainless steels and related alloys by use of chloride solution
ASTM E 45	Standard test methods for determining Inclusion content of steel
ASTM E 562	Standard test method for determining volume fraction by systematic manual point count
ASTM E 213	Standard practice for UT of metal tube and tubing
ASTM E 309	Eddy current examination of steel tubular products using magnetic saturation
ASTM E 426	Standard practice for ECT examination of seamless and welded tubular products austenitic stainless steel & similar alloys
ISO 4406	Method for coding level contamination by solid particles
ISO 148	Charpy impact test (V-notch)
NF EN 10204	Produits métalliques - Types de documents de contrôle
COFREND	Comité français des essais non destructifs (French Committee of non destructive testing)

Regulations

Reference	Title
Not applicable	



Codes

Reference	Title
ASME V	Pressure Vessel Code, Section V: Non-destructive Examination

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP PVV 175	Cleaning of piping and vessels

3. General

3.1 Definitions

COMPANY	Total E&P or agents acting on its behalf, shall be referred to herein as the "COMPANY"
SUPPLIER	The Companies, or their agents including steel and tube MANUFACTURER, designated on the Purchase Order form or Contract as being The selected supplier of the said materials and tubes shall be referred to herein as the "SUPPLIER"
Inspection Agency	An independent inspection body (other than any inspection department of the SUPPLIER or any Inspection Agency subcontract by him), or its members, who shall be appointed by COMPANY and thus notified to SUPPLIER
Inspector	The COMPANY representatives or members from the COMPANY elected Inspection Agency for the time being or from time to time duly appointed in writing by the COMPANY to act as its representatives for the purpose of the contract shall be referred to herein as the "Inspector"
Mill	The plants, mills, workshops, laboratories or other locations where the fabrication, inspection and testing of steel and small bore tubes are to be performed complete or in part, including storage areas shall be referred to herein as the "Mill"
Contract Documents	The material requisitions, material specifications, etc. issued by the COMPANY and attached to the contract or the purchase order shall be referred to herein as the "Contract Documents"

Approval	Authorisation in writing given by COMPANY to SUPPLIER to proceed with the performance of a specific part of the work without releasing in any way SUPPLIER from any of its obligations or liabilities under the contract or at law; Approve, Approved and Approval shall be construed accordingly
PPS	Used to designate the Project Particular Specification
May	Used to indicate that a provision is optional
Shall	Used to indicate that a provision is mandatory
Should	Used to indicate that a provision is not mandatory but is recommended as good practice

3.2 Quality Assurance/Quality Control

The SUPPLIER shall operate a Quality Assurance system in accordance with [ISO 9000](#), or equivalent, approved by a recognized authority. The Quality Assurance Manual shall be submitted to COMPANY.

Three weeks prior to commencement of the tube manufacture, the SUPPLIER shall prepare and submit to the COMPANY a written Quality Control Plan which describes the inspections to be performed during the supply of tubes. The Quality Control Plan shall set forth "witness", "hold", "review" and "monitor" points.

4. Project Particular Specification

The Project Particular Specification (PPS) shall define:

- Grade
- Nominal dimensions (OD x W.T.) of small bore tubes to be supplied
- Minimal individual and total length of tubes
- Weldability Tests
- Any other information or particular tests to be carried out with related requirements (e.g. Weldability tests, bending tests, hydrotests, etc.).

The PPS shall include the small bore tubes Data Sheet (see Appendix 6), if it is not included elsewhere in any other Project Specifications.

5. Inspection by the COMPANY

All procedures shall have prior approval of COMPANY. All qualification tests shall take place under the supervision of the Inspector.

SUPPLIER shall notify the Inspector sufficiently in advance to enable him to be present at qualification tests and at all other tests or stages of manufacture subject to acceptance in accordance with this specification.

SUPPLIER shall ensure that Inspector has full and free access to all parts of the Mill during all fabrication stages.

Inspector shall ensure that materials and small bore tubes are fabricated in accordance with all the specified requirements and Company's approved procedures.

Inspection by Inspector shall be carried out during small bore tubes production in order to avoid any special or additional handling. Inspection will be made in such a manner to avoid delay in small bore tubes production insofar as the small bore tubes that are presented to him meet the specified requirements.

Inspector shall notify COMPANY without delay of any difficulty, irregularity, problem or delay liable to occur during tube production.

It shall be made available in the inspector office, a free access to the mill computerised:

- Tracking system of production and inspection
- All data and results of mechanical tests, NDE results
- Billet tube/small bore tube output, rejections status with causes, repairs
- Any other information considered pertinent by the inspector for his monitoring
- Computer, software environment compatible with the mill software, software interface where necessary for data exploitation with EXCEL and ACCESS shall be made available by the Supplier
- COMPANY's Inspector shall be provided with facilities/equipments for sending and receiving faxes, communicating by @mails and fast Internet access.

COMPANY reserves the right to re-check tests carried out by SUPPLIER. For this purpose, COMPANY may request the delivery of samples or specimens for analyse in an independent laboratory chosen by COMPANY.

6. Small bore tubes manufacture

6.1 General requirements

Small bore tubes shall be manufactured in accordance with all the requirements of [ASTM A 789](#) unless otherwise indicated in the present specification. All points not specifically mentioned or modified herein remains applicable.

Weldability Tests (see Appendix 5) are to be carried out only when so required in the Particular Specification.

Except as otherwise agreed between the SUPPLIER and the COMPANY, all inspections and tests required for tubes manufacturing procedure qualification shall be performed at the manufacturing Mill.

6.2 Process of manufacture

6.3 General manufacturing

Small bore tubes shall be **seamless**. Exclusively the Plug Rolling Mill Process or the Mandrel Mill Process shall manufacture them from billets or rough shape tubes.

Small bore tubes shall be manufactured by the hot rolling seamless process as stated above.

Unless otherwise indicated in the P.P.S. or agreed at bid stage, tubes shall be supplied heat-treated in annealed condition (table 1 of [ASTM A 89](#)) with Minimum cooling speed of 4°C/S.

6.4 Process control

Process control records with parameters identified as critical in the applicable quality plan approved by Company shall be issued and made available to Company Representative for review.

Control instruments shall be subject to previous calibration. Records and conditions shall be made available upon Inspector request.

All equipment used during end preparation, cutting, grinding, polishing, NDE and subsequent testing shall be suitable and dedicated to super duplex only.

6.5 Chemical properties requirements

All small bore tubes shall be manufactured from steel that shall have a chemical composition ensuring proper ductility, strength, toughness and weldability under all conventional welding processes and techniques, indicated in the relevant COMPANY general specification, used on lay-barges or on onshore installation works, where applicable.

Aimed chemical composition, minimum and maximum working limits (ladle and check chemical analysis of base steel), which are selected and guaranteed by SUPPLIER for the order, shall be in conformance with [ASTM A 789](#) amended by Appendix 1.

SUPPLIER shall carry out heat and product analyses for all specified chemical elements (plus all others intentionally added elements). Those chemical compositions shall be included in Mill Certificates. Heat and Product analyses shall meet the requirements contained in Tables 1A & 1B of Appendix 1.

However, the ruling composition shall be that proposed by SUPPLIER and approved by COMPANY at the bid stage (see §18.1).

Number, type, location, and frequency of tests shall be as defined under § 11.

6.6 Mechanical properties requirements

The finished tubes shall meet the requirements stated in Table 2 of Appendix 2 for tensile properties requirements. Number, type, location, and frequency of tests shall be as defined under § 11.

6.7 Small Bore Tube Manufacturing Procedure Specification (MPS)

SUPPLIER shall establish a detailed specification for the manufacture and inspection of small bore tubes, describing all proposed operations in their correct sequence together with their execution parameters. The proposed specification shall include, but not be limited to, all information concerning:

- Aimed chemical analysis, minimum and maximum working limits (ladle and product) selected by SUPPLIER for the order
- Steel manufacturing
- Billet heating
- Equipment for tube rolling, sizing, straightening
- Heat treatment for tubes
- Visual inspection