ICGB AD
13, Veslets Str., 1000 Sofia, Bulgaria
tel.: +359 (2) 9263 862; www.icgb.eu

Natural Gas
Interconnector
Greece - Bulgaria

# Technical specification for supply of line pipes DN800
# Project IGB

# Table of content

# 1 Project description

The project concerns the design, construction, commissioning and operation of a natural gas pipeline directly connecting the national gas transmission systems of the Republic of Greece and the Republic of Bulgaria, having the outer diameter of DN 800, the total length of approximately 182km, and the entry point in the region of the town of Komotini (Greece), with the exit point in the region of the town of Stara Zagora (Bulgaria) (**"Project"**).

The proposed pipeline will be a high pressure natural gas pipeline system (design pressure 8 MPa (80 bar), maximum operational pressure 7,5 MPa (75 bar)), with its associated Above Ground Installations (AGIs) called the “Gas Interconnector, Greece – Bulgaria” (or "IGB").

The design of this bi-directional pipeline system shall be in accordance with the internationally recognized codes of practice: EN1594 and ASME B31.8, and also in conjunction with national regulations, for the safe transportation of 3bcm/y of gas initially, with the provision for the future expansion up to a maximum technical capacity of 5bcm/y.

## 1.1 Definitions

The terminology as used in this Technical Specification shall be interpreted as follows:

| | |
|---|---|
| CONTRACTING ENTITY | ICGB AD |
| REPRESENTATIVE | Representative of ICGB AD |
| SUPPLIER | The entity named as SUPPLIER in the Agreement for supply of DN800 line pipes |
| Agreement | The agreement for supply of DN 800 line pipes, to be entered between the CONTRACTING ENTITY and the SUPPLIER in relation to the Project, in the form of the template enclosed to the public procurement documentation. |
| THIRD PARTY INSPECTOR | The third party inspector selected by the CONTRACTING ENTITY with responsibility for carrying out testing an inspection of the line pipes to be supplied under the Agreement, as notified to the SUPPLIER by the CONTRACTING ENTITY or the OWNER'S ENGINEER on behalf of the CONTRACTING ENTITY. |
| OWNER’s ENGINEER | The CONTRACTING ENTITY’s engineer appointed by the CONTRACTING ENTITY to manage the Agreement on behalf of the CONTRACTING ENTITY in accordance with the terms of a services agreement entered into between the OWNER'S ENGINEER and the CONTRACTING ENTITY. |
| INSPECTION PARTIES | The Contracting Entity, its insurers, any providers of finance, the Owner's Engineer, the THIRD PARTY INSPECTOR and their agents. |
| EPC CONTRACTOR | The engineering, procurement and construction contractor engaged by the CONTRACTING ENTITY in respect of the Project, as notified by the CONTRACTING ENTITY to the SUPPLIER in writing. |
| PROJECT | The design, construction, commissioning and operation of a natural gas pipeline directly connecting the national gas transmission |

systems of the Republic of Greece and the Republic of Bulgaria, having the outer diameter of DN 800, the total length of approximately 182km, and the entry point in the region of the town of Komotini (Greece), with the exit point in the region of the town of Stara Zagora (Bulgaria)

| | |
|---|---|
| "must" | Signifies a legal or statutory requirement. |
| "shall" | Signifies a requirement made mandatory by this specification. |
| "may | Signifies a feature, which is discretionary in the context in which it is applied. |
| "will" | Signifies a feature which the SUPPLIERs may assume to be already present. |

# 2 Scope and General description

The scope of this tender is the supply of line pipe with nominal diameter DN800. All other services related to the pipe installation and additional materials will be purchased by the Contracting Entity via a parallel running tender for the EPC CONTRACTOR.

The requested pipes are listed in the attachment 01 "Bill of quantities - line pipe DN800". The whole scope of supply is defined in the following chapters of this specification and the other attachments.

This specification refers to the requirements for steel pipes used in construction of gas transmission systems and linear valve stations according to EN 1594.

The scope of supply includes the production, inspection, testing, shipment, transportation to point of delivery and documentation requirements of these items in accordance with this specification.

Delivered pipes shall comply with EN ISO 3183:2012, level PSL 2 and Annex M – *PSL 2 pipe ordered for European onshore natural gas transmission pipelines* – and the requirements of this specification including all referenced documents.

For all DN800 pipes an inspection certificates according to EN 10204, TYPE 3.2 shall be provided by the THIRD PARTY INSPECTOR appointed by the CONTRACTING ENTITY.

The CONTRACTING ENTITY, or the OWNER'S ENGINEER on behalf of the CONTRACTING ENTITY, shall notify the SUPPLIER of the identity and contact details of the THIRD PARTY INSPECTOR who is to carry out the inspection and to issue the inspection certificate Type 3.2.

## 2.1 General obligations of the SUPPLIER

The compliance of the manufactured pipes with the requirements of EN ISO 3183 and with this specification shall be checked by the SUPPLIER's testing in accordance with this section 2.

**Before start of pipe production the SUPPLIER is obliged to do the following:**

- The SUPPLIER shall prove to the CONTRACTING ENTITY that he continues to operate a quality management system according to EN ISO 9001 or an approved

equivalent and he shall inform about latest changes in this matter.
The SUPPLIER's up to date quality assurance manual shall be submitted to the CONTRACTING ENTITY for approval.

- The SUPPLIER shall submit a detailed Quality Plan and Test and Inspection Plan to the CONTRACTING ENTITY for approval. Information for the tests and inspections for which the participation of the CONTRACTING ENTITY/THIRD PARTY INSPECTOR is required] shall be included in the submitted plans.

- The SUPPLIER shall submit the Manufacturing Procedure Specifications (MPS) to the CONTRACTING ENTITY for approval. The SUPPLIER shall receive the CONTRACTING ENTITY´s written approval of MPS prior to start of pipe production.

- The CONTRACTING ENTITY reserves the right to require re-approval of Manufacturing Procedure Specification in the case of change in the productions processes or in the Manufacturing Procedure Specification.

- All inspection personnel employed by the SUPPLIER shall be qualified in accordance with Annex E from ISO 3183 or an equivalent scheme approved by the CONTRACTING ENTITY.

- All procedures require prior approval by the CONTRACTING ENTITY. All qualification tests shall take place under the supervision of the THIRD PARTY INSPECTOR.

- The SUPPLIER has to organize the inspections by the Third Party Inspector with the THIRD PARTY INSPECTOR directly.

**During the production process the following obligations apply:**

- The SUPPLIER is responsible for performing all required tests and inspections before, during and after the production process.

- The SUPPLIER shall ensure that the INSPECTION PARTIES have full and free access to all parts of the MILL and all sites during all fabrication stages and shall support the inspection process.

- The THIRD PARTY INSPECTOR shall finalise its inspection by the application of a special stamp (or indelible paint marking, when so previously agreed) on the accepted pipes. Die stamping is permitted only on the bevel surface.

- The SUPPLIER shall provide all necessary office accommodation, facilities, test equipment and assistance as required by the [INSPECTION PARTIES].

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

- In the event that defective plates, coils, pipes or welds or other non-conformities are detected during any test or inspection (or the test or inspection is otherwise failed), the items in question shall by re-tested by the Supplier at a time and date agreed with the CONTRACTING ENTITY and the THIRD PARTY INSPECTOR in accordance with clause 5.4.5 of the Agreement, the cost of which (including the CONTRACTING ENTITY's additional costs) shall be borne by the SUPPLIER.

**After the production process the following obligations apply:**

- The pipe can be dispatched only after a release note and Inspection Documents to EN 10204 Type 3.2 have been issued by the THIRD PARTY INSPECTOR
- Transport to and material handover at the delivery points.
- The complete document package as described in the SDRL shall be provided in the required formats languages and quantities and using the document management system for documentation exchange using the software described by the Supplier in the Technical Offer.

Any relocation of manufacturing facilities and/or change of SUPPLIER of the initial materials, not mentioned in the tender documents of the SUPPLIER, must be reported and is only permitted after written approval from the CONTRACTING ENTITY.

The SUPPLIER is fully responsible for the product, including the initial raw materials and the final delivery of pipes and documentation.

## 2.2 Material Delivery and hand over process

The pipes shall be stored, handled, and transported in accordance with specific procedures and loading diagrams that detail how the pipe is to be arranged, protected and secured on trucks, railcars, barges or ocean-going vessels whichever is applicable prepared by the SUPPLIER and approved by the CONTRACTING ENTITY.

The SUPPLIER shall keep the CONTRACTING ENTITY informed about the production time schedule of the line pipes DN800.

**Delivery Points:**
All line pipe DN800 for the Bulgarian part shall be delivered to maximum 3 different pipe yards along the gas pipe line route between Stara Zagora and the last train station in Podkova – 35 km South from Kardzhali.
For the Greek part there will be one pipe yard close to the train station Komotini – distance not more than 20 km.

All pipe yards will be accessible with a standard 40t semi-trailer truck. The exact location will be defined by the CONTRACTING ENTITY within the timescales specified in the Agreement. The accessibility by bigger trucks shall be considered to allow delivery of pipes with length up to 18m.

Following notification by the CONTRACTING ENTITY to the SUPPLIER of the delivery points, transport routes and access points the SUPPLIER will prepare a suitable delivery schedule for approval by the CONTRACTING ENTITY, in accordance with the Agreement. Subject as expressly provided otherwise in the Agreement, all cost for storage of produced pipes at the pipe mill of the SUPPLIER shall be borne by the SUPPLIER.

The SUPPLIER is fully responsible for the pipe quality as a whole and any transport damages until delivery to the pipe yards, owned by the EPC CONTRACTOR. Thereafter the SUPPLIER will have ongoing responsibility for defects, in accordance with the terms of the Agreement.

The unloading and storage of the pipes at the pipe yards will be done by the EPC CONTRACTOR. Nevertheless a representative of the SUPPLIER should participate in the unloading for having an efficient hand over process.

It is planned to deliver the whole amount of pipes spread over a period of 12 month. The start of the delivery will be coordinated with the construction start as notified by the CONTRACTING ENTITY to the SUPPLIER.

Before any single delivery a release note for delivery has to be signed by the THIRD PARTY INSPECTOR (upon issue of the TYPE 3.2 certificate).

Any delivery shall also be conditional (among other things) on notification of delivery to the CONTRACTING ENTITY at least fourteen (14) days in advance, to allow the EPC CONTRACTOR to make arrangements to receive the materials.

# 3 Applicable norms and documents

Without prejudice to the other requirements of this Technical Specification, the Agreement, and as may be required by applicable laws, the SUPPLIER shall perform the requirements described in this Technical Specification in accordance with, and shall ensure that the pipes and materials to be provided by it meet, the standards, codes, statutory regulations and specifications listed in this section 3. Only the latest issues of the relevant standards, codes, statutory regulations and specifications referenced shall be applied to the work being performed unless specifically stated otherwise.

## 3.1 Norms and standards

**EN 1594** Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirements

**EN 10204** Metallic products - Types of inspection documents

**EN ISO 3183** Petroleum and natural gas industries - Steel pipe for pipeline transportation systems (ISO 3183:2012)

**EN ISO 10893-9** Non-destructive testing of steel tubes - Part 9: Automated ultrasonic testing for the detection of laminar imperfections in strip/plate used for the manufacture of welded steel tubes (ISO 10893-9:2011)

**EN ISO 10893-11** Non-destructive testing of steel tubes - Part 11: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections (ISO 10893-11:2011)

**EN ISO 15607** Specification and qualification of welding procedures for metallic materials - General rules (ISO 15607:2003)

**EN ISO 15609-1** Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1:2004)

**EN ISO 15610** Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables (ISO 15610:2003)

**EN ISO 15611** Specification and qualification of welding procedures for metallic materials - Qualification based on previous welding experience (ISO 15611:2003)

**EN ISO 15612** Specification and qualification of welding procedures for metallic materials - Qualification by adoption of a standard welding procedure (ISO 15612:2004)

**EN ISO 15613** Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613:2004)

**EN ISO 148-1** Metallic materials - Charpy pendulum impact test - Part 1: Test method

**EN 14161** Petroleum and natural gas industries - Pipeline transportation systems (ISO 13623:2009 modified)

**ASTM E208** Standard Test Method for Conducting Drop-Weight Test to Determine Nil-Ductility Transition Temperature of Ferritic Steels

**API 5L** Specification for Line Pipe

**DIN 30670:2012-04** Polyethylene coating of steel pipes and fittings - Requirements and tests

Also applicable are all norms and standards equivalent to the above mentioned in the sense of art. 48 para. 2 and art. 49, para. 2 of the Public Procurement Act in Bulgaria.

## 3.2 Legal documents Bulgaria

**Ordinance No 6** / 25.11.2004 for the technical rules and legislative acts for design, erection and exploitation of sites and facilities for transmission, storage, distribution and delivery of natural gas, 2004.

**Ordinance** on the Structure and Safe Operation of Gas Transmission and Gas Distribution Pipelines, Natural Gas Facilities, Installations and Appliances - 67/02.08.2004

**Ordinance** on the essential requirements and conformity assessment of pressure equipment. (Adopted by Decree No 204 of 3.09.2002)

## 3.3 Legal documents Greece

Greek Technical Regulation for Natural Gas networks with operating pressure over 16 bars" (Gov. Gaz. B 603 of 05.03.2012)

## 3.4 Project documents

The following documents are attachments to this specification and shall be considered as part of this specification.

- Bill of Quantities - line pipes DN800
- 10760-SPC-CP-P0-002 "Specification for 3 Layer Polyethylene External Coating of Linepipe".
- 10760-SPC-CP-P0-003 "Specification for Internal Lining of Linepipe".
- 10760-SDR-PL-P0-003 Rev 1 SUPPLIER Data Requirements List (SDRL)
- Specification for transport and storage of line pipe

Moreover, the following technical specifications in their up-to-date version are applicable and can be found on the DESFA's website, www.desfa.gr:

- Technical job specification 970/2, High pressure (HP) transmission systems, Shop inspection of equipment and materials for NGT project and

- Technical job specification 970/3, High pressure (HP) transmission systems, Inspection and test instructions.

In case of contradiction requirements in the project documents it is the SUPPLIER's obligation to inform and clarify them with the CONTRACTING ENTITY in advance.

# 4 Technical requirements

## 4.1 General requirements

The pipes shall be suitable for the transport of natural gas.

For the construction of the main linear part of the pipeline the following pipes will be used:

| | |
|---|---|
| **Pipe Size** | DN 800 |
| **Design Pressure** | DP = 8 MPa (80 bar) |
| **Max Operation Pressure** | MOP = 7,5 MPa (75 bar) |
| **Max Incidental Pressure** | MIP = 8,25 MPa (82,5 bar) |
| **Standard** | EN ISO 3183:2012, level PSL 2 including Annex M |
| **Pipe Production Type** | SAWH – Submerged Arc-Welding Helical<br>or<br>SAWL – Submerged Arc-Welding Longitudinal |
| **Pipe Production Type for field/cold bends** | SAWL – Submerged Arc-Welding Longitudinal |
| **Pipe Material** | L450ME |
| **External coating** | 3 layers Polyethylene – 3xLPE for corrosion protection |
| **Internal coating** | Epoxy smooth coating, maximum roughness 15µm $R_Z$ |

- In case of contradiction between the requirements, clause 1.2.2.2 of the Agreement shall apply.
- Specific dimensions and technical parameters of the pipes are provided in the bill of quantities of the pipeline (Attachment 01).
- SAWL pipes with two welding seams are not acceptable same as per EN ISO 3183.
- The pipes shall be suitable for cold bending using bending machine.
- The steel shall be fully killed and shall be produced according to fine grain practice. The process employed to make steels is left to the SUPPLIER´s discretion.

- The pipes shall have smooth outside and inside surface consistent with the used manufacturing process.
- Delivered pipes shall not have any defects.

## 4.2 Welding procedures and weldability of the pipes

The proof of the suitability of the proposed welding procedure shall be conducted by the SUPPLIER.

Electric welded pipe shall be manufactured from thermo mechanically or hot rolled strip in cold forming process. Weld area shall not be normalized after welding. (EN ISO 3183:2012, table 3)

The welding process must be demonstrated in one of the process tests according to EN ISO 15607, EN ISO 15609-1, EN ISO 15610, EN ISO 15611, EN ISO 15612 and EN ISO 15613.

Respective measures for the production and quality assurance shall be verified by independent experts.

The tolerances for the weld seam shall be according EN ISO 3183:2012, p. 9.13.

The pipes shall be field-weldable using the manual shielded metal arc method of welding, with commercially available electrodes and standard field welding techniques, like manual, semi-automatic and/or mechanised field welding to produce welds acceptable for service conditions.

The SUPPLIER shall supply weldability data for the type and grade of steel and pipe concerned. The CONTRACTING ENTITY will be seeking conclusive proof that pipe of the highest specified carbon equivalent (IIW and Pcm) can be welded using the intended manual, semi-automatic and automatic field welding procedures. If the CONTRACTING ENTITY is unable to accept the data provided as proof of the weldability he will specify a weldability test programme to be investigated by the SUPPLIER before the start of the line pipe production.

The welding procedures for weldability testing shall be supplied by the CONTRACTING ENTITY as per EN ISO 3183:2012, p. 9.15.

## 4.3 Dimensions and mass

### 4.3.1 Wall thickness of pipes

Selected wall thicknesses of pipes DN800 are shown in the table below and more detailed given in Attachment 01 - Bill of Quantities:

Table.2

| Outer pipe diameter, mm | Steel grade acc. EN ISO 3183 | Pipe wall thickness, mm | Design factor, F |
|---|---|---|---|
| 813 | L450ME (X65M) | 11 | 0,72 |
| | | 14,2 | 0,6 |
| | | 16 | 0,5 |
| | | 20 | 0,4 |

The design factor in the table has to be considered for the correct selection of the minimum average absorbed energy for the CVN impact test acc. EN ISO 3183:2012, p. M.4.4.1 (selection table G1 or G2).

For 11 mm the minimum absorbed energy according table G2 shall be 43 J.

For 14,2 to 20 the minimum absorbed energy acc. table G1 shall be 40 J.

### 4.3.2 Length of supplied pipes:

The lengths of the pipes shall be 12m and 18m with tolerance ± 0.5 m (EN ISO 3183:2012. item. 9.11.3.3, b). In the attachment “Bill of Quantities - line pipes DN800” the lengths of the pipes for each pipe type are defined.

For the pipe types in the Bill of Quantities where the lengths are determined as 12m;18m, the exact ratio of the lengths in the quantities to be delivered (12m; 18m) will be determined by the CONTRACTING ENTITY latest at the Commencement date of the Agreement for supply of DN800 line pipes. This ratio may be amended unilaterally by the CONTRACTING ENTITY at least 3 months prior to the last Guaranteed completion date for each position in the table in the Bill of Quantities, after the EPC CONTRACTOR has determined the transport routes and the access to the temporary storage sites for the pipes.

### 4.3.3 Mass

The mass per unit shall be individually weighed according to EN ISO 3183:2012, p. 10.2.9.

Tolerances are allowed acc. p.9.14.

## 4.4 Pipe ends

The pipes are on both sides with plain ends including grooves according to EN ISO 3183:2012, 9.12.

The out-of-squareness shall be below 1.6mm, acc. EN ISO 3183:2012, p. 9.12.1.4

The angle of bevel shall be 30°+5°/-0°. The width of the root face of bevel shall be 1,6 mm ± 0,8 mm.

Welding seams shall be smoothly ground in the longitudinal tube direction, measured at the tube ends on the inside with a length of about 100 mm and on the outside over a length of approximately 150 mm.

The transition shall be smooth with a taper of no more than 7°. The grinding shall not reduce the wall thickness below that of the pipe and shall match the profile of the pipe. The grinding should also be no more than 0.5mm above the pipe surface

Strip end welds shall be removed.

## 4.5 Tolerances

In general all tolerances for geometry are according to EN ISO 3183:2012, Annex M, M.5.

To facilitate automatic field welding it is necessary to tighten up on some of the dimensional tolerances and in particular the tolerance limit on internal diameter and out of roundness of the pipe ends - more strictly than Table M.3:

| | |
|---|---|
| The **internal** out of roundness within 100mm of the pipe end | <4 mm or 0.75% D. |

| | |
|---|---|
| Peaking in the pipe body from the design form when measured over an arc of not less than 200 mm | <1,5 mm |
| Internal diameter at pipe ends | +/-1,2mm max |

Pipe wall thickness tolerance shall be according EN ISO 3183:2012, Annex M, Table M.4.

ID and out of roundness at pipe ends to be measured with Automatic (laser) robotic measuring method. The complete information of the applied measurement shall be provided.

## 4.6 Testing

In general the testing type and frequency has to be followed according Table 18 of EN ISO 3183:2012.

### 4.6.1 Chemical composition

A detailed analysis shall be proposed by the SUPPLIER for approval by the CONTRACTING ENTITY before an order for the raw material is placed. The SUPPLIER shall made such adjustments to the analysis as are [reasonably] required by the CONTRACTING ENTITY to obtain the CONTRACTING ENTITY's approval. This shall include maximum values for carbon equivalent based on both the IIW formula and the Pcm formula. The maximum values of Carbon Equivalent are given in ISO 3183:2012, Table 5/Table M1.

The necessary analysis values of the parent metal must be available prior to the start of welding work, in order to be able to specify the corresponding parameters for the appropriate welding method and procedures to guarantee the quality of the welds. The chemical composition should be according EN ISO 3183:2012, Annex M, Table M.1

### 4.6.2 Mechanical testing

CVN testing shall comply with EN ISO 3183:2012 Chapter 10 and Annex M.4.4. The required values are given in tables G1 and G2.

During tensile testing of the weld the yield strength shall also be measured. Testing shall also include hardness testing in accordance with ISO 3813 Annex J. In addition to the mechanical tests specified Charpy tests shall be taken from the fusion line, fusion line +2mm and fusion line +5mm positions. For information, additional Charpy tests shall be carried out at stepped reductions in temperature, to establish the transition temperature for the steel. Testing shall also include strain age testing to ensure the yield to ultimate tensile strength ratio. The strain age testing method and acceptance shall be subject to approval by the CONTRACTING ENTITY.

Longitudinal and transverse tensile tests shall be carried out in accordance with EN ISO 3183 (table M2). All tensile tests shall include yield strength, ultimate tensile strength and elongation determinations.

For the longitudinal tensile test full section strip specimens shall be used. Specimens shall be tested without flattening. Maximum range of yield strength and ultimate tensile strength for both transverse and longitudinal tensile tests shall be 100MPa.

Tensile strain capacity (total extension at maximum force for longitudinal direction) shall be 3% minimum.

### 4.6.3 Hydrostatic test

The test pressure shall be carried out in accordance with EN ISO 3183:2012 sections 9.4, 10.2.6 . The hoop stress of 95% of the specified minimum yield strength of the pipe shall be reached (according M.7.4.3 and 10.2.6.7).

For this case it has to be observed that in formula in p. 10.2.6.5 the minimum permissible wall thickness has to be used. (M.7.4.3).

The test pressure shall be held for not less than 10 seconds and pressure versus time shall be recorded. This record shall be available for examination by inspection representative.

Each length of pipe shall withstand the test without showing leakage or visible deformation.

### 4.6.4 Macrographic and metallographic examination

For SAW-L and SAW-H pipes, the alignment of the internal and external seams shall be verified by macrographic examination. Any misalignment of the weld beads of SAW pipes shall not exceed the values given in section 9.13, EN ISO 3183:2012.

Alternative methods, such as ultrasonic inspection, may be used with the CONTRACTING ENTITY's agreement.

### 4.6.5 Visual examination

Pipe internal and external surface shall be smooth and shall conform to the pipe manufacturing process. In general the requirements of EN ISO 3183:2012, Chapter 9.10 shall apply.

Each pipe shall be visually inspected to detect surface defects, with an illuminance of at least 300 lx (28 fc). Such inspection shall be over the entire external surface and shall cover as much of the internal surface as is practical.

The requirements of ISO 3183:2012, p. 10.2.7 shall be followed, except others agreed.

If the visual examination indicates that hard spot exceeds 50 mm in any direction the hardness in this area shall be determined.

Imperfections and defects disclosed by visual examination shall be repaired or pipe rejected as indicated in EN ISO 3183:2012, annex E.

### 4.6.6 Non-destructive testing (NDT)

Non-destructive testing of pipes shall be carried out after the hydrostatic test is completed according to the requirements of EN ISO 3183:2012, annex E.

All activities for non-destructive testing (NDT) shall be conducted by skilled personnel with qualification level 1 and / or Level 2 or from a registered Third Party Inspector, approved by the CONTRACTING ENTITY.

If the used automatic NDT operations leave the pipe ends untested, these shall be tested manually for longitudinal imperfections.

Weld repairs within 300mm of the pipe ends and repair of pipe with cracks is not permitted.

Ultrasonic inspection using compression and shear wave techniques shall be applied to a full 50mm of circumferential band at each pipe end to ensure this area is free of laminations, planar imperfections and micro cracks.

Ultrasonic equipment shall be standardized with the appropriate standard at least twice per operating shift, with the second standardization being conducted 3 h to 4 h after the first to demonstrate its effectiveness and the effectiveness of the inspection procedures. Instrument

standardization shall be confirmed prior to turning the unit off at the end of the inspection cycle.

Verification of compliance with E.3.2.3, E8 and E9 from ISO 3183:2012 is required.

The use of fluoroscopic inspection for final acceptance is not acceptable.

## 4.7 Identification

### 4.7.1 Embossed marking of pipes

In general the requirements of EN ISO 3183:2012, Chapter 11, p. 11.2.1, Example 1 shall be followed.

Each pipe shall be delivered with its own number and the relation between Pipe and Inspection certificate shall be clearly indicated.

The pipes shall be at least stamped with markings, wherein the embossed markings shall be permanently affixed and clearly legible. The embossed markings shall be made in accordance with the documents for the delivery of the pipe required by the CONTRACTING ENTITY (pipe certificates).

Embossed marking of the pipes shall be located at the left or right side of the weld (where visible) at both ends at a distance of 30 mm to 125 mm from them.

If necessary, barcode shall be applied in accordance with the documents for the delivery of the pipe required by the CONTRACTING ENTITY (pipe certificates).

Preferably the bar code shall be applied continuously to the tube at a distance of 1,0 m.

The durability of the barcode shall meet at least the permissible outdoor storage of the pipes.

### 4.7.2 Wall thickness colour coding

Colour codes shall be applied for different wall thicknesses of the pipes.

As the line pipes are with identical nominal diameters but different wall thicknesses on the outer surface of the finished pipes colour coding with weatherproof, well-adhering paint shall be applied (after application of the pipe's insolation cover).

The weather-resistant paint shall be by applied to make two strips with at least 50 mm width, staggered by 180° to each other over the entire tube length.

The colour coding to be applied:

| Outer pipe diameter, mm | Pipe wall thickness, mm | Colour code |
|---|---|---|
| 813 | 11 | No colour |
| | 14,2 | 1 stripe yellow (RAL 1021) |
| | 16 | 1 stripe red (RAL 3003) |
| | 20 | 2 stripes red (RAL 3003) |

Instead of coloured vertical stripes the pipes may be provided alternatively with the corresponding colouring of the tube coating if proposed by the SUPPLIER, with the prior approval of the CONTRACTING ENTITY.

### 4.8 Internal protection coating

Internal protection coating shall be according 10760-SPC-CP-P0-003 “Specification for Internal Lining of line pipe”, maximum roughness 15µm $R_Z$.

### 4.9 External corrosion protection coating

External corrosion protection coating shall be according DIN 30670-N-v and 10760-SPC-CP-P0-002 “Specification for 3 Layer Polyethylene External Coating of line pipe”.

### 4.10 Transport

Pipes shall be carefully loaded at the factory of the SUPPLIER and respectively protected against damage during transport.

Each end shall be protected with a suitable plug or cap that will protect the pipe´s internal surface during transportation and storage.

Plug or cap construction shall allow pipe lifting during transportation in case no electromagnet or vacuum device will be used. Plug or cap material shall contain no compounds that are capable of causing corrosion or promoting adherence of the plug or caps, and shall be suitable for service at temperatures of -45°C to +65°C (-50°F to +150°F).

Protective paddings for pipes shall be used during transportation.

Pipes and/or PE-coating damaged by the SUPPLIER due to improper loading and transportation shall be repaired or substituted by the SUPPLIER at the SUPPLIER’s expense.

Costs for stay of wagons or waiting trucks etc. due to the SUPPLIER’s fault (for example delayed sending of the documents for the customs and shipping documents) shall be at the SUPPLIER’s expense.

## 5 Documents

The documents required to be provided by the SUPPLIER are those listed on the SDRL (SUPPLIER Data Requirement List), Attachment 02: 10760-SDR-PL-P0-003 Rev 1 SUPPLIER Data Requirements List ("SDRL").

In general documents to the following document groups are required:

- Documents for production and quality procedures for approval before the production start
- Documents in parallel to the project, which give the project status, like progress reports
- Documents proving the product quality – test and inspection certificates
- Documents for the transport and pipe handover

For inspection documents especially the EN ISO 3183:2012 Chapter 10 has to be followed. Additionally to EN ISO 3183 requirements paper copies are required as well.

The number of prints required for each document, and submission period, are listed on the SDRL.

### 5.1 Guidance Notes for SDRL Documents

The following notes are included as guidance to those items in the SDRL which may require some clarification. Not all items are included here as most are self-explanatory in the SDRL.

### 5.1.1 A.01 SUPPLIER Document Register

Completed to show listing by category and by title of all documents to be submitted by the SUPPLIER to meet the data requirements of this SDRL. List to include SUPPLIER's own document numbers and CONTRACTING ENTITY's requirements for numbering of documents and date of submittal.

### 5.1.2 A.02 Fabrication/Production & Sub-order Schedule

Calendar dated and committed schedule for the manufacture by the SUPPLIER, including procurement and delivery of sub-contractor items. Schedules to be A3 size maximum and presented in bar chart form.

The bar chart should consist of two bars for each activity - one for planned progress and one for actual progress, to be updated regularly and submitted as part of the progress report described in A03 below.

### 5.1.3 A.03 Progress Reports

Regular submission of these documents is required in order to compare progress with A02 Fabrication/Production Schedule. This report, shall as a minimum consist of the following:

1. Description of all work accomplished in the preceding period
2. Comparison of the present work status with the original schedule.
3. Status of all drawings, procedures and any other documents required by the Purchase Order and anticipated issue compared to the SUPPLIER Data Schedule.
4. Proposed course of action in anticipation of/or in the event of any delays to the programme.

The report submission period is as shown in the SDRL.

### 5.1.4 G.03 Handling and Shipping Procedures

SUPPLIER's proposed techniques. Indicate method, size of container, number off, weight, identification and contents

### 5.1.5 K.01 Manufacturing Record Book Manual Format

SUPPLIER shall prepare a Manufacturing Record Book fully describing the manufacturing procedures used, the material certification and test and inspection reports.

Typically the above items are covered by Document Code No's H, K, L in the SDRL.

## 5.2 Submission Requirements

All SUPPLIER drawings and data shall be submitted under cover of a transmittal sheet bearing the enquiry or purchase order number indicating the applicable SDRL code.

All electronic documents have to be submitted with a file naming system and a document transmittal structure required by the CONTRACTING ENTITY. The details of the submittal structure will be agreed at project start. The system shall contain as a minimum:

- Document / drawing number,

- Type of document
- SDRL Code
- Title of document.
- Document language
- Number of sheets per engineering issue (i.e. 1 of 3, 2 of 3, etc. defined by the same drawing number).
- Revision number
- Status of document like
  draft for information / issue for approval / approved / etc.
- Transmittal number
- Transmittal date
- Remarks

SUPPLIER drawings and data shall be submitted in size A4, A3 and A1 paper only. All drawings and data shall be fully legible and in English language, if required as well in Bulgarian and/or Greek. Final certified copies of documents shall also be supplied in CD format in accordance with the SDRL

Except where a different period is expressly provided in the Agreement SUPPLIER's drawings and data submitted for review shall be returned in one (1) marked up copy to the SUPPLIER within ten (10) working days of receipt by the CONTRACTING ENTITY .

Except where a different period is expressly provided in the Agreement drawings and documents returned to the SUPPLIER with comments shall be re-submitted to the CONTRACTING ENTITY incorporating said comments within ten (10) working days of receipt.

Manufacturing Record Book (SDRL code K01) where requested shall be supplied in A4 size hard backed ring binders for the review and acceptance of the CONTRACTING ENTITY. One copy shall be submitted for review and approval within the time specified in the SUPPLIERs Data Requirements List. Upon acceptance by the CONTRACTING ENTITY two final copies plus one original shall be provided to the CONTRACTING ENTITY incorporating the CONTRACTING ENTITYs comments.

The K01 section shall also be produced in CD format. The contents of the CD shall include the K01 index. The component document shall be sequenced with this index and shall be in pdf format. Each section shall be tabbed and bookmarked for easy access, by the use of hyperlinks.

In case a document is not listed in above mentioned document it has to be delivered in one paper copy and electronic form.

All documentation shall be drawn up in Bulgarian and English.

The content of the documents shall comply with Ordinance No.3 „Documents and reports during construction", valid for Bulgarian part of the supplied pipes, with the relevant applicable normative requirements from the Greek institutions and third inspecting party for final acceptance and conformity assessment of the installation, and all applicable standards, especially but not only - EN ISO 3183:2012.

## 5.3 SUPPLIER Quality Programme Requirements

### 5.3.1 General

SUPPLIER shall operate an effective quality assurance system which, as a minimum, shall comply with the requirements of ISO 9001.

Where the SUPPLIER is registered by an accreditation body to ISO 9001, a copy of their registration certificate shall be provided. Where the SUPPLIER is not registered, the requirements of the SDRL for the submission of the Quality Manual shall apply.

The quality assurance requirements of the Agreement shall be passed on to any sub-contractors of the SUPPLIERs as applicable to their scope of supply.

### 5.3.2 Quality Plan and Test and Inspection Plan

A Quality Plan specifying quality controls (equipment, personnel, type of tests and inspections, process organisation, etc.) for the manufacturing and delivery of the product shall be provided. The Quality Plan shall address all applicable parts of the scope of supply in accordance with this Technical Specification, including Sub-supplier activities. Where Sub-supplier Quality Plans are submitted, such plans shall be approved by the SUPPLIER **prior to submission to the CONTRACTING ENTITY**.

The detailed test and inspection activities to be carried out by the SUPPLIER in accordance with this Technical Specification shall be included by the SUPPLIER in the Test and Inspection Plan. The Test and Inspection Plan shall set out the detailed schedule of dates for carrying out the test and inspection activities conducted by the Supplier in accordance with approved by the CONTRACTING ENTITY Delivery Schedule.

The CONTRACTING ENTITY reserves the right to modify the extent of his inspection surveillance as he deems necessary.

### 5.3.3 Guidance Notes for the Preparation of the Quality Plan

**Activity Numbers** shall be allocated sequentially to each described activity

within the process.

**Activity Description** shall briefly describe the activities from contract review through production control and all stages of the process to completion.

**Control Document Reference**. The qualification/procedure/written instruction used to control the activity shall be referenced.

**Verifying Record.** The document produced as objective evidence of satisfactory completion of the activity shall be referenced.

**Hold Points.** (H). The CONTRACTING ENTITY will indicate on the Quality Plan any additional hold points beyond which the SUPPLIER may not continue without written authorisation from the CONTRACTING ENTITY.

**Witness Points.** (W). The CONTRACTING ENTITY will indicate on the Quality Plan any additional witness points whereby CONTRACTING ENTITY shall receive advance notice of the dates when these points will be reached. Manufacture beyond these points may continue at the SUPPLIER's risk, should CONTRACTING ENTITY fail to attend at the pre-determined time.

**Certification. (C).** The SUPPLIER shall indicate all certification required by technical requisition documents or relevant legislation etc.

## 5.4 Other documents required under national legislation

In addition to the documents required by the CONTRACTING ENTITY described in the previous clauses of Chapter 5, the SUPPLIER is obliged to provide all other necessary documents for the delivered pipes which satisfy the requirements of the Bulgarian and Greek legislation.

The legally required documents should be in the language of the country concerned.

# 6 Health, Safety and Environment

Where in the performance of the SUPPLIER's obligations the SUPPLIER intends to supply or to use any product which may or does contain a substance which is hazardous to health or to the environment the SUPPLIER shall provide full details within its Technical Offer. In considering whether any product contains such substance the SUPPLIER shall include any substance which may be released in the manufacturing process or by cutting, grinding, spreading, burning, mixing or flushing etc.

When undertaking any work on site the SUPPLIER shall comply with all applicable site HS&E regulations. The terms of such requirements shall be made available prior to any site visits.

NOTE: "SUPPLIER" includes all sub-suppliers/tradesman and contractors.

# 7 Attachments

All attachments have to be considered as part of this specification with the same order among other documents.

| No | Title. |
|---|---|
| 01 | Bill of Quantities - line pipes DN800 |
| 02 | 10760-SDR-PL-P0-003 Rev 1 SUPPLIER Data Requirements List (SDRL) |
| 03 | Specification for Transport, Handling and Storage of Pipes |
| 04 | 10760-SPC-CP-P0-002 Specification for 3 Layer Polyethylene External Coating of line pipe |
| 05 | 10760-SPC-CP-P0-003 Specification for Internal Lining of line pipe |