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Hellenic Gas Transmission System Operator

HELLENIC GAS TRANSMISSION SYSTEM OPERATOR

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TECHNICAL JOB SPECIFICATION

597/1

REVISION 0

DATE 05/04/2011

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

INSULATING COUPLINGS

QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

0	05-04-2011	FIRST ISSUE	PQ DPT	VG
Rev. No	Rev. Date	REASON FOR CHANGE	Made By	Approved By

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REFERENCE DOCUMENTS

EU Directive 97/23/EC **"of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment" (PED)**

Job Spec. No. 970/2
[Shop Inspection of Equipment and Materials for NGT Project]

Job Spec. No. 970/3
[Inspection and Test Instruction]

ELOT EN 10045-1
[Charpy impact test on metallic materials; part 1: test method]

ELOT EN 583-1
[Non-destructive testing - Ultrasonic examination - Part 1: General principles]

ELOT EN 1290
[Non-destructive testing of welds - Magnetic particle testing of welds]

ELOT EN 10208-2
[Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2: Pipes of requirements class B]

ELOT EN 12732
[Gas supply systems - Welding steel pipework - Functional requirements]

ELOT EN 1591-1 (harmonised with EU Directive 97/23/EC- PED)
[Flanges and their joints - Design rules for gasketed circular flange connections - Part 1: Calculation method]

1.0 SCOPE

1.1 ITEM

Insulating Couplings

1.2 SERVICE

a) Natural gas.

b) Liquid oil products.

1.3 ADDITIONAL INFORMATION

Additional information may be given in the Data Sheet and these documents should be read in conjunction with the specification herein.

Any conflict between requirements of this Specification and drawings, Data Sheets, Codes and Standards shall be referred to Owner for clarification, before proceeding with fabrication of the affected part.

2.0 GENERAL REQUIREMENTS

2.1 TYPE

Monoblock with pipe stubs

2.2 OPERATING DATA

Refer to data sheet

2.3 DESIGN DATA

Refer to Data Sheet

2.3.1 COUPLING ELEMENTS DESIGN PRESSURE

Unless Supplementary requirement SR3 is specified on the Data Sheet coupling elements design pressure is equal to design pressure of the pipeline.

2.3.2 WELDING ENDS (STUBS) DESIGN PRESSURE

Equal to pipeline design pressure.

2.4 DESIGN CALCULATIONS

2.4.1 DESIGN CODE

ELOT EN 1591-1

In any event, the minimum thickness, exclusive of corrosion allowance, shall not be less than 5 mm for carbon and low-alloy steel pressure parts or the abutting pipe thickness whichever is bigger.

2.4.2 BENDING MOMENT

No bending moment maybe taken into account, unless supplementary requirement SR3 is specified on the Data Sheet.

2.4.3 CORROSION ALLOWANCE

Refer to Data Sheet.

2.4.4 PRODUCTION ALLOWANCE

To be added to calculated wall thickness.

2.5 CONSTRUCTION

2.5.1 JOINTS

Bolted or threaded joints are not permitted. The design of welds joining stubs and coupling element shall permit radiographic examination of the welds.

2.5.2 SEALS

One or two independent seals refer to Data Sheet.
Each seal shall be made from continuously moulded precision O-rings in a dielectric material.

2.5.3 EMERGENCY SEAL

Not required, unless Supplementary Requirement SR1 is specified. Refer to Data Sheet.

2.5.4 BORE

Not less than 96 % of abutting pipe's inside diameter, unless Supplementary Requirement SR2 is specified. Refer to Data Sheet.

2.5.5 LENGTH

Stub length shall be sufficient for application of internal coating in accordance with **paragraph 2.11** (total length of coated area).

2.5.6 WELDING ENDS

Shall match the abutting ends within a tolerance of + 1.6 mm. Refer to Data Sheet for abutting pipe dimensions.

Bevelling shall be as specified in **ELOT EN 10208-2.**

2.6 MATERIALS

2.6.1 GENERAL

ELOT EN 10208-2 grades L245 through L485

2.6.2 IMPACT TESTS

On all pressure retaining components **ELOT EN 10045-1** impact tests at a temperature lower than -20°C shall be performed on each material used, consisting of three test specimens from the same heat as the actual delivery.

2.6.3 WELDING ENDS (STUBS)

Seamless or welded carbon steel pipe as per **ELOT EN 10208-2** grades L245 through L485 inclusive or equivalent.
Grades L360 through to L485 can only be used on stubs of DN 750 or larger.

2.6.4 COUPLING RINGS, SHELL ETC.

Forgings, rolled plates, or tubular products shall be used.

2.6.5 SEALS AND DIELECTRIC

Shall be inert to gas, methanol and glycol. Elastic properties shall ensure a sustained precompression of sealing element.

2.7 FABRICATION

2.7.1 FORMING OF PLATE

As per **ELOT EN 10208-2.**

Subsequent heat treatment, if required, shall be normalizing.

2.7.2 WELDING

As per **ELOT EN 12732.**

Hardness of the weld seam and heat affected zone may nowhere exceed 300 HV 10.

2.7.3 REPAIR BY WELDING

Not permit in base materials.

2.7.4 GRINDING

Surface defects may be removed by grinding, providing the minimum calculated wall thickness is maintained.

2.7.5 POSTWELD HEAT TREATMENT

As per **ELOT EN 12732** and **ELOT EN 10208-2**.

Any heat treatment operations performed by fabricator and intended to enhance mechanical properties, shall obtain Owner approval.

When normalized and tempered materials are specified, the tempering shall be performed prior to any welding unless specifically otherwise authorized in writing by Owner.

The tempering temperature shall be 100°C higher than that required for PWHT, unless otherwise specified.

Final closure welds around dielectric components may be exempted.

2.8 NON DESTRUCTIVE EXAMINATION

2.8.1 PLATES AND WELDED PIPE

All items shall be ultrasonically scanned to **ELOT EN 583-1**.

2.8.2 FORGINGS

All forgings shall be magnetic particle examined as per **ELOT EN 1290** over entire surface. On machined surfaces no linear indications are acceptable.

2.8.3 WELDS

All joints shall be NDT inspected RT or UT, as applicable, in acceptance with **ELOT EN 12732.**

2.8.4 WELDING ENDS

All welding ends shall be ultrasonically examined to a minimum distance of 50 mm from and including the bevel. Any indication shall be cause for rejection.

2.9 HYDROSTATIC TESTING

2.9.1 TEST PRESSURE

Each insulating coupling shall be hydrostatically pressure tested for at least five minutes and a minimum test pressure 1,5 x design pressure as per para. 8.5.2, **ELOT EN 1594**.

Temperature of water shall never be less than 4°C and insulation coupling Fabricator shall take all necessary precautions avoid brittle fracture of equipment during the hydrotest.

Axial forces occurring during testing shall not be constrained.

2.9.2 PRESSURE CYCLES

Initially each coupling shall be subjected to 3 pressure cycles between 10% and 85% of the Test Pressure.

2.9.3 ACCEPTABILITY STANDARD

With the full test pressure applied for a minimum of 30 minutes, no signs of leakage or permanent deformation shall be observed.

2.10 ELECTRICAL TESTS

2.10.1 COUPLING CONDITION

Couplings with one seal shall have these tests applied after hydrostatic testing and the application of the internal coating.

Couplings with two seals shall have these tests applied both before and after hydrostatic testing and the application of the internal coating.

Couplings shall be in a fully dried condition.

2.10.2 DIELECTRIC STRENGTH TEST

5000 V AC., 50 Hz shall be applied for a period of not less than one minute during which no puncture of coating or formation of sparks (internal or external short circuit) may occur, and the leak current differential shall not exceed 2 mA.

The leak current differential between the two tests performed on couplings with two seals shall not exceed 10% of the current of the first test.

2.10.3 RESISTANCE TEST

1000 V DC. with a measured electrical resistance greater than 20 Mohm.

2.11 SURFACE TREATMENT (COATINGS)

Unless specified on the Data Sheet, coatings shall be to coupling manufacturer's recommendation with the following requirements:

2.11.1 EXTERNAL

Insulating coating capable of resisting preheating to 150°C at the welding end.

Coating to be cut back 150 mm from welding end.

Coating to be subject to a holiday test of not less than 5 kV + 5 kV per mm of coating thickness, unless stated otherwise on the Data Sheet and is free of holidays.

2.11.2 INTERNAL

Abrasion resistant coating of a minimum length of 1 x Nominal diameter or 300 mm whichever is the largest.

Coating to be subject to a holiday test of not less than 5 kV, unless stated otherwise on the Data Sheet, and is free of holidays.

2.12 MARKING

Each coupling shall be marked with:

- Manufacturer's mark.
- Coupling's serial number.
- Material grade of stubs.
- Outside diameter of pipe to which the coupling shall be attached.
- Inspection stamp.

Markings shall be dye stamped in a place outside the coating and covered with a clear soluble varnish.

The Owner Contract Number shall be paint stenciled.

3.0 SUPPLEMENTARY REQUIREMENTS

3.1 GENERAL

The following Supplementary Requirements shall not apply, unless specifically requested on the applicable Data Sheet.

Further requirements, if specifically mentioned on the Data Sheet, shall be valid. Material Requisition shall specify the applicability (as requested) of PED 97/23/EC. In case of conflict between such requirements and the requirements contained herein, the former shall prevail.

3.1.1 SUPPLEMENTARY REQUIREMENTS - SR1

The coupling shall be prepared for installation of a tight emergency seal. Installation shall be possible with coupling under pressure.

3.1.2 SUPPLEMENTARY REQUIREMENTS - SR2

The coupling shall permit passage of scrapers. The bore shall not be less than 0.96 x inside diameter of abutting pipe.

3.1.3 SUPPLEMENTARY REQUIREMENTS - SR3

The coupling elements design pressure shall include an allowance for predictable well defined bending moments (M) with a value as specified on the Data Sheet.

This revised design pressure shall be determined thus:

$$\text{(Coupling Element Design Pressure)} = \text{(Pipeline Design Pressure)} + \frac{16 \cdot M}{3.1416 \cdot G^3}$$

where :

G = Diameter at location of the effective gasket load reaction.

M = Bending moment at the insulating coupling position induced due to seismic forces, soil displacement / settlements, etc, according to the stress analysis of the pipeline system.

4.0 INSPECTION AND CERTIFICATION

Inspection will be performed by an Independent Accredited Inspection Body. Inspection requirements are defined in the following documents:

a) Material Requisition.

b) **Job Spec. No. 970/2** "Shop inspection of equipment and material for NGT project" and **Job Spec. No. 970/3** "Inspection and Test Instruction".

c) Relevant project specifications.

d) Inspection clauses of applicable codes.

5.0 SHIPMENT

One piece equipment shall be completely equipped with all internal/ external attachments before shipment unless otherwise specified.

Where necessary, insulating couplings shall be supported by temporary stiffeners to avoid distortion and damage during transportation and erection.

All exposed machined surfaces shall be coated with rust preventive. Welding ends shall be protected with plastic covers.