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TECHNICAL JOB SPECIFICATION

134/1

REVISION 0

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

FILTERS

QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

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Rev. No	Rev. Date	REASON FOR CHANGE	Made By	Approved By

CONTENTS

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. 830/1
[External Painting]

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

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

Std Drawings STD-3-11-8
[Name Plate for Vessel]

ELOT EN 1092-1 (harmonised with EU Directive 97/23/EC- PED)
[Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated – Part1: steel flanges]

ELOT EN 1514
[Flanges and their joints - Dimensions of gaskets for PN -designated flanges]

ELOT EN 10204 (harmonised with EU Directive 97/23/EC- PED)
[Metallic products - Types of inspection documents]

ELOT EN 12560
[Flanges and their joints - Gaskets for class-designated flanges]

ELOT EN 13445-1 (harmonised with EU Directive 97/23/EC- PED)
[Unfired pressure vessels – Part 1: General]

ELOT EN 13445-2 (harmonised with EU Directive 97/23/EC- PED)
[Unfired pressure vessels – Part 2: Materials]

ELOT EN 13445-3 (harmonised with EU Directive 97/23/EC- PED)
[Unfired pressure vessels – Part 3: Design]

ELOT EN 13445-4 (harmonised with EU Directive 97/23/EC- PED)
[Unfired pressure vessels – Part 4: Fabrication]

ELOT EN 13445-5 (harmonised with EU Directive 97/23/EC- PED)
[Unfired pressure vessels – Part 5: Inspection and TestingEN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments]

ELOT EN 60947-5-6
[Low-Voltage Switchgear and Control Gear-Part 5-6. Control Circuit device and Switching Elements - DC interface for Proximity Sensors and Switching Amplifiers]

1.0 SCOPE

1.1 ITEM

Filters

1.2 SERVICE

Sweet, natural gas with sporadic passage of water and glycol.

1.3 APPLICATION

The filters shall remove solid impurities from the gas stream.

1.4 ADDITIONAL INFORMATION

Additional information may be given in the Material Requisition and this document should be read in conjunction with this Job specification.

Vendor shall be responsible to design filters and their components in accordance with requirements of applicable documents. In any thicknesses and other design characteristics shall not be less than those shown on the basic design documents and drawings unless specific written approval to the contrary is received from Owner.

Any conflict between requirements of this Job Specification, basic design documents and drawings, Standards and Material Requisition shall be referred to Owner for clarification before proceeding with fabrication of the subject part.

GENERAL REQUIREMENTS

2.0 DESIGN LEGISLATION AND STANDARDS

2.1 Pressure vessels shall be designed, constructed, inspected and tested in accordance with:

a. **EU Directive 97/23/EC**

b. **ELOT EN 13445** (mandated to EU Directive 97/23/EC).

c. Requirements mandatory as accepted by the National or Local Authorities where the filter is to be located.

d. Insurance requirements.

DESIGN DATA

2.1.1 Refer to Material Requisition

2.1.2 CALCULATIONS

According to **ELOT EN 13445**.

Reinforcement pads, shall be calculated and provided by the Vendor for all openings and shall not be less than the required in the applicable standard. Reinforcement shall be equal to the greater of the requirements obtained from the following:

- New vessel subject to testing conditions
- Vessel subject to design condition

2.2 UNITS

Metric

2.3 OPERATING TEMP. RANGE

As per Material Requisition

2.4 PRESSURE RATING

As per Material Requisition

2.5 CONSTRUCTION

2.5.1 GENERAL

The filter shall be a vertical unit with gas inlet and outlet flanges on the same centre line. The filter design shall secure that the separation efficiency specified in the Material Requisition are fulfilled.
Vessel parts shall have minimum thickness of not less than the requirements of **ELOT EN 13445**.

In any event the minimum thickness shall not be less than 5 mm for Carbon and low-alloy steels filters and 3 mm for high-alloy steels.

2.5.2 HEADS AND CONICAL SECTIONS

All heads shall conform to permissible code shapes.
Elliptical heads shall have a ratio of the inside major axis to the inside minor axis of 2:1.

Appex. angle of the conical portion of toriconical heads shall not exceed 60 Deg, unless otherwise noted on filter basic design documents and drawings.

2.5.3 No. OF STAGES

Filters shall be either single stage cartridge filters or two-stage units comprising a cyclone/multicyclone first stage and a cartridge second stage.

2.5.4 CLOSURE

Filters shall be equipped with a quick-closing door at the top to allow easy access for changing filter cartridges. The design of the door shall be such that it cannot be opened whilst the filter is pressurized.
Suitable equipment shall be provided to lift and/or swing the door.
Hinges shall be supplied for all closures.

2.5.5 CARTRIDGES

Filters of the same type shall have identical cartridges in all filter sizes. Minimum cartridge bursting pressure as per Process Data Sheet.

2.5.6 SEPARATING PLATE

For two stage filters, the plate separating the two stages shall be designed to withstand at least the actual bursting pressure of the cartridges.

2.5.7 NOZZLE ALIGNMENT

Alignment of connection nozzles shall be within a tolerance of 1/2 degree.

2.5.8 FLANGES

Flanges shall be in accordance with **ELOT EN 13445**, **ELOT EN 1092-1** and **ELOT EN 1514 series,** raised face. Flanges shall be of weld neck type unless otherwise specified in the Material Requisition.

2.5.9 GASKETS

All gaskets and seals shall be asbestos free and be resistant to natural gas and gas condensates.

Flat ring gaskets shall be of a type having a stainless steel lip ring on the inner edge.

Vessel external attachments and reinforcing pads:
Vendor's supply shall also include the followings:

- Saddle supports (if any).
- External insulation supports if specified.
- Support legs, clips and brackets.
- Lifting lugs.
- All attachments to vessel as required for shipment and erection.

All external attachments shall be of the same material as the shell and head to which they are directly attached.

Gasket surface finished in accordance with **ELOT EN 13445**, **ELOT EN 1092-1**, **ELOT EN 1514 series** and **ELOT EN 12560** as follows:

FLANGE FACE	GASKET TYPE	FACE FINISH
Raised & flat face	1.5 mm soft ring	"Stock"
Raised face	Spiral wound	Smooth (>3,6μm Ra)
Raised face	Metal jacketed	Very smooth (<1,6μm Ra)

Accessories:

2.5.10 LEVEL GAUGES

Two-stage dust/liquid filters shall be equipped with liquid level gauges on both stages.

First stage shall be equipped with a magnetic type level gauge fitted with shut-off valves and with one (or two level alarm switch(es) mounted on the outside of the gauge, making alarm setting over the whole gauge length possible.

The level alarm switches shall be no-touch inductive proximity switches in accordance with **ELOT EN 60947-5-6**, having an enclosure with protection class min. IP 65 and with min. Pg 13,5 cable gland.

The Explosion protection shall be min Ex ib, for zone 1, group IIB, class T3.

Second stage shall be equipped with a reflection glass level gauge fitted with automatic shut-off safety valves, which prevents the escape of gas and liquids in case of glass rupture. Manual shut-off shall be possible.

All level gauges shall be equipped with a drain valve.

2.5.11 VALVES

Drain connections on liquid filters shall, unless otherwise stated in the Material Requisition, shall be equipped with a drain valve and a blind flange.
Drain valves shall be ball or plug-valves.
Only valves manufactured in accordance with **ELOT EN 13445**.

2.6 MATERIALS

2.6.1 GENERAL

Materials shall fulfill the requirements of **ELOT EN 13445**.

Plate material according to **ELOT EN 13445**. For the plate material to be used for reinforcing pads applies the applicable specification for the vessel parts to which they are connected. Plate materials P295GH are not accepted. Casting shall not be used.
No other material will be used unless specifically written by Owner. Welding fittings for pressure parts shall be of seamless steel.

The individual steel items shall be marked with Vendor's mark and material grade.

Prefabricated items, as caps, reducers, flanges, etc, shall be marked according to the Standard to which they are manufactured.

Materials shall conform to **ELOT EN 13445-2**. Carbon content on heat analysis shall never exceed 0.22%. Carbon equivalent (CE=C+Mn/6) shall be <0.42% on heat analysis and Vanadium content <0.07%.

Impact tests: For all pressure retaining parts, V- Charpy impact test shall be performed according to **ELOT EN 13445**. Properties shall be determined on each heat from a set of three Charpy V-notch specimens.

The test temperature shall be -20°C or lower with acceptance criteria as follows: Mean value from 3 tests 28 joules or better with the lowest single value 22 joules with all test-specimens being removed transverse to the longitudinal axis.

2.7 FABRICATION

2.7.1 GENERAL

Pressure vessels shall be manufactured in accordance with the requirements of **ELOT EN 13445**.

Filters shall be completely shop fabricated and no field work shall be accepted by Owner.

Tolerances on out-of-roundness of vessels shall conform to the Standard and Owner requirements.

All tolerances must be referred to the completed vessel, after heat treatment, if required.

2.7.2 HEAT TREATMENT

Cold formed dished heads shall after forming undergo appropriate heat treatment.

Hot formed dished heads shall be manufactured to ensure a heat treatment corresponding to that required for cold formed dished heads.

Any heat treatment operations performed by vessel Vendor 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 10°C higher than that required for PWHT, unless otherwise specified on vessel basic design documents and drawings.

Vessels which have been submitted to PWHT shall have a large warning notice painted on shell at convenient locations stating:
STRESS RELIEVED VESSEL NO WELDING PERMITTED.

2.7.3 WELDING PROCEDURES/WELDERS QUALIFICATIONS

WPS, PQR, WQR shall be in accordance with the requirements of **ELOT EN 13445.**

2.7.4 WELDING

Hardness of the weld seam and the heat affected zone may nowhere exceed 300 HV10.

Repair by welding:

Only permitted in welds. Repair procedure shall be approved by Owner Representative.

2.8 NON-DESTRUCTIVE EXAMINATION

2.8.1 GENERAL

All joints on pressure retaining parts, except for nozzle weld seams with sizes below DN 100, shall be 100% radiographed and found acceptable in accordance with **ELOT EN 13445.**

If weld-on nozzles are used, the affected area of the shell plate shall be ultrasonically tested for laminations.

2.8.2 NOZZLES DN <100

Nozzle weld seams shall be 100% dye penetrant or magnetic particle examined in accordance with **ELOT EN 13445.**

2.9 TESTING

2.9.1 HYDROSTATIC TEST

Each unit shall be hydrostatic tested as per Standard.

Temperature of water shall never be less than 5°C. Filter vessel shall take all necessary precautions to avoid brittle fracture of filters during the hydrotest.

All shop fabricated vessels shall be hydrotested and certified by a Notified Body as per **EU Directive 97/23/EC** and **ELOT EN 13445**.

Only water having less than 50 ppm chloride ion shall be used during hydrotest for all austenitic/martensitic stainless steel exposed to water-test.

In addition the equipment shall be immediately drained after hydrotest and carefully dried by blowing with air and an absolute absence of any pocket water must be ensured.

The hydrostatic test pressure shall be measured at the top of the vessel. Vertical shop fabricated vessels shall be tested in horizontal position with test pressure increased to consider the static head present when the vessel is in vertical position.

The type of gaskets used for hydrotest must be the same selected for the operating conditions. All gaskets shall be replaced, after hydrotest.

2.9.2 TIGHTNESS TEST

Each unit shall pass a tightness test, using air or nitrogen. Test pressure, shall be 6 bar and hold time 30 minutes.

2.10 SURFACE TREATMENT

Raised faces on flanges shall neither be sandblasted nor primed, but shall be protected against corrosion with a soluble varnish or equivalent.

The vessel shall be delivered in primed conditions.
Job Spec. No. 830/1 shall dictate surface preparation and painting required.

All parts painted with rich zinc paints or hot dip galvanized shall not be welded to the vessel.

The primer shall allow over-coating after six (6) months of stocking on site without any significant reduction in adhesion of the following coats. If necessary this shall be achieved by the additional application of a sealer.

Mashined surfaces shall not be painted welding ends shall be capped and protected against corrosion damage in transit.

2.11 MARKING

Filters shall be fitted with stainless steel identification plates, containing the item number and the information required by the Standard and **EU Directive 97/23/EC**.

The text shall be in Greek, as per **Std Drawing STD-3-11-8.**

2.12 DELIVERY

All outlets shall be capped and protected against corrosion or damage in transit.

2.13 INSULATION

Filters shall be insulated as per relevant Specification.

3.0 TECHNICAL DOCUMENTATION

3.1 QUANTITY

Four copies of each inclusive of original for all Documents and Certificates, except otherwise specified.

Four copies of each inclusive of one reproducible for all drawings, except otherwise specified.

Also electronic files (word documents and/or AutoCAD documents as applicable) of all Documents and Certificates must be submitted by Vendor to the Owner.

3.2 DOCUMENT REQUIREMENTS

Ail drawings must be marked with Owner purchase order number and with the part number to which they apply. Design data, design and construction applied European Standards shall be noted on these drawings.

All drawings (except those with tender) shall be addressed to Owner Document Control Department.

3.2.1 WITH TENDER

Standard drawings indicating dimensions, location and size of nozzles, materials, overall weight, etc.

Assembly drawing with indication of accessories (type of valves, level gauges, level switches, etc.) and internal design.

Capacity curves, etc. necessary for the evaluation of design.

EEx-approval- and conformity certificates for level alarm switches (if any).

Completed data sheets (if not complete).

Technical file certified by Notified Body as per requirements of **EU Directive 97/23/EC (section 4).**

3.2.2 AFTER AWARD OF CONTRACT (BEFORE START OF PRODUCTION)

Preliminary documents shall be submitted to Owner within three (3) weeks after letter of intent.

The following documentation shall be provided for the Owner approval:

- detailed construction drawings including parts list detailing material standard and grade, item description, and certification level, eight (8) copies.
- design calculations, eight (8) copies,
- heat treatment specification, three (3) copies,
- non-destructive testing specification, three (3) copies,
- pressure test specification, three (3) copies,
- identification plate text, three (3) copies,
- electronic files (word documents and/or AutoCAD drawings as applicable) of all Documents, Drawings and Certificates

The Vendor Detailed Test and Inspection plan, approved copy (BY THE NOTIFIED BODY) shall be forwarded to the Owner as soon as available.

The plan should show the main control points at which the Notified Body witnessing/approval is required, as per section 4 herein.

3.2.3 ON DELIVERY

Comprehensive operation, maintenance and reconditioning manuals in Greek, five (5) copies.

List of recommended tools, spare parts, etc., three (3) copies.

As-built drawings, sixteen (16) copies.

Statement regarding solvents applicable for removal of varnish, three (3) copies.

FILTER CERTIFICATION PACKAGE as listed above, five (5) copies. Certified

drawings required within two weeks after return of "For Approval" drawings.

Also electronic files (word documents and/or AutoCAD documents as applicable) of all Documents, Drawings and Certificates.

4.0 INSPECTION AND CERTIFICATION

Inspection will be performed by a Notified Body.

Inspection requirements are defined in the following:

a. **EU Directive 97/23/EC**

b. Material requisition.

c. **Job Spec. No. 970/2** "Shop inspection of equipment and materials for NGT project",

d. Relevant project specifications.

e. Inspection clauses of **ELOT EN 13445**.

Inspection procedures to be followed are detailed in DESFA **Job Spec. 970/3** "Inspection and Test Instructions".

5.0 SPARE PARTS

As a minimum two (2) spare gaskets plus 10% bolts and nuts (if any) shall be supplied.

Also Vendor shall include a start-up filtering media with a lighter filtration degree.

6.0 SHIPMENT

One piece filter shall be completely equipped with all external attachments before shipment unless otherwise specified on the drawings.

Where necessary filter and its components shall be supported by temporary stiffeners to avoid distortion and damage during transportation and erection.

All exposed mashined surfaces shall be coated with rust preventive. All ends (flanges, welding, etc) shall be protected with plastic covers and all threaded connections (if any) shall be plugged.

7.0 GUARANTEES

For guarantee requirements see the Purchase Order.