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## **TECHNICAL SPECIFICATION**

**Doc No: DSF-SPC-PIP-028**

**Rev. 1**

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### **HIGH PRESSURE (HP) TRANSMISSION SYSTEMS**

# **Plug Valves Nps $\geq 50$ (Non Lubricated)**

**JUNE 2021**

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### **REFERENCES DOCUMENTS**

Job Spec. DSF-SPC-MEC-009 [Plant Coating of Burned Valves for Pipeline]

Job Spec. DSF-SPC-QAC-005 [Shop inspection of equipment and materials for NGT project]

Job Spec. DSF-SPC-QAC-006 [Inspection and Test Instructions]2014/68/EU [Pressure Equipment Directive – PED]

EN 1759-1 [Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, class-designated. Steel flanges, NPS 1/2 to 24]

EN ISO 148-1

[Charpy Impact test on metallic materials-part 1: test method]

EN 10204

[Inspection Documents for metallic products]

EN 13445-4

[Unfired pressure vessels - Part-4: Fabrication]

EN 13942 (ISO 14313 modified)

[Petroleum and natural gas industries - Pipeline transportation systems - Pipeline valves]

EN 14141

[Valves natural gas transportation in pipelines - Performance and tests]

EN ISO 10497

[Testing of valves - Fire type testing requirements]

ASMEB16.5

[Pipe Flanges and Flanged Fittings]



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## **1. SCOPE**

### **1.1 ITEM**

Non Lubricated Plug Valves DN > 50, straightway.

### **1.2 SERVICE**

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

### **1.3 APPLICATION**

For throttling and blow-down service.

### **1.4 ADDITIONAL INFORMATION**

Additional information may be given in the DATA SHEETS and Material Requisition and these documents should be read in conjunction with this material specification.

All items shall cover the requirements of PED 2014/68/EU.

Any conflict between requirements of this Specification and drawings, DATA SHEETS and Material Requisition and supplementary design data shall be referred to Owner for clarification, before proceeding with fabrication of affected part.

Plug valve Vendor shall be responsible to design valves and their components in accordance with the requirements of the reference documents.

Thickness, dimension, etc. must not be less than those shown on the valve drawings, unless otherwise written instructed by the Owner.

## **2. STANDARDS**

### **2.1 SPECIFICATION**

**EN 13942** and **EN 14141** additionally satisfying the requirements herein.

### **2.2 UNITS**

Metric.

### **2.3 PRESSURE RATING**

Refer to DATA SHEET or Material Requisition.



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### **2.4 PATTERN**

Refer to DATA SHEET for short, regular or venturi pattern requirement.

### **2.5 CONSTRUCTION**

#### **2.5.1 GENERAL**

The Plug Valve shall be Non Lubricated, insensitive to vibrations and near sonic flow velocities and suitable to Low Temperature Service (Throttling).

Valves for underground buried use shall be with welding ends, shall have their stem extended above ground, and shall be suitable for underground buried service.

#### **2.5.2. PLUG**

Tapered, with metal to metal seals.

#### **2.5.3 MECHANICAL ADJUSTMENT OF PLUG**

Required by bottom screw.

#### **2.5.4 STEM/PLUG CONNECTION**

Design shall prevent lateral strain on stem for valves PN 50 and higher (equalizer ring).

#### **2.5.5 STEM SEALS**

Dual O-rings or alternate design of equivalent or better quality.

Ingress of water between stem and gland shall be prevented (e.g. weather seal).

#### **2.5.6 STEM STOPS**

Required

#### **2.5.7 WELDING ENDS**

Shall match the diameters of the abutting ends within a tolerance of  $\pm 1.6$  mm. Refer to DATA SHEET for abutting pipe dimensions.

Beveling shall be as specified in **EN 14141**.

#### **2.5.8 FLANGES**

Raised Face or Ring Joint as per **EN 1759-1**. For flanges with DN>600 not covered by this standard, dimensions given in **ASME B16.5** apply.



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Refer to DATA SHEET for type. Bore to be derived from abutting pipe dimensions, see DATA SHEET.

### **2.5.9 VALVE OPERATION**

Refer to DATA SHEET for method.

### **2.5.10 LIFTING EYES**

Required for valves size DN > 150.

### **2.5.11 STEM EXTENSION HOUSING**

Housing shall be rigidly mounted to valve body by flanges (or similar joint). Housing design and its connections to valve and gear operator shall prevent any ingress of water, humid air or other substances which may affect valve operation, particularly during cold periods.

### **2.5.12 SUPPORT RIBS AND LEGS**

Refer to DATA SHEET for requirement. Where a support is required, the size of the area actually transferring the load to a base below, shall be at least 20 mm<sup>2</sup>/kg of valve weight.

## **2.6 MATERIALS**

### **2.6.1 GENERAL**

Only fully killed fine grain carbon steel conforming with recognized Material standards shall be used.

When normalized and tempered materials are specified, the tempering shall be performed prior to any welding unless otherwise specified by Owner. The tempering temperature shall be 10°C higher than that required for Post Weld Heat Treatment, unless otherwise specified. Attention is drawn to section 3.0 detailing certification requirements.

Body and cover shall have impact tests for each type of material used as per **EN 14141** and **EN ISO 148**. The test temperature shall be -46°C or lower with an acceptance criterion of: Mean value from the 3 tests 20 Joules or better, with the lowest single value 16 Joules. Mating seating surfaces shall have a hardness differential of at least 50 HB.

### **2.6.2 BODY (INCL WELDING ENDS)**

- Castings to **grade G20Mn5/1.6220** or equivalent.
- Forgings to **grade P285NH/1.0477** or equivalent,



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- Carbon content C shall be < 0.22% on heat analysis.
- Carbon equivalent ( $CE = C + Mn/6$ ) < 0.42% on heat analysis.
- Body shall be normalized or normalized and tempered.

### 2.6.3 PLUG

Carbon steel (similar material to body).

### 2.6.4 TRIM

18 Cr 8Ni or equivalent stainless steel. Carbon steel may be used for plug and body seats if deposited stainless steel overlay welds are used on seating surfaces.

Mating seating surfaces shall have a hardness differential of at least 50 HB.

### 2.6.5 COVER

**Grade G20Mn5/1.622 or P285NH/1.0477 or P275NH/1.0487 or P355NH/1.0565** or equivalent.

### 2.6.6 STEM SEALS

Suitable elastomer.

### 2.6.7 FORMING

As per **EN 13445-4**.

Subsequent heat treatment, if required shall be normalizing.

### 2.6.8 WELDING

As per **EN 13942**.

Hardness of the weld seam and heat affected zone shall nowhere exceed 260 HV10.

### 2.6.9 REPAIR BY WELDING

Only permitted in welds and castings.

### 2.6.10 POSTWELD HEAT TREATMENT

As per **EN 13445-4**, with exceptions for closure welds.

Valve bodies of welded construction shall be stress relieved if welded wall thickness is  $\geq 30$  mm.



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

## **2.7 NON DESTRUCTIVE EXAMINATION**

### **2.7.1 BODY AND COVER**

All items shall be radiographically and magnetic particle examined to ELOT **EN 14141**.

### **2.7.2 PLATES AND WELDED PIPE**

All items shall be ultrasonically scanned according to **EN 14141**.

### **2.7.3 WELDS**

All joints shall be examined according to **EN 14141**.

All welds shall be 100% visual inspected.

- For DN<200 penetrant testing or magnetic particle testing. For DN>200 ultrasonic or radiographic testing.

Where radiography or ultrasonic examination is unfit for detection then magnetic particle examination may be used.

Radiographic films during shop inspection performed by Owner's TPI shall be available at request.

### **2.7.4 WELDING ENDS**

All welding ends made from plate, tubulars or forgings shall be ultrasonically examined to a minimum distance of 50 mm from, and including the bevel, according to **EN 14141**. Any discontinuity with a width exceeding 6 mm shall be cause for rejection.

### **2.7.5 SEALING AND SEAT SURFACES**

All sealing and seat surfaces shall be magnetic particle examined to **EN 14141**. However laminar defects are not acceptable.

## **2.8 FIRE TEST**

If so specified on the data sheet valve design shall have been qualified under **EN ISO 10497**.

"Fire-safe" certification shall include "fire-safe" tests representing all sizes and pressure ratings for each valve model. "Fire-safe" tests shall be witnessed by the Inspector. Previous acceptance of certification by the Client is acceptable in lieu of requalification for the identical



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valves.

## 2.9 FACTORY TEST

### 2.9.1 STRENGTH AND TIGHTNESS TEST

Air seat tests plus hydrostatic shell tests as per **EN 14141** are required.

### 2.9.2 OPERATIONAL TORQUE TEST

Required, after mounting of operating equipment and inclusive of operator functions.

## 2.10 SURFACE TREATMENT

As per DATA SHEET. Valves to be installed below ground (Buried) shall be coated externally by supplier. External coating for buried valves shall be in accordance with **Tech Spec. DSF-SPC-MEC-009**. Valves to be installed above ground shall be primed and painted.

## 2.11 MARKING

Valves to be installed below ground shall be marked on a welding end with valve serial number, Client contract number and material of welding end, otherwise all marking shall be as per **EN 13942** on the nameplate which shall be fixed at a point close to the actuator/operator.

Valves to be installed above ground shall be marked on their bodies with serial number and Client contract number. Welding ends shall be marked with material grade otherwise all marking shall be as per **EN 13942** on the nameplate.

The nameplate shall additionally bear the Inspection Body stamp as per **EN 10204** and **Tech Specification DSF-SPC-QAC-005**.

## 2.12 TAGGING

All valves shall be tagged with the valve number (commodity code) as stated on the data sheet and be prefixed by the valve nominal size. This shall be clearly stamped on a noncorrodible metal tag which is to be securely attached to the valve with a non- corrodible metal wire.

## 2.13 DELIVERY

When wrench is specified on the DATA SHEET, one piece shall be supplied with each valve.

Handle extension is required if valve is to be installed below ground.

Handwheels and wrenches may be shipped in accordance with the manufacturer's standard



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procedure, otherwise the valve shall be delivered in fully assembled condition with all openings, pipe ends, nipples, etc. capped for protection. Open/ Close direction on handwheels must be clearly marked.

### **3. TECHNICAL DOCUMENTATION INSPECTION AND CERTIFICATION**

#### **3.1 QUANTITY**

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

Four copies of each, inclusive of one reproducible, for all Drawings.

Also electronic files of all Documents and Certificates must be submitted by Contractor to the Owner.

#### **3.2 INSPECTION AND CERTIFICATION**

Inspection will be performed by an Independent Accredited Inspection Body or /and the Manufacturer's Authorized representative independent of the manufacturing department.

Inspection requirements are defined in the following documents:

- a. Material requisition
- b. Job Specification DSF-SPC-QAC-005"Shop inspection of equipment and material for NGT project".
- c. Relevant project specifications
- d. Inspection clauses of Applicable Standards.

Inspection procedures to be followed are detailed in Owner document "Inspection and Test Instructions" (Job Specification DSF-SPC-QAC-006).

#### **3.3 INSPECTION DOCUMENT REQUIREMENTS**

##### **3.3.1 WITH TENDER**

Proof of design either as certificates of approval or prototype test report issued by an Accredited certifying authority.

Statement of Manufacturer's type number for each item if standard product offered.

Catalogues, general arrangement drawings and Parts List covering all items, inclusive of



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operating equipment.

Statement regarding materials used for all principle components with reference to material standards herein.

Statement regarding materials for surface treatment.

Certificate confirming valve design has been qualified for Fire Test Approval.

### **3.3.2 AFTER AWARD OF CONTRACT (BEFORE PRODUCTION)**

Dimensioned General Arrangement drawing including support ribs, operating gear etc., together with component material parts list, detailing material standard and grade, item number and description as well as certification level of materials as a minimum.

Welding procedures specifications, Testing Procedures.

Recommended welding procedure for installation in pipeline to avoid excessive heat on valve.

Manufacturer's Detailed Test and Inspection plan. The plan should additionally show the control points at which the independent inspector's witnessing /approval is required, as per section 3.2 herein.

### **3.3.3 ON DELIVERY**

IRNs when required

Comprehensive operation, maintenance and reconditioning manuals.

List of recommended tools, spare parts, lubricants etc, necessary for two years' operation.

## **3.4 VALVE CERTIFICATION PACKAGE**

Valve drawings shall include the following information printed clearly in, or adjacent to the title block:

- a. Contract No.
- b. Requisition No. and Item No.
- c. Purchase Order No.
- d. Valve number (commodity Code)



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The principal dimensions of the valve, any gear operator, the size, type and style The weight of the valve, per size, should also be included.

e. Materials of construction

f. Pressure-Temperature limitations.

Also the weight of the valve per size should be included.

Drawings shall be checked and certified by the Vendor as being an actual record of the valve being supplied against the Purchase Order.

Drawings shall be sent to Client accompanied by a transmittal note or letter marked for the attention of Procurement Department.

Owner's approval of Vendor's drawings shall not be considered as relieving the vendor of any responsibility for detailed design, dimensions, construction of equipment or deviation from specification.

Vendor shall not commence final manufacture of valves until receipt by Client approval of his drawings.

#### **4. SHIPMENT PROTECTIVE COATING AND END PROTECTION**

- Valves shall be shipped in the open position.
- Unmachined exterior surfaces of valves shall be painted according to manufacturer's standard.
- Machined or threaded surfaces subject to atmospheric corrosion during shipment or subsequent storage shall be coated with an easily removable rust preventive.
- Valves with screwed or socket weld parts shall have the ends protected with metal, or plastic plugs.
- Valves with flanged ends shall have the gasket surface protected by means of a suitable disc wired on.
- Valves with butt-weld ends shall have the bevels covered with a suitable close fitting protector.
- When lifting the valves, the slingers must be wrapped around the body only and not around the spindle lever.
- Packing is to be in wood cases.
- The valves to be transported must be firmly fixed to the case load-bearing bottom.



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- For valves with a weight greater than 0.6 tons fastening is performed with wooden saddles and joists nailed to the side walls. The saddles two for each valve must ensure a uniform distribution of the valve weight over the case bottom. For valves with a weight lighter than 0.6 tons only the joists nailed to the side walls are required. For the valve actuator units and the valve components (e.g. extensions) the fastening will depend upon their shape, weight and dimensions,
- The packing shall be mechanically protected i.e. from impact caused by falls during handling, vibration caused by transport etc.
- Vendor Quality Plan shall include details about lifting, support during transportation, preservation, etc.