

Israel Gas Transmission Project


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		PLUG VALVES > NPS 50				
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1 Scope

1.1 **Items**

Plug valves > NPS 50.

1.2 **Service**

Natural Gas with sporadic passage of water and methanol.

2 General Requirements

2.1 **Type**

Type: Plug valve for pipeline Acc API 6D.

2.2 **Operating temperature**

Operating temperature: Form – 30° C to + 50° C.

2.3 **Operating pressure**

Operating pressure: 80 bar g.

3 Design Codes

Codes to be considered:

This Specification
NEN 3560 (1) (2)
API 6D

ANSI B 31.8

API 598

MSS PS 44

MSS PS-53

Requirements for Pipeline Systems (last edition)*
Specification for Steel Gate, Plug and Ball Valves for
Pipeline Service

Gas Transmission and Distribution Piping Systems

Valve Inspection and Testing

Steel Pipe Line Flanges

Magnetic Particle Examination Method



MSS PS-54	Radiographic Examination Method
MSS PS-93	Liquid Penetrant Examination Method
ASNT-SNT-TC-IA	American Society for Non Destructive Testing

*) The requirements of NEN 3650 supersede all other referenced codes and standards. If there is any conflict between this specification or any other specification and related data sheets, or with any applicable codes, standards and regulations, Contractor and/or Manufacture shall inform INGL in writing. Written clarification must be given by INGL before Contractor and/or Manufacture commences work.

4 **Design Data**

Design Pressure:	80 Barg
Design Temperature:	From -30°C to + 80°C
Design Factor:	F = 0.4 (S = 2.5)
Test Pressure:	2 times Design Pressure (DP)
Bevel ends of Pipes:	Acc. ENG-X17-SPC-0019
Corrosion Allowance (CA):	1mm for valves above of 6"

5 **Design**

Each valve shall be fit for the intended service under operation conditions. Hydrostatic test and drying with vacuum.

Valve body, stem extensions, gear box, hand wheel and accessories are an integral part of the plug valve.

Each valve shall be designed that any failure of the gear will not affect any other part of the valve. Any defective component shall be able to be replaced without removing the valve from service.

Clearance volume shall be avoided to prevent the forming of hydrates. The design shall be acc. API 6D.

5.1 **Valve body**

- Only fully killed fine grain carbon steel shall be used.

- All connections to the valve shall be welded. Seal threaded connections shall not be used for connection to valve bodies.
- The steel components shall conform to API 6D.
- The base material shall be from OECD suppliers only and be certified by an EN 10204 3.1 certificate and shall be clearly identifiable.

5.2 Inside diameter of plug valve

The bore of such valve shall not be more than 5 mm + 2 % of the nominal diameter of the pipeline smaller than the inside diameter of the pipeline (example: DN 300, max. 5+6 mm = 11 mm)

5.3 Sealing

5.3.1 Sealing systems:

The design of all valves shall ensure correct functioning and a tight shut off in both flow directions.

The valve shall be able to withstand the passage of dust and other contamination from the pipeline.

The metallic sealing system shall be used between body and plug.

5.3.2 Stem sealing

Maintenance free stem seal.

Each valve shall be equipped with at least two O-ring stem sealing systems and a stem back seat providing additional a seal.

If this stem back seat type is not furnish, an secondary sealing device shall be equipped for the injection of viscous sealing material.

AED testing certification shall be EN 10204 3.1 certificate (for mechanical and Explosion decompression testing to carried out).

The O-ring seals shall be from Western Europe countries only.

The records of the test, Datasheets of the O-rings shall be delivered with the valve documents.

O-Rings must be made of AED or RGD (Anti-Explosive De-compression) with the shore Hardness ≥ 70 for the temperature range of -30°C to $+80^{\circ}\text{C}$.



5.3.3 Device for viscous sealing material

Threaded socket with non-return valve.
Thrust bolt with screw with hexagonal recessed hole

5.3.4 Viscous sealing material

The Viscous sealing material shall be fit for the intended service under operating conditions and shall also resist the temperature range from -30°C to $+80^{\circ}\text{C}$, resigning, dis- solving and chemical change in service and conditions of storage.

5.3.5 End preparation

Each valve shall be equipped with bevelled welding ends or flanged ends according ANSI B 16.5, class 600 as specified in the Contract.

If welding end valves are specified, the welding ends shall have dimensions and strength properties equivalent to those of the line pipes in accordance with Figure I 4 or I 5 of ANSI B 31.8, Appendix I.

The offset between weld end and line pipe shall not exceed ± 1.6 mm.
The wall thickness of the weld ends shall not exceed $1.5 \times t$, where t is the wall thickness of the line pipe and acc. ENG-X17-SPC-0019.

If the difference in wall thicknesses exceeds said value, the valves shall be equipped with transition pieces made of steel with strength properties equivalent to those of the line pipes; said transition pieces shall have a length of not less than 150 mm .

The out-of-roundness at butt welding ends, as specified below, shall not exceed 0.5 %.

$$U = 200 \frac{D_{e \max} - D_{e \min}}{D_{e \max} + D_{e \min}} \leq 0.5 \%$$

5.3.6 Support

All valves shall be equipped with support/stand.

The support shall be designed in such way that there will be no interference or blockage of maintenance activities, which may be necessary.

5.3.7 Lifting lugs

Lifting Lugs shall be welded to the body of each valve with a nominal diameter exceeding DN \geq 150.

5.3.8 Spindle

The Spindle shall be self-locking. Length of stem extension:

For underground service the length from centerline of the buried valve to the centerline of the aboveground hand wheel or to operating square head in the surface box (road cap) shall be as specified in the contract.

5.3.9 Locking device

All manual valves (whether operated with a lever or a gear operator) shall be provided with locking device and with adequate pads and holes for enabling locking at both the open and closed positions preventing any possible movement by involuntary external action, vibration, etc. Design and efficiency of the locking device shall be independent of the installation position of the valves.

5.3.10 Operation

The valves shall be designed for manual operation.

5.3.11 Position indicator

Each valve shall be equipped with a position indicator.
Each valve shall be equipped with steel limit stops for both the open and close position.

5.3.12 Installation

The valves shall be designed for horizontal or upright installations in locations above ground or below ground.

5.3.13 Material

5.3.13.1 Body:

The body of each valve shall be cast from non-alloyed steel or easily weld able low-alloy killed steel. The steel used for valves shall be conform to the standards stated in API 6D, or material standards equivalent to these.

If the production shall be by sub-contractor it shall be acc. Section 4 of this spec.



The manufacture shall ask for approval and shall be notice to INGL for the origin of the valve body.

The base material used for pressure-containing parts shall be certified by an EN 10204 3.1 certificate and shall be clearly identifiable by the steel quality (grade), heat number and steel manufacturer's stamp or inspection authority stamp.

The base material will and body valve shall be only from OECD countries

5.3.13.2 Stubs:

Seamless or welded carbon steel according to API 5 L The SMYS shall be used:

- 360 N / mm² for DN < 400 mm
- 420 upto 460 N /mm² for DN ≥ 400 mm

5.3.13.3 Plug:

The plug shall be tapered and be from carbon steel (similar material to body).

5.3.13.4 Plug and body seats:

The materials used for plug and body seats shall be as follows:

- seats in body:
equal to X 8 Cr Ti 18 build-up welding
- seats on plug:
equal to X 20 Cr Mo Ti 17 1 build-up welding.

5.3.13.5 Mechanical properties:

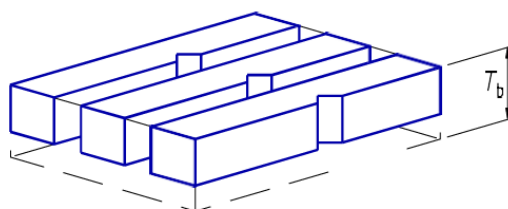
Control of the mechanical properties shall be carried out after the last heat treatment. Testing shall be done in accordance with the material standard chosen. In addition im- pact testing shall be made in accordance with EN 10045-1., with ISO - V specimen at -30°C.

5.3.13.5.1 **Charpy-V values**

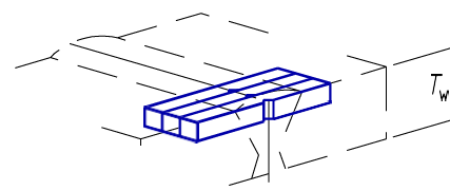
T	Impact test temperature in °C	Charpy-V impact values in J	
		average of three specimens	minimum of one specimen
in mm			
T ≤ 15	0	27	22
15 < T ≤ 20	-10	27	22
20 < T ≤ 25	-20	27	22
25 < T ≤ 35	-46	27	22
35 < T ≤ 60	-46	35	28
T > 60	-46	40	32



5.3.13.5.2 **Location:**



Body base material



Body weld material

Location of test specimens

5.3.13.6 Chemical Properties:

The chemical composition of the welding ends shall meet the following requirements for steel grades with specified yield strength.

Composition	SMYS ≤ 360 N/mm ² Max %	SMYS > 360 ≤ 485 N/mm ² Max %
C	0.18	0.20
Si	0.40	0.60
Mn	1.50	1.70
P	0.030	0.030
S	0.030	0.025
Nb	0.05	0.06
V	0.05	0.15
Ti	-	0.04
Max. total % allowed for the combination of the elements V, Nb and Ti	≤ 0.12	≤ 0.18

At min. 0.02 % when other nitrogen binding elements do not exist.

The ratio of yield strength to ultimate tensile strength, shall not exceed 0,85 for the base material and 0,90 for the weld material.

The minimum elongation of the base material shall be at least 18 %, of the weld material at least 16 %.



6 **Forming of plate:**

As per ASME BPV Code, Section VIII para. UCS - 79. Heat treatment shall be normalizing.

7 **Workshop coating:**

- see Section 10 of this Specification
- Cut-back at ends = 150 mm

8 **Welding**

All factory welds shall be made in accordance with the requirements of the American Welding Society and Section IX of the ASME Boiler and Pressure Vessel Code, or an equivalent code such as AD - Regulation Series HP. The equivalent code is acceptable if the Code fulfills the requirements of AWS and ASME - Code as well as having API approvals.

Minor surface defects in cast steel may be repaired. Repair welding on cast steel shall only be used where necessary in order to maintain the minimum wall thickness.

No weld in the body of the valve shall contain any crack or lack of fusion. If possible welds shall consist both of external and internal runs. Each weld shall be shaped smooth. No weld shall contain any major inclusions. The height of the weld above the surface of the parent metal shall not exceed 3 mm. Undercuts shall not exceed 10 % of wall thickness or 1 mm, whichever is less and may not be longer than 50 mm.

Each welded joint shall be completely filled; no weld shall be thinner than the calculated wall thickness of the parent metal.

Hardness may nowhere exceed 260 HV 10.

Surface defects may be removed by grinding, provided the resulting wall thickness is not less than the minimum calculated wall thickness.

8.1 **Repair of welding**

- Repair of welding is not permitted in the base material.

- Repair welding is only permitted under the following conditions:
 - Repair shall be performed according to an approved repair welding procedure.
 - Defects shall be removed in such way that the repair weld can be carried out in at least two passes.
 - The repair area shall be preheated to approximately 150° C.
 - Items with repaired weld seam shall be completely stress-relieved after the completion of repair welding.

9 Annealing

Valve bodies of welded construction shall be annealed if they include wall thicknesses of 30 mm or higher. All cast valve bodies, irrespective of wall thickness, shall be annealed. The annealing process shall be carried out after all repair welds, if any, have been completed at the Valve Body.

As per ASME BVP Code, Section VIII, para. UCS - 56.

10 External Surface Treatment

The valves shall be delivered externally sandblasted and treated with paint or coating in accordance with Specification Doc Nos.:

EEN-EPI-SPC-003 Painting

EEN-EPI-SPC-014 Coating of valves and fittings -shop coating-

11 Testing

11.1 Non Destructive Testing

- Pipe and rolled plate:

Ultrasonic examination to ASTM A 578, Level I over entire surface or equivalent standard approved by Client /Consultant.

○ Forging:

Magnetic particle examination to MSS SP-53 over entire surface. On machined surface no linear indications are acceptable.

ASME

The critical areas of the body of the valve (for guidance location critical areas see B16.34) shall be radiographic inspected in accordance with NEN-EN 13942:2009, A.2.

ultrasonic

For wall thickness over 40 mm radiographic examination may be replaced by examination according NEN-EN 13942:2009, A.4. after approval by INGL.

○ Welds:

All joints shall be radiographed and found acceptable in accordance with ASME Boiler and Vessel Code, Section VIII, para. UW-51. However, where radiography is unfit for detection of defects joints shall be ultrasonically examined in accordance with. UW-53

○ Welding ends:

Welding ends shall be ultrasonically scanned for laminations or other discontinuities not less than 25 mm from the bevel ends. Laminations wider than 3 mm and other kinds of discontinuities are unacceptable.

11.2 **Strength - Tightness and Functional Tests:**

Shell and seat tests of all valves shall be performed in accordance with API 6D. The hydrostatic shell test (including drain, vent and bypass lines) tested for strength and tightness shall be carried out with a pressure of not less than 2.0 times the design pressure.

When strength tested at the manufacturer's works, the valves must be subjected to the longitudinal forces to which they will subsequently be exposed when installed in the pipe-line. For that reason, they should be mounted between flanges or caps and not between fixed clamps.

The full test pressure must be applied to the valve in the axial direction. No permanent deformation may result.

For the high pressure closure test the test fluid shall be air or inert gas. The pressures shall be held for at least 10 minutes and from both sides of the valve. The tightness (High pressure closure) of valve seals shall be in accordance with API 598.

Test pressures and hold times shall be recorded and entered in test certificates.

For > 6": The certification shall be 3.2 according EN 10204. The manufacture shall issue full report, recorded by an inspector of the quality assurance department of the manufacturer and be witnessed by third party inspector of this tests.

For valves up to and 6": The certification shall be 3.1 according EN 10204.

12 **Marking, Documents and Shipment**

Each valve accepted shall be marked visibly and permanently in a suitable position. The marking shall be in accordance with Doc.No.:

- EEN-EPI-SPC-007 Marking of Components

The Documentation to be provided by the Manufacturer during the process of manufacturing until final release shall be in accordance with Doc. No.:

- EEN-EPI-SPC-010 Documentation to be provided by Manufacturer

Before starting any proceeding activity the manufacturer shall achieve the approval of the documents submitted for each production step.

All valves (including actuators) shall be assembled prior to shipment and shall be ready for installation upon delivery. The valves shall be packed, transported and stored as o prevent damage prior to delivery. The Contractor shall warrant that the valves will remain clean and dry during transportation and storage until installation.

Packing and Shipping shall be in compliance with Doc.Nos.:

- EEN-EPI-SPC-005 Packing
- EEN-EPI-SPC-006 Shipping

13 **Inspection Certificates**

The Manufacturer shall issue an inspection certificate certified by an inspector of his own quality assurance department or an independent third party inspector in accordance with certification requirements laid down in Doc. N^o.:

IEN-EPI-SPC-001 General Rules for Certification

Ball valves up to and including 6" shall be delivered with a 3.1 Certificate in accordance to EN 10204. Ball valves 8" and above" shall be delivered with a 3.2 Certificate in accordance to EN 10204.

Each such certificate shall show the results of the tests made under this Specification and shall be in compliance with the standard certification contained in that specification.

14 **Quality Plan**

Contractor shall submit a Quality Plan (Test and Inspection Plan), based on the manufacturing Quality Manual, covering (as a minimum) all production, pipe tracking system, inspection and testing operations, for review and approval by INGL not less than 21 days prior to the commencement of any work. Contractor's subsequent Quality Control of the work shall strictly adhere to the agreed Quality Plan.

The Quality Plan shall show hold, witness, re-view and monitor points for INGL and Certifying Authority.

Quality Plan shall be submitted in accordance with INGL Document No.: 409803 rev. 2

15 **Subcontracting**

All Valves are deemed to be fabricated and tested at the Manufacturer's premises. Any deviation to this requires a prior approval from the Company, which must be obtained prior to the Purchase Order issue. In such an event, the Manufacturer shall maintain full QA/QC control over any Sub-Contractor or sub-contracted activity.



In any case the fabrication of valves body shall be in own manufacture's mill.
Any other option the manufacturer shall ask INGL for approval.

First level suppliers for pressure containing parts and pressure controlling parts shall be approved by the Company. The requirement also applies to sub-manufacturers for special process, e.g. weld-overlay ENP, tungsten carbide coating, etc.

Whatever the extent of the sub-contracted activities, the Manufacturer is reputed to have the full control of the individual valve part design, manufacturing flow process, (heat treatment) delivery conditions manufacturing tolerances, together with the quality control activities related to those parts all along the delivery process.

This also applies to the supply of the actuators and associated local panel when the valve Manufacturer is in charge of that supply.

16 **Materials Certificates**

The Manufacturer shall submit material certificates giving the results of the chemical analysis and of the mechanical tests carried out in accordance with the requirements of the reference codes and standards, for all main metallic materials. The following types of certificates are required, with reference to EN 10204:

16.1 **Type of material certificate required for each valve part**

Nature of valve part	Type of certificate
BODY	<i>3.2 acc. This spec</i>
FLANGES	<i>Above 8" shall be 3.2 Up to 8" shall be 3.1</i>
OBTURATOR	<i>3.1</i>
STEMS (1)	<i>3.1</i>
SEATS	<i>3.1</i>
SEALS (1)	<i>3.1</i>

Note: AED testing certification according to this spec shall be 3.1 type.



17 **Revision record**

Rev. No.	Date	Description	Prepared	Checked	Approved	Date	
			Company				
1	20/07/2004	Discipline Internal Check	ODE	BD	MWM		
2	11/10/2004	Issued for IDC	ODE	MWM	PIL		
3	26/10/2004	Issued for Approval	ODE	MWM	PIL		
4	22/05/2012	Revision & Issued for Approval	-	-	-		
5	17/09/2019	Revision & Issued for Approval	KLT				

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