

Supplementary Specification to API Standard 526 Flanged Steel Pressure-relief Valves

Public Review Draft

Revision history

VERSION	DATE	PURPOSE
0.1	August 2020	Issued for Public Review

Acknowledgements

This IOGP Specification was prepared by a Joint Industry Programme 33 Standardization of Equipment Specifications for Procurement organized by IOGP with support by the World Economic Forum (WEF).

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Foreword

This specification was prepared under Joint Industry Programme 33 (JIP33) "Standardization of Equipment Specifications for Procurement" organized by the International Oil & Gas Producers Association (IOGP) with the support from the World Economic Forum (WEF). Companies from the IOGP membership participated in developing this specification to leverage and improve industry level standardization globally in the oil and gas sector. The work has developed a minimized set of supplementary requirements for procurement, with life cycle cost in mind, resulting in a common and jointly agreed specification, building on recognized industry and international standards.

Recent trends in oil and gas projects have demonstrated substantial budget and schedule overruns. The Oil and Gas Community within the World Economic Forum (WEF) has implemented a Capital Project Complexity (CPC) initiative which seeks to drive a structural reduction in upstream project costs with a focus on industry-wide, non-competitive collaboration and standardization. The CPC vision is to standardize specifications for global procurement for equipment and packages. JIP33 provides the oil and gas sector with the opportunity to move from internally to externally focused standardization initiatives and provide step change benefits in the sector's capital projects performance.

This specification has been developed in consultation with a broad user and supplier base to realize benefits from standardization and achieve significant project and schedule cost reductions.

The JIP33 work groups performed their activities in accordance with IOGP's Competition Law Guidelines (November 2014).

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Introduction

The purpose of this specification is to define a minimum common set of requirements for the procurement of flanged steel pressure-relief valves in accordance with API Standard 526, seventh edition, published September 2017 for application in the petroleum and natural gas industries.

This JIP33 specification follows a common document structure comprising the four documents as shown below, which together with the purchase, order define the overall technical specification for procurement.



**JIP33 Specification for Procurement Documents
Supplementary Technical Specification**

This specification is to be applied in conjunction with the supporting data sheet, quality requirements specification (QRS) and information requirements specification (IRS) as follows.

IOGP S-730: Supplementary Specification to API Standard 526, Flanged Steel Pressure-relief Valves

This specification defines the technical requirements for the supply of the equipment and is written as an overlay to API Standard 526, following the API Standard 526 clause structure. Clauses from API Standard 526 not amended by this specification apply as written to the extent applicable to the scope of supply.

Modifications to API Standard 526 defined in this specification are identified as Add (add to clause or add new clause), Replace (part of or entire clause) or Delete.

IOGP S-730D: Data Sheet for Flanged Steel Pressure-relief Valves

The data sheet defines application specific requirements, attributes and options specified by the purchaser for the supply of equipment to the technical specification. The data sheet may also include fields for supplier provided information attributes subject to purchaser's technical evaluation. Additional

purchaser supplied documents may also be incorporated or referenced in the data sheet to define scope and technical requirements for enquiry and purchase of the equipment.

IOGP S-730Q: Quality Requirements for Flanged Steel Pressure-relief Valves

The QRS defines quality management system requirements and the proposed extent of purchaser conformity assessment activities for the scope of supply. Purchaser conformity assessment activities are defined through the selection of one of four generic conformity assessment system (CAS) levels on the basis of evaluation of the associated service and supply chain risks. The applicable CAS level is specified by the purchaser in the data sheet or in the purchase order.

IOGP S-730L: Information Requirements for Flanged Steel Pressure-relief Valves

The IRS defines the information requirements, including contents, format, timing and purpose to be provided by the supplier. It may also define specific conditions which invoke information requirements.

The terminology used within this specification and the supporting data sheet, QRS and IRS follows that of API Standard 526 and is in accordance with ISO/IEC Directives, Part 2 as appropriate.

The data sheet and IRS are published as editable documents for the purchaser to specify application specific requirements. The supplementary specification and QRS are fixed documents.

The order of precedence (highest authority listed first) of the documents shall be:

- a) regulatory requirements;
- b) contract documentation (e.g. purchase order);
- c) purchaser defined requirements (data sheet, QRS, IRS);
- d) this specification;
- e) API Standard 526.

1 Scope

Replace second sentence with

This specification defines the requirements for API Standard 526 for direct spring-loaded pressure-relief valves and pilot-operated pressure-relief valves as follows:

2 Normative References

Add to section

ANSI/NACE MR0103/ISO 17945-2015-SG, *Petroleum, petrochemical and natural gas industries - Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments*

ANSI/NACE MR0175/ISO 15156-2009, *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels - Second Edition*

ISO 12944-5, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems - Fourth edition*

ISO 12944-6, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods - Second Edition*

ISO 12944-9, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 9: Protective paint systems and laboratory performance test methods for offshore and related structures - First Edition*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules - Second edition*

ISO 15609 all parts, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification*

ISO 15614, *Specification and qualification of welding procedures for metallic materials - Welding procedure test*

ISO 15848-1, *Industrial valves — Measurement, test and qualification procedures for fugitive emissions — Part 1: Classification system and qualification procedures for type testing of valves*

IOGP S-563, *Material Data Sheets for Piping and Valve Components*

IOGP S-715, *Supplementary Specification to Norsok M-501 Coating and Painting Specification for Offshore, Marine Coastal and Subsea Environment*

IOGP S-716, *Supplementary Specification to API RP 551 Process Measurement for Design and Installation of Small Bore Tubing and Fittings*

Replace Section 3 title with

3 Terms, Definitions, Acronyms, Abbreviations and Symbols

Add to end of sentence

with the addition of the terms defined in 3.1

3.1 Terms and Definitions

3.1.1

purchaser

An associate, subsidiary or other organization acting as owner, company, principal or customer as designated in the purchase order. It is the one who initiates the purchase order, ultimately pays for its design and construction, and will generally specify the technical requirements.

3.1.2

pressure containing part

A part whose failure to function as intended results in a release of contained fluid into the environment and, as a minimum, includes the body, bonnet, bellow and bolting.

3.1.3

pressure-controlling part

A part intended to prevent or permit the flow of fluids and as a minimum includes the stem, nozzle, disc and spring.

3.1.4

process wetted part

components that neither contain the fluid process nor controls but it nonetheless carrying out its function when immersed in the process fluid and as a minimum includes bonnet and spring on balanced bellows valves, other threaded parts, cap and bonnet on the pilot.

3.1.5

non wetted part

component of the pressure relief device that is not in contact with the process medium.

3.2 Acronym, Abbreviations and Symbols

BoM	bill of materials
DN	Diametre Nominale
EU	European Union
FAT	factory acceptance test
FE	fugitive emissions
GA	general arrangement
IP	ingress protection (rating code)
ITP	Inspection and test plan
NPS	nominal pipe size
NPT	national pipe thread
OD	outside diameter
PQR	procedure qualification record
PWHT	post-weld heat treatment
QA	quality assurance
QMS	quality management system
QRS	quality requirement specification
WPQR	welding procedure qualification record
WPS	weld procedure specification

4 Responsibility

4.2

Replace list item a) with

- a) designing and manufacturing pressure-relief valves to satisfy the requirements of this standard and the purchaser's requisition;

Replace list item c) with

- c) advising the purchaser of any nonconformance to the purchaser's requisition;

6 Orifice Areas and Designations

Replace first sentence with

The standard effective orifice areas and the corresponding letter designations shall be selected from those detailed in Table 1.

Replace second sentence with

These effective areas and designations shall be used in conjunction with the sizing equations contained in API Standard 520, Part I.

7 Design

7.1 General

Add to section

The nozzle shall not be welded to the valve body.

Add to section

The nozzle shall have an integral seat oversized to permit lappings or remachining operations.

NOTE Details of allowance can be found on the general arrangement drawing.

Add to section

The nozzle shall be secured by means of a nozzle ring set screw.

Add to section

The vent screen design shall prevent ingress of water and foreign matter (see Figure 1a).

Add to section

The bellows bonnet shall have a screwed vent with covering mesh (0.015 in. hole size) to prevent ingress of moisture and foreign bodies.

Add new figure

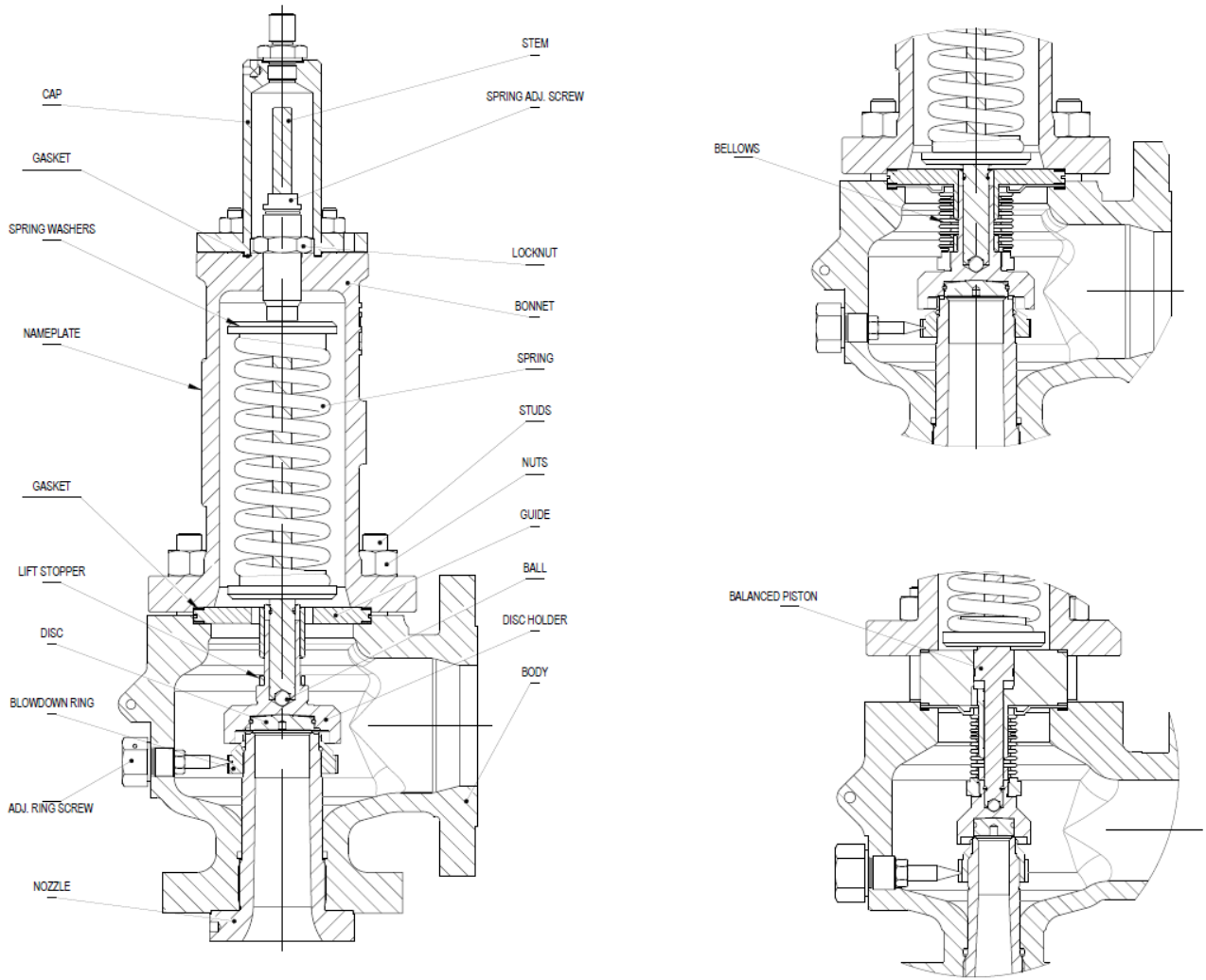


Figure 1a—Cross-section Drawing: Spring Loaded Pressure-relief Valve

Public

Add new figure

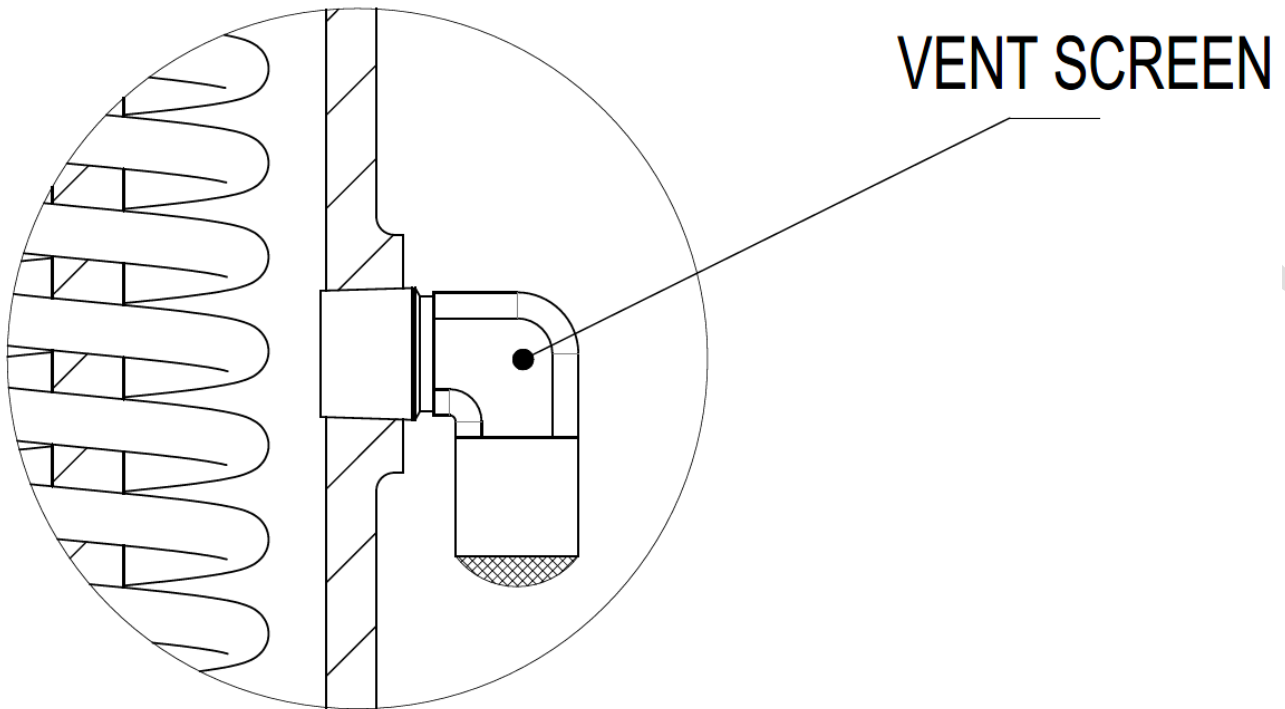


Figure 1b—Typical Vent Screen

Add to section

A sealed cap (see figures 1, 2, 3 and 4) shall enclose the set pressure adjustment screw to prevent tampering.

Add to section

Valves shall have a bolted bonnet.

Add new figure

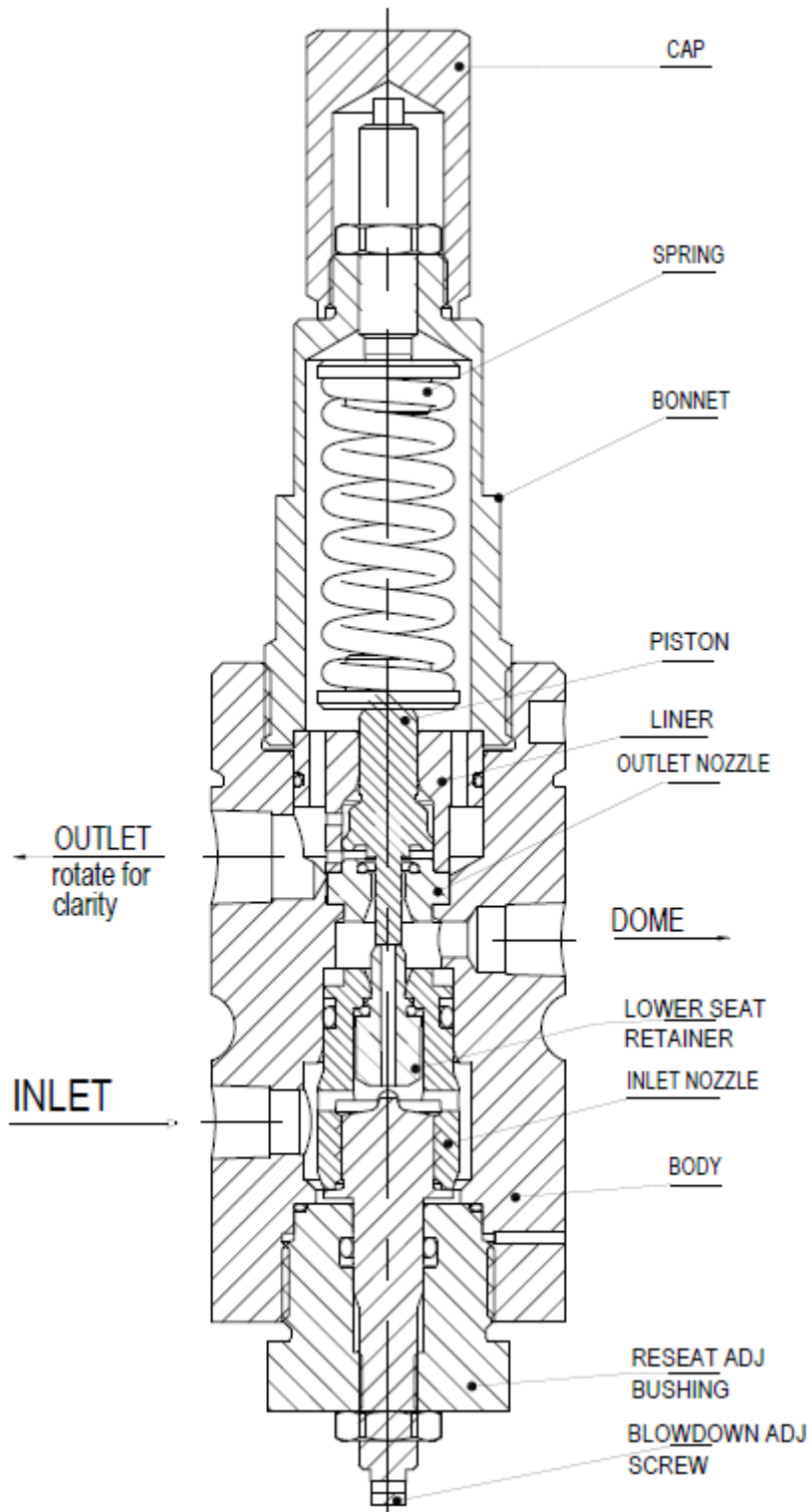


Figure 2—Cross-section: Pop Action Pilot

Add new figure

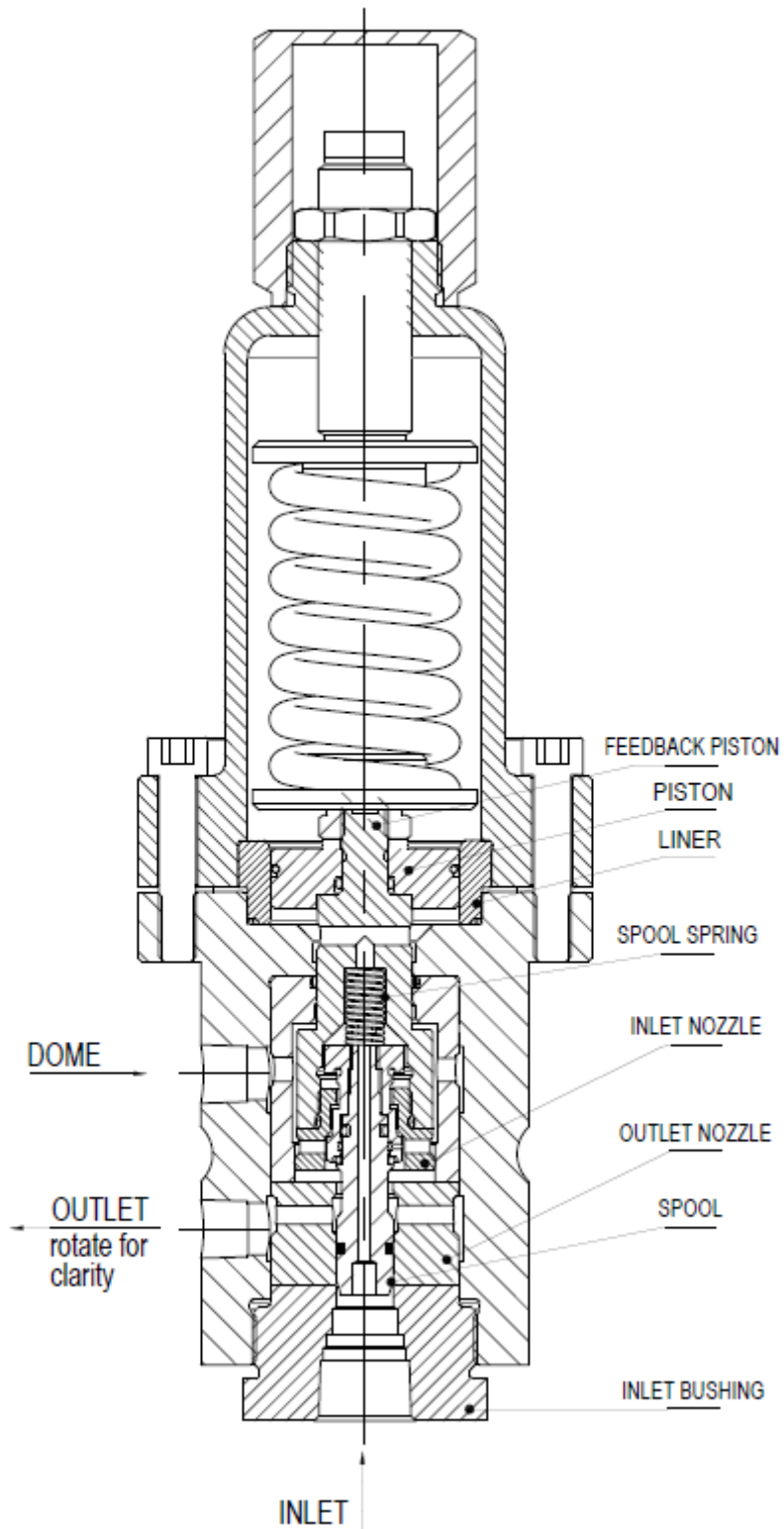


Figure 3—Cross-section: Modulating Pilot with Piston

Add new figure

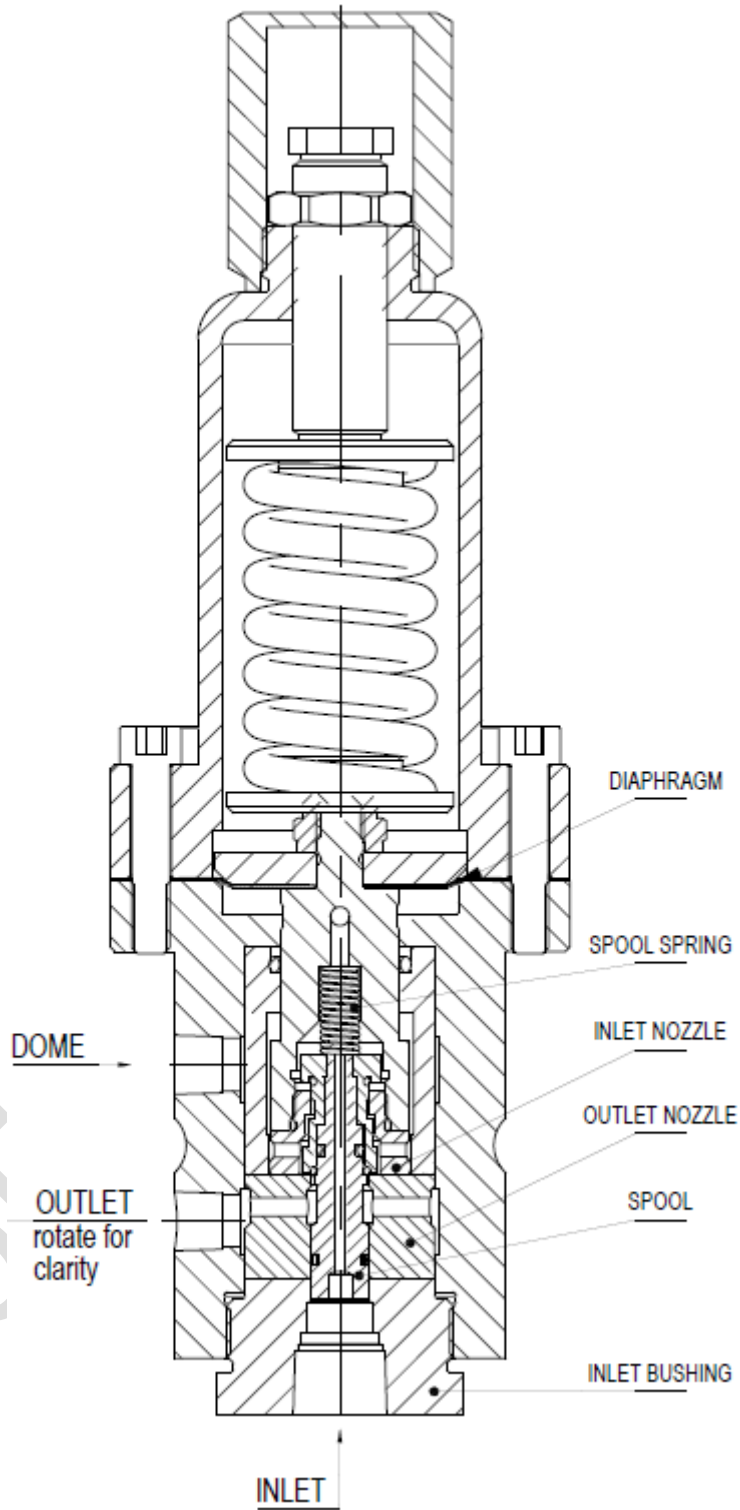


Figure 4—Cross-section: Modulating Pilot with Diaphragm

Add new figure

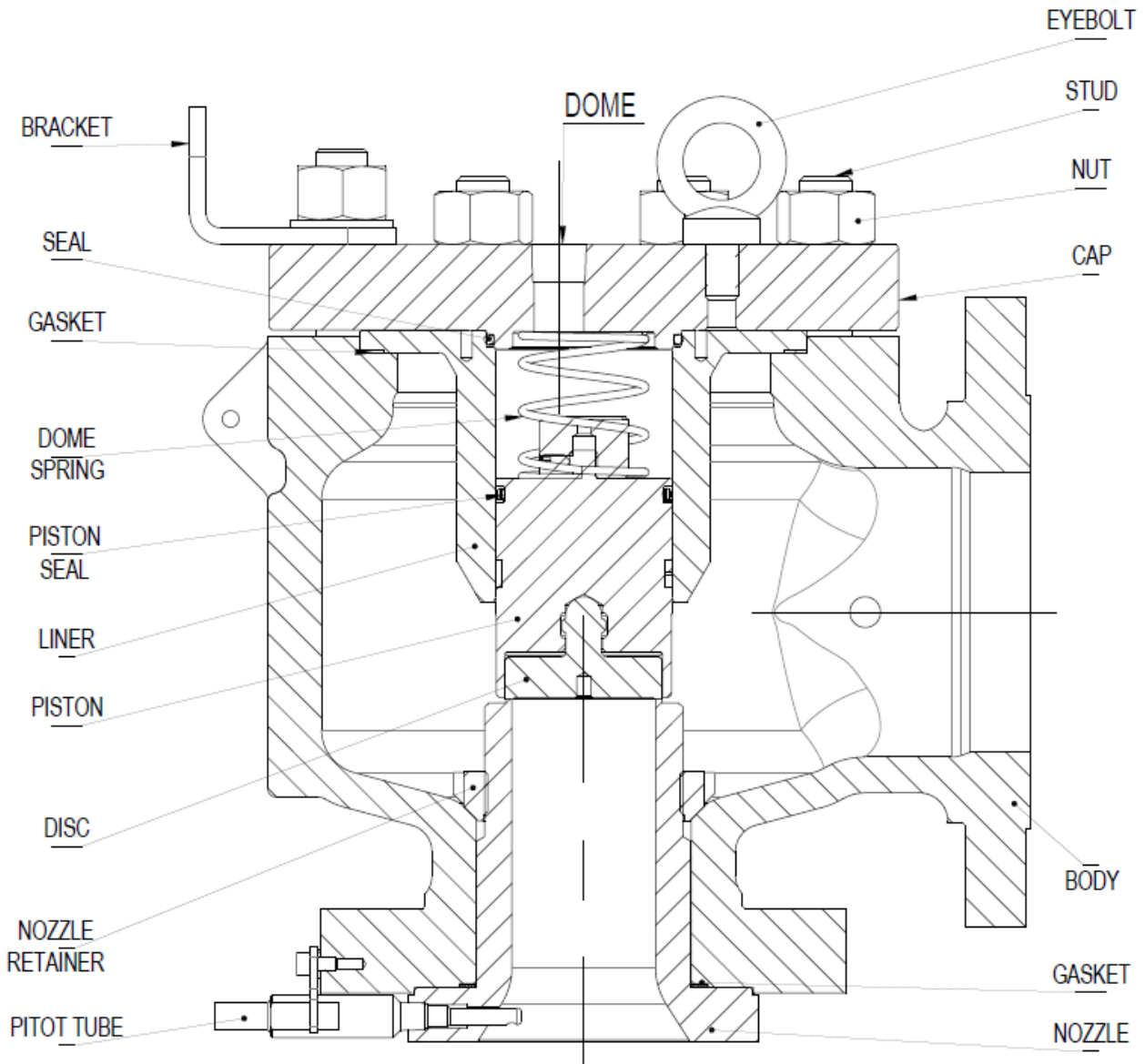
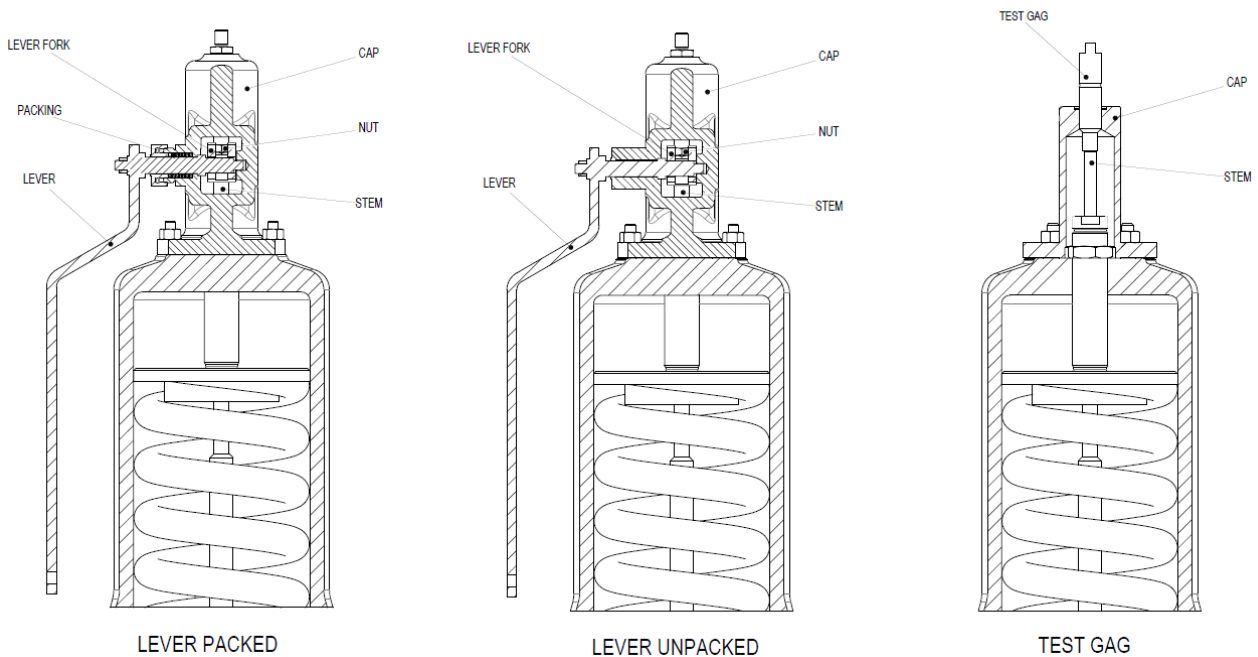


Figure 5—Cross-section: Pilot Valve Main Body

Add new figure**Figure 6—Cross-section: Accessory Lifting Lever**Add to section

Pilot valves shall be fitted with a pilot filter.

Add to section

Factory setting screws shall be tamper proof sealed for integrity of setting.

Add to section

Minimum wall thickness shall be in accordance with ASME B16.34

7.4 DimensionsReplace first paragraph with

Center-to-face dimensions shall be in accordance with Table 3 through Table 30 with tolerances of $\pm 1/16$ in. for valve inlet sizes to 4 in., and $\pm 1/8$ in. for valve inlet sizes larger than 4 in.

Replace second sentence of third paragraph with

Exact dimensions shall be stated in manufacturer general arrangement drawings.

7.5 Lifting LeversAdd to section

Lifting lever omission shall be permitted if the conditions in ASME Code case #2203 are met.

7.6 Special Construction Features

Add to section

Test gag option (Figure 6) shall prevent the valve from lifting by screwing the bolt into the cap and onto the stem.

Add to section

The back flow preventer shall be selected for cases where pressure at the valve outlet is greater than the pressure at the valve inlet.

7.7 Restricted Lift Pressure-Relief Valves

Replace first sentence of section b) with

The rated capacity for restricted lift valves shall be in accordance with ASME BPVC, Section VIII and paragraph UG-136.

Add new section f)

f) Lift restrictors shall be non-adjustable and secured in place with a spigot.

Add new section g)

g) Fixed spacers or equivalent shall be used to restrict main valve piston lift.

Add new section

7.8 Threaded Auxiliary Connections

Pressure retaining plugs, for example vent and drain plugs, shall have NPT thread design.

NPT threads shall be according to ASME B1.20.1 with additional thread tolerance requirements ensuring that a hand tight joint assembly achieves four to five complete turns of engagement prior to application of sealant.

The design of the internal thread length and port geometry of NPT fittings shall avoid the plug bottoming out on the valve body.

Manufacturer shall further tighten the threaded fitting with sealant applied covering circumference achieve the make number of three turns.

Calibrated torque wrench shall be used to apply the manufacturers stated torques.

The thread sealant shall be compatible with the plug and housing material and consideration made to prevent galling.

Pilot tube and fittings shall be at least $\frac{3}{8}$ in. O.D.

Fittings shall be double ferrule compression type.

In dirty services where purge medium is unavailable the design shall account for this e.g. $\frac{3}{4}$ in. or larger pilot line to the filter.

LTCS, NTCS, and 316 valve body designs shall utilize 316 tubing and fittings in accordance with IOGP S-716.

DSS, SDSS and P-Alloy valve body designs shall utilize SDSS tubing and 316 fittings in accordance with IOGP S-716.

Add new section

7.9 Lifting

The manufacturer shall provide lifting sketches and handling instructions for safe valve assembly lifting operation weighing between 55 lbs. and 550 lbs.

Lifting lugs shall be provided for valve assemblies over 550 lbs.

Lifting points shall be selected from:

- forged lifting lug welded to valve body/bonnet;
- integral forged/cast lifting lug;
- single piece plate lifting lug connected to at least two pressure retaining bolts;
- lifting eye bolt threaded into valve body/bonnet.

Lifting points shall be considered part of the valve and not a lifting apparatus.

The design of lugs shall consider the additional weight of operators.

Lifting points on the pilot shall not be used for lifting the valve.

Lifting lug positions shall be designed for the valve orientation specified in the datasheet.

If the installation orientation is not specified, the valve orientation shall be vertical flow up through the inlet.

Lifting lug material shall be per the valve body, with the exception that stainless steel grade 316 is permitted on duplex stainless steel valves.

Valves shall mark the mandatory safe lifting points and mark lugs with the SWL.

The SWL shall be specified on the general arrangement drawings.

Add new section

7.10 Surface Protection

The manufacturer shall specify the coating systems to be applied to the items exposed to the environment, or in contact with service fluids, if the material selection for the specified environment, service and durability is dependent on surface protection.

Preservation treatments shall be applied to uncoated metallic actuators and actuator control equipment to preclude surface oxidation during storage and delivery of the equipment.

Offshore / marine coating systems shall be in accordance with IOGP S-715.

Onshore / non marine coating systems shall be selected in accordance with ISO 12944-5 and qualified to ISO 12944-6.

8 Material

8.1 General

Add to section

An overlay material shall be used if differential hardness cannot prevent galling.

Add to section

Materials for sour service shall be in accordance with ISO 15156 /NACE MR0175 or ISO 17945 / NACE MR0103.

Add to section

Materials for sour service shall comply with the additional metallurgical, manufacturing, testing and certification requirements stated in the applicable material data sheet (MDS) in IOGP S-563.

Add to section

Materials selected for sour service shall have the MDS suffixed with 'S'.

Add to section

The purchaser shall specify materials from Table F.1 for the specific sour environments defined in the contract documentation.

Add to section

Materials for sour service shall be marked in accordance with ISO 15156-2/NACE MR0175-2:2015, Section 9 or ISO 15156-3/NACE MR0175-3:2015, 7.2.

Add to section

Material selection shall be based on the specified service and pressure-temperature envelope.

Add to section

Bellows material shall be Inconel 625 welded to a 316L top flange.

8.2 Spring-loaded Pressure-relief Valves

Replace first sentence of first paragraph with

The body and bonnet materials shall be selected from Table F.1 in accordance with Table 3 through Table 16 for the required temperature range.

Add after second sentence of first paragraph

The material selection of spring loaded pressure relief valve components shall be in accordance with Annex F.

Replace third sentence of first paragraph with

The body and bonnet materials shall be equivalent to or better than those detailed in Table F.1.

Delete list

Add after first sentence of second paragraph

Spring material selection shall be in accordance with Table 2.

Replace third paragraph with

The material for the internal parts of the valve shall be selected from Table F.1 in Annex F and in accordance with the manufacturer's standards for the temperature and service.

Replace Table 2 with

Table 2—Spring Materials

Body/Bonnet	Conventional		Pilot	
	Spring	Bellow	Snap action	Modulating
NTCS (sweet)	CrAlloy	CrAlloy	316	316
NTCS	X750	CrAlloy	316	316
LTCS	X750	CrAlloy	316	316
ss316	X750	316	316	316
DSS	X750	X750	X750	316
SDSS	X750	X750	X750	316
P11	X750	X750	N/A	N/A
P22	X750	X750	N/A	N/A
P9	X750	X750	N/A	N/A

8.3 Pilot-operated Pressure-relief Valves

Replace first sentence with

The body material shall be selected from Table F.2 and in accordance with Table 17 through Table 30 for the required temperature range.

Replace second sentence with

The body material shall be equivalent to or better than those detailed in Table F.2.

Delete list

Replace second paragraph with

Pilot material selection shall be from Table F.2 in accordance with the manufacturer's standards (for temperature and service).

Add to section

Materials for springs shall be selected per Table 2 on the basis of the body material selected.

Add new section

8.4 Welding

Welding of pressure-containing parts and attachment welding to pressure-containing parts shall be performed in accordance with procedures qualified to ISO 15607, ISO 15609 (all parts), ISO 15614-1 or ASME *BPVC*, Section IX.

Welders and welding operators shall be qualified in accordance with ISO 9606-1 or ASME *BPVC*, Section IX.

The qualification test results shall be documented in a process qualification record (PQR).

Post weld heat treatment (PWHT) shall be performed in accordance with the welding procedure specification (WPS).

Forgings, plate, seamless products and bars shall not be weld repaired.

Weld repair of materials shall comply with the applicable Material Data Sheet specified in Annex F (refer to IOGP S-563).

Castings that leak during pressure testing shall not be weld repaired.

Weld repairs shall be inspected to the same original casting inspection requirements.

Additional weld repairs shall not be permitted on areas that have undergone major weld repair.

9 Inspection and Shop Tests

9.1 Inspection

Replace section with

The purchaser shall reserve the right to witness the shop tests and inspect the valves in the manufacturer's plant to the extent as detailed within the QRS.

Add to section

The valve manufacturer shall confirm compliance with the requirements of this specification (inspect and examine) in accordance with the applicable quality specification level (QSL).

NOTE The QSL defines the extent of inspection and testing to be undertaken by the manufacturer.

Add to section

The QSL shall be selected on the basis of service risk, with the QSL number increasing with the extent of inspection and testing required.

Add to section

Inspection and examination shall be in accordance with ASME *BPVC*, Section VIII with amendments detailed in Annex G.

Add to section

The requirements for NDE (frequency, methods, extent and acceptance criteria) shall be in accordance with the QSL, detailed in Table G.1 and Table G.2.

Add to section

The test fluid quality shall be fresh water containing a corrosion inhibitor.

add to section

The test fluid quality shall have chloride content of test water in contact with austenitic and duplex stainless steel wetted components of valves to not exceed 30 µg/g (30 ppm by mass).

Add to section

The test fluid quality shall apply to set-pressure, seat-leakage and body/bonnet/cap hydrostatic tests.

9.2 Set Pressure Test

Replace first sentence with

Pressure-relief valves shall set to the specified pressure in accordance with the ASME *BPVC*, Section VIII (UG-139), the, the manufacturer's standard practice as published, or designated by the purchaser.

9.3 Seat Leakage Test

Replace first sentence with

Pressure-relief valves shall be seat leakage tested in accordance with API Standard 527.

Add new section

9.4 Hydrostatic Testing

Hydrostratic pressure testing shall be conducted in accordance with ASME *BPVC*, Section VIII (UG-136) with the below clarifications.

The portion of the valve from the inlet to the seat shall be tested to a pressure 1.5 times the applicable inlet pressure at 100 °F per ASME B16.34.

The hydrostatic test duration shall be in accordance with ASME B16.34, Section 7.1.2.
Nozzles shall be hydrostatic tested.

Pilot relief valves with semi nozzles shall be subject to hydrostatic test on assembly of the internal components.

Add new section

9.5 Fugitive Emission Testing

If fugitive emissions testing is required (option in datasheet), requirements in Annex H shall be followed.

10 Identification and Preparation for Shipment

10.1 Identification

Replace first sentence with

A 316 stainless steel nameplate shall be permanently attached to the body or bonnet.

Add after first sentence

Nameplates shall be resistant to constant contamination from and exposure to the operating environment e.g. ultra-violet, grease, applicable temperatures and cleaning solvents.

Replace second sentence with

The nameplates shall be stamped with the data specified in Annex A.

Delete fourth sentence

Delete fifth sentence

Delete sixth sentence

Add to section

The nameplate letter size shall be ≥ 0.12 in. (3 mm).

Add to section

The nameplate rivet holes shall be pre-drilled prior to valve testing.

Add to section

On completion of coating the nameplate shall be securely fastened to the valve at a visible location.

Add to section

The use of wire for attachment of nameplates shall not be allowed.

Add to section

The nameplate shall contain metric and US customary units.

10.2 Preparation for Shipment

Delete first sentence

Delete first sentence of list item a)

Delete second sentence of list item a)

Delete third sentence of list item a)

Delete first sentence of list item b)

Delete second sentence of list item b)

Delete list item c)

Add to section

Valves shall be packaged to prevent damage occurring in transit by preventing movement inside containment and external bodies from entering

Add to section

Covers shall prevent ingress of water and dirt into the valve during outdoor storage for at least a year.

Add to section

The valve internals shall be cleaned (free from test fluids, cleaning agents, particulates and organic substances) and dried prior to dispatch.

Add to section

Valves shall be packed in an enclosed vapor proof barrier material.

Add to section

Valves shall have vapor phase inhibitor sachets added at 0.06 oz./ft.3 (60 g/m³).

Add to section

The vapor phase inhibitor shall be kept away from the paint on carbon steel valves.

Add to section

The manufacturer shall weigh valves exceeding 2205 lb, excluding transportation equipment.

Add to section

For identical valves exceeding 2205 lb, only a single unit shall be weighed and recorded.

11 Pressure-temperature Tables

11.1 Materials

Delete section

11.3 Maximum Inlet Flange Pressure

Replace first sentence with

The maximum inlet flange pressure is provided at specific temperature ranges.

Delete sixth sentence

11.4 Outlet Pressure Limit

11.4.1 Outlet Flange Limit

Delete second sentence

Delete third sentence

Delete fifth sentence

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Annex A (normative) Pressure-relief Valve Nameplate Nomenclature

Add to section

Detail markings for the pressure relief device shall be detailed on a nameplate with the information per Table A.1.

Replace Table A.1 with

Table A.1—PRV Nameplate Markings

Nomenclature	Description
Tag number	Project specific tag
Manufacturer's name or identifying trademark	Identification of manufacturer
Size	Nominal pipe size, inlet by outlet
Type, style, model or figure number	Manufacturer's designation
Orifice	Valve orifice size, standardized letter designations {for restricted lift orifice add "-RL" suffix (i.e. "P-RL") or use the manufacturer's designation}
Capacity at 10 % overpressure	Pounds per hour of saturated steam, standard cubic feet per minute of air, at 60 °F and 14.7 psia or U.S. gallons per minute of water at 70 °F
Serial number or shop number	Manufacturer's identification
Set pressure	Valve inlet pressure at which the pressure-relief valve is adjusted to open under service conditions
Back pressure	Constant (e.g. 50 psig), variable (e.g. 0 psig to 50 psig)
Cold differential test pressure	The pressure at which the pressure-relief valve is adjusted gauge (if applicable) to open on the test stand. The cold differential test pressure includes corrections to the set pressure for the service conditions of back pressure or temperature or both (see examples below)
Lift, inch, for restricted lift valves	See 7.7
Certified capacity	Certified capacity of the valve body e.g. 100 lb/hr.
Year built	e.g. 2020
Certification mark	e.g. UV mark

Add to section

Detail markings for the pilot device shall be detailed on a nameplate with the information within Table A.2.

Add new table

Table A.2—Pilot Nameplate markings

Nomenclature	Description
Manufacturer type	Model type of manufacturer
Pilot type	E.g. pilot pop action (flowing), pilot pop action (non flowing), pilot modulating (flowing), pilot modulating (non flowing)
Set pressure	Barg or other internationally approved units.
Serial number	or equivalent to denote year of manufacture.

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Add new annex

Annex F (normative) **Material Selection Tables**

F.1

This annex provides acceptable internal component materials for the following body materials:

- normal temperature carbon steel (non-sour and sour);
- low temperature carbon steel (LTCS);
- austenitic stainless steel type 316;
- ferritic/austenitic stainless steel, type 22Cr duplex and 25Cr super duplex;
- ferritic low alloy steel, P11, P22 and P9 Alloy.

F.2

The materials shall be delivered in accordance with the MDSs in IOGP S-563 (referenced in Table F.1 and Table F.2) for the components listed (see figures 1 to 6) and any applicable additional requirements specified in this document.

F.3

The requirements of the referenced material product design code shall apply in addition to those in the MDS.

F.4

If the material selection year of issue is not stated, then the current version shall apply.

F.5

Materials shall be selected without additional requirements if corresponding MDS is not listed in the reference tables.

F.6

MDS numbers shall be suffixed with an “S” for valves to be used in sour service (reference is made to Section 8).

Add new table

Table F.1—Materials Selection Table Spring Loaded Type

Basic Material			NTCS							NTCS						
Design min / max temperature range:			[-29 °C (-20 °F) to +425 °C (+800 °F)]							[-29 °C (-20 °F) to +425 °C (+800 °F)]						
- Service			non Sour							Sour NACE						
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC	PR	PW	NW			PC	PR	PW	NW				
Material selection	MDS	Notes	2	3	4	5	6	7	2	3	4	5	6	7		
A105	IC004	1	A				A		A				A			
A216 WCB	IC006	1	A				A		A				A			
A216 WCC	IC006	1	A				A		A				A			
ASTM A696 Grade B or and C	IC007	1		A				A	A	A				A		
A350 LF2 Class 1	IC104	1														
A352 LCC	IC106	1														
ASTM A696 Grade B or and C	IC107	1														
A182 F316/316L	IS104	1			A	A				A	A					
A351 CF3M/CF8M	IS106	1														
A276 316/316L	IS107	1			A	A				A	A					
A479 316/316L	IS107	1			A	A				A	A					
A182 F51	ID144	1														
A182 F53/F55	ID254	1														
A276 UNS S31803	ID147	1														
A276 UNS S32750 / UNS32760	ID257	1														
A995 Gr. 4A	ID146	1														
A995 Gr. 6A	ID256	1														
A182 F11 Cl.2																
A182 F22 Cl.3																
A182 F9																
A217 WC6																
A217 WC9																
A217 C9																

Notes

1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL.
2. Body / bonnet.
3. Threaded plugs (drain plug, blow down lock screw, etc.).
4. Stem, nozzle, disc and blowdown ring.
5. Disc holder, guide, etc.
6. Cap and bonnet on balanced bellows valves, etc.
7. Other threaded parts.

A = Acceptable alternative.

Table F.1 (continued)

Basic Material			LTCS							SS 316						
Design min / max temperature range:			[-29°C (-20°F) to +425°C (+800°F)]							[-270°C (-450°F) to +540°C (+1000°F)]						
- Service			Sour NACE							Sour NACE						
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC	PR	PW	NW			PC	PR	PW	NW				
Material selection	MDS	Notes	2	3	4	5	6	7	2	3	4	5	6	7		
A105	IC004	1														
A216 WCB	IC006	1														
A216 WCC	IC006	1														
ASTM A696 Grade B or and C	IC007	1														
A350 LF2 Class 1	IC104	1	A				A									
A352 LCC	IC106	1	A				A									
ASTM A696 Grade B or and C	IC107	1		A				A								
A182 F316/316L	IS104	1			A	A			A		A	A	A			
A351 CF3M/CF8M	IS106	1							A		A	A	A			
A276 316/316L	IS107	1			A	A				A	A	A		A		
A479 316/316L	IS107	1			A	A				A	A	A		A		
A182 F51	ID144	1														
A182 F53/F55	ID254	1														
A276 UNS S31803	ID147	1														
A276 UNS S32750 / UNS32760	ID257	1														
A995 Gr. 4A	ID146	1														
A995 Gr. 6A	ID256	1														
A182 F11 Cl.2																
A182 F22 Cl.3																
A182 F9																
A217 WC6																
A217 WC9																
A217 C9																

Notes

1. Full MDS requirements to be followed for main valve body / bonnet. Forl other parts, NDE requirements to be in accordance with the QSL.
2. Body / bonnet.
3. Threaded plugs (drain plug, blow down lock screw, etc.).
4. Stem, nozzle, Disc and blowdown ring.
5. Disc holder, guide, etc.
6. Cap and bonnet on balanced bellows valves, etc.
7. Other threaded parts.

A = Acceptable alternative.

Table F.1 (continued)

Basic Material			DSS							SDSS						
Valve design or options to be specified by purchaser:			[-29°C (-20°F) to +425°C (+800°F)]							[-29°C (-20°F) to +425°C (+800°F)]						
- Service			Sour NACE							Sour NACE						
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC	PR	PW	NW		PC	PR	PW	NW					
Material selection	MDS	Notes	2	3	4	5	6	7	2	3	4	5	6	7		
A105	IC004	1														
A216 WCB	IC006	1														
A216 WCC	IC006	1														
A350 LF2 Class 1	IC104	1														
A352 LCC	IC106	1														
A182 F316/316L	IS104	1														
A276 316/316L	IS107	1														
A479 316/316L	IS107	1														
A351 CF3M/CF8M	IS106	1														
A182 F51	ID144	1	A		A	A	A									
A995 Gr. 4A	ID146	1	A		A	A	A									
A276 UNS S31803	ID147	1		A	A	A		A								
A182 F53/F55	ID254	1							A		A	A	A			
A995 Gr. 6A	ID256	1							A		A	A	A			
A276 UNS S32750 / UNS32760	ID257	1								A	A	A		A		
A182 F11 Cl.2																
A182 F22 Cl.3																
A182 F9																
A217 WC6																
A217 WC9																
A217 C12																
<p>Notes</p> <ol style="list-style-type: none"> Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL. Body / bonnet. Threaded plugs (drain plug, blow down lock screw, etc.). Stem, nozzle, disc and blowdown ring. Disc holder, guide, etc. Cap and bonnet on balanced bellows valves, etc. Other threaded parts. <p>A = Acceptable alternative.</p>																

Table F.1 (continued)

Basic Material			P11							P22								
Valve design or options to be specified by purchaser:			[-270°C (-450°F) to +540°C (+1000°F)]							[-270°C (-450°F) to +540°C (+1000°F)]								
- Service			Sour NACE							Sour NACE								
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC		PR		PW		NW		PC		PR		PW		NW	
Material selection	MDS	Notes	2	3	4	5	6	7	2	3	4	5	6	7				
A105	IC004	1																
A216 WCB	IC006	1																
A216 WCC	IC006	1																
A350 LF2 Class 1	IC104	1																
A352 LCC	IC106	1																
A182 F316/316L	IS104	1																
A276 316/316L	IS107	1																
A479 316/316L	IS107	1																
A351 CF3M/CF8M	IS106	1																
A182 F51	ID144	1																
A995 Gr. 4A	ID146	1																
A276 UNS S31803	ID147	1																
A182 F53/F55	ID254	1																
A995 Gr. 6A	ID256	1																
A276 UNS S32750 / UNS32760	ID257	1																
A182 F11 Cl.2			A	A	A	A	A	A										
A182 F22 Cl.3									A	A	A	A	A	A				
A182 F9																		
A217 WC6			A		A	A	A											
A217 WC9									A		A	A	A					
A217 C12																		
<p>Notes</p> <ol style="list-style-type: none"> 1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL. 2. Body / bonnet. 3. Threaded plugs (drain plug, blow down lock screw, etc.). 4. Stem, nozzle, disc and blowdown ring. 5. Disc holder, guide, etc. 6. Cap and bonnet on balanced bellows valves, etc. 7. Other threaded parts. <p>A = Acceptable alternative.</p>																		

Table F.1 (continued)

Basic Material			P9						
Valve design or options to be specified by purchaser:			[-270°C (-450°F) to +540°C (+1000°F)]						
- Service			Sour NACE						
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC	PR	PW	NW			
Material selection	MDS	Notes	2	3	4	5	6	7	
A105	IC004	1							
A216 WCB	IC006	1							
A216 WCC	IC006	1							
A350 LF2 Class 1	IC104	1							
A352 LCC	IC106	1							
A182 F316/316L	IS104	1							
A276 316/316L	IS107	1							
A479 316/316L	IS107	1							
A351 CF3M/CF8M	IS106	1							
A182 F51	ID144	1							
A995 Gr. 4A	ID146	1							
A276 UNS S31803	ID147	1							
A182 F53/F55	ID254	1							
A995 Gr. 6A	ID256	1							
A276 UNS S32750 / UNS32760	ID257	1							
A182 F11 Cl.2									
A182 F22 Cl.3									
A182 F9			A	A	A	A	A	A	
A217 WC6									
A217 WC9									
A217 C12			A		A	A	A		
Notes 1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL. 2. Body / bonnet. 3. Threaded plugs (drain plug, blow down lock screw, etc.). 4. Stem, nozzle, disc and blowdown ring. 5. Disc holder, guide, etc. 6. Cap and bonnet on balanced bellows valves, etc. 7. Other threaded parts. A = Acceptable alternative.									

Add new table

Table F.2—Material Selection table Pilot Operated Type

Basic Material			NTCS								NTCS							
Design min / max temperature range:			[-29°C (-20°F) to +260°C (+500°F)]															
- Service:			Sweet								Sour NACE							
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC		PR	PW	NW			PC		PR	PW	NW				
Material selection	MDS	Notes	2	3	4	5	6	7	8	2	3	4	5	6	7	8		
A105	IC004	1	A							A								
A216 WCB	IC006	1	A							A								
A216 WCC	IC006	1	A							A								
ASTM A696 Grade B or and C	IC007	1			A				A			A				A		
A350 LF2 Class 1	IC104	1																
A352 LCC	IC106	1																
ASTM A696 Grade B or and C	IC107	1																
A182 F6A																		
A182 F316/316L	IS104	1		A		A	A	A			A		A	A	A			
A351 CF3M/CF8M	IS106	1		A				A			A				A			
A276 316/316L	IS107	1				A	A						A	A				
A479 316/316L	IS107	1				A	A						A	A				
A182 F51	ID144	1																
A995 Gr. 4A	ID146	1																
A276 UNS S31803	ID147	1																
A182 F53/F55	ID254	1																
A995 Gr. 6A	ID256	1																
A276 UNS S32750 / UNS32760	ID257	1																

Notes

1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL.
2. Main valve body/bonnet.
3. Pilot body (and other pressure containing parts).
4. Threaded plugs.
5. Piston and nozzle.
6. Internal parts (both).
7. Cap and bonnet on pilot.
8. Other threaded parts.

A = Acceptable alternative.

Table F.2 (continued)

Basic Material			LTCS								SS 316							
Design min / max temperature range:			[-29°C (-20°F) to +260°C (+500°F)]								[-270°C (-450°F) to +540°C (+1000°F)]							
- Service:			Sour NACE								Sour NACE							
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC		PR		PW		NW		PC		PR		PW		NW	
Material selection	MDS	Notes	2	3	4	5	6	7	8	2	3	4	5	6	7	8		
A105	IC004	1																
A216 WCB	IC006	1																
A216 WCC	IC006	1																
ASTM A696 Grade B or and C	IC007	1																
A350 LF2 Class 1	IC104	1	A															
A352 LCC	IC106	1	A															
ASTM A696 Grade B or and C	IC107	1			A				A									
A182 F6A																		
A182 F316/316L	IS104	1		A		A	A	A		A	A		A	A	A			
A351 CF3M/CF8M	IS106	1		A				A		A	A		A	A	A			
A276 316/316L	IS107	1				A	A					A	A	A				
A479 316/316L	IS107	1				A	A					A				A		
A182 F51	ID144	1																
A995 Gr. 4A	ID146	1																
A276 UNS S31803	ID147	1																
A182 F53/F55	ID254	1																
A995 Gr. 6A	ID256	1																
A276 UNS S32750 / UNS32760	ID257	1																
A182 F11 Cl.2																		

Notes

1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL.
2. Main valve body/bonnet.
3. Pilot body (and other pressure containing parts).
4. Threaded plugs.
5. Piston and nozzle.
6. Internal parts (both).
7. Cap and bonnet on pilot.
8. Other threaded parts.

A = Acceptable alternative.

Table F.2 (continued)

Basic Material			DSS								SDSS							
Design min / max temperature range:			[-29°C (-20°F) to +260°C (+500°F)]								[-29°C (-20°F) to +260°C (+500°F)]							
- Service:			Sour NACE								Sour NACE							
Valve parts: Grouped as follows: PC = Pressure-containing parts PR = Pressure-controlling parts PW = Process-wetted parts excluding PC and PR NW = Non-wetted and non-pressure-containing parts			PC		PR		PW		NW		PC		PR		PW		NW	
Material selection	MDS	Notes	2	3	4	5	6	7	8	2	3	4	5	6	7	8		
A105	IC004	1																
A216 WCB	IC006	1																
A216 WCC	IC006	1																
ASTM A696 Grade B or and C	IC007	1																
A350 LF2 Class 1	IC104	1																
A352 LCC	IC106	1																
ASTM A696 Grade B or and C	IC107	1																
A182 F6A																		
A182 F316/316L	IS104	1		A							A							
A351 CF3M/CF8M	IS106	1		A							A							
A276 316/316L	IS107	1																
A479 316/316L	IS107	1																
A182 F51	ID144	1	A			A	A	A										
A995 Gr. 4A	ID146	1	A			A	A	A										
A276 UNS S31803	ID147	1			A				A									
A182 F53/F55	ID254	1								A			A	A	A			
A995 Gr. 6A	ID256	1								A			A	A	A			
A276 UNS S32750 / UNS32760	ID257	1										A				A		
A182 F11 Cl.2																		

Notes

1. Full MDS requirements to be followed for main valve body / bonnet. For other parts, NDE requirements to be in accordance with the QSL.
2. Main valve body/bonnet.
3. Pilot body (and other pressure containing parts).
4. Threaded plugs.
5. Piston and nozzle.
6. Internal parts (both).
7. Cap and bonnet on pilot.
8. Other threaded parts.
9. A = Acceptable alternative.

Add new table

Table F.3—Bolting Material Selection

Material selection	MDS	NTCS sweet	NTCS	LTCS	316	DSS	SDSS	P11	P22	P9
A193 B7 / A194 2H	IX110/IX120	A								
A193 B7M / A194 2HM	IX110/IX120	A	A							
A193 B8M Class 1 / A194 8M / A194 8MA	-				A					
A193 B8ML CuNA / A194 GRADE 8MLCuNA	-					A	A			
A193 B8MLCuN-CLASS 1B / A194 GR 9CA	-					A	A			
A320 L7 / A194 7	IX100/IX109	A								
A320 L7M / A194 7M	IX100/IX109	A	A	A						
A453 GR 660 Class D	IU100					A	A			
A1014 UNS N07718 API 6ACRA (120K)	IN120S					A	A			
A1082 UNS S32750, S32760	ID260					A	A			
ASTM A193 B16 / ASTM A194 Gr 4 (or 7)	-							A	A	A

Annex G (normative)

Supplementary Requirements for Inspection and Testing

G.1

The requirements for inspection and examination shall be detailed in this annex either amended from, or in addition to, those detailed in ASME *BPVC*, Section VIII.

G.2

NDE activities listed in Table G.1 for a specific part and product form or forms shall be conducted.

NOTE 1 Table G.1 specifies NDE requirements by inspection code for QSL-1, QSL-2, QSL-3 and QSL-4. These requirements vary by the type of material product form and the finished valve part being inspected.

NOTE 2 QSLs increase in stringency of requirements with the increase in the QSL number.

Add new table

Table G.1—NDE Requirements

Part	QSL-1		QSL-2		QSL-3		QSL-4	
	Cast	Forged	Cast	Forged	Cast	Forged	Cast	Forged
Body, bonnet, Full nozzle, Bolted cap, Bolted cover (pilot)	VT1	VT2	VT1 and RT1 ^{a g} and MT1 ^g or PT1 ^g	VT2 and MT1 ^g or PT1 ^g	VT1 and RT1 ^a and MT1 ^g or PT1 ^g	VT2 and UT2 and MT1 ^g or PT1 ^g	VT1 and RT1 ^{a d} and UT1 and MT1 or PT1	VT2 and UT2 and MT1 or PT1
Stem	N/A	VT2	N/A	VT2	N/A	VT2 and MT1 OR PT1	N/A	VT2 and UT2 and MT1 or PT1
Bolting - pressure containing	N/A	VT4 ^h	N/A	VT4 ^h	N/A	VT4 ^h	N/A	VT4 ^h and MT1 or PT1
Disc, semi-nozzle, piston (pilot), line (pilot)	VT1	VT2	VT1	VT2	VT1 and MT1 ^g or PT1 ^g	VT2 and MT1 ^g or PT1 ^g	VT1 and MT1 or PT1	VT2 and MT1 or PT1
Welded on lifting lugs	VT3 and PT1 or MT1							
Integrally cast lifting lugs	RT3 or UT4							
<p>a RT1 may be replaced by UT4 by agreement.</p> <p>b MT or PT to be performed prior to coating, or overlay.</p> <p>c RT1 plus UT1 may be replaced by RT3.</p> <p>d 5 % or minimum (QSL-1 and 2) and 10 % or minimum (QSL-3), 1 part per component batch to be examined. If defects outside acceptance criteria are detected, two or more parts shall be tested. if any of these fail, 100 % examination shall be required.</p> <p>e. VT examination shall cover threads, shanks and heads. Discontinuities shall comply with requirements specified in ASTM F788 for bolts/studs and ASTM F812 for nuts.</p>								

Add new table

Table G.2—Extent, Method, and Acceptance Criteria of NDE/Item Examination Code

Examination	NDE	Extent	Method	Acceptance
RT1	RT casting ^a	Areas defined by ASME B16.34 for special class valves, at abrupt changes in sections and at the junctions of risers, gates or feeders to the casting	ASME <i>BPVC</i> , Section V, Article 2	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 7
RT2	RT weldments	100 % where practicable	ASME <i>BPVC</i> , Section V, Article 2	ASME <i>BPVC</i> , Section VIII, Division 1, UW-51 for linear indications. / ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 4 for rounded indications
RT3	RT casting ^a	100 %	ASME <i>BPVC</i> , Section V, Article 2	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 7
UT1	UT casting ^a	Remaining areas not covered by RT1	ASME <i>BPVC</i> , Section V, Article 5	ASTM A609/A609M, Table 2, Quality Level 2
UT2	UT forging	All surfaces	ASME <i>BPVC</i> , Section V, Article 5	ASME <i>BPVC</i> , Section VIII, Division 1, UF-55 for angle beam and ASME B16.34 for straight beam
UT3	UT weldments	100 % of full penetration welds	ASME <i>BPVC</i> , Section V, Article 4	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 12
	UT overlay weld	100 % of overlay weld surface	ASME <i>BPVC</i> , Section V, Article 4 (straight beam method)	ASTM A578/A578M Level C
UT4	UT Casting ^a	100 %	ASME <i>BPVC</i> , Section V, Article 5	ASTM A609/A609M, Table 2, Quality Level 1
MT1	MT Casting ^a	All accessible external and internal surfaces	ASME <i>BPVC</i> , Section V, Article 7	ASME <i>BPVC</i> Section VIII, Division 1, Appendix 7
	MT Forgings	All surfaces	ASME <i>BPVC</i> , Section V, Article 7	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 6
	MT welds	100 % of weld surface	ASME <i>BPVC</i> , Section V, Article 7	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 6
	MT bolting surface area	100 % of bolting surface	ASME <i>BPVC</i> , Section V, Article 7	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 6
	MT machined surfaces including weld bevels	100 % of machined surface	ASME <i>BPVC</i> , Section V, Article 7	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 6
MT2	MT sealing surfaces	100 % sealing surfaces	ASME <i>BPVC</i> , Section V, Article 7	No indications shall be permitted

Table G2 (continued)

Examination	NDE	Extent	Method	Acceptance
PT1	PT casting ^a	All accessible external and internal surfaces	ASME <i>BPVC</i> , Section V, Article 6	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 7
	PT Forgings	All surfaces	ASME <i>BPVC</i> , Section V, Article 6	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 8
	PT welds	100 % of weld surface	ASME <i>BPVC</i> , Section V, Article 6	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 8
	PT weld overlay	Per applicable EDS	Per applicable EDS	Per applicable EDS
	PT bolting surface area	100 % of bolting surface	ASME <i>BPVC</i> , Section V, Article 6	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 8
	PT machined surfaces including weld bevels	100 % of machined surface	ASME <i>BPVC</i> , Section V, Article 6	ASME <i>BPVC</i> , Section VIII, Division 1, Appendix 8
PT2	PT sealing surfaces	100 % sealing surfaces	ASME <i>BPVC</i> , Section V, Article 6	No indication shall be permitted
VT1	VT castings ^a	Per applicable MDS	Per applicable MDS	Per applicable MDS
VT2	VT forgings	Per applicable MDS	Per applicable MDS.	Per applicable MDS
VT3	VT weldments	100 % accessible surfaces	ASME <i>BPVC</i> , Section V, Article 9	Undercut shall not reduce the thickness in the area (considering both sides) to below the minimum thickness
	VT weld overlay	Per applicable EDS	Per applicable EDS	Per applicable EDS
VT4	Other	100 % accessible surfaces	Per applicable MDS, EDS or material standard	Per applicable MDS, EDS or material standard
NOTE 1 Where the table refers to MDS or EDS, NDE shall comply with the requirements in the applicable MDS or EDS in IOGP S-563 as referenced in Annex D. Where no MDS or EDS is referenced in Annex D, the applicable material standard shall apply without additional requirements.				
^a NDE requirements for pilot casting shall be according to the applicable datasheet in IOGP S-563 as referenced in Annex D.				

NOTE 3 Table G.2 specifies the extent, method and acceptance criteria for the various inspection codes used in Table G.1.

G.3

NDE activities shall be conducted on completion of final heat treatment or post-weld heat treatment.

G.4

NDE requirements for pilot casting for cast of pressure-containing and pressure-controlling parts shall be according to IOGP S-563:2018, 4.8, the applicable MDS referenced in Annex D (independent of the extent specified in Table G.1).

G.5

NDE personnel shall be qualified to ASNT SNT-TC-1A or ISO 9712:2012 Level 2.

G.6

Certification shall be performed by an independent third-party certification body or authorized qualifying body in accordance with the ASNT Central Certification Program (ACCP-CP-1) or ISO 9712.

G.7

Inspection and test activities shall utilize calibrated equipment.

Public Review Draft

Add new annex

Annex H (informative) **Fugitive Emissions Production Testing**

H.1

A helium fugitive emission production test shall be carried out on a sample of valves in accordance with ISO 15848-1 with the exception that no mechanical cycles are required.

H.2

For very toxic services the helium leakage rate shall be AH.

NOTE 1 The AH category is the leak tightness of the stem seal using helium gas, typically achieved using a bellows.

H.3

For hydrocarbon service, the helium leakage shall be BH.

NOTE 2 The BH category is the leak tightness of the stem seal using helium gas, typically achieved using PTFE packing or elastomeric seals.

H.4

Inspection campaign test samples shall be :

- part of same purchase order;
- manufactured at same location;
- same fugitive emission class;
- same body type (e.g. metal, o-ring, gasket);
- same inlet pressure class group (e.g. \leq class 600, class 900/1500, class 2500).

H.5

Fugitive emission production testing shall be required if the valve has not successfully passed prototype testing (in accordance with ISO 15848-1 except that no mechanical cycles are required) within the last two years.

H.6

Fugitive emission production testing shall be required if production testing has not been carried out (on the same valve type, design, pressure class, size, fugitive emission class and under the same test conditions, with consistent quality) within the last six months.

H.7

Conventional type shall be assembled and subjected to a back pressure test pressure with air or gas at the valve outlet (external leakage test).

H.8

The test pressure shall be the set pressure, but at least 90 psi_g.

H.9

The test pressure shall be the maximum back pressure detailed in the process conditions.

H.10

Balanced bellows type shall be subject to a tightness test of the bellows assembly with the bonnet vent open to prove bellows tightness.

H.11

The bellows assembly shall be examined for leakage.

H.12

The vacuum rating of bellows shall be specified by the manufacturer.

H.13

Pilot operated type shall be assembled and pressurized at the valve inlet.

H.14

Joints, e.g. bolted connections, tube fittings and adjustment screws, shall be examined for leakage.

H.15

The inlet pressure shall be 90 % of the set pressure.

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New Draft