

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

Revision history

VERSION	DATE	PURPOSE
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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 2020).

Table of Contents

	Foreword	1
	Introduction	4
2	Normative References	6
3	Terms, Definitions, Acronyms, Abbreviations and Symbols	6
	3.1 Terms and Definitions	6
	3.2 Acronyms, Abbreviations and Symbols	7
4	Responsibility	7
6	Orifice Areas and Designations	8
7	Design	8
	7.1 General	8
	7.4 Dimensions	9
	7.6 Special Construction Features	9
	7.8 Threaded Auxiliary Connections	9
	7.9 Lifting	10
	7.10 Surface Protection	10
8	Material	11
	8.1 General	11
	8.2 Spring-loaded Pressure-relief Valves	12
	8.3 Pilot-operated Pressure-relief Valves	13
	8.4 Welding	13
	8.5 Material Marking	13
9	Inspection and Shop Tests	14
	9.1 Inspection	14
	9.4 Hydrostatic Testing	14
10	Identification and Preparation for Shipment	15
	10.1 Identification	15
	10.2 Preparation for Shipment	15
11	Pressure–temperature Tables	16
	11.1 Materials	16
	Annex A (normative) Pressure-relief Valve Nameplate Nomenclature	17
	Annex F (normative) Material Selection Tables	19

List of Tables

Table 2—Spring Materials	12
Table A.1—PRV Nameplate Markings	17
Table A.2—Pilot Nameplate Markings	18

Table F.1—Normal Temperature Carbon Steel – Sweet Service, -29 °C (-20 °F) to 425 °C (800 °F)20

Table F.2—Normal Temperature Carbon Steel – Sour Service, -29 °C (-20 °F) to 425 °C (800 °F).....20

Table F.3—Low Temperature Carbon Steel – Sour Service, -46 °C (-51 °F) to 230 °C (450 °F)21

Table F.4—Austenitic Stainless Steel Type 316 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F).....21

Table F.5—Ferritic-austenitic Stainless Steel Type 22Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)22

Table F.6—Ferritic-austenitic Stainless Steel Type 25Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)23

Table F.7—Ferritic Low Alloy Steel P11 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)24

Table F.8—Ferritic Low Alloy Steel P22 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)24

Table F.9—Ferritic Low Alloy Steel P9 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)25

Table F.10—Normal Temperature Carbon Steel – Sweet Service, -29 °C (-20 °F) to 260 °C (500 °F)25

Table F.11—Normal Temperature Carbon Steel – Sour Service, -29 °C (-20 °F) to 260 °C (500 °F)26

Table F.12—Low Temperature Carbon Steel — Sour Service, -46 °C (-51 °F) to 260 °C (500 °F)26

Table F.13—Austenitic Stainless Steel Type 316 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F).....27

Table F.14—Ferritic-austenitic Stainless Steel Type 22Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)27

Table F.15—Ferritic-austenitic Stainless Steel Type 25Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)28

Table F.16—Bolting Material Selection28

List of Figures

Figure 1—Typical Bug Screen.....8

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, September 2017, including Errata 1, September 2018 for application in the petroleum and natural gas industries.

This 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.

2 Normative References

Add to section

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

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

API Recommended Practice 571, *Damage Mechanisms Affecting Fixed Equipment in the Refining Industry*

ASME BPVC Section IX, *Welding, Brazing, and Fusing Qualifications*

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

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

IOGP S-716, *Supplementary Specification for Small Bore Tubing and Fittings*

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

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

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

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

ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys*

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

Add new section

3.1 Terms and Definitions

3.1.1

pressure-containing part

component that is exposed to and contains pressure

Note 1 to entry: As a minimum, this includes the body and bonnet.

3.1.2

pressure-controlling part

part that is intended to prevent or permit the flow of fluids

Note 1 to entry: Includes the semi-nozzle and disc/piston.

3.1.3

process-wetted part

part that neither contain the fluid pressure nor control but nonetheless carry out its function when immersed in the process fluid

3.1.4

non-wetted part

part of the pressure-relief valve that is not in contact with the process medium even when the valve is flowing

Add new section

3.2 Acronyms, Abbreviations and Symbols

ITP inspection and test plan

MDS material data sheet

NPT national pipe thread

PWHT post-weld heat treatment

SWL safe working load

4 Responsibility

4.1

Remove “primarily” from first sentence

In list item b), replace “specifying materials” with

specifying the body and bonnet materials

4.2

Remove “primarily” from first sentence

In list item a), replace “the requirements of this standard and the purchaser’s specification” with

the purchaser’s requirements

In list item c), replace “the purchaser’s specification” with

the purchaser’s requirements

Replace list item d) with

- d) calculated flow capacities of the selected pressure-relief valves shall be those established and guaranteed by the pressure-relief valve manufacturer for the applicable service conditions and be equal to or greater than the required capacities;

Add new list item e)

- e) the pressure-relief valve manufacturer is fully responsible for the overall valve (i.e. valve complete with accessories);

Add new list item f)

- f) completing those portions of the pressure-relief valve data sheet that are the responsibility of the manufacturer.

6 Orifice Areas and Designations

In first sentence, replace “are listed in Table 1” with

shall be selected from those detailed in Table 1

Replace second sentence with

The effective orifice 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.

Add to section

The adjusting ring shall be secured by means of an adjusting ring set screw.

Add to section

The bonnet vent for bellows valves shall have a screwed vent fitting (see bug screen shown in Figure 1).

Add to section

The bug screen mesh holes size shall be 0.015 in. (0.4 mm).

Add new Figure 1

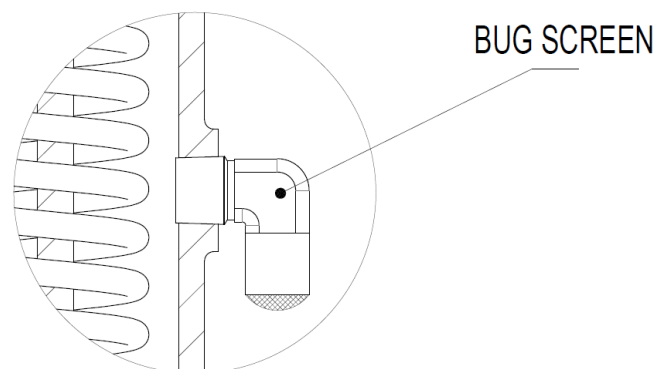


Figure 1—Typical Bug Screen

Add to section

Spring-loaded pressure-relief valves shall have a bolted bonnet.

Add to section

Exposed adjustable parts (i.e. adjustable ring screw and spring adjusting screw) shall be tamper-proof sealed for integrity of setting.

Add to section

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

Add to section

If the required spring-loaded pressure-relief valve blowdown pressure is not the manufacturer's standard setting, the manufacturer shall confirm acceptability.

Add to section

For spring-loaded pressure-relief valves that have an adjustment for blowdown, the blowdown shall be 5 % to 10 % below the valve set pressure.

Add to section

Spring-loaded pressure-relief valves shall be full nozzle type.

7.4 Dimensions

Replace 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.

7.6 Special Construction Features

Add to section

Pressure-relief valves with a steam-relief scenario, not designated in steam service, shall not have an exposed spring design.

Add new section

7.8 Threaded Auxiliary Connections

7.8.1

Pressure retaining plugs (e.g. vent and drain plugs) shall have NPT thread design.

7.8.2

Pressure-retaining plugs shall be designed in accordance to ASME B 1.20.1 with a minimum of four turns of hand tightening prior to wrench tight engagement.

7.8.3

A calibrated manual torque wrench shall be used to apply the manufacturer's stated torques.

7.8.4

Pilot tube and fittings shall be at least $\frac{3}{8}$ in. (10 mm) O.D.

7.8.5

Fittings shall be double ferrule compression type.

7.8.6

Valve body designs shall utilize tubing and fittings in accordance with the guidelines provided in IOGP S-716.

Add new section

7.9 Lifting

7.9.1

The manufacturer shall provide lifting sketches and handling instructions for valves weighing from 50 lbs (22.5 kg) to 550 lbs (250 kg).

7.9.2

Lifting lugs shall be provided for valve assemblies over 550 lbs (250 kg).

7.9.3

Lifting points shall be selected from:

- integral forged or cast lifting lug;
- lifting eye bolt threaded into valve body/bonnet.

7.9.4

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

7.9.5

Only designated lifting points shall be used to lift the pilot-operated valve.

7.9.6

Lifting points shall be marked with the SWL.

Add new section

7.10 Surface Protection

7.10.1

Coating systems shall be specified for items exposed to the environment.

7.10.2

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

7.10.3

Onshore and 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

Sliding elements and threaded components shall have a hardness and surface finish to avoid galling.

Add to section

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

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 manufacturer shall select materials from Annex F tables for the specific sour environments defined.

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.

Add to section

Explosive decompression elastomers shall be provided in accordance with Norsok M-710 or ISO 23936 parts 1 and 2, when specified.

NOTE Explosion decompression resistant elastomer grades are to be considered for high pressure applications, as the probability of explosive decompression increases with pressure, pressure variations, temperature and cross-section of the O-ring.

Add to section

Elastomers and thermoplastics shall be suitable for the specified temperature and service conditions.

NOTE The presence of methanol and H₂S will make the elastomers significantly more prone to explosive decompression.

8.2 Spring-loaded Pressure-relief Valves

Replace third paragraph with

The material for the internal parts of the valve shall be selected from Table F.1 through Table F.9 and in accordance with the manufacturer's standards for the temperature and service.

Table 2—Spring Materials

Replace Table 2 with

Body/Bonnet Material	Pressure-relief Valve Type and Spring Service			
	Spring-loaded Conventional (Wetted)	Spring-loaded Balanced Bellows (Non-wetted)	Pilot-operated Snap Action (Wetted)	Pilot-operated Modulating (Non-wetted)
NTCS (sweet)	CrAlloy (A231/232)	CrAlloy (A231/232)	316 / 17-7ph	316 / 17-7ph
NTCS	X750	CrAlloy (A231/232)	X750	316 / 17-7ph
LTCS	X750	CrAlloy (A231/232)	X750	316 / 17-7ph
SS316	X750	316 / 17-7ph	X750	316 / 17-7ph
DSS	X750	316 / 17-7ph	X750	316 / 17-7ph
SDSS	X750	316 / 17-7ph	X750	316 / 17-7ph
P11	X750	316 / 17-7ph	N/A	N/A
P22	X750	316 / 17-7ph	N/A	N/A
P9	X750	316 / 17-7ph	N/A	N/A

NOTE 1 The temperature ranges for each type as follows:
 – X750: -75 to 1000 °F;
 – 316/17-7ph: -450 to 1000 °F;
 – CrAlloy (A231/232): -20 to 800 °F.

NOTE 2 On sour service the purchaser may specify to change the Inconel X750 to one of the following ISO 15156-3/NACE MR0175 compliant materials:
 – UNS N07718 (Nickel alloy 718) also in compliance with API 6ACRA;
 – UNS R30035;
 – UNS R3003 (Elgiloy).

NOTE 3 For seawater service spring material shall be selected from:
 – UNS N06625 (Nickel 625);
 – UNS N010276 (Hastelloy).

Add to section

Selection of X750 material from Table 2 shall be dependent upon the actual service conditions.

NOTE Alternative material may be specified as indicated in the table.

8.3 Pilot-operated Pressure-relief Valves

Replace first sentence with

The main valve body and cap material shall be in accordance with Table 17 through Table 30 for the required temperature.

Replace second paragraph with

Pilot-operated pressure-relief valve materials shall be selected from Table F.10 through Table F.15 and be in accordance with the manufacturer's standards (for temperature and service).

Add to section

Materials for the pilot spring shall be selected from Table 2 on the basis of the body material selected.

Add new section

8.4 Welding

8.4.1

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

8.4.2

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

8.4.3

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

8.4.4

Additional weld repairs shall not be permitted on areas that have undergone major weld repair as defined in IOGP S-563.

8.4.5

PWHT shall be performed as detailed API Recommended Practice 571.

NOTE An example is for alkaline services like sodium hydroxide, potassium hydroxide or amine service. PWHT shall be performed for carbon steel and/or low alloy castings and forgings after any welding operation on these services.

Add new section

8.5 Material Marking

8.5.1

Cast and forged body, bonnet and cap shall have the charge or heat number cast or stamped in the material.

8.5.2

Springs used for the set pressure or CDTP adjustment shall have the spring number identified.

NOTE The spring number is either stamped directly on the spring or if the wire diameter is smaller than 6 mm ($\frac{1}{4}$ in.), it may be provided with a color code.

9 Inspection and Shop Tests

9.1 Inspection

Replace section with

Shop tests and valve inspection at the manufacturer's plant shall be witnessed in accordance with IOGP S-730Q for the specified CAS level and the manufacturer's inspection and test plan (ITP).

Add to section

The valve manufacturer shall be responsible for ensuring that the NDE is carried out in accordance with the MDSs for pressure-containing parts.

Add new section

9.4 Hydrostatic Testing

9.4.1

Hydrostatic pressure testing shall be conducted in accordance with ASME BPVC, Section VIII.

9.4.2

Pneumatic tests shall not be allowed in place of hydrostatic tests.

9.4.3

The portion of the valve from the inlet to the seat shall be tested to a pressure 1.5 times the design pressure at 100 °F (38 °C) per ASME B16.34.

NOTE This would require semi nozzles to be installed on pilot-operated pressure-relief valves.

9.4.4

The hydrostatic test duration shall be in accordance with ASME B16.34.

9.4.5

The full nozzle shall be considered as a pressure-containing part of the shell.

9.4.6

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

9.4.7

The chloride content of test water in contact with austenitic and duplex stainless steel wetted components of valves shall not exceed 50 mg/kg (50 parts per million by mass).

9.4.8

The chloride content in the test water shall be tested at least annually.

9.4.9

The pH of the test water shall be between 6 and 8.5.

9.4.10

Test media reservoirs shall be drained and biocide-flushed at least one time per annum.

9.4.11

Valves shall be drained of test fluid and thoroughly dried on completion of hydrotesting.

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.

Delete fifth sentence

Add to section

Drilling requirements to the body to support fixing of nameplates (e.g. rivets) shall be done prior to valve testing.

Add to section

On completion of pressure-relief valve coating process, the nameplate shall be securely fastened to the valve at a visible location.

Add to section

A separate tag nameplate fixed by a wire shall be utilized when space is a constraint on the nameplate detailed in Table A.1.

Add to section

The nameplate shall contain units selected on the data sheet.

10.2 Preparation for Shipment

Replace section a) with

- a) Prior to packaging and shipment, valve internals shall be cleaned, dried, and their surfaces be free from test fluids, cleaning agents, particles and organic substances.

Replace first sentence of section b) with

Threaded openings shall be plugged with suitable protective devices e.g. metal pipe plugs or plastic protectors.

Replace second sentence of section b) with

Temporary plugs shall be distinguishable from permanent metal plugs.

Add to section c)

Protective covers shall be used to seal the valve ends in order to avoid foreign material or moisture from entering the valve bore.

Add to section c)

Protective covers shall be made of plastic at least $\frac{1}{8}$ in. (3 mm) thick or wood.

Add to section c)

Protective covers made of wood or wood fiber shall be fitted with a nonporous moisture barrier between the cover and the metal flange.

Add to section c)

The design of the covers shall prevent the valves from being installed without prior removal of the covers.

Add to section c)

Plastic caps with integral molded securing plugs shall be secured in bolt-holes.

11 Pressure-temperature Tables

11.1 Materials

Delete section 11.1

Annex A (normative)

Pressure-relief Valve Nameplate Nomenclature

Add to section

Markings for the pressure-relief valves shall be detailed on a nameplate with the information as 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
Year built	e.g. 2020
Certification mark	(optional) e.g. UV mark

Add to section

In addition to the nameplate detailed in Table A.1, for pilot-operated pressure-relief valves, the pilot itself shall bear an additional nameplate with the information as per Table A.2

Add new Table A.2**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 (nonflowing), pilot modulating (flowing), pilot modulating (nonflowing)
Set pressure	Valve inlet pressure at which the pressure-relief valve is adjusted to open under service conditions
Serial number or shop number	Manufacturer's identification

Add new Annex F

Annex F **(normative)**

Material Selection Tables

F.1

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

- normal temperature carbon steel (sweet);
- normal temperature carbon steel (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 those listed (refer to Table F.1 through Table F.16) for the components stated 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, the current version shall apply.

F.5

Materials shall be selected without additional requirements if the corresponding MDS is not listed in Table F.1 through Table F.15.

F.6

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

Add new Table F.1

Table F.1—Normal Temperature Carbon Steel – Sweet Service, -29 °C (-20 °F) to 425 °C (800 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including threaded plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A105	IC004	A				A	A
A216 WCB	IC006	A				A	
A216 WCC	IC006	A				A	
A696 Grade B or and C	IC007	A ^b					A
A350 LF2 Class 1	IC104						A
A352 LCC	IC106						
A696 Grade B or and C	IC107						
A182 F316/316L	IS104		A	A	A		
A351 CF3M/CF8M	IS106						
A479 316/316L	IS107		A	A	A		
A479 316/316L	IS107		A	A	A		
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.2

Table F.2—Normal Temperature Carbon Steel – Sour Service, -29 °C (-20 °F) to 425 °C (800 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A105	IC004S	A				A	A
A216 WCB	IC006S	A				A	
A216 WCC	IC006S	A				A	
A696 Grade B or and C	IC007S	A ^b					A
A350 LF2 Class 1	IC104S						A
A352 LCC	IC106S						
A696 Grade B or and C	IC107S						
A182 F316/316L	IS104S		A	A	A		
A351 CF3M/CF8M	IS106S						
A479 316/316L	IS107S		A	A	A		
A479 316/316L	IS107S		A	A	A		
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.3

Table F.3—Low Temperature Carbon Steel – Sour Service, -46 °C (-51 °F) to 230 °C (450 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A105	IC004S						A
A216 WCB	IC006S						
A216 WCC	IC006S						
A696 Grade B or and C	IC007S						
A350 LF2 Class 1	IC104S	A				A	A
A352 LCC	IC106S	A				A	
A696 Grade B or and C	IC107S	A ^b					A
A182 F316/316L	IS104S		A	A	A		
A351 CF3M/CF8M	IS106S						
A479 316/316L	IS107S		A	A	A		
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.4

Table F.4—Austenitic Stainless Steel Type 316 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F316/316L	IS104S	A		A	A	A	
A351 CF3M/CF8M	IS106S	A		A	A	A	
A479 316/316L	IS107S	A ^b	A	A	A		A
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.5

Table F.5—Ferritic-austenitic Stainless Steel Type 22Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F51	ID144S	A		A	A	A	
A995 Gr. 4A	ID146S	A		A	A	A	
A479 UNS S31803	ID147S	A ^b	A	A	A		A
A182 F53/F55	ID254S						
A995 Gr. 6A	ID256S						
A479 UNS S32750 / UNS32760	ID257S						
A182 F11 Cl.2							
A182 F22 Cl.3							
A182 F9							
A217 WC6							
A217 WC9							
A217 C12							
B654 UNS N06625			A				
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.6

Table F.6—Ferritic-austenitic Stainless Steel Type 25Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F51	ID144S						
A995 Gr. 4A	ID146S						
A479 UNS S31803	ID147S						
A182 F53/F55	ID254S	A		A	A	A	
A995 Gr. 6A	ID256S	A		A	A	A	
A479 UNS S32750 / UNS32760	ID257S	A ^b	A	A	A		A
A182 F11 Cl.2							
A182 F22 Cl.3							
A182 F9							
A217 WC6							
A217 WC9							
A217 C12							
B654 UNS N06625			A				
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.							

Add new Table F.7

Table F.7—Ferritic Low Alloy Steel P11 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F316/316L	IS104S			A			
A479 316/316L	IS107S			A			
A479 316/316L	IS107S			A			
A351 CF3M/CF8M	IS106S						
A182 F11 Cl.2		A	A		A	A	A
A182 F22 Cl.3							
A182 F9							
A217 WC6		A			A	A	
A217 WC9							
A217 C12							
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							

Add new Table F.8

Table F.8—Ferritic Low Alloy Steel P22 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F316/316L	IS104S			A			
A479 316/316L	IS107S			A			
A479 316/316L	IS107S			A			
A351 CF3M/CF8M	IS106S						
A182 F11 Cl.2							
A182 F22 Cl.3		A	A		A	A	A
A182 F9							
A217 WC6							
A217 WC9		A			A	A	
A217 C12							
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							

Add new Table F.9

Table F.9—Ferritic Low Alloy Steel P9 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)

Material Selection	MDS ^a	Pressure-containing		Pressure-controlling	Process-wetted	Non-wetted	
		Body/Bonnet and Full Nozzle	Other pressure-containing parts including Threaded Plugs	As a minimum, Semi Nozzle, Disc	As a minimum, Disc Holder, Guide, Stem and Blowdown Ring	As a minimum, Cap, Guide and Bonnet on Balanced Bellows Valves	Other Threaded Parts
A182 F316/316L	IS104S			A			
A479 316/316L	IS107S			A			
A479 316/316L	IS107S			A			
A351 CF3M/CF8M	IS106S						
A182 F11 Cl.2							
A182 F22 Cl.3							
A182 F9		A	A		A	A	A
A217 WC6							
A217 WC9							
A217 C12		A			A	A	
Key							
A Acceptable alternative							
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.							

Add new Table F.10

Table F.10—Normal Temperature Carbon Steel – Sweet Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A105	IC004	A						
A216 WCB	IC006	A						
A216 WCC	IC006	A						
A696 Grade B or and C	IC007	A ^b						A
A182 F316/316L	IS104		A	A	A	A	A	
A351 CF3M/CF8M	IS106		A				A	
A479 316/316L	IS107			A	A	A		
Key								
A Acceptable alternative								
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.								
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.								

Add new Table F.11

Table F.11—Normal Temperature Carbon Steel – Sour Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A105	IC004S	A						
A216 WCB	IC006S	A						
A216 WCC	IC006S	A						
A696 Grade B or and C	IC007S	A ^b						A
A182 F316/316L	IS104S		A	A	A	A	A	
A351 CF3M/CF8M	IS106S		A				A	
A479 316/316L	IS107S			A	A	A		
Key								
A Acceptable alternative								
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.								
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.								

Add new Table F.12

Table F.12—Low Temperature Carbon Steel — Sour Service, -46 °C (-51 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted.	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A105	IC004S							A
A216 WCB	IC006S							
A216 WCC	IC006S							
A696 Grade B or and C	IC007S							
A350 LF2 Class 1	IC104S	A						A
A352 LCC	IC106S	A						
A696 Grade B or and C	IC107S	A ^b						A
A182 F316/316L	IS104S		A	A	A	A	A	
A351 CF3M/CF8M	IS106S		A				A	
A479 316/316L	IS107S			A	A	A		
Key								
A Acceptable alternative								
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.								
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.								

Add new Table F.13

Table F.13—Austenitic Stainless Steel Type 316 – Sour NACE Service, -270 °C (-450 °F) to 540 °C (1000 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A182 F316/316L	IS104S	A	A		A	A	A	
A351 CF3M/CF8M	IS106S	A	A		A	A	A	
A479 316/316L	IS107S	A ^b		A	A	A	A	A
Key								
A Acceptable alternative								
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.								
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.								

Add new Table F.14

Table F.14—Ferritic-austenitic Stainless Steel Type 22Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A182 F51	ID144S	A	A		A	A	A	
A995 Gr. 4A	ID146S	A	A		A	A	A	
A479 UNS S31803	ID147S	A ^b	A ^b	A				A
A182 F53/F55	ID254S							
A995 Gr. 6A	ID256S							
A479 UNS S32750 / UNS32760	ID257S							
Key								
A Acceptable alternative								
^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.								
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.								

Add new Table F.15

Table F.15—Ferritic-austenitic Stainless Steel Type 25Cr Duplex – Sour NACE Service, -29 °C (-20 °F) to 260 °C (500 °F)

Material Selection	MDS ^a	Pressure-containing			Pressure-controlling	Process-wetted	Non-wetted	
		Main Valve Body Bonnet/Cap and Full Nozzle	Pilot Body (and Other Pressure-containing Parts)	Threaded Plugs	As a minimum, Piston, Disc and Semi Nozzle	As a minimum, Internal Parts (Main Valve and Pilot), Bonnet and Cap on Snap acting	As a minimum, Cap and Bonnet on Modulating	Other Threaded Parts
A182 F51	ID144S							
A995 Gr. 4A	ID146S							
A479 UNS S31803	ID147S							
A182 F53/F55	ID254S	A	A		A	A	A	
A995 Gr. 6A	ID256S	A	A		A	A	A	
A479 UNS S32750 / UNS32760	ID257S	A ^b	A ^b	A				A

Key
A Acceptable alternative

^a MDS requirements, detailed in IOGP S-563, apply to pressure-containing parts only.
^b Body and bonnet up to 4 in. manufactured from bar stock with additional testing per ASTM A961.

Add new Table F.16

Table F.16—Bolting Material Selection

Bolt and nut Material selection ^b	MDS ^c	Body/Bonnet Material			
		NTCS (Sweet)	NTCS LTCS	316 DSS SDSS	P11 P22 P9
A193 B7 / A194 2H	IX120 (S)	A	A		
A193 B7M / A194 2HM	IX120 (S)	A	A		
A193 B8M A194 8M / A194 8MA	-			A ^a	
A320 L7 / A194 7	IX100 (S)	A	A		
A320 L7M / A194 7M	IX100 (S)	A	A		
A1082 UNS S32750, S32760	ID260 (S)			A	
A1014 UNS N07718 API 6A718 (120K)	IN120 (S)			A	
A193 B16 / ASTM A194 Gr (7)	-				A

^a Applies to 316SS only.
^b Bolting is pressure-retaining category.
^c NACE requirement to follow that of body/bonnet material.

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