

FUNCTIONAL SPECIFICATION

FOR

PRESSURE RELIEF VALVE (PRV)

PREPARED / REVISED BY	REVIEWED BY	APPROVED BY	TOTAL No. OF PAGES	DATE	REV. No.
<i>Rajki Dey</i>	<i>ARD</i>	<i>AS</i>	9	20/3/19	7
RS	ARD	AS	9	20/3/19	7
CNN	ARD	AS	8	15.11.2017	6
MD	ARD	KM	8	28.06.2017	5
TKK	ARD	AKR	8	28.08.2012	4
TKK	ARD	AKR	8	14.12.2010	3
VS	SRS	GRP	7	18.02.2008	2
AK	RS	GRP	10	28.03.2003	1
AK	MC	AC	10	25.08.2003	0

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1.0 SCOPE OF THIS DOCUMENT:

- 1.1 This functional specification describes the essential design considerations for the selection of Pressure relief valve for the intended service.

2.0 Reference Documents and Specifications:

- a) Instrumentation Design Criteria
- b) Basic Bid Work
- c) Project P & IDs
- d) Process Design Criteria / Instrument Process Data Sheets

3.0 SCOPE OF SUPPLY:


- 3.1 The quantity to be supplied and installed shall be as per the requirements indicated in the Basic Bid Work, Design Criteria and the P & IDs.
- 3.2 The vendor shall be responsible for the selection of the Pressure relief valve suitable for its intended application, its procurement, tagging, packing, testing & calibration, preparation for shipment, along with accessories, spares, and assistance where required for its installation & commissioning at site. This FS shall be read in conjunction with the Instrumentation Design Criteria.

4.0 PRESSURE RELIEF VALVES:

4.1 Basis of selection:

- 4.1.1 All relief valves of size 1" and above shall be full nozzle full lift type. Relief valves with size less than 1" shall be base or modified nozzle type.
- 4.1.2 Flanged relief valves for process piping, excluding steam and air pressure piping shall be either the enclosed spring type or pilot-operated type.
- 4.1.3 Balanced relief valves shall be used if the variable backpressure is more than 10% of valve set pressure or where the service is corrosive. Balanced relief valves suitable for variable backpressure may also be used where appreciable savings in the discharge disposal system piping can be affected by virtue of the increased allowable backpressure. Balanced bellow materials shall be the same as the valve trim.
- 4.1.4 Rupture disc type pressure relief devices shall not be used as primary relief devices.
- 4.1.5 Relief valves 1" and larger shall be of the type having a nozzle bushing which extends through and beyond the base of the inlet-bolting flange, and which forms the gasket-bearing surface for the inlet flange.
- 4.1.6 $\frac{3}{4}$ " and 1" relief valves may have screwed ends. All process Relief valve 1" size and larger shall have flanged inlet and outlet connections.

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4.1.7 Thermal relief valves shall have a minimum orifice area of 38.7mm².

4.1.8 Venting and breathing equipment for low pressure above ground storage tanks shall be in accordance with the API STD 2000 "Guide for venting atmospheric and low pressure storage tanks".

4.1.9 Lifting levers shall be provided for periodic testing of the Pressure Relief Valve. Closed bonnet construction shall be used.

4.1.10 All castings and welding shall be 100% radiographed.

4.2 Sizing:

4.2.1 The vendor shall size pressure relief valve according to capacity, set point, reset differential and the blow down requirements of the Process for the Project.

4.2.2 The selected orifice shall be the next standard orifice size available above the calculated area. Valve capacity shall then be calculated based on the selected orifice code.

4.2.3 For two-phase liquid/vapour relief application, the total orifice area shall be the sum of the orifice areas calculated individually for liquid and vapour at the actual conditions.

4.2.4 In Pressure Relief valve sizing calculations, the fail open state of a control valve (if any) shall be taken into consideration.

4.3 Set Pressure:

4.3.1 Set point of the Pressure Relief valves shall not be higher than the design pressure of the system being protected by the valve, except as permitted by the relevant ASME Codes & API 521/526.

4.3.2 The set pressure of a pressure relief valve shall not be adjusted outside the range of set pressure specified by the device manufacturer. The allowing tolerances in set pressure are as below:
The set pressure tolerance, plus or minus, of pressure relief valves shall not exceed ± 2 psi (15 kPa) for pressure up to including 70 psi (500kPa) and $\pm 3\%$ for pressure above 70 psi (500kPa)


4.4 Material:

4.4.1 The material requirements for pressure relief valve shall in general be according to clause 3.6.4.5 of Instrumentation Design Criteria and the material selection chart provided in Annexure –1 of this specification.

4.5 Valve Springs:

4.5.1 Valve spring shall be sized to meet the requirement of ASME Section VIII Division 1, UG - 136.


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4.6 MISCELLANEOUS REQUIREMENTS:

- 4.6.1 Relief valve shall have tamperproof sealing, by wiring of screw cap and body, and lead sealing.
- 4.6.2 The installation of Pressure Relief Valve shall in general be according to clause 3.6.4.6 of Instrumentation Design Criteria.
- 4.6.3 Where no possibility of hydrocarbon pollution (such as in water and air service), pressure relief valves may be vented to atmosphere, with due consideration of position and angle of venting.
- 4.6.4 Pressure relief valve shall be installed after testing/setting for set pressure, blow down and seat tightness.
- 4.6.5 Discharges from all Pressure relief valves shall be individually routed to common header/ safe location, as per P&ID.
- 4.6.6 All pressure relief valves discharge lines shall join the relief header from top and shall be at an angle of 30 to 40 degrees with the axis of the header.
- 4.6.7 All pressure relief valves discharge and equipment depressurizing lines shall be free draining to vent header and shall have no pockets up to and including header.
- 4.6.8 Discharge piping shall be designed to avoid liquid collection, backpressure build up, and stress on the valve body under all conditions. A low point discharge drain may only be fitted on relief valves venting to atmosphere.
- 4.6.9 Inlet piping shall be arranged to ensure that pressure drop at full flow does not exceed 3% of set pressure.
- 4.6.10 Isolation valves provided at up-stream of double PSVs (1 working + 1 standby) should have both lockable open and lockable closed provisions with mechanically interlocked arrangement so that both the valve cannot be isolated simultaneously (one LO and other shall be LC).
- 4.6.11 Contractor shall arrange all facilities free of cost to company engineer or their authorized representative for inspection and witness to the following tests at vendor's works:
- Material –Body, trim etc.
 - Physical- Visual and dimensional as per API/ASME/ASTM standards.
 - Pop-up test.
 - Seat tightness test
- 4.6.12 Pressure relief valves shall be tested for opening at specified set pressure and also for seat tightness.
- 4.6.13 Testing for seat tightness shall be in accordance with the latest edition of API Std. 527. soft seating (coring) shall be provided wherever tight shutoff is called for.

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 4.6.14 Valid certificate of “ASME Section VIII, Div.I, UV Stamp” to be provided by the vendor along with the supply of Pressure relief valves and the same shall be included in the PS.

4.6.15 Compressed air or nitrogen shall be used for testing pressure-relief valves (gas service) and shall be furnished by the contractor prior to handover.




4.6.16 For liquid service pressure relief valve, water may be used as testing medium.

4.6.17 The following information shall be shown on the nameplates as a minimum:

- Manufacturer’s Name and trade mark.
- Valve Model and serial number
- Tag number.
- Valve catalogue number.
- Set pressure.
- Purchase order number.
- Valve manufacturer.
- Valve body, spring and nozzle material.
- Orifice designation
- Valve inlet and outlet connection sizes and ratings.
- Back pressure.
- ASME Code stamp shall be marked

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ANNEXURE – I
Material Selection Chart

Sl. No.	Piping Class	Pressure relief valve			
		Body & Bonnet	Wetted Parts (Nozzle, disc) (forged)	Bellows	Spring
1.	A1, B1, D1, E1, F1, XF1, F1, PA1, PB1, PD1, PE1, PXF1, PF1, A2, B2, D2, E2, XG1, A1H, A3 (above 2"), B3 (above 2"), A4, A8	CS/ASTM A216 Gr .WCB	SS316/ SS PH17/4	SS316/ SS321	Inconel-750
2.	A3 (upto2"), B3(upto2"), D3 (upto2"), A6, A9, B9, D9, E9	SS316	SS316	SS316	Inconel-750
3.	A5	AL. BRONZE / MONEL	MONEL	MONEL	Inconel-750
7 	A12	Titanium	Titanium	Hastalloy-C	Hastalloy-C
5.	A1N, B1N, D1N, E1N, F1N, XF1N, PA1N, PB1N, PD1N, PF1N, XG1N	CS (NACE)	SS316/ SS316L (NACE)	SS316/ SS321 (NACE)	Inconel-750
7 	A10, B10, D10, E10, F10, A22	SS316L (NACE)	SS316L (NACE)	Inconel-625	Inconel-750
7.	A23, B23, D23, E23, F23, PA23, PB23, PD23, PE23, PF23	DSS (UNS-32205)	DUPLEX SS (UNS-32205)	Inconel-625	Inconel-750
7 	-----	Hastalloy-C	Hastalloy-C	Hastalloy-C	Hastalloy-C



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ANNEXURE-II:-TYPICAL DATA SHEET

Pressure Relief Valve

UNITS: Flow-> Liquid- m³/hr Gas- Nm³/hr Steam- kg/hr Pressure- > kg/cm²g Temperature-> °C Area-in²

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General	1.	Tag Number			
	2.	Line Number /P&ID no.			
	3.	Vessel Protected			
	4.	Safety / Relief			
	5.				
Valve Body	6.	Type			
	7.	Full Nozzle, Full Lift / Modified Nozzle			
	8.	Bonnet Type			
	9.	Conventional/Bellows/ Pilot operated			
	10.	Inlet Connection : Size & Rating			
	11.	Facing & Finish			
	12.	Outlet Connection : Size & Rating			
	13.	Facing & Finish			
	14.	Cap over Adjustment Bolt			
	15.	Screwed Bolted			
	16.	Lifting Gear Type			
	17.	Test Jig			
	18.				
Material	19.	Body & Bonnet			
	20.	Nozzle & Disc.			
	21.	Spring			
	22.	Bellows			
	23.	Bolts and Nuts			
	24.	Resilient Seat Seal			
	25.				
Basis	26.	Code			
	27.	Basis of Selection			
	28.				
Service Conditions	29.	Fluid & State			
	30.	Corrosive Constituents			
	31.	Required Flow Capacity			
	32.	Mol. Wt. / Sp. Gr. At Relieving Temp.			
	33.	Operating Pressure			
	34.	Operating Temp./Relieving Temp.			
	35.	Valve Discharges to : Flare/Vent/Close Drain			
	36.	Back Pressure : Constant / Variable			
	37.	Set Pressure			
	38.	Cold Bench Test Pressure			
	39.	% Over Pressure / %Blow Down			
	40.	P/Cv/Compressibility Factor			
	41.	Viscosity At Relieving Temperature cP			
	42.	Vessel Wall Temp. Surface Area			
Orifice	43.	Calculated Area			
	44.	Selected Area Orifice Designation			
	45.	No. of valves required for capacity			
	46.	Total Area			
	47.	Actual Flow Capacity/Rated flow capacity			
	48.				
Model	49.	Make			
	50.	Model Number			
	51.	IBR certification			
	52.	ASME UV Stamp			

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ISSUE No.


REV. No.

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NOTE:-

VENDOR SEAL AND SIGNATURE

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