

A. Technical Specifications of Safety Relief Devices

1. Parameters

Quantity, Tag Number, Type, Fluid Medium, Working Temperature range	As specified in Annexure-1
Set Pressure, Flow Temperature	To be discussed and finalized during Detail engineering review
Extent of lift	Full lift
Minimum required gas flow capacity	Based on “loss of vacuum” condition in the jacket + “Fire engulfing” in the environment as per ISO 21013-2016-Part 3, for safety relief valves.
Orifice Size	To be discussed and finalized during Detail engineering review
Overpressure	≤ 7±3 % of set pressure
Blow down	≤ 5 % of set pressure
Permissible leakage rate across seat	As per API 527
End connection	Raised Face (RF) flanges with concentric serrations for pressure rating class ≤ 1500 as per ASME B 16.5
Design code	API 526/ ASME Section VIII, Div. 1

2. Material of Construction

Body, bonnet	<ul style="list-style-type: none"> ASTM A351 CF8/8M (for conventional & balanced bellow valves)
Nozzle	<ul style="list-style-type: none"> ASTM A182 F304/316 (for Set Pressure ≤ 15 MPa)
Disc	<ul style="list-style-type: none"> PTFE (for Set Pressure 1 to 15 MPa & Operating Temperature 75 to 300 K) or better
Bellows (for valves of balanced bellow construction)	Stainless steel 316L/ 316Ti/321
Spring	Stainless steel 316L
Bolts	ASTM A 320 B 8
Nuts	ASTM A 194 8

3. Tests

- 3.1 **Material certificates:** The material certificates, detailing the mechanical and chemical properties, of the principal pressure bearing parts (Body, Bonnet, Nozzle, Disc, Spring, etc.) shall be provided. Apart from Manufacturer’s Test Certificate, sample is to be taken from the material to be used for fabrication at shop in the presence of TPI for every heat number. Samples are to be tested in a NABL approved laboratory. After ensuring material properties in compliance with standards, clearance shall be given for shop fabrication.
- 3.2 **Soundness test for castings & forging (wherever applicable):** All the castings shall be subject to soundness test with radiographic or ultrasonic technique for flaw detection.
- 3.3 **Welding joint test (wherever applicable):** All butt welding joints in the filter shall be subject to radiographic test with X rays or gamma rays to 2% equivalent sensitivity as per Section IX, ASME.
- 3.4 **Hydrostatic test:** The nozzles of each valve shall be subject to hydrostatic test at 1.5 times of Set Pressure.

- 3.5 **Shell Pneumatic test:** The shell of assembled valve shall be subject to pneumatic test at 0.69 MPa(g) by pressurizing through the outlet end connection with dry air or nitrogen.
- 3.6 **Seat leakage test:** To be done at 0.9 times of Set Pressure. Procedure for testing shall be as per API 527.
- 3.7 **Cold differential set pressure test:** To validate set pressure and resealing pressure.
- 3.8 **Flow Capacity Test:** Copy of prototype test certificate by an accredited agency for the flow capacity of valve shall be submitted.
- 3.9 **Visual & Dimensional check.**
- 3.10 **Cleanliness:** All the interior flow surfaces of the valve shall be degreased and cleaned to Oxygen service standards as per CGA G-4.1 or ASTM G 93.
- 3.11 **Marking:** All the valves are assigned with tag numbers for the sake of identification. The tag number for each valve shall be legibly and indelibly engraved on the body of the valves besides, set pressure, size & pressure rating class of inlet & outlet connections, material of construction, etc., marking.

B. Technical Specifications of Rupture Disc

1. Parameters

Quantity, Tag Number, Fluid Medium, Working Temperature range, , Minimum required gas flow capacity	As specified in Annexure-1
Set Pressure, Flow Temperature	To be discussed and finalized during Detail engineering review
Vacuum Support	Yes
Type	<ul style="list-style-type: none"> Scored metal, pre-torque, rupture disc along with safety heads and corrosion resistant screws. Each Rupture Disc Device shall contain one Rupture disc in assembled condition. In addition, each Rupture Disc device shall be supplied with 2 Spare Rupture Discs.
Flow capacity	Based on “loss of vacuum” condition in the jacket + “Fire engulfing” in the environment as per CGA S 1.2 of Compressed Gases Association Inc., USA.
Mode of Buckling	<ul style="list-style-type: none"> Forward or Reverse
Disc size	<ul style="list-style-type: none"> To be discussed and finalised during Detail Engineering Review.
Manufacturer range	0 %
Burst Tolerance	± 5 %
Tell-tale indicator and excess flow valve	The outlet flange of the safety head shall be provided with a tell-tale indicator and excess flow valve required for checking the integrity of rupture disc in-situ. A bourdon type pressure gauge with suitable range of dial size 50 mm shall be connected in the tell-tale port.
<ul style="list-style-type: none"> Companion flanges need not be supplied by Supplier however the safety heads offered shall be compatible for interfacing between flanges. Raised Face (RF) flanges with serration for Pressure rating class ≤ 1500. 	

2. Material of Construction

Disc	<ul style="list-style-type: none"> Austenitic Stainless Steel for Nitrogen
Safety Head	ASTM A182 F304/316
Studs	ASTM A320 B8
Nuts	ASTM A194 8
Tell-tale adaptor and Excess Flow Valve	SS 304 / 316

3. Tests

- 3.1. **Material certificates:** The material certificates, detailing the mechanical and chemical properties, of the principal pressure bearing parts shall be provided.
- 3.2. **Burst Test:** One rupture disc of each size and set Pressure shall be subjected to Burst Test as per UG-127, Section VIII, Division 1 of ASME. Rupture disc required for conducting Burst Test is under the scope of Supplier.
- 3.3. **Dimensional check:** After forming, the dimensions of the disc, especially the thickness, shall be measured and recorded.
- 3.4. **Type test certificate** establishing flow resistance value and minimum net flow area value shall be submitted for each type of Rupture Disc Device supplied.
4. **Cleanliness:** All the interior flow surfaces of the device shall be degreased and cleaned to Oxygen service standards as per CGA G-4.1 or ASTM G 93.
5. **Marking:** All the Rupture Disc Devices are assigned with tag numbers for the sake of identification. The tag number for each disc shall be legibly and indelibly engraved on the heads besides, Burst Pressure, size & Pressure rating heads, material of construction of disc, etc.