RUPTURE DISCS

How It Works

The function of a rupture disc is to protect against over-pressure. A foil disc is clamped in a holder. The disc is designed to burst at a pre-determined pressure - the set pressure. A reverse acting disc is used.

This means the disc is domed against the direction of the fluid pressure and designed to buckle due to compression forces, prior to bursting. Advantages of a reverse acting disc include being less sensitive to temperature, high operating pressures and improved fatigue life.

Each disc is manufactured with a precision score mark. This score mark in combination with the buckling action causes the disc to burst. At burst, the disc is designed to hinge resulting in a large available flow area. The disc is designed to be non-fragmenting after rupturing.

Applications

A rupture disc protects against any leakage or weeping of refrigerant through a relief valve. A rupture disc can also be used in combination with a pressure gauge and or pressure switch to detect if a relief valve has discharged.
Henry Group rupture discs are designed to operate with gases and should not be used to prevent liquid over-pressure.
The brass 55 series models are suitable for use with HCFC, HFC, A2L and CO_2 refrigerant gases. The stainless steel 56 series models are also suitable for ammonia and HFO refrigerant gases.

In line with the Institute of Refrigeration Guidelines (UK), it is recommended that at least every 5 years all low and high side bursting discs should be replaced. These intervals may have to be reduced if other regulations apply.

Main Features

- Proven safe design
- CE marked
- High Flow Capacity
- Compact
- Reverse acting, non-fragmenting disc
- 2 x 1/8 NPT pressure ports
- Helium leak tested
- Pressure settings up to 130 barg available on request
- EN ISO 4126-2 Compliant

Technical Specifications

Set Pressure Range:
10.3 to 60 barg (55 series)
10.3 to 130 barg (56 series)

Allowable Operating Pressure:
-40°C to +121°C (55 series)
-40°C to +427°C (56 series)

Note: Rupture discs burst pressures are rated at a specific temperature (e.g. 20°C). Whilst the unit can operate within the temperature limits stated, large deviations in temperature will affect the burst pressure. Refer to the “Selection Guidelines” section for more information.

Materials of Construction

For 55 series and 56 series, the main bodies are made from brass and stainless steel respectively. The foil disc is made from nickel alloy.

Tolerance Guidelines

As per industry standards, rupture disc rated burst pressures are subject to a performance tolerance.
When specifying a disc, the nominal pressure setting should be quoted as part of a part number. The rupture disc will be provided with a rated burst pressure stamped on the body, which is the average of all burst tests carried out on the batch of the discs. As a result, the rated burst pressure may differ slightly from the nominal setting depending on the manufacturing tolerance for the specific batch of discs. The manufacturing tolerance will never be greater than +/-5% and in the majority of cases is significantly less.
The rated burst pressure is subject to a performance tolerance of +/-5%. Examples of actual burst pressure ranges are shown in the table below for a selection of typical rated pressure settings.

Performance Tolerance Examples	
Rated burst pressure (barg)	Burst pressure range (barg)
10.3	9.8 - 10.8
14	13.3 - 14.7
16.2	15.4 - 17.0
17.2	16.3 - 18.0
20.7	19.7 - 21.7
24.1	22.9 - 25.3
24.8	23.6 - 26.0
25.9	24.6 - 27.2
27.6	26.2 - 29.0
31	29.5 - 32.6
40	38 - 42

Accessories

The 2 x 1/8” NPT pressure ports can be used for after-market accessories. If unused, the ports may be closed using a 1/8” NPT plug. If this is required, the Henry Group part number is A0624.

Part No	Conn Size (inch)		Dimensions (mm)					Maximum Setting pressure (barg)	Weight (kg)	CE/UKCA Cat
	Inlet	Outlet	A	B	ØC	D	MNFA, mm² (note 1)			
5525	3/8 NPT	3/8 FPT	65	31.8 A/F	9.7	20	64.5	60	0.28	Cat IV
5526	1/2 NPT	1/2 FPT	73	31.8 A/F	12.7	23	109.7	60	0.30	Cat IV
5625	3/8 NPT	3/8 FPT	65	Ø28.6	9.7	20	64.5	130	0.20	Cat IV
5626	1/2 NPT	1/2 FPT	73	Ø28.6	12.7	23	109.7	130	0.20	Cat IV
5627	3/4 NPT	3/4 FPT	81	Ø38.1	19	29	187.1	130	0.34	Cat IV
5628	1 NPT	1FPT	93	Ø44.5	25.5	32	335.5	130	0.56	Cat IV
5629	1 1/4 NPT	1 1/4 FPT	95	50.8 A/F	33.3	33	683.9	130	0.76	Cat IV

Note 1: MNFA = Minimum net flow area. The MNFA is the net area after a complete disc burst, taking into account any structural members which reduce the nominal flow area. MNFA should be used as the flow area, A, in flow capacity calculations

Nominal standard rupture disc settings at 22˚C (barg)
Bold denotes typical stock models

5525 series: 16.2, 20.7, 24.1, 25.9, 27.6, 31.0, 40.0
5526 series: **14.0, 16.2, 20.7, 24.1, 24.8, 25.9, 27.6, 31.0, 40.0, 42.0**
5626 series: 10.3, 17.2, 20.7
5627 series: 10.3, 17.2, 20.7
5628 series: 10.3, 17.2, 20.7
5629 series: 10.3, 17.2, 20.7

Selection Guidelines

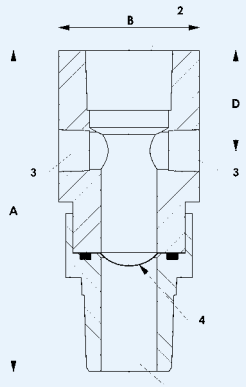
1. The rupture disc pressure setting should be the same as the Henry Technologies pressure relief valve setting.
2. The rated burst pressure is subject to a performance tolerance of +/-5 %. This tolerance should be taken into account when specifying a rupture disc setting (refer to table).
3. The burst pressure is affected by operating fluid temperature. Refer to table for temperature adjustment factors. At higher operating temperatures the disc burst pressure is reduced while at sub-zero temperatures it is increased. This factor should be taken into account when specifying a rupture disc setting.

Temperature Range °C	Temperature Adjustment Factor
-40 to -18	1.05
-17 to -1	1.04
0 to +45	1
+46 to +80	0.98
+81 to +107	0.97
+108 to +150	0.95

4. It is recommended that the maximum operating pressure of the system is no more than 80% of the rated burst pressure, in order to minimise the risk of premature fatigue failure of the disc. If operating pressures exceed 90% of the rated burst pressure, the disc should be replaced immediately.
5. The design fatigue strength of each disc is 100,000 pressure cycles. Fatigue life will be reduced by excessive pressures or temperatures, corrosion, damage, etc. A de-rating factor of 0.8 is recommended to account for the effects of fatigue during the recommended system operating pressure calculation (see the following example).

Example

Rupture disc rated burst pressure = 90 barg @ 22˚C
Minimum actual burst pressure, using performance tolerance = 0.95 x 90 = 85.5 barg
Maximum actual burst pressure, using performance tolerance = 1.05 x 90 = 94.5 barg
Maximum operating fluid temperature = 100˚C



1. INLET
2. OUTLET
3. GAUGE PORT, 1/8 NPT
4. RUPTURE DISC

To determine the recommended maximum operating pressure, the user should consider the -5% performance tolerance and the de-rate factors for both temperature and fatigue life.

Therefore:-

Minimum actual burst pressure = 85.5 barg
Temperature de-rate factor = 0.97
Fatigue life de-rate factor = 0.8

Recommended maximum operating pressure for rupture disc = 85.5 x 0.97 x 0.8 = 66.3 barg.

Installation – Main issues

1. Connect the rupture disc either directly to the pressure vessel or to a three-way valve above the liquid refrigerant level in the vapour space.
2. The rupture disc comprises of a two-piece body design. To avoid damage during assembly or removal, the product's Installation Instructions must be followed.
3. The pipework must not impose loads on the rupture disc. Loads can occur due to misalignment, thermal expansion, discharge gas thrust, etc.