Bailey

716T Pressure & Temperature Safety Relief Valves

716T Pressure & Temperature S a fe t y R e l i e f Va l ve s

INTRODUCTION

The effects of exceeding safe pressure levels in an unprotected pressure vessel or system, can have catastrophic effects on both plant and personnel.
Safety relief valves should be used to protect any pressurised system from the effects of exceeding its design pressure limit.
A safety relief valve is designed to automatically discharge gas, vapour or liquid from any pressure containing system, preventing a predetermined safe pressure being exceeded, and protecting plant and personnel.

Safety Valve
A valve which automatically discharges gases and vapours so as to prevent a predetermined safe pressure being exceeded. It is characterised by a rapid full opening action and is used for steam, gases or vapour service.
Relief Valve
A valve which automatically discharges fluid, usually liquid, when a predetermined upstream pressure is exceeded. The term is commonly used for pressure relieving valves in which the lift is proportional to the increase in pressure above the set pressure.
Safety Relief Valve
A valve which will automatically discharge gases, vapours or liquids, to prevent a predetermined safe pressure being exceeded. It is characterised by a rapid opening action.

DEFINITIONS

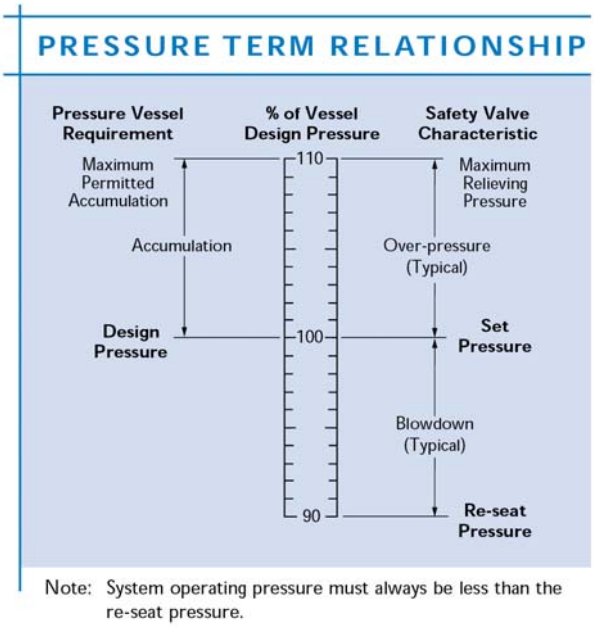
Set Pressure
The pressure measured at the valve inlet at which a safety relief valve should commence to lift under service conditions.
Overpressure
The pressure increase above set pressure at the valve inlet at which the discharge capacity is attained. Usually expressed as a percentage of set pressure.
Accumulation
The pressure increase over a maximum safe working pressure of the vessel or system when the safety relief valve is discharging at its rated capacity is called accumulation. The term refers to the vessel or system to be protected and not to the valve. Accumulation is the same as over-pressure when the valve is set at the design pressure of the vessel.
Re-Seat Pressure
The pressure measured at the valve inlet at which the safety relief valve closes.
Blow-Down
The difference between the set pressure and the re-seating pressure expressed as a percentage of the set pressure or as a pressure difference.
Simmer
The pressure zone between the valve set pressure and the popping pressure. In this pressure zone the valve is only slightly open and therefore discharging a small percentage of its rated capacity.
Popping Pressure
The pressure at which the valve disc rapidly moves from a slightly open (simmer) position to a practically full open position.
Superimposed Back Pressure
Pressure higher than atmosphere in the safety relief valve outlet. This may result from discharge into the common disposal system of other safety relief valves or devices, or as a result of a specific design requirement. Back pressure can be either constant or variable depending on the operating conditions.
Built Up Back Pressure
The pressure existing at the outlet of a safety relief valve caused by flow through the valve into the disposal system.

Differential Set Pressure
This is the difference between the set pressure and the constant superimposed back pressure. It is applicable only when a conventional type safety relief valve is used to discharge against constant superimposed back pressure. (It is the pressure at which the safety valve is set at on the test bench without back pressure.)

Cold Differential Set Pressure
The pressure at which a safety relief valve, intended for high temperature service, is set on a test rig using a test fluid at ambient temperature. The cold differential test pressure will be higher than the set pressure, in order to compensate for the effect of elevated temperature on the valve.

Valve Lift
The actual travel of the valve disc away from the seat when the valve is relieving.

Discharge Capacity
Actual rate of discharge of service media, which can be expressed in mass flow or volumetric terms.



Equivalent Capacity
Calculated mass or volumetric flow rate of the valve of a given test fluid. The fluids commonly used for test purposes are steam, air and water.

SAFETY RELIEF VALV E – APPLICATIONS

Application	Medium	Safety Relief Valve Type
Vented boilers Un-vented boilers	Hot Water	706 716 746/766 Pop 716T
Boiler, pipeline and vessel protection	Steam	706/716 746 756/766 Pop 1640B 300
Compressor pipeline and receiver protection	Air	706 716 746 POP 1640B 300
Pipeline and vessel protection	Cold Water	706 716 746 1640B 300
Pump Protection	Liquids	480/485
Process pipeline, pump and vessel protection	Process/Corrosive Liquids	716 Stainless steel 746 Stainless steel 490 Stainless steel
Clean steam and hygienic environments	Steam and Gases	716 Stainless steel 746 Stainless steel
Pipework, tank and equipment protection	Cryogenic Gases	776
Pipework, tank and equipment protection	Cold & Fine Gases	716 776
Blowers, bulk transfer, tank duty, road/rail transfers	Air	616D

The selection of figure number for each application depends on:
Pressure - capacity - material - temperature - fluid - connection required.

716T
Pressure & Temperature Safety Relief Valve

TECHNICAL SPECIFICATION

Approvals

ASME Section IV

PED certified to Article 3 Paragraph 3 (sound engineering practice), hence they do not carry the CE mark

Water Regulation Advisory Scheme (WRAS)

Also independently tested by the Building Research Establishment

Materials

Body	-	Bronze
Internals	-	Dzr brass
Trim	-	Silicone

Size Range

Size	Min (Barg) Pressure	Max (Barg) Pressure
DN20 (3/4")	2.4	10.3
DN25 (1")	2.4	10.3
DN32 (1-1/4")	2.4	10.3
DN40 (1-1/2")	2.4	10.3
DN50 (2")	2.4	10.3

Connections

Screwed In x Screwed Out

Construction

Top Guided

Cap Options

Lever fitted as standard

Sizing

Refer to Capacity Charts opposite

- WRAS Approved
- Manual Test Lever
- Soft Seated Design
- Double Safety Protection
- Designed to EN1490/BS6283
- Large Discharge Capacities
- Independently Tested by BRE
- Smooth Temperature Probe
- Diaphragm Protection

DESIGN

The 716T is the ultimate solution to hot water system protection, it protects unvented hot water systems, against both excess pressure and excess temperature. Increasing pressure is sensed by the spring, which automatically opens the relief valve at the pre-set pressure and the integral probe independently monitors increases in temperature, safely opening the relief valve between 90 C and 95 C.

The 716T has capacities well in excess of EN1490:2000 code requirements, and has been independently tested by the Building Research Establishment, in accordance with EN1490:2000 which is to supersede BS6283 pt3.

The temperature probes are designed to have a smooth surface free from crevices, to reduce mineral build-up, and are white powder coated to minimise galvanic action within the heater.

The 716T has a bronze body, Dzr brass internals and silicone seat in accordance with potable water code requirements. A soft seat provides leak tight operation. The spring and spring chamber are protected from the hot water by the EPDM diaphragm, reducing corrosion and increasing life in service. The manual test lever can be easily operated from any

SIZING

Temperature Rating in kW					
Size	3/4"	1"	1-1/4"	1-1/2"	2"
kW	44	70	80	173	184
kW (Per BSEN 1490)	25	50	75	100	-

To convert kW to Btu/hr multiply by 3400. The temperature probe will safely open the relief valve approximately in the region of 90 to 95°C.

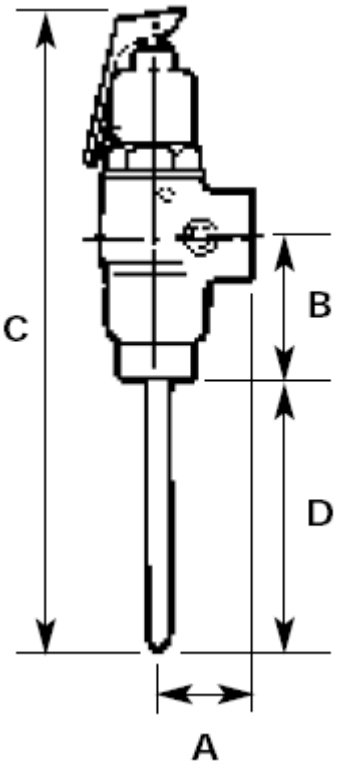
Pressure Rating in kW					
Set P	**Size**				
Barg	3/4"	1"	1-1/4"	1-1/2"	2"
2.4	166	186	315	524	631
2.5	171	192	324	540	650
3.0	196	220	371	619	745
4.0	246	277	466	777	935
5.0	296	323	560	935	1125
6.0	345	389	655	1093	1315
7.0	395	445	749	1251	1505
8.0	445	502	844	1409	1695
9.0	495	558	939	1567	1885
10.0	545	614	1033	1725	2075
10.3	560	631	1062	1773	2132

The kW rating shown has been calculated in accordance with BS6759 pt1 and ASME IV.
They represent the steam relief capacity of the relief valve at 10% over pressure.
To convert kW to Btu/hr multiply by 3400.

DIMENSIONS						
Inlet & Outlet BSP		**A**	**B**	**C**	**D**	**(kg)**
3/4"	male x 3/4" female	38	62	262	113	0.60
1"	male x 1" female	40	53	262	121	0.75
1-1/4"	male x 1" female*	44	50	259	99	1.20
1-1/2"	male x 1-1/2" female	63	68	271	80	2.00
2"	male x 2" female	63	75	280	65	2.00

*1-1/4" valve has a 1" outlet

All dimensions in mm



INSTALLATION

Safety Relief Valves should always be installed in an upright position with their spring chamber vertical.
All packing materials should be removed from the valve connections prior to installation.

Pressure Vessels

When fitting a Safety Relief Valve onto pressure vessels, the inlet connection pipe should be as short as possible and the bore should be at least equivalent to the nominal bore size of the valve.
The pressure drop between the vessel and the valve should be no more than 3% at rated capacity.
A pressure-tight dome should be specified when:
1) A back pressure must be contained within the relieving system.
2) A head of liquid is built up within the valve body and consequently needs to be contained.
3) The relieving medium is toxic, corrosive or environmentally unfriendly.

Pipelines

When fitting a Safety Relief Valve into a pipeline, the inlet connecting pipe leading from the main pipeline to the Safety Relief Valve should be as short as possible, so that the inlet pressure drop is no more than 3% of rated capacity. In addition, it is advised that the Safety Relief Valve is placed a sufficient distance downstream of the pressure source. This will protect the valve from the adverse effects of pressure pulsations.

Discharge Pipelines

These should be equal to or larger than the valve outlet, with adequate supports, minimum number of bends and overall length. Unless balanced bellows valves are installed, the maximum built up backpressure should not exceed 10% of the set pressure, although the 746, 756 and the 766 can handle higher back pressure if required. Steam service valves should be adequately drained.
Alignment of the discharge or drain should present no risk to persons or property. Protection from the collection of rainwater or condensation in the discharge pipe is advisable.

System Cleansing

It is essential that new installations are fully flushed and all debris removed prior to installing the valve as serious damage can be caused to valve seats, resulting in subsequent leakage.

Pressure Adjustment

Every valve is fitted with a suitable spring and tested before leaving the factory. Valves can be preset on request but to alter the set pressure, the adjusting screw, when viewed from the top, should be screwed downwards in a clockwise direction to increase the set pressure and upwards in an anti-clockwise direction to decrease it. Set pressure adjustment must be carried out by experienced and approved personnel. Any change in set pressure must be within the range of the existing spring, if it exceeds the range, a new spring will be required. The cap lead seal must be re-made after any adjustment to the set pressure.

Blow-down Adjustment (POP, 756 & 766 valves only)

The blow-down ring (part no. 8) is set before the valve leaves the factory and normally no further adjustment will be necessary. However, if the reseating pressure has to be altered in service, the blow-down ring should be screwed (downwards) clockwise to raise the re-seat, popping and simmer pressures. If the blowdown ring is screwed (upwards) anti-clockwise the re-seat, popping and simmer pressures will lower. When re-inserting the setting screw (part no 9.) it should always be placed to engage a slot in the blow-down ring. The standard blowdown is 5% for 756, 10% for 766 and 10% for a POP type valve (minimum 0.3 Barg for all three valve types).
For recommended settings, please contact our technical sales office who will be pleased to help.

COLD DIFFERENTIAL TEST PRESSURE

When setting a valve intended for use at high temperature on a test rig using a test fluid at ambient temperatures, it is necessary to set the valve at a slightly higher pressure, so that it will open at the correct set pressure under operating conditions. The necessary allowance is shown in the following table.

Operating temperature	Increase in set pressure at ambient temperature
Up to 121°C	None
122°C to 316°C	1%
317°C to 427°C	2%