

# Consolidated

## Safety Relief Valves 1900/3900 Series to AS1271 - Class 'A'

Austral Engineering Supplies has earned an Australia-wide reputation for engineering excellence. Our manufacturing facility is devoted to the manufacture of safety and relief valves, to the requirements of AS1271 for use on Boilers and Unfired Pressure Vessels.

### Safety Relief Valves for Gas, Vapour & Liquid Service

Protection of personnel and equipment is the paramount concern in the selection of safety relief valves for plant operating systems. Only the most reliable safety valves should be considered for such a crucial role. Consolidated valves have consistently been recognized as leaders in the pressure relief valve field since their introduction over 100 years ago.

Leadership in design, manufacture and product services is founded on reputation for unrelenting dedication to product innovation and improvement. A continuous program for keeping abreast of constantly changing requirements of the valve market and a concentrated research and development effort assure strong support for customer needs.

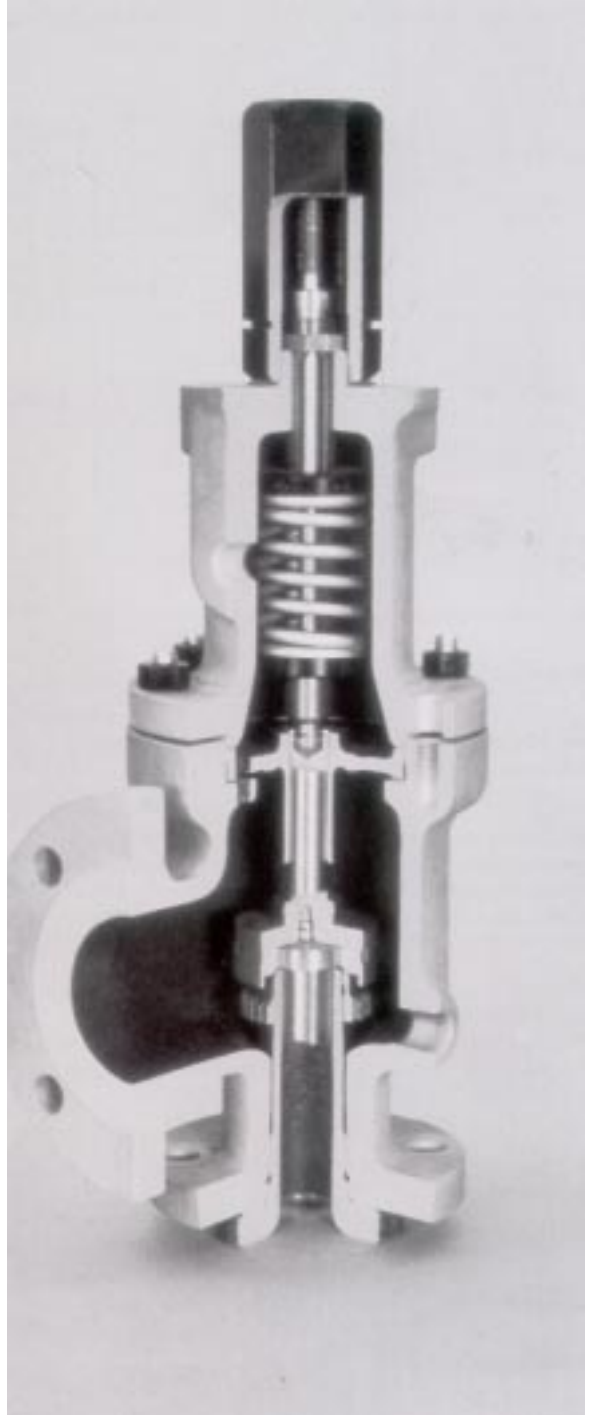
Austral personnel are technically trained and available to provide guidance in sizing and selection of the appropriate valves for specific applications.

### ASME Code

Consolidated Safety Valves have been flow tested in accordance with ASME Code rules to establish rated capacities. Capacities specified in catalogue SRV1 have been certified by the National Board of Boiler and Pressure Vessel Inspectors and are listed in the National Board publication "Pressure Relieving Device Certifications".

### Quality

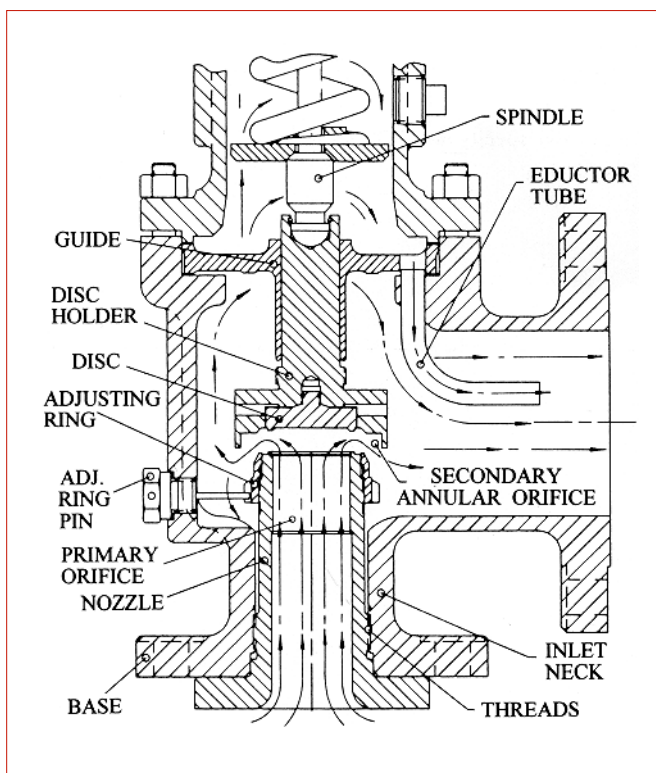
Each valve is manufactured in accordance with established design criteria and is tested for functional performance under and ISO 9000 quality system, thereby ensuring that it will provide long and reliable service.



*Type 1900 Series - Conventional*

## Safety Relief Valves

## Design Features for 1900Series



### Fixed High Capacity

The Consolidated valve features full rated capacities regardless of the adjusting ring position.

The adjusting ring in the Consolidated safety relief valve can be pre-set to predetermined positions prior to putting the valve in service to obtain optimum valve performance. Presetting reduces the necessity of popping the valve in service to ascertain that the ring has been properly set for the necessary lift and relieving capacity.

The carefully developed contours of the Consolidated valve huddling chamber and secondary orifice, together with redirection of the flow stream through 180°, provides the greatest possible lifting force. The lifting forces are not dissipated and are at their maximum at the full lift position.

### Resistance to Discharge Piping Strains

The threaded section holding the valve nozzle into the valve body is at the lowest possible point in a Consolidated safety relief valve. This reduces transmission of any distortion of the inlet neck of the body, to the nozzle.

Also, the valve disc is mounted in the disc holder on a shouldered radius to ensure alignment of the disc with the seating surface of the nozzle, thus assuring tightness at the valve seat.

### Reduction of Valve Bonnet Pressure

To eliminate excess bonnet pressure and ensure good valve opening and closing action, an Educator Tube is provided.

Educator tube reduces bonnet pressure by pulling discharging fluids out of the bonnet faster than is possible for the discharging fluids to enter past the guiding surfaces, acting as a siphon due to the drawing effect of the flow through the outlet side of the valve.

### Features of the Educator Tube

- Increases the lifting force when the valve opens.
- Tends to break slight corrosive deposits or surface film.
- Allows the valve to operate satisfactorily against high back pressures.
- Assures positive full rated valve capacity at low over pressure.
- Makes a uniform response to blowdown control adjustment.
- Assures stability of valve life and capacity during operation.

### Simple Blowdown Adjustment

Adjustment of Consolidated safety relief valve blowdown or reseating pressure, is by means of a single adjusting ring. The simplicity and advantages of this adjustment are obvious when comparing valves having two or more adjusting rings, each of which affects valve action, as well as blowdown.

### Nozzle made from Investment Casting/Forging

The nozzle provides uniform and flawless material consistency.

### Spindle Pocket Connection

The Inconnel snap ring and groove design makes it virtually impossible to remove the spindle from the disc holder accidentally. Minimum effort is required to disassemble during maintenance.

### Maximum Seat Tightness

Consolidated safety relief valves seats are precision machined and lapped to an optical flatness. This assures positive seating and prevents loss of contained media.

### Interchangeability

All Consolidated flanged safety relief valves may be converted from standard conventional type to bellows type, O-ring seat seal type, liquid trim type or Thermoflex disc type, requiring a minimum number of new parts.

### Quality Material

All consolidated valves are made to ASTM/ASME specifications and rigid inspections, assuring highest degree of quality, guaranteed to more than satisfy the requirements of AS1271.

# Construction:

## 1900 Series - Conventional Design

This standard rugged configuration is equipped with corrosion resistant stainless steel trim and a carbon steel body, bonnet and cap. The components are top guided with a 2:1 ration, providing for free and repeatable action.

The flat disc seat provides for easy maintenance, remachining and lapping.

The exclusive "Educator Tube" minimises bonnet cavity pressure which ensures good valve opening and closing action under adverse conditions.

The nozzle is bottom inserted and rigidly held in position, providing a corrosion resistant path of flow to the valve and corrosion resistant seating surfaces.

Unless other stated the valve is always supplied with a screwed cap. The exceptions to this would be where code AS1271 requires levers for steam, air and hot water service. Refer to the SRV-1 Catalogue for available types of caps, levers and accessories.

## 1900-30 Series-Bellows Design

This valve is the same as the conventional design except that a bellows has been added. When the bellows is installed, the educator tube is removed.

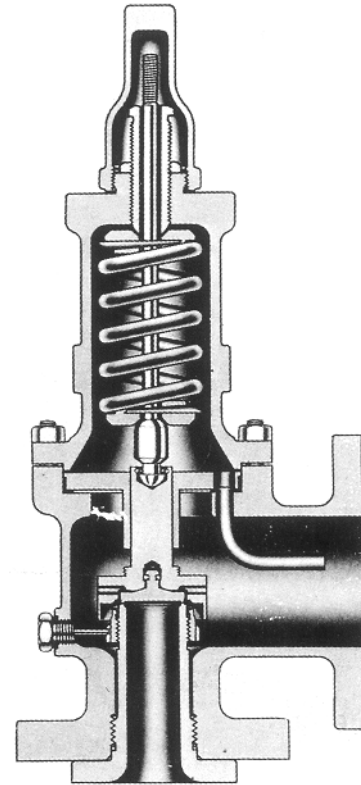
A bellows is added to the conventional valve to deal with any of several situations:

- (1) If back pressure at the valve outlet is excessive, variable of fluctuates more than  $\pm 10\%$  of a nominal value.
- (2) If built up back pressure exceeds 10% of the set pressure.
- (3) If the fluid is a slurry or of a highly viscous nature.
- (4) If the fluid is corrosive to the upper works of the valve, the bellows isolates the bonnet chamber.

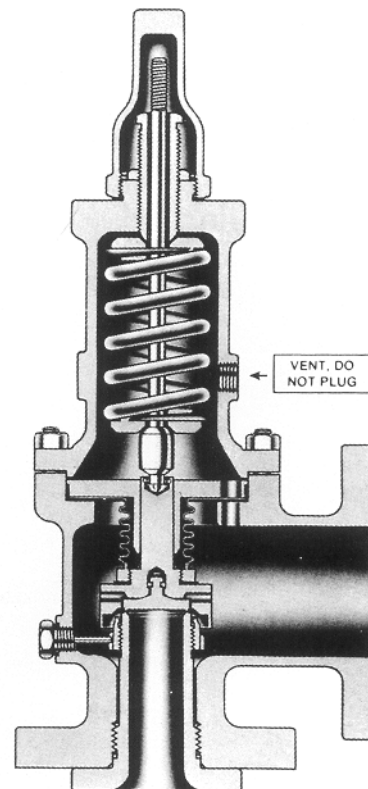
Conventional valves can be easily converted to a bellows design or vice versa through the use of retrofit kits.

All Consolidated 1900-30 valves are balanced bellows design, meaning that they fully compensate for the effects of back pressure.

Unless otherwise stated the valve is always supplied with a screwed cap. The exception to this would be where Code AS1271 requires levers for steam, air and hot water service. Refer to the SRV-1 Catalogue for available types of caps, levers and accessories.



Type 1900Series



Type 1900-30Series

# Consolidated Safety-Relief Valve

## Applications

Refinery  
PetroChemical and  
Chemical Process-  
ing

Hydrocarbon  
Processing

Pressure Vessels

Heat Exchangers

Piping

Reactors

Cryogenic Plants

Process Steam

Compressor  
Stations

Thermal Relief

Liquefied Gas  
Storage

Heat Transfer  
Fluids

Pipelines

Process Steam  
Injection

Compressors

Receivers

Headers

Pressure Reducing  
Stations

Off Shore Drilling

## Steel Flange



**1900 Series**



**1900-30 Series**

	1900 Series	1900-30 Series
<b>Codes</b>	ASME Section III and VIII AS1271 Class A	ASME Section III and VIII AS1271 Class A
<b>Inlet Sizes</b>	25mm through 300mm flanged	25mm through 300mm flanged
<b>Inlet Ratings</b>	ANSI Class 150 through 2500	ANSI Class 150 through 2500
<b>Outlet Sizes</b>	50mm through 400mm flanged	50mm through 400mm flanged
<b>Outlet Ratings</b>	ANSI Class 150 and 300	ANSI Class 150 and 300
<b>Temperature Range</b>	-267°C to 815°C	-267°C to 815°C
<b>Set Pressure Range</b>	35kPag to 41380kPag	70kPag to 41380 kPag
<b>Orifice Sizes</b>	Fifteen Sizes: D through W	Fifteen Sizes: D through W
<b>Standard Materials:</b> Base/Bonnet Disc/Nozzle Spring	WCC carbon steel 316 st.st. 'CR' alloy steel	WCC carbon steel 316 st.st 'CR' alloy steel 316L st.st. Bellows
<b>Options:</b> Liquid Service Double Seal Soft Seat Sour Gas Service-NACE Steam Service Balancing Piston	1900 LS and DL 1900DA 1900 SG 1900 TD -	1900-30 LS and DL 1900-30 DA 1900-30 SG 1900-30 TD 1900-35
<b>Features:</b>	Conventional design.  Flat seat, top guided, high capacity, conforming to API 520, 526 and 527. Available in a wide range of materials of construction.  Adjustable blowdown 5% to 10%.	Balanced bellows design.  Flat seat, top guided, high capacity, conforming to API 520, 526 and 527. Available in a wide range of materials of construction.  Adjustable blowdown 5% to 10%.


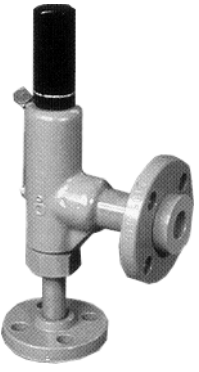
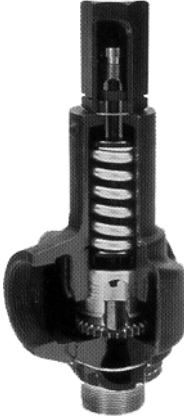

For more information refer catalogue

SRV-1

SRV-1



# Valves - For Gas, Vapour and Liquid Service

Pilot Operated Valves		Steel Screwed Valves	
			
<b>3900 Series Pilot Operated</b>	<b>1990/3990 Series</b>	<b>Type 1982</b>	<b>1990/3990 Series</b>
ASME Section VIII AS1271 Class A	ASME Section III and VIII AS1271 Class A	ASME Section III and VIII AS1271 Class A	ASME Section III and VIII AS1271 Class A
25mm through 300mm flanged ANSI Class 150 through 1500	15mm to 50mm flanged ANSI Class 150 through 2500	15mm through 50mm NPT/BSP 3445 kPag limit	15mm through 50mm NPT/BSP 55172 kPag Limit
50mm through 250mm flanged ANSI Class 150 and 300 -1°C to 204°C	25mm through 65mm flanged ANSI Class 150 and 300 -267°C to 815°C 3990: -245°C to 593°C	20mm through 65mm NPT/BSP 340kPag Limit 1990: -28°C to 426°C	20mm through 65mm NPT/BSP 2758 kPag limit 1990: -28°C to 426°C 3990: -245°C to 59.°C
100kPag to 25850 kPag	35kPag to 39896 kPag	70 kPag to 3448kPag	35 kPag to 55172 kPag
Fourteen Sizes: D through T Three: Dual outlets full bore	Seven Sizes: 12 through 486mm <sup>2</sup>	Five Sizes: 78 through 902mm <sup>2</sup>	Seven Sizes: 12 through 486mm <sup>2</sup>
WCC carbon steel 316 st.st. 316 st. st.	316st.st./WCC carbon steel 316 st.st. 'CR' alloy steel 3990 all 316 st.st.	304 st.st./WCC carbon steel 304 st.st. 'CR' alloy steel	316 st.st/WCC carbon steel 316 st.st. 'CR' alloy steel 3990 all 316 st.st.
Use VMF Pilto Standard SG1 Use VMF-3S Pilot Use Backflow Preventer	1990 LS/ 3990 LS 1990 DA / 3990DA 1990 SG 1990 -	1982 LS - - 1982 -	1990 LS / 3990 LS 1990 DA / 3990 DA 1990 SG 1990 -
Single or dual outlet. Dual seat, nozzle guided. <b>Main valve</b> - WCC carbon steel base/cover plate, all trim parts 316 st.st. as standard. All 316 st.st. construction available. <b>Pilot Valve</b> - all 316 st.st. External adjustment for set point and blowdown.  Less than 2% blowdown.	Convenational only, no bellows available.  Flat seat, locally guided, all trim parts are 316 st.st. as standard.  Fixed blowdown 7% to 20%.	Conventional only, no bellows available.  Flat seat, top guided, all trim parts are stainless steel as standard, high capacity.  Adjustable blowdown 7% to 10%.	Conventional only, no bellows available.  Flat seat, locally guided, all trim parts are 316 st.st. as standard.  Fixed blowdown 7% to 20%.

POSRV-b1 & B2

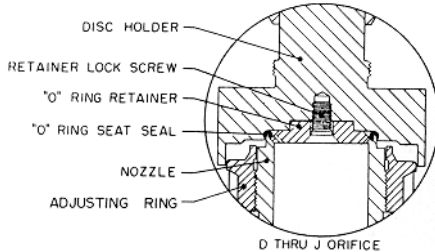
SRV-1 & AULO3

SRV-1

SRV-1 & AULO 3

# Consolidated Safety-Relief Valves - Options

## 1900 Soft Seats (DA)



### The Double Seal Soft Seat

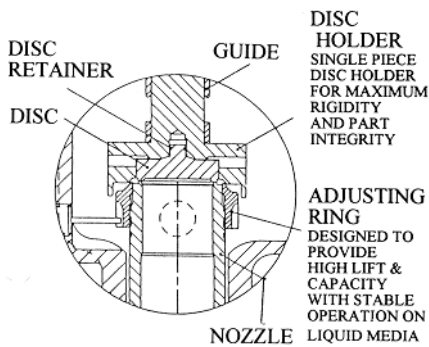
The double seal design incorporates the merits of both a soft seat and a metal seat design valve. The 45° metal seat provides the load bearing surface for transmitted spring force, the slotted O-ring retainer allows the O-ring to be pressurised. This O-ring seal design can be used throughout the full pressure range of the valve. For pressure/temperature ratings of the seal, refer to Section 5 of catalogue SRV1.

**Tightness:** Consolidated O-ring seat valves are bubble tight at 95% of set pressure over 690 kPag.

Consolidated O-ring seat seal provide positive closure at service pressures closer to the set pressure than is possible with metal-to-metal seats, assuring continuous, trouble-free service and complete valve tightness after numerous "pops".

The 1900 O-ring design features a secondary metal-to-metal seat which becomes effective if O-ring integrity is lost due to external fire or other causes. The retainer is lapped to the nozzle at assembly assuring seat tightness.

## 1900 Liquid Trim Valves (LS)



The 1900 LS option is designed for liquid service and is certified to ASME Code Section VIII. The adjusting ring and disc holder are designed to allow the valve to achieve full lift without valve chatter.

### Application Guidelines

- If the fluid remains liquid while flowing through the valve, use liquid trim.
- If flowing fluid flashes going through the valve, use liquid trim.
- If in a two-phase fluid the volume of gas at inlet is greater than or equal to the volume of liquid, then liquid trim is not necessary.
- When valves are used for thermal relief applications to prevent excessive pressure caused by thermal expansion of trapped liquids, use liquid trim.
- All 1900 Series valves can be supplied with liquid trim internals, additionally conventional valves can be converted.

For more information refer to Catalogue SRV-1.

## 1900 Sour Gas Service (SG)

Part Name	Conventional Valves (2)		Bellows Valves (2)	
	SG1	SG10	SG5	SG15
Bellows	NA	NA	Monel	316L
Spindle	316 Stainless	-	-	-
Spring	Inconel X-750	(1)	(1)	(1)
Spring Washers	316 Stainless	-	-	-
Adjusting Screw	316 Stainless	-	-	-
Adj. Screw Nut	316 Stainless	-	-	-

Symbol "-" denotes stainless steel construction.

Note 1: Alloy springs are used for temperatures up to 800°F (426.7°C) and are aluminium metallised.

Note 2: SG10 and SG15 are the same as standard valves except for springs being aluminium metallised.

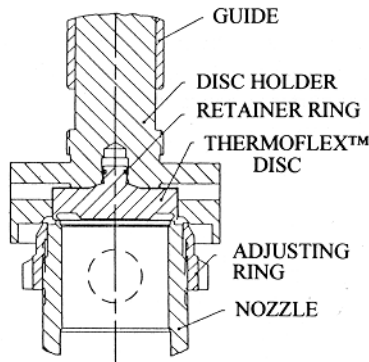
Material requirements of NACE Standard MR-01-75 are applicable to systems handling sour gas if the total operating pressure of the system is 447 kPaa or greater and if the partial pressure of H<sub>2</sub>S in the gas is 0.35 kPaa or greater.

The SG1(non-bellows) and SG5(bellows) material selections comply with NACE standard MR-01-75.

The SG10(non-bellows) and SG15(bellows) material selections are satisfactory for applications in which the valve secondary pressure does not exceed 447 kPaa. Under valve relieving conditions, 345 kPag secondary pressure would not normally be exceeded until the valve set pressure exceeds 3100 kPag.

# Consolidated Safety-Relief Valves - Options

## 1900 Steam Trim (TD)



The 1900 TD option is specifically designed for steam service and organic heat transfer media and is certified to ASME Code Section VIII. For consistent performance on these media, specify the "TD" design which utilises the exclusive THERMOFLEX Disc design.

### THERMOFLEX Disc

This is a specifically designed disc for use on high temperature fluids. This concept has more than 40 years of field proven performance that ensures the tightest valves in the world.

The martensitic stainless steel disc construction for high strength and toughness. As the set point of the valve is approached, the pressure sealing effect of the THERMOFLEX Disc assists in the tightness of the seat, as does the rapid thermal equalisation that occurs due to the thin sealing section. Since disc flexibility ensures the sealing effectiveness, the "TD" design will be used for all set pressures and all orifice sizes except the D-1 and E-1 designs.

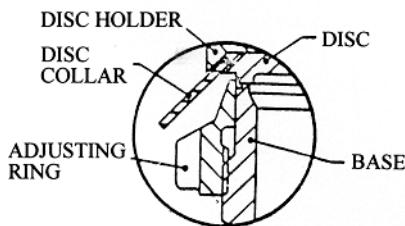
## 1982 Liquid Trim Option (LS)



CONVENTIONAL DISC



LIQUID SERVICE DISC



The 1982 LS option is designed for liquid service and is certified to ASME Code Section VIII (capacity rated at 10% overpressure and National Board Certified.)

A special disc design is provided to maximise valve lift while preventing valve chatter.

### Application Guidelines

- If the fluid remains liquid while flowing through the valve, use liquid trim.
- If flowing fluid flashes going through the valve, use liquid trim.
- If in a two-phase fluid the volume of gas at inlet is greater than or equal to the volume of liquid, then liquid trim is not necessary.
- When valves are used for thermal relief applications to prevent excessive pressure caused by thermal expansion of trapped liquids, use liquid trim.
- All 1900 Series valves can be supplied with liquid trim internals, additionally conventional valves can be converted.

For more information refer to catalogue SRV-1.

## Options for 1990/3990

Variations to the Consolidated type 1990 include:

- |                        |   |
|------------------------|---|
| <b>1990 SG</b>         | Special materials allow this valve to be used in systems which handle sour gas. |
| <b>3990</b>            | This is an all stainless steel version of the 1990.                             |
| <b>1990DA / 3990DA</b> | These have an "O" Ring seat seal design to increase tightness.                  |
| <b>1990LS / 3990LS</b> | Liquid trim with metal seats.   |
| <b>1990DL / 3990DL</b> | Liquid trim with soft seats.  |

# Consolidated Safety-Relief Valves - Options

## 1982 Conventional Valve

This product is normally supplied with screwed inlet and outlet connections. The valve ranges in inlet size from 15mm up to 50mm and has screwed cap as standard, with option of packed lever, plain lever and gag.

The size 20 x 25mm 1982 is now manufactured in Australia to suit local market requirements, with all 316 stainless steel construction. Fully meeting the requirements of AS1271-Class A, this valve has a wide range of applications including NACE MR-01-75 and other corrosive services and is available for fast delivery at short notice.

Available with standard trim suitable for gas, vapour or steam service, with an option of 'LS' liquid trim.

The 1982 LS option is designed for liquid service and is certified to ASME Code Section VIII. A special disc design is provided to maximise valve lift with 10% overpressure, while preventing valve chatter.

REFER TO PAGE 9 FOR APPLICATION GUIDELINES

Minimum set pressure of this valve is 70kPag. Valves with set pressures less than 103kPag cannot be stamped with ASME code stamp.

Features and Benefits:

- Valves manufactured in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section VIII and Australian Code AS1271 - Class A.
- Relieving capacities certified by National Board of Boiler and Pressure Vessel Inspectors. Certification includes steam, air and water.
- Larger orifice areas than any other similar size valve on the market, providing maximum capacity, performance and cost effectiveness.
- Adjustable blowdown provides reliable reseating pressure. Typical blowdown is 7 to 10% for gas and vapour applications.
- Precision lapped flat metal to metal seat provides good seat tightness beyond API527.
- Stainless steel body, with stainless steel trim as standard.
- Standard Bonnet material is ASTM SA216 Grade WCC carbon steel. For more corrosive applications stainless steel is available.
- Alloy steel spring is for service temperatures to 204°C. For higher temperatures Inconel X-750 is used to valve limit of 427°C.

Note: the size 20 x 25mm 1982 manufactured in Australia has 304 Stainless Steel Spring as standard suitable to valve limit of 427°C.



## Applications

Pressure Vessels

Heat Exchangers & Reactors

Process Steam

Pipelines

Thermal Relief

Compressor Stations

Refinery

Petro-chemical

Chemical Processing

Water Treatment Plants



# 1982 High Capacity Valve Series

Valve Size (mm)	Valve Type	Temperature Range (°C)	Set Pressure Range (kPag)	(Ae) ASME and Actual Orifice Area (mm <sup>2</sup> )	Standard Connections Inlet/Outlet	Back Pressure Limit
15 x 20	1982c	-28 to 204.4°C	70 to 3448	78.06	Male/Female NPT	340kPag
	1982t	-28 to 426.6°C				
20 x 25	1982c	-28 to 204.4°C	70 to 3448	139.35	Male/Female NPT or BSPT	340kPag
	1982t	-28 to 426.6°C				
25 x 40	1982c	-28 to 204.4°C	70 to 3448	214.19	Male/Female NPT	340kPag
	1982t	-28 to 426.6°C				
40 x 50	1982c	-28 to 204.4°C	70 to 3448	552.90	Male/Female NPT	340kPag
	1982t	-28 to 426.6°C				
50 x 65	1982c	-28 to 204.4°C	70 to 3448	902.57	Male/Female NPT	340kPag
	1982t	-28 to 426.6°C				

## Coefficient of Discharge

( $\alpha$ ) = 0.855 (Vapour, Gases & Steam)  
 = 0.758 (Liquids)  
 For capacity table refer  
 Catalogue SRV-1 (P4-12, 4-13) and  
 Bulletin SRV 1982/96

1982 Series Valves Dimensions (mm) and Weights (kgs)					
Screwed Connections					
Size	15x20	20x25	25x40	40x50	50x65
A	66.7	69.9	82.6	98.4	111.1
B	31.8	36.5	47.6	66.7	82.6
C	181.0	190.5	231.8	304.8	357.2
Approx.	1.0	1.4	2.3	5.4	8.4
Weight					

**Size 20 x 25mm**  
 Manufactured in Australia

- All Stainless Steel Construction
- 304 St. St. Spring as Standard
- Suitable to limit of 426.6°C

