



Consolidated* Pressure Relief Valves For Power Service

Pressure relief solutions for the power industry

- Safety Relief Valves
- Safety Valves





**DESIGN AND
PERFORMANCE
THAT MEETS
CUSTOMER NEEDS**



Safety, Quality, Support Equal Dependability

Keeping People and Equipment Safe

For over 130 years Consolidated has worked closely with our customers and regulatory organizations to configure, engineer, and manufacture a comprehensive portfolio of safety valves that help maintain safe, smooth and cost-effective operating conditions in demanding real-world power industry applications.

Steam service environments are a case in point. Consolidated safety valves from BHGE feature pop-action release that can relieve steam over-pressurization if pressures reach the valves' set point.

What's more, Consolidated safety valves comply with many certifications, including ASME Section I code for boiler applications. For example, all models feature a lifting lever required by the code for testing instead of a deadweight or weighted lever.

Plus, tight tolerancing ensures Consolidated safety valves are at full lift at 103 percent of set pressure and quickly close when pressures reach 4 percent below the set pressure.

Our commitment to safe and efficient boiler operation is evidenced by our contributions to international organizations advancing pressure relief valve technology like the ASME, IBR and ISO.

Certified Quality

We adhere to strict manufacturing, testing and regulatory standards controlled by an ASME-approved Quality Assurance Program, and we hold an ISO 9001

Quality System Certification. Additionally, our Quality Management System and Design Control procedures uphold stringent design criteria and require thorough testing for functional performance.

Once a valve passes the final test, we attach the Consolidated Green Tag* symbol to show that it meets or exceeds requirements, including ASME specifications. Our customers can feel confident that their crucial safety functions are supported by high quality products.





Consolidated Safety Valves

Expert Technical Support throughout the Product Life Cycle

We complement the excellent engineering and expertise behind every valve we make with knowledgeable sales guidance and reliable support services to help maintain safer operations for your people and your facility. Our worldwide sales force is factory-trained to offer consultation in valve sizing and selection to solve your specific challenges. Consolidated valve experts use their extensive pressure valve experience to seek the best fit for your budget and operational requirements with valves offering:

- Customized selections based on price, performance and cost of ownership
- Expert alternate recommendations that can save you money
- Safety-minded systems engineered with our extensive knowledge of codes, applications and service conditions
- Safety valve requirement validation for greater peace-of-mind
- Expert application evaluation to anticipate possible system problems and help improve operational earnings
- Experienced project management focused on your satisfaction, from bid request through shipment and startup

Support comes from our trained field service technicians who handle installations, startups, retrofits, upgrades and onsite emergencies worldwide. And our Green Tag* Centers (GTC) provide fully certified assembly and repair services so customers can find the right resource to keep their valve equipment operating at high performance.

Improving Turbine Operating Efficiency

“A power plant was experiencing frequent failure rates with Pressure Relief Valves installed to protect turbine gland seals from overpressure.”

“Since the implementation, Consolidated’s 2900 Series POSRV has performed flawlessly allowing the plant to operate more efficiently.”



Complete Green Tag Coverage

We're Right at Your Doorstep!

We bring reliable valve services to your doorstep through our worldwide Green Tag certified valve assemblers and repair centers. Our authorized Green Tag Centers have successfully served the valve marketplace for more than 25 years. Our services include:

Valve Survey

- Comprehensive and accurate record of all pressure relief valve service
- Identification of overlooked valves and valve interchangeability
- Product upgrades to reduce cost and improve performance

Inspection of the Valve and Installation

- Evaluation of the installation for compliance to codes and regulations
- Written evaluation covering compliance issues and discrepancies
- Expert recommendations and corrective actions

Testing

- Onsite and in-place testing using the
- Consolidated EVT*-Pro testing device
- High-capacity shop testing with steam, air or water
- Fully trained and certified pressure relief valve technicians
- Base-line history establishment

Repair

- Audited facility with Consolidated inspection criteria and critical dimensions
- Highly trained and certified pressure relief valve technicians
- Original manufacturer replacement parts

Inventory Control

- Global access to spare parts inventories
- Parts interchangeability
- Obsolete and excess inventory identification
- Recommended cost-effective inventories

ValvKeep* Asset Management

- Comprehensive computer-based valve management service
- Historical data storage and permanent record tracking
- Maintenance scheduling and planning
- Repair intervals validated by maintenance history of each valve
- Code compliance
- Interfaces easily with enterprise or legacy systems

Other Services

- Training, sales and engineering support



Consolidated Safety Valve Applications

Boiler Safety Valves – Fired Pressure Vessel ASME Section I

Taking into account a variety of important factors, our valve experts can help determine the right pressure relief valve solutions for your power and energy applications:

Drum, Superheater & Reheater Safety Valves

- Blowdown requirements
- Seat-tightness requirement for low set valves
- Effects of high temperature, both service and ambient
- Maintenance requirements and features of the valve type selected

Power-Actuated Relief Valves

- Number of cycles the valve can be expected to operate before failure
- Preventing chatter through proper sizing of the total boiler set

Economizer Safety Relief Valves

- Code requirements
- Design of the installation and operating procedures



Consolidated Safety Valves

The Right Safety Valve Solutions for Your Applications

Maxiflow[®] 1700 and 2700 Safety Valve Types

Max. Pressure: 5360 psig (369 bar)

Max. Temperature: 1120°F (604°C)

- Superb performance and stable, trouble-free boiler operation
- Repeatable seat tightness and extreme temperature compensation for safer operation and reduced down time
- Helps to save costs thanks to high allowable back-pressure limits when sizing the discharge stack and silencer
- 100 percent repairable and restorable design lowers cost of ownership throughout its lifespan
- A large installed base estimated to be more than 80 percent on Utility Power Boilers combined with the Green Tag network allows for local expertise and a large support inventory

1541, 1543, 1511 and 1811 Safety Valve Types

Max. Pressure: 725 psig (49 bar)

Max. Temperature: 1000°F (538°C)

- Rugged and reliable valves recognized as some of the finest in the industry
- Inexpensive and easy to maintain with a low number of parts, reducing outage and inventory costs
- High-capacity discharge for excellent performance and valve number reduction

2900-40 Pilot Operated Safety Relief Valve

Max. Pressure: 3750 psig (259 barg)

Max. Temperature: 1200°F (649°C) with heat exchanger

- Designed for economizer and organic vapor service
- Superior performance with shorter blowdowns and operation at higher pressures
- Certified on steam and water

Electromatic[®] 3500-5 Power-Actuated Relief Valve Type

Max. Pressure: 4500 psig (310 bar)

Max. Temperature: 1150°F (620°C)

- Reduced maintenance with increased boiler efficiency
- Technologically advanced design offers operational excellence and improved cycle life
- Lower maintenance costs and extended life-cycle with technically advanced spray and fuse coating process for ball and seat assembly



Type 1541 Safety Valve



Type 2700 Safety Valve



Consolidated Safety Relief Valve Applications

Off-Boiler Safety Relief Valves – Unfired Pressure Vessel ASME Section VIII

Tube-side Feedwater Heater Safety Relief Valves - Features

- Trim selected for incompressible liquid service
- Material selected to fight flashing water erosion

Shell-side Feedwater Heater Safety Relief Valves - Features

- Capacity requirement per ASME Section VIII, the heater manufacturer and the application
- Discharge system and the back pressure requirements

Deaerator Safety Relief Valves - Features

- Are well suited for high vibration environments
- Pilot operated safety relief valves excel in de-aerator applications

Sootblower, Reducing Station, and Extraction Steam Safety Relief Valves - Features

- Robust valves for demanding service
- Used where the control valve is not fast enough to regulate the system pressure



Consolidated Safety Relief Valves

The Right Safety Relief Valve Solutions for Your Applications

1900 Safety Relief Valve Type

Max. Pressure: 6250 psig (430 bar)

Max. Temperature: 1500°F (815°C)

- Suitable for the demanding requirements of off-boiler applications
- Trim and material options allow valves to be configured for specific applications and services
- Generous wall thickness for maximized set pressure, helps to lower costs and increases valve life
- Repairable with replaceable nozzle and disc assembly

19000 Safety Relief Valve Type

Max. Pressure: 8000 psig (551 bar)

Max. Temperature: 1100°F (593°C)

- Cost-effective small size with threaded, welded or flanged connections
- Compact, light design lowers installation cost
- Trim and material options allow valves to be configured for specific applications and services

2900 and 3900 Pilot Operated Safety Relief Valve Types

Max. Pressure: 6250 psig (430 bar)

Max. Temperature: 1200°F (649°C)

- Innovative design for reliable performance
- Higher allowable operating pressures and temperatures increase plant profits
- Innovative modulating pilot valve with remote sensing tackles problems related to excessive inlet pressure drop, varying capacity loads and two-phase flow
- Expanded capabilities for high and low temperature applications

13900 Pilot Operated Safety Relief Valve Type

Max. Pressure: 300 psig (20 bar)

Max. Temperature: 550°F (288°C)

- Handles extra large capacity requirements up to 3,000,000 lbs. per hour
- Compact, light design lowers installation cost
- In-line disassembly and repair capability helps to lower repair cost

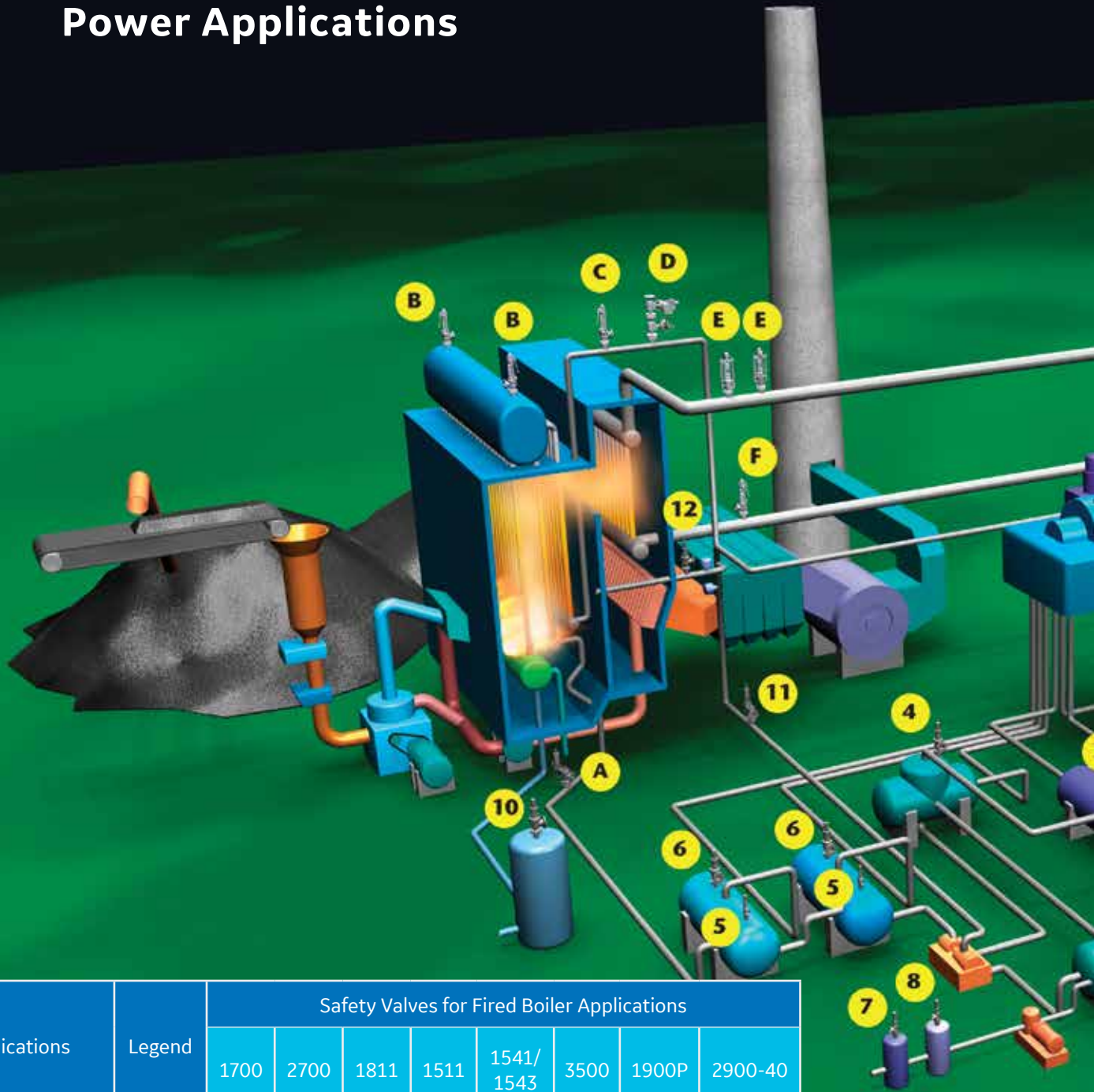


Type 2900
Pilot Operated
Safety Relief Valve

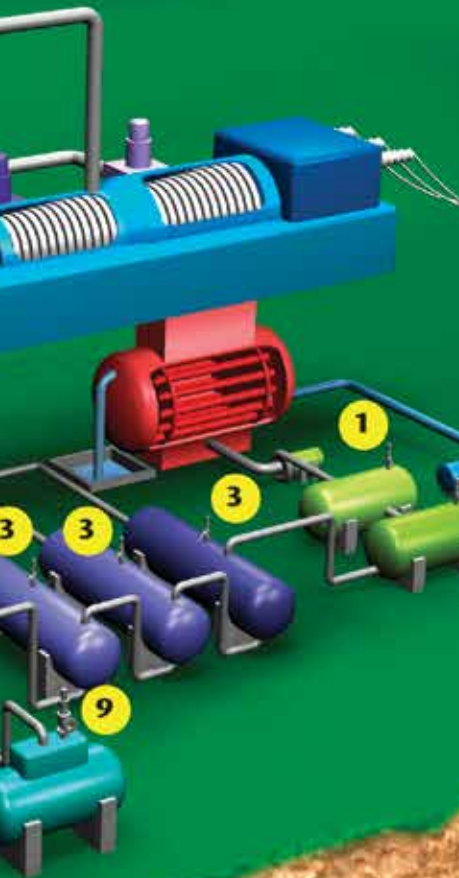


Type 1900
Safety Relief Valve

Power Applications



Applications	Legend	Safety Valves for Fired Boiler Applications							
		1700	2700	1811	1511	1541/ 1543	3500	1900P	2900-40
Economizer	A							X	X
Drum	B	X	X	X	X	X			X
Superheater Main Steam Line	C	X	X	X					X
Power Actuated Relief Valve	D						X		
Cold Reheater Line	E	X	X	X					X
Hot Reheater Line	F	X	X	X					X



Applications	Legend	Safety Valves for Unfired Boiler Applications				
		1900	19000	2900-40	3900	13900
Hydrogen Cooler	1		X			
Oil Cooler	2		X			
L.P. Feedwater heaters	3	X	X			
Deaerators	4	X			X	
H.P. Feedwater heaters - Tube Side	5		X			
H.P. Feedwater heaters - Shell Side	6	X		X		
Economizer	A	X		X		
Make up Water Storage	7		X			
Chemical Feedwater Treatment	8		X			
Evaporator	9	X	X	X	X	
Flash Tank	10	X		X		
Reducing Valve	11	X		X		
Sootblower	12	X		X		
Applications not shown						
Turbine By Pass						X
Turbine Gland Seal		X		X	X	



Consolidated Boiler Safety Valves



**Type 1700
Maxiflow* Safety Valve**

The Consolidated 1700 Maxiflow high pressure safety valve is a premium product that is installed on the majority of power generating stations worldwide to help protect boilers from overpressure conditions.

Inlet Sizes:	1 ½" through 6"
Inlet Ratings:	ANSI Class 600 through 4500
Outlet Sizes:	3" through 10" flanged
Outlet Ratings:	ANSI Class 150 and 300
Orifice Sizes:	Eleven sizes – 1 through RR
Set Pressure Range:	100 psig to 5360 psig
Temperature Range:	Up to 1120°F
Materials:	Alloy and carbon steel cast body with stainless steel trim
Certifications:	ASME Section I and VIII, PED and SQL ISO 4126-1,3 and IBR



**Type 2700
Safety Valve**

The Consolidated Type 2700 safety valve can meet the specific requirements of the co-generation and waste-to-energy markets.

Inlet Sizes:	1 ½" through 6"
Inlet Ratings:	ANSI Class 600, 900 and 1500
Outlet Sizes:	3" through 8"
Outlet Ratings:	ANSI Class 150 and 300
Orifice Sizes:	Seven sizes – 1 through Q
Set Pressure Range:	100 psig to 1600 psig
Temperature Range:	Up to 1050°F
Materials:	Alloy and carbon steel cast body with stainless steel trim
Certifications:	ASME Section I and VIII, PED and SQL ISO 4126-1,3 and IBR



Type 1811 Safety Valve

The Consolidated Type 1811 safety valve is a cost-effective, high-capacity, flanged-steel safety valve for steam service.

Inlet Sizes:	1 ¼" through 6"
Inlet Ratings:	ANSI Class 300 and 600
Outlet Sizes:	1 ½" through 8"
Outlet Ratings:	ANSI Class 150
Orifice Sizes:	Ten sizes – F through Q
Set Pressure Range:	15 psig to 725 psig
Temperature Range:	Up to 1000°F
Materials:	Alloy and carbon steel cast body with stainless steel trim
Certifications:	ASME Section I and VIII, PED and SQL ISO 4126-1,3



Type 1511 Safety Valve

The Consolidated Type 1511 safety valve is configured for low pressure, steam-heating boilers and steam generators as well as air service applications.

Inlet Sizes:	1 ½" through 6"
Inlet Ratings:	ANSI Class 250
Outlet Sizes:	2 ½" through 4"
Outlet Ratings:	ANSI Class 125
Orifice Sizes:	Eight sizes – H through Q
Set Pressure Range:	15 psig to 250 psig
Temperature Range:	-20°F to 420°F
Materials:	Cast iron body with brass trim
Certifications:	ASME Section I and VIII, PED and SQL



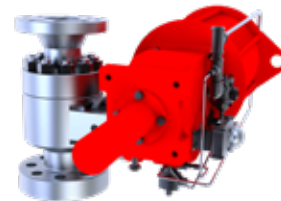
Consolidated Boiler Safety Valves



Type 1541, 1543 Safety Valve

The Consolidated Type 1541 and 1543 safety valves are configured for steam and other compressible fluids. Compression media is limited to non-toxic, non-flammable, non-corrosive service. They are most commonly used in pharmaceutical and process plants.

Inlet Sizes:	½" through 2 ½"
Outlet Sizes:	¾" through 2 ½"
Orifice Sizes:	D, E, F, G, H and J
Set Pressure Range:	15 to 350 psig
Temperature Range:	-20°F to 420°F
Materials:	Cast iron bonnet with brass base and trim
Certifications:	ASME Section I and VIII



Type 3500-5 Electromatic* Ball Valve

The Consolidated Type 3500-5 Electromatic ball valve offers automatic or manual overpressure protection for steam boiler systems, and can also be used to assist start-up and shut-down venting.

Inlet Sizes:	1 ½", 2" and 2 1/2"
Inlet Ratings:	ANSI Class 1500 and 4500
Outlet Sizes:	3" and 4"
Outlet Ratings:	ANSI Class 300 and 900
Set Pressure Range:	50 psig to 4500 psig
Temperature Range:	Up to 1150°F
Materials:	Alloy steel body with Colmonoy® coated inconel alloy seat and ball
Certifications:	ASME B & PVC Section I 'V' code stamp on once through boilers (full bore only) and non-code section I



Type 2900-40 Pilot Operated Safety Relief Valve

The Consolidated Type 2900-40 pilot operated safety relief valve offers superior performance while meeting the stringent requirements of boiler applications. This product is especially suited for economizer service. It offers maximum seat tightness and a shorter blowdown that can help to minimize steam loss. It also operates closer to set pressure.

Inlet Sizes: 1" to 6"

Outlet Sizes: 2" through 8"

Orifice Sizes: 12 sizes - D through Q

Outlet Ratings: ANSI Class 150 and 300

Set Pressure Range: 15 to 3750 psig

Temperature Range: -20 to 1200°F

Materials: Main Valve: Carbon steel base and 316 stainless steel internal components
Pilot Valve: 316 stainless steel base and internal components

Certifications: ASME Section I
ISO 4126-4



Type 1900/P Safety Relief Valve

The Consolidated Type 1900/P steam internal series is configured for ASME Section I non-power boiler and organic vapor service applications.

Inlet Sizes: 1" through 8" flanged

Outlet Sizes: 2" through 10" flanged

Outlet Ratings: ANSI Class 150 through 2500

Orifice Sizes: 14 sizes - D through T

Set Pressure Range: 4 psig to 5000 psig

Temperature Range: 90°F to 850°F

Materials: Carbon steel body with stainless steel trim

Certifications: ASME Section I and PED and SQL
ISO 4126-1,3 and IBR



Consolidated Boiler Safety Relief Valves



Type 2900 Pilot Operated Safety Relief Valve

The Consolidated Type 2900 pilot operated safety relief valve combines the strengths of two products into one— the 1900 safety relief valve and the 3900 POSRV. The 2900 POSRV can replace spring-loaded relief valves without requiring modified outlet piping.

Inlet Sizes:	1" through 12"
Outlet Sizes:	2" through 16"
Orifice Sizes:	Seventeen sizes – D through W
Set Pressure Range:	15 to 6250 psig
Temperature Range:	-40°F to 505°F
Materials:	Stainless steel pilot with carbon steel main valve and stainless steel trim
Certifications:	ASME Section VIII, PED and SQL ISO 4126-4



Type 3900 Pilot Operated Safety Relief Valve

The Consolidated Type 3900 pilot operated safety relief valve is a non-flowing design available in a modulating or pop action pilot. The 3900 POSRV is suitable for over pressure protection in many pressurized systems and vessels in the chemical, petrochemical, paper mill, oil and gas production and transmission industries.

Inlet Sizes:	1" through 10"
Outlet Sizes:	2" through 10"
Orifice Sizes:	Fourteen sizes – D through T
Set Pressure Range:	15 to 6250 psig
Temperature Range:	-40°F to 505°F
Materials:	Stainless steel pilot with carbon steel main valve and stainless steel trim
Certifications:	ASME Section VIII, PED and SQL ISO 4126-4



Type 4900 Pilot Operated Safety Relief Valve

The Consolidated Type 4900 pilot operated safety relief valve is a tubeless valve for oil and gas production and the offshore industry.

Inlet Sizes: 1" to 8" flanged

Outlet Sizes: 2" through 10" flanged

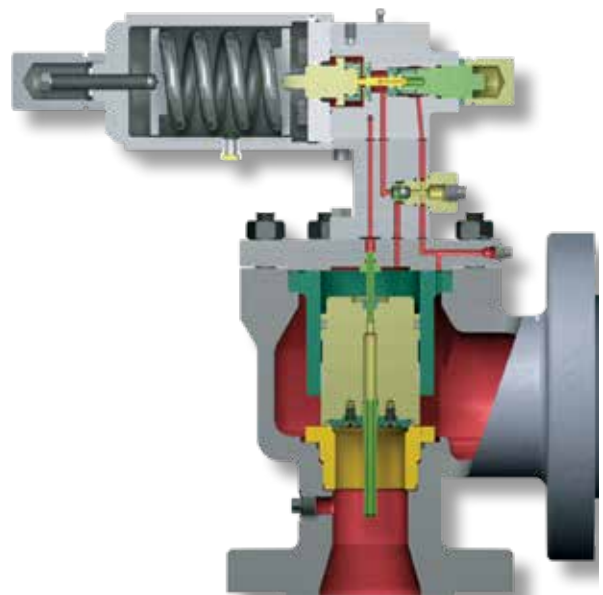
Orifice Sizes: Fourteen sizes – D through T

Set Pressure Range: 15 psig to 7200 psig

Temperature Range: -40°F to 505°F

Materials: Stainless steel pilot with carbon steel main valve and stainless steel trim

Certifications: ASME Section VIII,
PED and SQL
ISO 4126-4





Consolidated Off-Boiler Safety Relief Valves



Type 1900 Safety Relief Valve

The highly adaptable Consolidated Type 1900 safety relief valve can meet numerous application requirements.

Inlet Sizes:	1" through 12"
Inlet Ratings:	ANSI Class 150 through 2500
Outlet Sizes:	2" through 16"
Outlet Ratings:	ANSI Class 150 and 300
Orifice Sizes:	D through W
Set Pressure Range:	4 psig to 6250 psig
Temperature Range:	-450°F to 1500°F
Materials:	Cast carbon steel body with stainless steel trim
Certifications:	ASME Section III and VIII, PED and SQL ISO 4126-1,3

Options for 1900

1900-30

The Consolidated Type 1900-30 valve includes the addition of a balanced bellows to compensate for the effects of variable back pressure. By isolating the upper structure and allowing the use of less expensive materials, the bellows is also a cost-effective solution in applications where the valve is exposed to highly viscous or corrosive fluids.

1900-DA

The Consolidated Type 1900-DA valve contains an additional O-ring seat seal. This soft seat is the primary seal and allows the valve to remain leak free at 95 percent of set pressure over 100 psig (6.89 barg). A backup metal seat provides additional safety for critical fire-relief applications when O-rings can be destroyed by high-temperature exposure. Consolidated type 1900-DA O-ring seat is available for set pressures up to 6250 psig (430.92 barg). Most other manufacturers' soft seats are limited to 1500 psig.



Type 19000 Safety Relief Valve

The Consolidated Type 19000 valve is ASME and PED certified. It meets and exceeds API seat tightness performance. The 19000 valve offers superior capacity and blowdown performance on many media types. In most cases, it does not require part changes to accommodate different media.

Inlet Sizes: ½" to 2"

Outlet Sizes: 1" through 2 1/2"

Orifice Sizes: .096" through .567"

Set Pressure Range: 5 psig to 8000 psig

Temperature Range: -425°F to 1100°F

Certifications: ASME Section III and VIII,
PED and SQL
ISO 4126-1,3

Options for 19000

19000-MS Standard Design

Metal-to-metal seat construction. Seat tightness-compliant with API 527.

19000-DA O-Ring Seat Design

Soft seat design offers bubble tight seats at up to 97 percent of valve set pressure for valves set at 101 psig (6.96 barg) and above. This option promotes higher, more efficient system operating pressures without seat leakage concerns.

DIRECT SALES OFFICE LOCATIONS

AUSTRALIA

Brisbane:
Phone: +61-7-3001-4319
Fax: +61-7-3001-4399

Perth:
Phone: +61-8-6595-7018
Fax: +61-8-6595-7299

Melbourne:
Phone: +61-3-8807-6002
Fax: +61-3-8807-6577

BELGIUM

Phone: +32-2-344-0970
Fax: +32-2-344-1123

BRAZIL

Phone: +55-19-2104-6900

CHINA

Phone: +86-10-5738-8888
Fax: +86-10-5918-9707

FRANCE

Courbevoie
Phone: +33-1-4904-9000
Fax: +33-1-4904-9010

GERMANY

Ratingen
Phone: +49-2102-108-0
Fax: +49-2102-108-111

INDIA

Mumbai
Phone: +91-22-8354790
Fax: +91-22-8354791

New Delhi

Phone: +91-11-2-6164175
Fax: +91-11-5-1659635

ITALY

Phone: +39-081-7892-111
Fax: +39-081-7892-208

JAPAN

Tokyo
Phone: +81-03-6871-9008
Fax: +81-03-6890-4620

KOREA

Phone: +82-2-2274-0748
Fax: +82-2-2274-0794

MALAYSIA

Phone: +60-3-2161-0322
Fax: +60-3-2163-6312

MEXICO

Phone: +52-55-3640-5060

THE NETHERLANDS

Phone: +31-15-3808666

RUSSIA

Veliky Novgorod
Phone: +7-8162-55-7898
Fax: +7-8162-55-7921

Moscow

Phone: +7 495-585-1276
Fax: +7 495-585-1279

SAUDI ARABIA

Phone: +966-3-341-0278
Fax: +966-3-341-7624

SINGAPORE

Phone: +65-6861-6100
Fax: +65-6861-7172

SOUTH AFRICA

Phone: +27-11-452-1550
Fax: +27-11-452-6542

SOUTH & CENTRAL AMERICA AND THE CARIBBEAN

Phone: +55-12-2134-1201
Fax: +55-12-2134-1238

SPAIN

Phone: +34-93-652-6430
Fax: +34-93-652-6444

UNITED ARAB EMIRATES

Phone: +971-4-8991-777
Fax: +971-4-8991-778

UNITED KINGDOM

Bracknell
Phone: +44-1344-460-500
Fax: +44-1344-460-537

Skelmersdale

Phone: +44-1695-526-00
Fax: +44-1695-526-01

UNITED STATES

Jacksonville, Florida
Phone: +1-904-570-3409

Deer Park, Texas

Phone: +1-281-884-1000
Fax: +1-281-884-1010

Houston, Texas

Phone: +1-281-671-1640
Fax: +1-281-671-1735

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