



# Consolidated\* 13900 Series

## *Pilot-Operated Safety Relief Valve*

### Overview

The Consolidated 13900 series pilot-operated safety relief valve from GE is designed specifically for high capacity steam applications and contributes to the overall efficiency and profitability of plant operations.

### Features and Benefits

For system applications that require large discharge releasing capacities, GE's 13900 valve series provides very reliable working economy and a simple, efficient valve design. In addition, its valve configuration simplifies valve installation and in-line valve maintenance.

#### Greater Total System Efficiency

The main valve can handle extremely large relieving capacities, in excess of 3 million pounds of steam per hour (1,360,777 kg/hr). It has a seven-to-one discharge capacity over a "T" type orifice, and a two-to-one discharge capacity over a "W" type orifice.

#### Improved Design

The total valve external configuration is considerably smaller in size, and the valve is lighter in weight than a comparable spring-loaded valve. Because of these features, less space is required for valve installation.

A simple, efficient, and reliable direct acting valve design with few components eliminates the need for excessive spare parts inventory and reduces maintenance time.

#### Easy Installation and Maintenance

Valve configuration is considerably smaller in size and lighter in weight than a comparable spring-loaded valve. This simplifies installation, field handling, testing, and valve maintenance.

Valve maintenance is relatively simple and straightforward. The simple valve design means fewer parts, so less can go wrong, malfunctions can be readily diagnosed, and maintenance cost and process downtime can be very limited.

To simplify valve maintenance, all main valve components are removable through the top bonnet of the valve. The pilot valve can be field tested and repaired without breaking inlet and outlet piping connections on the main valve. The pilot valve opening and closing is easily adjusted on a small test facility.



### Description

The 13900 series pilot-operated safety valve is an ASME Section VIII-approved valve intended for use on compressible fluids. The valve design is simple. It consists of a small, conventional, fail-safe pilot safety valve and main valve.

The metal-to-metal contact bearing surfaces between the disc and bushing eliminate overcompression of the main valve seat O-ring, located between the disc and bushing. By removing the pressure from behind the O-ring via two small slots when the valve is open and flowing, O-ring seal blowout is eliminated. A condensate drain hole in the disc facilitates drainage of any accumulated moisture in the upper disc cavity.

The spring-loaded U-shaped Teflon® guide seal provides increased seat tightness as system pressure increases.

The Teflon® material greatly lessens friction on the main disc and allows for reliable, dependable, and repeatable disc action. The seal spring load ensures sealing at all times.

Teflon® guide rings eliminate metal-to-metal contact between the disc and guide, and eliminate friction. Main valve disc action is repeatable and reliable.

The pilot valve action directly controls the pressure forces on the main valve disc and eliminates the need for a transfer valve. System pressure that actuates the pilot valve is transmitted through a simple, full-flow-design sensing tube. The sensing tube eliminates small orifice control parts and their possible clogging characteristics and is enclosed within the valve body, which protects it from damage and freezing.

Pilot valve blowdown adjustment can be set independently of the main valve. The pilot valve can be adjusted and set before it is installed on the main valve.

The pilot valve disc is a metal-seated design that can be easily serviced and provides a seat tightness to 95 percent of set pressure.

The main unloading valve has a large orifice of up to 200 in<sup>2</sup> (1290 cm<sup>2</sup>), which reduces the number of valves required for overpressure protection and eliminates installation costs for additional header nozzles and exhaust lines.

The O-ring seat seal design and the spring-loaded Teflon® rings assure tightness and valve integrity, and simplify valve maintenance.

## Applications

- GE's 13900 series pilot-operated safety relief valve is designed for steam applications where pressures range from 50 psig (3.45 barg) to 300 psig (20.68 barg) and temperature ranges from 250°F (121°C) to 550°F (288°C). The temperature limit is applied to the valve to ensure that the Teflon® seal rings will maintain sealing integrity.

- The 13900 series valve can be used on any compressible fluid within the pressure and temperature limits of the valve, provided the fluid media exhibits characteristics similar to saturated steam. For applications other than steam, the open-lift lever cap should be reviewed for adequacy. If another cap design is required, it should be so stated.
- Four sizes of 13900 series valves are available: 114, 143, 176 and 200 in<sup>2</sup> (735, 923, 1135 and 1290 cm<sup>2</sup>). For all sizes except the 200 in<sup>2</sup> (1290 cm<sup>2</sup>), the largest possible relieving capacity is supplied for the valve inlet size specified.
- For those applications where discharge pressures at the valve outlet exceed 10 percent of the pilot valve set pressure, or where economics dictate that higher discharge pressures be required, the pilot valve can be exhausted separately and the discharge pressure of the main valve can be allowed to increase above the limit of 10 percent of the pilot valve set pressure.
- Typical valve applications include boiler feed pump turbines, flash tanks, steam lines and de-aerator.

## Standard Options

### Omni Pilot Discharge Piping

Pilot valve vent to area other than main valve outlet.

### Dump Valve Design

Rather than having a spring-loaded safety valve as its pilot valve, which opens automatically at the pre-determined set pressure, the dump valve has a pilot that is operated by an electrical signal so that the valve may be opened at any time, independent of the steam pressure.

## Specifications

INLET SIZES	16" (103 mm) through 20" (129 mm)
OUTLET SIZES	18" (116 mm) through 24" (154 mm)
INLET RATINGS	ANSI Class 300
OUTLET RATINGS	ANSI Class 150
ORIFICE SIZES	Four sizes: 114, 143, 176 and 200.
PRESSURE RANGE	50 psig (3.45 barg) to 300 psig (20.68 barg)
TEMPERATURE RANGE	250°F (121°C) to 550°F (288°C)
MATERIALS	
MAIN VALVE	Carbon steel base and 316 stainless steel internal components.



Omni Pilot Discharge Piping



Dump Valve Design

PILOT VALVE (Std.)

304 stainless steel base and internal components.

Certifications

ASME B & PVC, Section VIII, Division I  
 ASME B & PV, Code Section II  
 ASME B16.34  
 ASME B16.5  
 ASME B16.9  
 MSS SP-44

