



**SHERWOOD®**

# GSV SERIES

**SHERWOOD VALVE  
COMPRESSED GAS  
PRODUCTS**

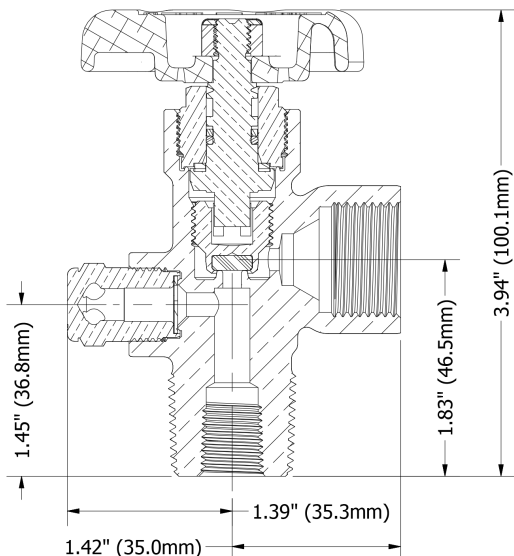


Industrial Gas Valves

**GSV & GSHV Series**  
Global Industrial Gas Valves



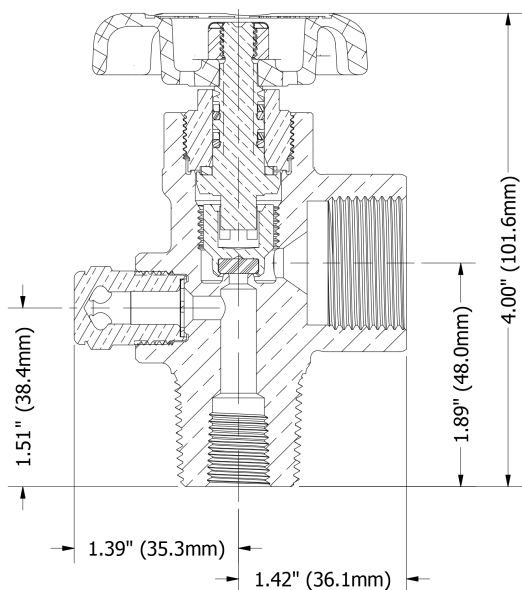
GSV58061-XX



**GSV Series**  
Up to 3500 PSI Working Pressure



GSHV70361-XX



**GSHV Series**  
Up to 6400 PSI Working Pressure

Designed for use in every country around the world, our Global Industrial Gas Valve, the GSV Series is designed to meet the newest revision of ISO 10297 and CGA V-9. For use in cylinders containing inerts, oxidizers and flammables.

**Key Features & Benefits**

- Automated assembly and testing processes ensure exceptional quality
- 100% helium leak tested
- Heavy-duty forged brass body for durability and high pressure
- Precisely machined internal components meet the most stringent international valve performance standards
- Pressure Relief Device (PRD) is a unitized plug design that provides excellent flow characteristics, ensures proper assembly and tamper resistance
- Improved metal-to-metal seal below bonnet threads prevents pressure in the threads at top of valve body
- Direct-drive stem design with optimized O-ring (GSV) or double O-ring (GSHV) seal reduces friction and operates at exceptionally low torque levels
- Inlet and outlet thread configurations are available for a broad spectrum of customer, country and code specifications
- Inlets tapped (1/4" NPT) for dip tube as required

For Product Markings Reference, see **A** on page 22.



## GSV Series

### Global Industrial Gas Valves

Design Specifications		
	English	Metric
Maximum Working Pressure	3,500 PSI	241 Bar
Burst Pressure	10,000 PSI	689 Bar
Operating Temperature Range	-50° F → +149° F	-45° C → +65° C
Storage Temperature Range	-65° F → +155° F	-54° C → +68° C
Leak Rate Internal/External	1x10 <sup>-3</sup> atm cc/sec.	1x10 <sup>-3</sup> Bar mL/sec.
Minimum Cycle Life	2000 Cycles	
Cv Flow Factor	Standard: .690 CO <sub>2</sub> /Manifold: 1.23	
Closing Torque	20–30 in.-lbs.	2.2–3.3 N-m
Operating Torque	10–20 in.-lbs.	1.1–2.2 N-m
Bonnet Installation Torque	50–60 ft.-lbs.	68–81 N-m
Handwheel Nut Installation Torque	15–35 in.-lbs.	1.7–3.9 N-m
PRD Installation Torque	25–35 ft.-lbs.	34–47 N-m
PRD Flow Capacity	60 cfm @ 100 PSI	1700 L/min. @ 6.9 Bar

Materials of Construction	
Part Description	Materials of Construction
Body	Forged Brass C37700; Chrome Plating When Applicable
Bonnet	Brass C36000; Chrome Plating When Applicable
Handwheel	Aluminum A380
Handwheel Nut	Steel Class 8, Zinc Plating
Lower Plug	Brass C48500
Lower Plug Seat	Nylon Zytel 101
PRD	<b>Plug:</b> Brass C36000; Chrome Plating When Applicable <b>Rupture Disc:</b> Nickel Alloy 201; Copper C22000 <b>Webbed Seal Gasket:</b> Copper Dead Soft C11000
Stem	Brass C36000
O-Ring	Ethylene Propylene (EPDM)
Back-up O-Ring	PTFE
Thrust Washer	Delrin® 500 AF

NOTE: GSV Series valves are not for use with CNG applications. For CNG Service, see NGSV Series on **pages 15-17**. No mechanical addition of force is to be used with handwheel-style valves without the use of controlled torque.

Standards Conformance	
CGA V-9	Standard for Gas Cylinder Valves
CGA S1.1	Standard for Pressure Relief Devices
CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Specifications
ISO 10297	International Standard for Cylinder Valves Design Specifications
ISO 11363-1	25E Inlet Thread Specifications
A-A-59860	U.S. General Services Administration Standards for Gas Cylinder Valves

Inlet O-Ring for Straight Threaded GSV Valves		
Sherwood Part Number	Size	Material
G907A	.625 UNF	Buna-N
G210A-9	.750 UNF	Buna-N
G216B	1.125 UNF	Buna-N
G016T	.625 UNF	PTFE
G210T	.750 UNF	PTFE
P1100X15-20T	1.125 UNF	PTFE

Lubricants	
Christo-Lube	Used in Valves for All Industrial Gas Applications

Replacement Parts	
Sherwood Part Number	Description
1251-6	Handwheel Nut
1919A	Handwheel
P625-19X9-XX	Pressure Relief Device Unitized Assembly Includes: Plug, Rupture Disc and Webbed Seal Washer

For further ordering information, refer to the Selection of Pressure Relief Devices on **page 18**, the Pressure Relief Device Numbering Matrix on **page 21**, the Product Markings Reference on **page 22** and the valve Part Numbering Matrix on **page 24**.

## GSHV Series

### Global Industrial Gas Valves

Design Specifications		
	English	Metric
Maximum Working Pressure	6,400 PSI	441 Bar
Burst Pressure	13,500 PSI	931 Bar
Operating Temperature Range	-50° F → +149° F	-45° C → +65° C
Storage Temperature Range	-65° F → +155° F	-54° C → +68° C
Leak Rate Internal/External	1x10 <sup>-4</sup> atm cc/sec.	1x10 <sup>-4</sup> Bar mL/sec.
Minimum Cycle Life	2000 Cycles	
Cv Flow Factor	Standard: .690	
Closing Torque	20–30 in.-lbs.	2.2–3.3 N-m
Operating Torque	10–20 in.-lbs.	1.1–2.2 N-m
Bonnet Installation Torque	60–70 ft.-lbs.	81–95 N-m
Handwheel Nut Installation Torque	15–35 in.-lbs.	1.7–3.9 N-m
PRD Installation Torque	40–50 ft.-lbs.	54–68 N-m
PRD Flow Capacity	60 cfm @ 100 PSI	1700 L/min. @ 6.9 Bar

Materials of Construction	
Part Description	Materials of Construction
Body	Forged Brass C37700; Chrome Plating When Applicable
Bonnet	Brass C36000; Chrome Plating When Applicable
Handwheel	Aluminum A380
Handwheel Nut	Steel Class 8, Zinc Plating
Lower Plug	Brass C48500
Lower Plug Seat	Nylon Zytel 101
PRD	<b>Plug:</b> Brass C36000; Chrome Plating When Applicable <b>Rupture Disc:</b> Nickel Alloy 201; Copper C22000 <b>Webbed Seal Gasket:</b> Copper Dead Soft C11000
Stem	Brass C36000
O-Ring	Ethylene Propylene (EPDM)
Back-up O-Ring	PTFE
Thrust Washer	Delrin® 500 AF

NOTE: GSHV Series valves are not for use with CNG applications. For CNG Service, see NGSHV Series on pages 15-17. No mechanical addition of force is to be used with handwheel-style valves without the use of controlled torque.

Standards Conformance	
CGA V-9	Standard for Gas Cylinder Valves
CGA S1.1	Standard for Pressure Relief Devices
CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Specifications
ISO 10297	International Standard for Cylinder Valves Design Specifications
ISO 11363-1	25E Inlet Thread Specifications
A-A-59860	U.S. General Services Administration Standards for Gas Cylinder Valves

Lubricants	
Christo-Lube	Used in Valves for All Industrial Gas Applications
Turmoxygen	Used in Valves for Oxygen Service

Replacement Parts	
Sherwood Part Number	Description
1251-6	Handwheel Nut
1919A	Handwheel
P625-19X9H-XX	Pressure Relief Device Unitized Assembly Includes: Plug, Rupture Disc and Webbed Seal Washer

For further ordering information, refer to the Selection of Pressure Relief Devices on page 18, the Pressure Relief Device Numbering Matrix on page 21, the Product Markings Reference on page 22 and the valve Part Numbering Matrix on page 24.

## Industrial Gas Valves

## GSV &amp; GSHV Series

## Global Industrial Gas Valves

For further ordering information, refer to the Selection of Pressure Relief Devices on [page 18](#), the Pressure Relief Device Numbering Matrix on [page 21](#), the Product Markings Reference on [page 22](#) and the Valve Part Numbering Matrix on [page 24](#)

## Ordering Information

Sherwood Part Number	Gas Service @ 70° F	CGA Outlet	Outlet Thread Size	Inlet Thread Size
<i>Carbon Dioxide</i>				
GSV32041-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	½" NGT
GSV32061-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	¾" NGT
GSV32081-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	1" NGT
GSV32025E1-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	25E ISO
GSV32051-XX-75	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	.750–16 UNF
GSV32051-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	1.125–12 UNF
<i>Nitrous Oxide</i>				
GSV32641-XX	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	½" NGT
GSV32661-XX	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	¾" NGT
GSV32681-XX	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	1" NGT
GSV32625E1-XX	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	25E ISO
GSV32651-XX-75	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	.750–16 UNF
GSV32651-XX	0 PSI–3000 PSI	326	.825–14 NGO RH Ext.	1.125–12 UNF
<i>Air</i>				
GSV34641-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	½" NGT
GSV34661-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	¾" NGT
GSV34681-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	1" NGT
GSV34625E1-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	25E ISO
GSV34651-XX-75	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	.750–16 UNF
GSV34651-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	1.125–12 UNF
GSHV34761-XX	3001 PSI–4700 PSI	347	.825–14 NGO RH Ext.	¾" NGT
GSHV70261-XX	4701 PSI–6400 PSI	702	1.125–14 NGO RH Int.	¾" NGT
<i>Carbon Monoxide and Hydrogen</i>				
GSV35045-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
GSV35065-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
GSV35085-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1" NGT
GSV35025E5-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E ISO
GSV35055-XX-75	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	.750–16 UNF
GSV35055-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1.125–12 UNF
GSHV69565-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	¾" NGT
GSHV70365-XX	4701 PSI–6400 PSI	703	1.125–14 NGO LH Int.	¾" NGT
<i>Oxygen</i>				
GSV54041-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	½" NGT
GSV54061-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	¾" NGT
GSV54081-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	1" NGT
GSV54051-XX-75	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	.750–16 UNF
GSV54051-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	1.125–12 UNF
GSHV57761-XX	3001 PSI–3500 PSI	577	.960–14 NGO RH Ext.	¾" NGT
GSHV70161-XX	3501 PSI–4700 PSI	701	1.103–14 NGO RH Ext.	¾" NGT
<i>Argon, Helium, Krypton, Neon, Nitrogen and Xenon</i>				
GSV58041-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	½" NGT
GSV58061-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	¾" NGT
GSV58081-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	1" NGT
GSV58025E1-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	25E ISO
GSV58051-XX-75	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	.750–16 UNF
GSV58051-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	1.125–12 UNF
GSHV68061-XX	3001 PSI–4700 PSI	680	1.045–14 NGO RH Int.	¾" NGT
GSHV67761-XX	4701 PSI–6400 PSI	677	1.030–14 NGO LH Ext.	¾" NGT
<i>Sulfur Hexafluoride</i>				
GSV59041-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	½" NGT
GSV59061-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	¾" NGT
GSV59081-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	1" NGT
GSV59025E1-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	25E ISO
GSV59051-XX-75	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	.750–16 UNF
GSV59051-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	1.125–12 UNF

**Oversize Inlets:** 4 and 7 (low-pressure) and 24 (high-pressure) threads oversize inlets: To order, add -4, -7 or -24 to the end of the Part Number. For example, GSV34661-XX becomes GSV34661-XX-7

**Chrome plating:** To order, add letter "A" after letters GSV or GSHV in the Part Number. For example, GSV34661-XX becomes GSVA34661-XX.

**Lexan® polycarbonate handwheels:** To order, add suffix LX to the end of the Part Number. For example, GSV34661-XX becomes GSV34661-XXLX.

**Fusible backed pressure relief devices:** For 165° F or 212° F nominal melting temperatures, change 1 in the Part Number to 4 (165° F) or to 5 (212° F) (e.g. GSV35061-XX becomes GSV35064-XX for 165° F, or GSV35065-XX for 212° F).



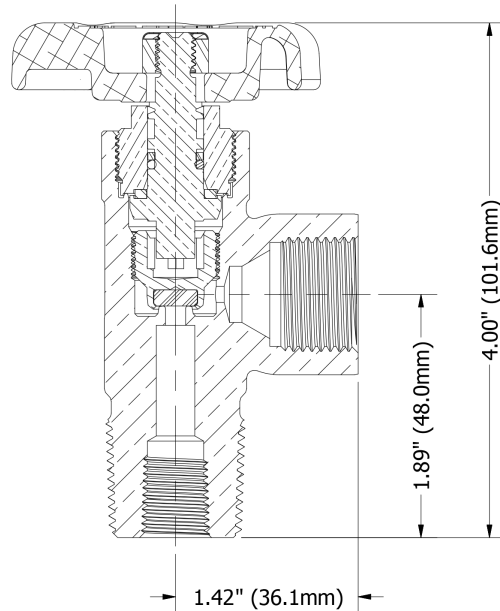
Industrial Gas Valves

# GSV Series Cylinders

## For Manifold, Oxygen and Fuel Gas



GSV58060



For further ordering information, refer to the GSV Specifications on [page 3](#), the GSHV Specification on [page 4](#) and the Valve Part Numbering Matrix on [page 24](#).

Ordering Information				
Sherwood Part Number	CGA Outlet	Outlet Thread Size	Inlet Thread Size	Description
<i>GSV O-Ring-Style Manifold Valves</i>				
GSV32040	320	.825"-14 NGO	1/2"-NGT	No PRD
GSV32060	320	.825"-14 NGO	3/4"-NGT	No PRD
GSV35040	350	.825"-14 NGO	1/2"-NGT	No PRD
GSV35060	350	.825"-14 NGO	3/4"-NGT	No PRD
GSV54040	540	.903"-14 NGO	1/2"-NGT	No PRD
GSV54060	540	.903"-14 NGO	3/4"-NGT	No PRD
GSV58040	580	.965"-14 NGO	1/2"-NGT	No PRD
GSV58060	580	.965"-14 NGO	3/4"-NGT	No PRD
GSHV68040	680	1.045"-14 NGO	1/2"-NGT	No PRD
GSHV68060	680	1.045"-14 NGO	3/4"-NGT	No PRD
<i>GSV O-Ring-Style Cylinder Valves, Tapered Thread for Fuel Gas and Oxygen</i>				
GSV02440	024	.875"-14 UNF	1/2"-NGT	No PRD
GSV02440CC	024	.875"-14 UNF	1/2"-NGT	No PRD; Cap and Chain
GSV02540	025	.875"-14 UNF	1/2"-NGT	No PRD
GSV02540CC	025	.875"-14 UNF	1/2"-NGT	No PRD; Cap and Chain

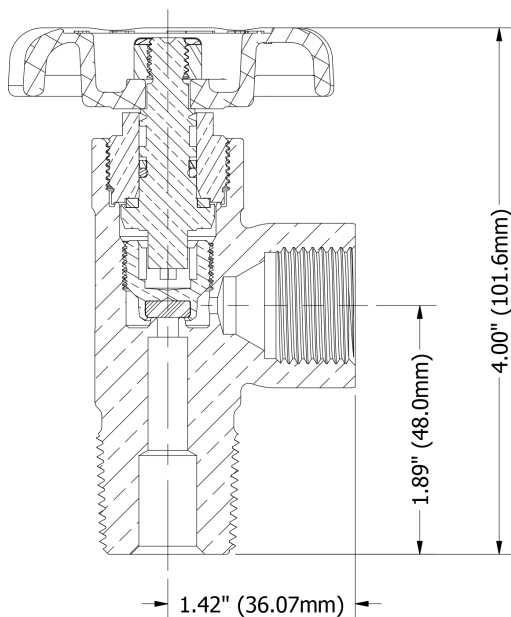
For Product Markings Reference, see **(A)** on [page 22](#).

## GSV Acetylene Series

### Large Cylinder Acetylene Valves



GSV51060



#### Key Features & Benefits

- Durable forged brass body, precisely machined internal components and design elements have been upgraded to meet the newest revision of ISO 10297 and CGA V-9.
- High-temperature aluminum alloy handwheel with large drainage holes
- 100% helium leak tested
- Designed with low-torque operation for easy hand use
- Durable lower plug made of tough naval brass resists wear
- Precise quality machining results in exceptional finishes for low-torque sealing
- Metal-to-metal seal below bonnet threads prevents pressure accumulation at top of valve body
- High durometer back-up ring prevents extrusion of O-ring in extreme applications
- Peroxide curing of elastomeric seals enhances valve longevity
- Direct drive stem design with optimized single O-ring seal reduces friction and operates at exceptionally low torque levels

#### Ordering Information

Sherwood Part Number	CGA Outlet Number	Outlet Thread Size	Inlet Thread Size
GSV30040	300	.825"-14 NGO RH Ext. (Commercial)	½" NGT
GSV30060	300	.825"-14 NGO RH Ext. (Commercial)	¾" NGT
GSV30080	300	.825"-14 NGO RH Ext. (Commercial)	1" NGT
GSV41060	410	.850"-14 NGO LH Ext. (Canadian Std.)	¾" NGT
GSV51040	510	.885"-14 NGO LH Int. (POL)	½" NGT
GSV51060	510	.885"-14 NGO LH Int. (POL)	¾" NGT
GSV51080	510	.885"-14 NGO LH Int. (POL)	1" NGT

For Product Markings Reference, see **A** on page 22

## GSV Acetylene Series

### Global Industrial Gas Valves

Design Specifications		
	English	Metric
Maximum Working Pressure	500 PSI	34.5 Bar
Burst Pressure	13,184 PSI	909 Bar
Operating Temperature Range	-50° F → +149° F	-45° C → +65° C
Storage Temperature Range	-65° F → +155° F	-54° C → +68° C
Leak Rate Internal/External	1x10 <sup>-3</sup> atm cc/sec.	1x10 <sup>-3</sup> Bar mL/sec.
Minimum Cycle Life	2000 Cycles	
Cv Flow Factor	Standard: .690	
Closing Torque	20–30 in.-lbs.	2.2–3.3 N-m
Operating Torque	10–20 in.-lbs.	1.1–2.2 N-m
Bonnet Installation Torque	50–60 ft.-lbs.	68-81 N-m
Handwheel Nut Installation Torque	15–35 in.-lbs.	1.7–3.9 N-m

Materials of Construction	
Part Description	Materials of Construction
Body	Forged Brass C37700; Chrome Plating When Applicable
Bonnet	Brass C36000; Chrome Plating When Applicable
Handwheel	Aluminum A380
Handwheel Nut	Steel Class 8, Zinc Plating
Lower Plug	Brass C48500
Lower Plug Seat	Nylon Zytel 101
PRD	<b>Plug:</b> Brass C36000; Chrome Plating When Applicable <b>Rupture Disc:</b> Nickel Alloy 201; Copper C22000 <b>Webbed Seal Gasket:</b> Copper Dead Soft C11000
Stem	Brass C36000
O-Ring	Ethylene Propylene (EPDM)
Back-up O-Ring	PTFE
Thrust Washer	Delrin® 500 AF

Standards Conformance	
CGA V-9	Standard for Gas Cylinder Valves
CGA S1.1	Standard for Pressure Relief Devices
CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Specifications
ISO 10297	International Standard for Cylinder Valves Design Specifications
ISO 11363-1	25E Inlet Thread Specifications
A-A-59860	U.S. General Services Administration Standards for Gas Cylinder Valves

Lubricants	
Christo-Lube	Used in Valves for All Industrial Gas Applications

Replacement Parts	
Sherwood Part Number	Description
1251-6	Handwheel Nut
1919A	Handwheel
P625-19X9H-XX	Pressure Relief Device Unitized Assembly Includes: Plug, Rupture Disc and Webbed Seal Washer

For further ordering information, refer to the Selection of Pressure Relief Devices on **page 18**, the Pressure Relief Device Numbering Matrix on **page 21**, the Product Markings Reference on **page 22** and the valve Part Numbering Matrix on **page 24**.

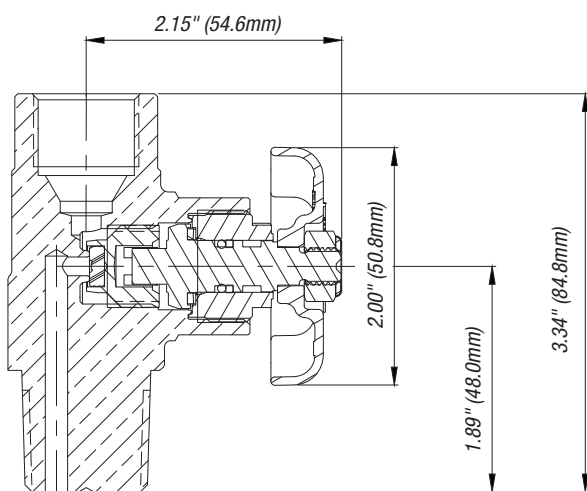


Acetylene Valves

**GSVT Series**  
Vertical Outlet Acetylene Valves



GSVT51060



GSVT51060

Standards Conformance	
CGA V-9	Standard for Gas Cylinder Valves
CGA S-1.1	Standard for Pressure Relief Devices
CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Connections
A-A-59860	US General Services Administration Standards for Gas Cylinder Valves

Ordering Information			
Sherwood Part Number	CGA Outlet	Outlet Thread Size	Inlet Thread Size
GSVT51060	510	.885-14 NGO LH Int.	3/4" NGT
GSVT30060	300	.825-14 NGO RH Ext.	3/4" NGT

**Key Features & Benefits**

- This valve is used on 360° collar type cylinders (including WB, WQ, WS, WT and WK style)
- Heavy-duty brass forged body
- O-ring designed for leak integrity and easy operation
- Handwheel eliminates interference with cylinder collar
- Easy-to-read valve markings roll stamped on outlet neck
- Soft seat design provides positive shut-off

Design Specifications		
	English	Metric
Max. Working Pressure	500 PSI	34.5 Bar
Burst Pressure	15,000 PSI	1034 Bar
Leak Rate	1x10 <sup>-3</sup> atm cc/sec.	1x10 <sup>-3</sup> Bar mL/sec.
Temperature Range		
Operating	-50° F → +149° F	-46° F → +65° F
Cycle Life Min.	2000 Cycles	2000 Cycles
Max. Operating Torque	10-20 in.-lbs.	1.1-2.2 N-m
Closing Torque	20-30 in.-lbs.	2.2-3.3 N-m
Cv Flow Factor	.69	.69
Seat Orifice	.158 in.	4.0 mm

Materials of Construction	
Part Description	Materials of Construction
Handwheel	Aluminum ASTM SC84B
Locknut	Class 8 Steel with Nylon Insert
Stem	Brass C36000
Bonnet	Brass C36000 H02 Temper 1/2 Hard or CW614N Brass (European)
Backup O-Ring	PTFE
O-Ring	Ethylene Propylene (EPDM)
Thrust Washer	Delrin® 500AF
<b>Plug and Seat Subassembly</b>	
Plug	Leaded Naval Brass C48500
Seat	Nylon, Zytel 101
Body	Forged Brass C37000
Lubricants	Christo-Lube

For Product Markings Reference, see **A** on page 22.



## GSRPV Series

### Residual Pressure Valves

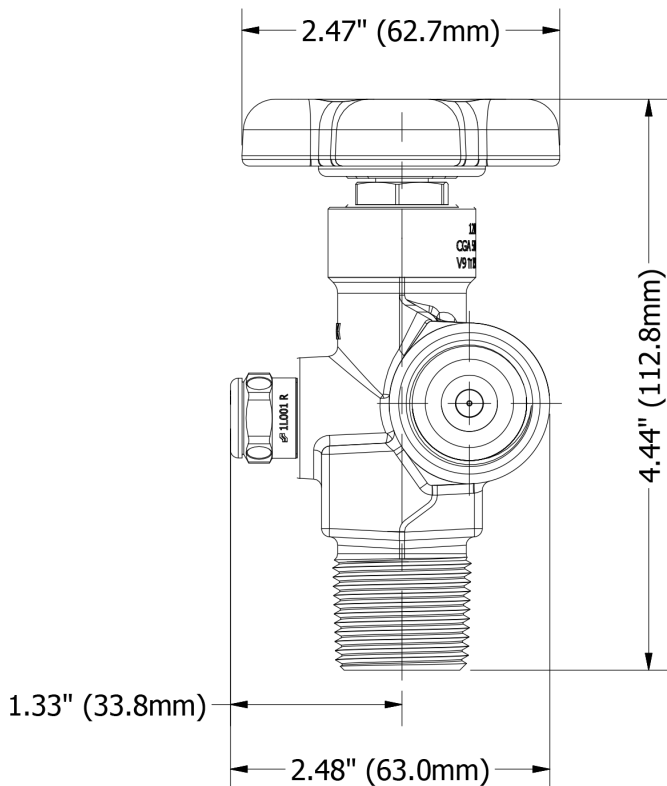


GSRPV58061-XX

Residual pressure valve designed to protect cylinder and contents.

#### Key Features & Benefits

- Prevents backflow of impurities and foreign substances
- Automated assembly and testing processes ensure exceptional quality
- 100% helium leak tested
- Durable forged brass body, precisely machined internal components and design elements meet the most stringent international valve performance standards
- Innovative design and quality construction offer protection of cylinder contents without the expense of a time-consuming purge-and-clean cycle
- Retains approximately 30 to 50 PSI pressure, maintaining the integrity of the cylinder contents against contaminants, even if the valve is left open
- Protects and extends life of cylinder by preventing ingress of moisture
- Pressure Relief Device (PRD) is a unitized plug design that provides excellent flow characteristics, ensures proper assembly and tamper resistance
- Dynamic front piston seal design is not in direct contact with the flow passage during filling
- Inlet and outlet thread configurations are available for a broad spectrum of customer, country and code specifications
- Optical Character Recognition technology utilized to verify appropriate burst disc pressure rating
- Exclusive “webbed washer” design protects burst disc during handling and bulk shipment
- Inlets tapped (1/4" NPT) for dip tube as required



GSRPV58061-XX

## Industrial Gas Valves

## GSRPV Series

### Residual Pressure Valves

For further ordering information, refer to the Selection of Pressure Relief Devices on [page 20](#), the Pressure Relief Device Numbering Matrix on [page 23](#), the Product Markings Reference on [page 24](#) and the Valve Part Numbering Matrix on [page 26](#).

Design Specifications		
	English	Metric
Maximum Working Pressure	3500 PSI	413 Bar
Burst Pressure	10,000 PSI	1035 Bar
Operating Temperature Range	-50° F → +149° F	-45° C → +65° C
Storage Temperature Range	-65° F → +155° F	-54° C → +68° C
Leak Rate Internal/External	1x10 <sup>-3</sup> atm cc/sec.	1x10 <sup>-3</sup> Bar mL/sec.
Minimum Cycle Life	2000 Cycles	
Cv Flow Factor	.26	
Closing Torque	20–30 in.-lbs.	2.2–3.3 N-m
Operating Torque	10–20 in.-lbs.	1.1–2.2 N-m
Bonnet Installation Torque	50–60 ft.-lbs.	68–81 N-m
Handwheel Nut Installation Torque	15–35 in.-lbs.	1.7–3.9 N-m
PRD Installation Torque	25–35 ft.-lbs.	34–47 N-m
PRD Flow Capacity	60 cfm @ 100 PSI	1700 L/min. @ 6.9 Bar

Materials of Construction	
Part Description	Materials of Construction
Body	Brass C37700/Chrome Plating When Applicable
Bonnet	Brass C36000/Chrome Plating When Applicable
Handwheel	Aluminum A380
Handwheel Nut	Steel Class 8, Zinc Plating
Lower Plug	Brass C48500
Lower Plug Seat	Nylon Zytel 101
PRD	<b>Plug:</b> Brass C36000/Chrome Plating When Applicable <b>Rupture Disc:</b> Nickel Alloy 201; Copper C22000 <b>Webbed Seal Gasket:</b> Copper Dead Soft C11000
Stem	Brass C36000
O-Ring	Ethylene Propylene (EPDM)
Back-up O-Ring	PTFE
Thrust Washer	Delrin® 500 AF
RPV Piston	Brass C3600
RPV Plug	Brass C36000/Chrome Plating When Applicable
RPV Spring	Beryllium Copper
Piston O-Ring	Ethylene Propylene (EPDM)
Piston O-Ring	Ethylene Propylene (EPDM)
RPV Plug O-Ring	Ethylene Propylene (EPDM)

NOTE: GSRPV Series valves are not for use with CNG applications. For CNG Service, see NGRSPV Series on [pages 15-17](#). No mechanical addition of force is to be used with handwheel-style valves without the use of controlled torque.



Standards Conformance	
CGA V-9	Standard for Gas Cylinder Valves
CGA S1.1	Standard for Pressure Relief Devices
CGA V-1	Compressed Gas Cylinder Valve Outlet and Inlet Specifications
ISO 10297	International Standard for Cylinder Valves Design Specifications
ISO 11363-1	25E Inlet Thread Specifications
A-A-59860	U.S. General Services Administration Standards for Gas Cylinder Valves

#### Inlet O-Ring for Straight Threaded GSRPV Series Residual Pressure Valves

Sherwood Part Number	Size	Material
G216B	1.125 UNF	Buna-N

#### Lubricants

Christo-Lube	Used in Valves for All Industrial Gas Applications
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#### Replacement Parts

Sherwood Part Number	Description
1251-6	Handwheel Nut
1919A	Handwheel
P625-19X9H-XX	Pressure Relief Device Unitized Assembly Includes: Plug, Rupture Disc and Webbed Seal Washer

For further ordering information, refer to the Selection of Pressure Relief Devices on [page 18](#), the Pressure Relief Device Numbering Matrix on [page 21](#), the Product Markings Reference on [page 22](#) and the valve Part Numbering Matrix on [page 24](#).



## GSRPV Series

### Residual Pressure Valves

For further ordering information, refer to the Selection of Pressure Relief Devices on **page 18** the Pressure Relief Device Numbering Matrix on **page 21**, the Product Markings Reference on **page 22** and the Valve Part Numbering Matrix on **page 24**.

Ordering Information				
Sherwood Part Number	Gas Service @ 70° F	CGA Outlet	Outlet Thread Size	Inlet Thread Size
<i>Air</i>				
GSRPV34641-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	½" NGT
GSRPV34661-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	¾" NGT
GSRPV34625E1-XX	0 PSI–3000 PSI	346	.825–14 NGO RH Ext.	25E
<i>Argon</i>				
GSRPV58041-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	½" NGT
GSRPV58061-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	¾" NGT
GSRPV58025E1-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	25E
<i>Carbon Dioxide</i>				
GSRPV32041-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	½" NGT
GSRPV32061-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	¾" NGT
GSRPV32051-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	1.125"–12 UNF
GSRPV32025E1-XX	0 PSI–3000 PSI	320	.825–14 NGO RH Ext.	25E
<i>Helium</i>				
GSRPV58041-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	½" NGT
GSRPV58061-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	¾" NGT
GSRPV58025E1-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	25E
<i>Hydrogen</i>				
GSRPV35045-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
GSRPV35065-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
GSRPV35025E5-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E
<i>Nitrogen</i>				
GSRPV58041-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	½" NGT
GSRPV58061-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	¾" NGT
GSRPV58025E1-XX	0 PSI–3000 PSI	580	.965–14 NGO RH Int.	25E
<i>Oxygen</i>				
GSRPV54041-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	½" NGT
GSRPV54061-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	¾" NGT
GSRPV54025E1-XX	0 PSI–3000 PSI	540	.903–14 NGO RH Ext.	25E
<i>Sulfur Hexafluoride</i>				
GSRPV59041-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	½" NGT
GSRPV59061-XX	0 PSI–3000 PSI	590	.965–14 NGO LH Int.	¾" NGT

#### Options

To order 7 threads oversize inlets, add -7 to the end of the Part Number (e.g. GSRPV58061-XX becomes GSRPV58061-XX-7).

To order chrome plating, add letter "A" after letters GSRPV in the Part Number (e.g. GSRPV58061-XX becomes GSRPVA58061-XX).

To order fusible backed Pressure Relief devices in 165° F or 212° F nominal melting temperatures, change 1 in the Part Number to 4 (165° F) or to 5 (212° F) (e.g. GSRPV35061-XX becomes GSRPV35064-XX for 165° F, or GSRPV35065-XX for 212° F).

*NOTE: GSRPV valves are not approved for CNG service. For CNG Service, see NGSRPV Series on pages 15–17. Not all valves are available in all configurations. Contact factory for availability. Orders may be subject to minimum quantities.*

For Product Markings Reference, see **B** on page 22.

## Fill Adapters for GSRPV Series

Ordering Information		
Sherwood Part Number	Inlet	Outlet
<i>Nipples with Retractable Pin (includes brass nut as shown)</i>		
TLG580SLW*	1/4" NPT	CGA 580
TLG590SLW*	1/4" NPT	CGA 590

Retractable Pin Adapters provide maximum operating flexibility to fill or evacuate a cylinder with either a conventional valve or a GSRPV. Engage the Pin Locking Tool (see below) and rotate the tool clockwise to depress the pin for use with a conventional valve. Or rotate the tool counterclockwise to release the pin for use with a GSRPV valve. The adapters incorporate an O-ring seal for a hand-tight connection.

\*Adapters can be used with TV RPV and GRPV also.

Ordering Information		
Sherwood Part Number	Inlet	Outlet
<i>Nipples with Fixed Pin (includes brass nut as shown)</i>		
TLG320W	1/4" NPT	CGA 320
TLG346S	1/4" NPT	CGA 346
TLG350S	1/4" NPT	CGA 350
TLG540S	1/4" NPT	CGA 540

Ordering Information		
Sherwood Part Number	Inlet	Outlet
<i>Matching CGA Outlet and Inlet Adapter</i>		
TL580D	CGA 580 Female	CGA 580 Male
TL590D	CGA 590 Female	CGA 590 Male

TLG580, TLG580SLW Rebuild Kit	
Sherwood Part Number	Description
TL580A-30-R	Each kit includes 25 Plunger & Pin Assemblies
TL580SP	Nose Bushing Torque Spanner sold separately

Ordering Information	
Sherwood Part Number	Description
TL580B	Pin Locking Tool

Used with Retractable Pin Adapter.

Ordering Information	
Sherwood Part Number	Description
TL580C	Checking Rod

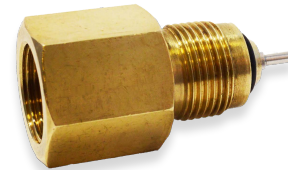
Understanding Fill Adapter Part Numbers	
S	Stainless Steel
L	Retractable Pin
W	Washer or O-Ring Seal
D	Matching CGA Outlet and Inlet



TLG580SLW



TLG346S



TL580D



TL580B

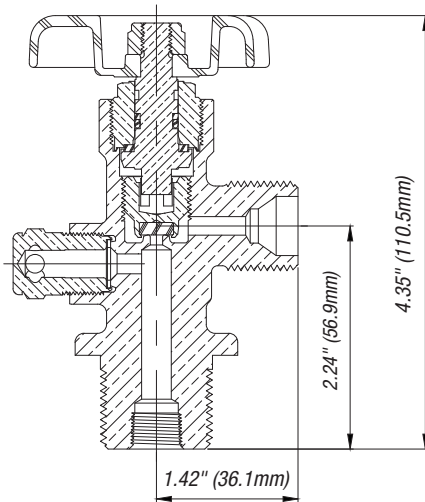


TL580C

Gas cylinders can be checked for content integrity by simply inserting the Checking Rod and pushing against the resistance of the check valve. The sound of escaping gas indicates residual cylinder pressure.

## GSV MRI Series

### Global Valves for Use in MRI Environments



GSV54051-XXMRI

High Capacity Oxygen Valve designed for use in Magnetic Resonance Environments (MRI), specifically when installed on high-capacity aluminum cylinders.

#### Key Features & Benefits

- Supports aluminum cylinder capacity to 265 cu. ft. with various straight-threaded inlet sizes to fit your needs
- Special construction process significantly reduces magnetic attraction
- Tested and meets all known tests for MRI-compatible components used in conjunction with a magnetic resonance imager for Level 3 Tesla requirements
- Clearly identified for hospital settings with ASTM standard F 2503-05 markings
- Cleaned for oxygen service and oil free per CGA G-4.1
- Automated assembly and testing processes ensure exceptional quality
- 100% helium leak tested
- Heavy-duty forged brass body for durability and high pressure
- Precisely machined internal components meet the most stringent international valve performance standards
- Pressure Relief Device (PRD) is a unitized plug design which provides excellent flow characteristics, ensures proper assembly and tamper resistance
- Metal-to-metal seal below bonnet threads prevents pressure in the threads at the top of the valve body
- Direct-drive stem design with optimized O-ring (GSV) or double O-ring (GSHV) seal reduces friction and operates at exceptionally low torque levels
- Inlet and outlet thread configurations are available for a broad spectrum of customer, country and code specifications
- Inlets tapped (1/4" NPT) for dip tube as required
- For more information, refer to GSV Design Specifications on page 3

For Product Markings Reference, see **A** on page 22.

#### Ordering Information

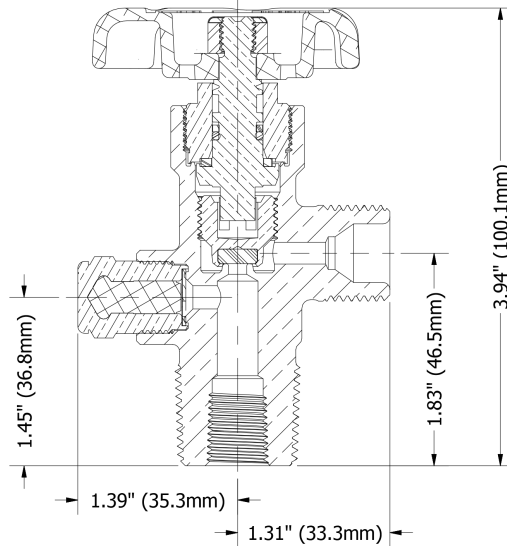
Sherwood Part Number	Gas Service @ 70° F	CGA	Outlet Thread Size	Inlet Thread Size
GSV32051-XXMRI	0–3000 PSI	320	.825–14 NGO RH Ext.	1.125-12 UNF
GSV32051-XX-75MRI	0–3000 PSI	320	.825–14 NGO RH Ext.	.750-16 UNF
GSV32651-XXMRI	0–3000 PSI	326	.825–14 NGO RH Ext.	1.125-12 UNF
GSV32651-XX-75MRI	0–3000 PSI	326	.825–14 NGO RH Ext.	.750-16 UNF
GSV34651-XXMRI	0–3000 PSI	346	.825–14 NGO RH Ext.	1.125-12 UNF
GSV34651-XX-75MRI	0–3000 PSI	346	.825–14 NGO RH Ext.	.750-16 UNF
GSV54051-XXMRI	0–3000 PSI	540	.903–14 NGO RH Ext.	1.125-12 UNF
GSV54051-XX-75MRI	0–3000 PSI	540	.903–14 NGO RH Ext.	.750-16 UNF
GSV58051-XXMRI	0–3000 PSI	580	.965–14 NGO RH Int.	1.125-12 UNF
GSV58051-XX-75MRI	0–3000 PSI	580	.965–14 NGO RH Int.	.750-16 UNF

## NGSV, NGSHV & NGSRPV Series

### Global Industrial Gas Valves for Hydrocarbon-Based Flammable Gases



NGSV35065-XX

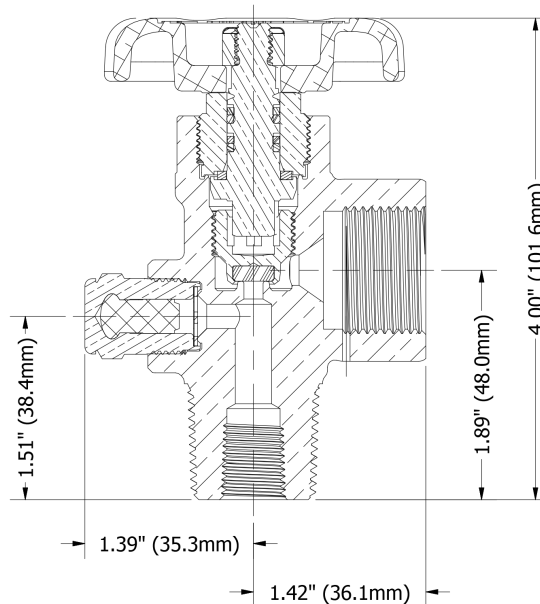


#### NGSV Series

Up to 3,500 PSI Working Pressure



NGSHV69565-XX



#### NGSHV

Up to 6,400 PSI Working Pressure

Global valve for hydrocarbon-based flammable gases, including compressed natural gas (CNG), methane, ethane and other similar gases.

#### Key Features & Benefits

- Automated assembly and testing processes ensure exceptional quality
- 100% helium leak tested
- Heavy-duty forged brass body for durability and high pressure
- Precisely machined internal components meet the most stringent international valve performance standards
- Reduced internal stress zones
- Innovative valve core design
- Durable Buna-N O-ring and PTFE backup O-ring compatible with flammable gases
- Pressure Relief Device (PRD) is a unitized plug design that provides excellent flow characteristics, ensures proper assembly and tamper resistance
- Metal-to-metal seal below bonnet threads prevents pressure in the threads at top of valve body
- Direct-drive stem design with optimized O-ring (NGSV) or double O-ring (NGSHV) seal reduces friction and operates at exceptionally low torque levels
- Inlets tapped (1/4" NPT) for dip tube as required

For Product Markings Reference, see **A** on page 22.

## Alternative Energy Valves

## NGSV, NGSHV &amp; NGSRPV Series

## Global Industrial Gas Valves for Hydrocarbon-Based Flammable Gases

For further ordering information, refer to the Selection of Pressure Relief Devices on **page 18** the Pressure Relief Device Numbering Matrix on **page 21**, the Product Markings Reference on **page 22** and the Valve Part Numbering Matrix on **page 24**.

Design Specifications		
	English	Metric
<b>Maximum Working Pressure</b>	NGSV: 3,500 PSI NGSHV: 6,400 PSI	NGSV: 241 Bar NGSHV: 413 Bar
<b>Burst Working Pressure</b>	NGSV: 10,000 PSI NGSHV: 13,500 PSI	NGSV: 689 Bar NGSHV: 931 Bar
<b>Operating Temperature Range</b>	-50° C → +130° F	-45° C → +54° C
<b>Leak Rate Internal/External</b>	1x10 <sup>-3</sup> atm cc/sec.	1x10 <sup>-3</sup> Bar mL/sec.
<b>Minimum Cycle Life</b>	2000 Cycles	
<b>Cv Flow Factor</b>	Standard: .690	
<b>Operating Torque</b>	NGSV: 10–20 in.-lbs. NGSHV: 10–20 in.-lbs.	NGSV: 1.1–2.2 N-m NGSHV: 1.1–2.2 N-m
<b>Bonnet Assembly Torques</b>	NGSV: 50–60 ft.-lbs. NGSHV: 60–70 ft.-lbs.	NGSV: 67.8–81.3 N-m NGSHV: 81.3–94.9 N-m
<b>PRD Torques</b>	NGSV: 25–35 ft.-lbs. NGSHV: 40–50 ft.-lbs.	NGSV: 33.9–47.4 N-m NGSHV: 54.2–67.8 N-m
<b>NGSRPV Cap Assembly Torques</b>	15–25 ft.-lbs.	20.3–33.9 N-m

Materials of Construction	
Part Description	Materials of Construction
Body	Brass C37700; Chrome Plating When Applicable
Bonnet	Brass C36000; Chrome Plating When Applicable
Handwheel	Aluminum A380
Handwheel Nut	Steel Class 8, Zinc Plating
Lower Plug	Brass C48500
Lower Plug Seat	Nylon, Zytel 101
PRD	<b>Plug:</b> Brass C36000; Chrome Plating When Applicable <b>Rupture Disc:</b> Nickel Alloy 201; Copper C22000 <b>Webbed Seal Gasket:</b> Copper Dead Soft C11000
Stem	Brass C36000
O-Ring	Buna-N
Back-up O-Ring	PTFE
Thrust Washer	Delrin® 500 AF

Standards Conformance	
<b>CGA V-9</b>	Standard for Gas Cylinder Valves
<b>CGA S1.1</b>	Standard for Pressure Relief Devices
<b>CGA V-1</b>	Compressed Gas Cylinder Valve Outlet and Inlet Specifications
<b>ISO 10297</b>	International Standard for Cylinder Valves Design Specifications
<b>ISO 11363-1</b>	25E Inlet Thread Specifications
<b>A-A-59860</b>	U.S. General Services Administration Standards for Gas Cylinder Valves

Lubricants	
<b>Christo-Lube</b>	Used in Valves for All Industrial Gas Applications

Replacement Parts	
Sherwood Part Number	Description
<b>1251-6</b>	Handwheel Nut
<b>1919A</b>	Handwheel
<b>P625-19X9H-XX</b>	Pressure Relief Device Unitized Assembly Includes: Plug, Rupture Disc and Webbed Seal Washer

For further ordering information, refer to the Selection of Pressure Relief Devices on **page 18**, the Pressure Relief Device Numbering Matrix on **page 21**, the Product Markings Reference on **page 22** and the valve Part Numbering Matrix on **page 24**.



## NGSV, NGSHV & NGSRPV Industrial Precision Valves

For further ordering information, refer to the Selection of Pressure Relief Devices on [page 18](#), the Pressure Relief Device Numbering Matrix on [page 21](#), the Product Markings Reference on [page 22](#) and the Valve Part Numbering Matrix on [page 24](#).

### NGSV and NGSHV Series

Ordering Information				
Sherwood Part Number	Gas Service @ 70° F	CGA Outlet	Outlet Thread Size	Inlet Thread
<i>Methyl Fluoride</i>				
NGSV35064-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Ethane</i>				
NGSV35061-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Ethylene</i>				
NGSV35061-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Methane</i>				
NGSV3504X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
NGSV3506X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
NGSV3505X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1.125-12 UNF
NGSV35025EX-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E ISO
NGSV3508X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1" NGT
NGSHV6956X-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	¾" NGT
NGSHV6955X-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	1.25-12 UNF
NGSHV69525EX-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	25E ISO
NGSHV7036X-XX	4701 PSI–6400 PSI	703	1.125–14 NGO LH Int.	¾" NGT
NGSHV70325EX-XX	4701 PSI–6400 PSI	703	1.125–14 NGO LH Int.	25E ISO
<i>Natural Gas</i>				
NGSV3504X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
NGSV3506X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
NGSV3505X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1.125-12 UNF
NGSV35025EX-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E ISO
NGSV3508X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	1" NGT
NGSHV6956X-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	¾" NGT
NGSHV6955X-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	1.25-12 UNF
NGSHV69525EX-XX	3001 PSI–4700 PSI	695	1.045–14 NGO LH Int.	25E ISO
NGSHV7036X-XX	4701 PSI–6400 PSI	703	1.125–14 NGO LH Int.	¾" NGT
NGSHV70325EX-XX	4701 PSI–6400 PSI	703	1.125–14 NGO LH Int.	25E ISO

### NGSRPV Series

Ordering Information				
Sherwood Part Number	Gas Service @ 70° F	CGA Outlet	Outlet Thread Size	Inlet Thread
<i>Methyl Fluoride</i>				
NGSRPV35064-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Ethane</i>				
NGSRPV35061-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Ethylene</i>				
NGSRPV35061-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
<i>Methane</i>				
NGSRPV35045X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
NGSRPV3506X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
NGSRPV35025EX-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E ISO
<i>Natural Gas</i>				
NGSRPV3504X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	½" NGT
NGSRPV3506X-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	¾" NGT
NGSRPV35025EX-XX	0 PSI–3000 PSI	350	.825–14 NGO LH Ext.	25E ISO

**Oversize Inlets:** 4 and 7 (low-pressure) and 24 (high-pressure only) threads oversize inlets: To order, add -4, -7 or -24 to the end of the Part Number. For example, NGSV35064-XX becomes NGSV35064-XX-7.

**Chrome plating:** To order, add letter "A" after letters NGSV or MGSHV in the Part Number. For example, NGSV34661-XX becomes NGSVA34661-XX.

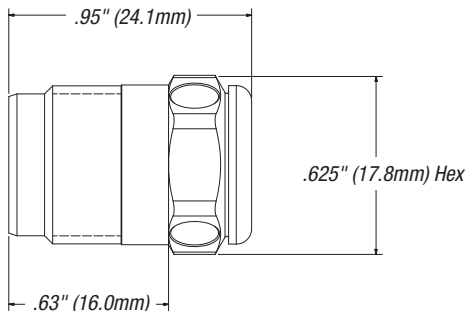
**Lexan® polycarbonate handwheels:** To order, add suffix LX to the end of the Part Number. For example, NGSV34661-XX becomes NGSV34661-XXLX.

To order fusible backed Pressure Relief devices in 165° F or 212° F nominal melting temperatures, change 1 in the Part Number to 4 (165° F) or to 5 (212° F) (e.g. NGSV35061-XX becomes NGSV35064-XX for 165° F, or NGSV35065-XX for 212° F).



Pressure Relief Devices

# Pressure Relief Devices



P625-19X9-XXX

Ordering Information

Pressure Relief Device			-XX	Cylinder Working Pressure			Disc Rupture Range PSI @ 160° F	
CG-1 Frangible Disc No Fuse Metal	CG-4 * Frangible Disc 165° F Fuse Metal	CG-5 * Frangible Disc 212° F Fuse Metal		D.O.T. Spec 3A 3AA 3AL Cylinders PSI	D.O.T. Exemption Cylinders PSI	International Cylinders Bar	Min.	Max.
<i>GSV Low Pressure</i>								
P625-19N9-28	P625-19C9-28M	P625-19C9-28W	-28	1800	—	—	2700	3000
P625-19N9-32	P625-19C9-32M	P625-19C9-32W	-32	2015	—	—	3025	3360
P625-19N9-35	P625-19C9-35M	P625-19C9-35W	-35	2265	—	—	3400	3775
P625-19N9-38	P625-19C9-38M	P625-19C9-38W	-38	2400	—	—	3600	4000
P625-19N9-39	P625-19C9-39M	P625-19C9-39W	-39	—	—	200	3915	4350
P625-19N9-43	P625-19C9-43M	P625-19C9-43W	-43	2670	—	—	4005	4450
P625-19N9-46	P625-19C9-46M	P625-19C9-46W	-46	2900	—	—	4350	4833
P625-19N9-47	P625-19C9-47M	P625-19C9-47W	-47	2950	—	—	4425	4917
<i>GSHV High Pressure</i>								
P625-19N9H-48	—	P625-19C9H-48W	-48	3000	—	230	4500	5000
P625-19N9H-55	—	P625-19C9H-55W	-55	3500/3600	—	—	5250	5833
P625-19N9H-63	—	P625-19C9H-63W	-63	4000	—	—	6000	6665
P625-19N9H-65	—	P625-19C9H-65W	-65	—	4500	300	6075	6750
P625-19N9H-71	—	P625-19C9H-71W	-71	—	5000	—	6750	7500
P625-19N9H-78	—	P625-19C9H-78W	-78	5000	—	—	7500	8333
P625-19N9H-85	—	P625-19C9H-85W	-85	—	6000	—	8100	9000
P625-19N9H-95	—	P625-19C9H-95W	-95	6000	—	—	9000	10,000

\* Copper disc must be used for hydrogen service.

Pressure relief devices come standard with a nickel disc. For copper disc option with CG-4 and CG-5, use an "C" in place of the "N" in the part number. For chrome-plated CG1 PRDs, add "1" before Part Number. For example, P625-19N9H-XX becomes 1-P625-19N9H-XX.



## Pressure Relief Devices Technical Information

Almost all compressed gas containers are fitted with pressure relief devices. A pressure relief device is a pressure- and/or temperature-activated device used to prevent the pressure from rising above a predetermined maximum, and thereby prevent rupture of a normally charged cylinder when subjected to a standard fire test as required by Title 49 of the U.S. Code of Federal Regulations (49CFR 173.34(d)), or equivalent regulations of Transport Canada.

The Compressed Gas Association, in pamphlet CGA S-1.1, has classified pressure relief devices according to type using the letter designation CG followed by a numeral. Each of these types described are in the following subsections (reference CGA S-1.1).

### Type CG-1 (Pressure Relief Rupture Disk)

A rupture disk (synonymous with the name burst disk within the industry) is a pressure-operated device which affords protection against development of excessive pressure in cylinders. This device is designed to sense excess pressure in a cylinder and will function when the cylinder is of sufficient magnitude to cause the rupture or bursting of the rupture disk element, thereby venting the contents of the cylinder. The rupturing of the rupture disk element results in a non-reclosing orifice.

Rupture disk devices installed on compressed gas cylinders may be either an integral part of the cylinder valve assembly or may be installed on the cylinder as an independent attachment. The materials of construction selected must be compatible with the fluid in the cylinder as well as the cylinder valve materials with which the rupture disk device comes in contact in order to minimize corrosion.

One of the most common types of rupture disk devices consists of a gasket and a rupture disk and a rupture disk holder. These components are only supplied as factory-assembled devices designed to be replaced as a unit.

The gasket is the part which provides the proper seal to prevent leakage of the cylinder contents past the rupture disk assembly and may be constructed of metallic or nonmetallic materials.

The rupture disk is the operating part of the pressure relief device and, when installed in a proper rupture disk holder, is designed to burst at a predetermined pressure to permit discharge of the cylinder contents. Such disks are usually made of metallic materials and may be of flat, preformed, reinforced, grooved or scored construction. Nonmetallic materials are also used for specific applications.

The rupture disk holder is the part of the pressure relief device which contains the opening, against which the rupture disk mates. The rupture disk holder usually also contains the discharge porting or passages, beyond the operating parts of the device, through which fluid must pass to reach the atmosphere. In many cases, the discharge holder is provided with radial vent holes through which the fluid in the cylinder vents to the atmosphere. This radical discharge design provides an anti-recoil feature, which minimizes rocketing of compressed gas cylinders during discharge of the contents through the pressure relief device. Other types of discharge ports may also be provided in rupture disk holders to suit specific application requirements.

Most rupture disk devices are designed with holders having either sharp-edged or radius-edged orifices to which the rupture disk mates. The sharp-edged orifice produces a shear-type actuation mode whereby the disk ruptures in shear, producing a characteristic leaf-type configuration after functioning.

The radius-edged orifice produces a tension-type actuation mode whereby the disc stretches over the radius-edge. This thins the center of the disc until it can no longer hold the pressure. This type of rupture produces a characteristic rose petal configuration after functioning.

Since the actuation modes of each type of holder described above are completely different, it is important that only original manufacturer's assemblies be used in the replacement of rupture disk devices.



#### WARNING

The pressure relief rupture disk device is a primary safety component and hence the following precautions should be noted and adhered to:

- A. Only trained personnel should be permitted to service pressure relief devices
- B. Tightening of the rupture disk assembly to the cylinder valve or to the cylinder itself should be in accordance with the manufacturer's instructions. Tightening to a torque less than the manufacturer's recommendations may result in a leaking device or a device that may rupture at a lower pressure than specified. Conversely, over tightening can also result in disk actuation at a lower pressure than specified due to excessive twisting action, which may create wrinkles or distortions in the disk, which may cause premature failure of the disk and inadvertent release of the pressure contents. Either of these premature releases could cause serious injury or death.



#### WARNING

Components of devices designed to rupture in shear are very similar in appearance to those designed to rupture in tension but are not interchangeable because they have completely different modes of actuation. If components are inadvertently interchanged, i.e. a disk designed to rupture in shear is installed in a rupture disk holder designed to rupture in tension, a serious cylinder failure incident could result that could lead to loss of life due to the significant increase in pressure required to rupture the disk. Conversely if a disk designed to rupture in tension is installed in a rupture disk holder designed to rupture in shear, premature rupture could occur with complete loss of contents due to significant reduction in rupture pressure of the disk. That may lead to fire, personal injury or death.

### Limitations

A rupture disk is a pressure-operated device which affords protection against excessive pressure. It protects against excessive pressure when the properties of the gas, cylinder design, and percentage of charge in the cylinder are such that exposure to excessively high temperatures will cause an increase in internal pressure sufficient to actuate the rupture disk

## Pressure Relief Devices

# Pressure Relief Devices Technical Information

before the cylinder loses its integrity and weakens. The rupture disk also protects against excessive pressure due to improper charging practices such as overfilling.

A rupture disk is a non-reclosing device. Once the disk has ruptured, there is no way to prevent the complete release of the contents of the cylinder.

This device does not provide good protection against pressures caused by exposure to excessively high temperatures when the cylinder is only partially charged. The pressure rise may not be sufficient to actuate the rupture disk before the cylinder loses its integrity and weakens.

Consideration should be given to environmental conditions to which the cylinder may be exposed. Severely corrosive atmospheres may contribute to premature rupture of the disk. To prevent corrosion of the rupture disk, care must be taken to select materials of construction that do not interact with either the contents of the cylinder or the anticipated environmental conditions.

## Type CG-2 and CG-3 (Fusible Plugs)

A fusible plug is a thermally operated pressure relief device which affords protection against excessive pressure developed by exposure to excessive heat. Once sufficient heat melts the fusible alloy, the entire contents of the cylinder will be vented. The CG-2 fusible alloy has a nominal melt temperature of 165° F (73.9° C); the CG-3 fusible metal has a nominal melt temperature of 212° F (100° C).

Fusible plugs can be installed on the cylinder as independent devices or fusible alloy can be cast directly into a suitable orifice in the cylinder valve body. In some cases, a fusible plug may be installed as a separate device into the cylinder valve body.

**WARNING** No attempt should be made to repair fusible plug devices. They are not repairable and attempts to repair will destroy the integrity of the fusible alloy causing leakage of gases that may lead to fire, personal injury or death.

### Limitations:

Since the fusible plus is a thermally operated device, it is designed to function only when the fusible metal melts out. Hence, it does not protect against over pressure from improper charging practices. Sufficient heat to melt the fusible alloy is necessary for proper functioning of this type of device. Therefore, the location of such devices is an important consideration. Industry practice limits the application of these style fusible plugs to cylinders with 500 psig (3447 kPa) service pressure or less to minimize the possibility of cold flow or extrusion of the fusible alloy. A fusible device is a nonreclosing devices and when it functions, it releases the entire contents of the cylinder.

## Type CG-4 and CG-5 (Combination Rupture Disk/Fusible Plug)

A combination rupture disk/fusible plug pressure relief device requires both excessive pressure and excessive temperature to cause it to operate. Sufficient heat is required to first melt out the fusible metal, after which the device will afford the same protection as the CG-1 rupture disk device.

The CG-4 combination device has fusible alloy with a nominal melt temperature of 165° F (73.9° C). The CG-5 combination device has fusible alloy with a nominal melt temperature of 212° F (100° C).

In this type of device, the rupture disk portion (CG-1) is directly exposed to the internal cylinder pressure, and so it is directly upstream of the fusible metal. In general, the same components that make up the CG-1 device are used and the vent portion or downstream side of the rupture disk is thus reinforced against rupturing by the fusible alloy, and the fusible alloy is reinforce against extrusion by the rupture disk.

*NOTE: The same precautions noted for CG-1 devices should be adhered to for CG-4 and CG-5 device. See previous warnings.*

### Limitations:

CG-4 and CG-5 combination devices function only in the presence of both excessive heat and excessive pressure, and sufficient heat must be present first to melt the fusible metal. Therefore, this device does not offer protection against over pressure from improper charging practices.

## Type CG-7 (Pressure Relief Valves)

A pressure relief valve is a spring-loaded pressure-operated device designed to relieve excessive cylinder pressure, reclose, and reseal to prevent further release of product from the cylinder after excessive pressure is removed and valve resealing pressure has been achieved.

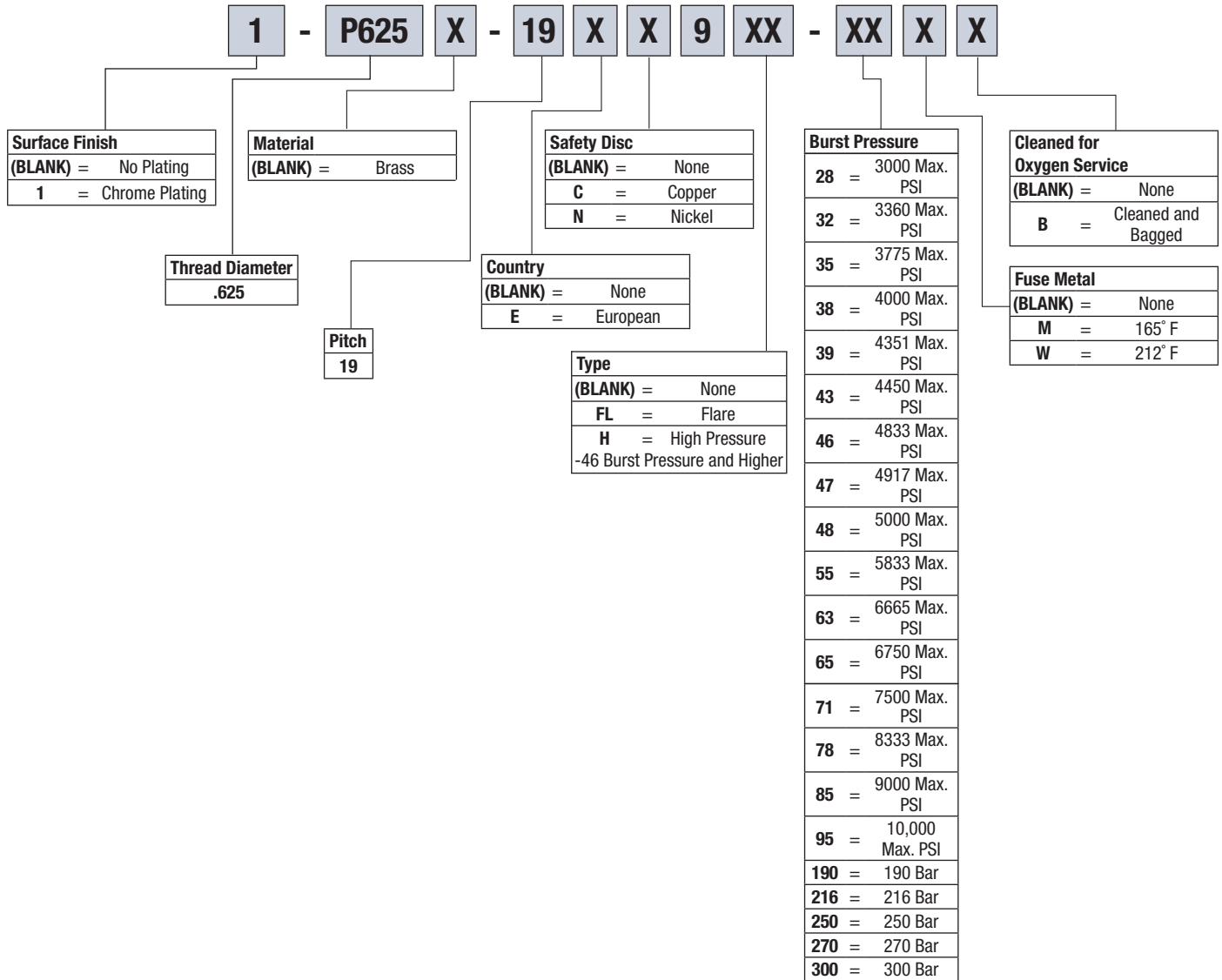
The primary advantage of using the pressure relief valve is that functioning of this type of device may not release all of the contents of the cylinder but is designed to reseal after resealing pressure has been achieved. This characteristic, in fire conditions, will minimize feeding the fire in the case of flammable or combustible cylinder contents.

### Limitations:

Pressure relief valves are designed to maintain the pressure in the cylinder at a limit as determined by the spring force. Therefore, such devices do not protect the cylinder against possible rupture when continued application of external heat or direct flame impingement weakens the cylinder wall to the point where its rupture pressure is less than the operating pressure of the relief valve.

If you require assistance in selecting a Pressure Relief or Safety device for a specific application, please contact Sherwood Customer Service at 888-508-2583 with the following information: Part number of the valve assembly being repaired, if applicable; Type of gas service in which cylinder will be used; and service or test pressure of the cylinder.

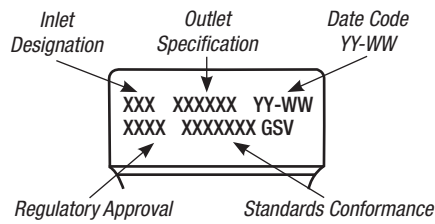
# Pressure Relief Device Numbering Matrix: Unitized Plug Series



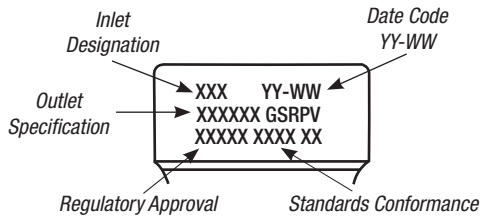
Product Markings Reference

# Product Markings Reference

**A** GSV, GSHV, GSV Acetylene, GSVT and NGSV Series



**B** GSRPV and NGSRPV Series



Inlet Code	
Inlet Code	Inlet Thread Designation
4FPT	¼"-18 NPT Female
06N	¾"-18 NGT
8MPT	½"-14 NPT
08N	½"-14 NGT
12FPT	¾"-14 NPT Female
12N	¾"-14 NGT
12S	¾"-14 SGT
16N	1"-11½ NGT
U8	½"-20 UNF
U10	⅝"-18 UNF
SP12	¾"-14 NPSM
U12	¾"-16 UNF
U14	⅞"-14 UNF
U18	1⅞"-12 UNF
17E	17,4 ISO/DIS 11116
198	DIN 477 W18,8 x ¼ <sub>4</sub>
25E	25,8 ICO/DSI 10920.2 & DIN 477 28.8 x ¼ <sub>4</sub>
313	DIN 477 W31,3 x ¼ <sub>4</sub>
V1	20 X 14 JIS B 8246
V2	28 X 14 JIS B 8246
V3	28 X 14 JIS B 8246 (Reduced Length)
W6	0.06-14 AS2473
W71	0.715-14 AS2473
W1	1-14 AS2473
18P	M18 x 1,5
25P	M25 x 2

Outlet Codes	
Code	Description
CGA	CGA Outlet
ABN	Brazil, ABNT
AS	Australia, AS2473
BS	British Standard
DIN	Germany
IND	Chile, Indura
INF	Mexico, INFRA
IRA	Argentina, IRAM
JIS	Japan
NF	France
SMS	Sweden

NOTE: Date codes include the last two digits of the year manufactured and two digits to represent the week manufactured. For example, the year is represented as "19" for 2019 or "20" for 2020. For example, the week is represented as "01" for first week of the year manufactured and "10" for tenth week of the year manufactured.



## DOs and DO NOTs for Valve Use

Source: Compressed Gas Association, Inc. CGA V-9, 2012, p. 39

### DOs

Proper care of compressed gas cylinder valves includes (but is not limited to) the following:

- Stored valves shall be packaged so cleanliness is maintained and adequate protection against damage during handling is provided.
- Valves should be visually inspected at each refill for any signs of damage or leakage.
- Question the supplier when a valve malfunctions and the problem cannot be diagnosed.
- Inspect PRDs per CGA S-1.1 before each refilling.
- Verify that a particular valve is suitable for both the cylinder and the commodity with which it is intended to be used.
- Open the valve slowly to prevent development of high pressure surges and heat generation on downstream equipment.
- When replacing PRDs, only original manufacturers' assemblies and parts shall be used unless the interchange of parts is proven by suitable test.
- When replacing PRDs, refer to the marking on the device to ensure the proper rated device is installed.
- When the cylinder is not in use, even when empty, the valve should be in the closed position with the outlet cap in place and the transport cap installed.
- Check the condition of both the inlet and outlet threads before inserting a valve into a cylinder to ensure that the threads are not damaged, especially the first thread. A damaged first inlet thread could adversely affect insertion. If the damage cannot be repaired by manually deburring with a file, replace the valve.
- Handle valves carefully to avoid damage, especially to threads, which could prevent proper connection to mating parts.
- Replace the valve or PRD whenever any of its required markings are no longer legible.
- Valves that are shipped not fully assembled or with unattached components shall be protected from contamination.
- Only lubricants specially prepared for oxygen service shall be used on tapered threaded inlet connections.

*NOTE: Not all PTFE tapes are suitable for oxygen service. Only PTFE tapes suitable for oxygen service shall be used.*

### DO NOTs

This list is not intended to be comprehensive. The user is cautioned to review maintenance activity with the valve supplier before beginning work if there is any uncertainty on the part of the user.

Proper care of compressed gas valves includes the following:

- Do not use a damaged valve where function or integrity might have been affected.
- Do not continue to use a valve that operates abnormally, such as it becoming noisy or progressively harder to operate.
- Do not try to recondition a valve until the design and operations of the valve are fully understood and the proper tools are available.
- Do not reuse a valve having a tapered inlet thread with less than four full threads showing after it is installed into the cylinder hand-tight.
- Do not use an automatic operator, adapter, wrench or other tool to obtain a greater mechanical advantage on handwheel-operated valves without first consulting with the valve manufacturer to ensure that the applied torque does not exceed the safe operating torque for the valve.
- Do not use the number of exposed valve threads to determine whether a valve is adequately engaged and leak tight in a cylinder. (See CGA V-11, General Guidelines for the Installation of Valves into High Pressure Aluminum Cylinders, for valve installed in aluminum cylinders.) Even with a new valve in a new steel cylinder, both with nominal 3/4"-14 NGT threads, the number of exposed full threads after three wrenching turns can vary between two and five.
- Do not lubricate valve internal surfaces with the pressure boundary without first checking with the valve manufacturer.
- Do not lubricate oxygen service valve threads (to cylinder threads) for installation in straight-threaded aluminum.
- Do not use poor fitting jaws on valving machines because they could cause:
  - Excessive bending and torsional forces into the valve
  - Rounding off of valve wrench flat corners with obliteration of valve identification markings, or
  - Interference of jaws with valve outlet, PRD, etc., resulting in damage and leaks
- Do not lift, drag or move a cylinder using the valve handwheel as a handle. It is not designed for this purpose and doing so can cause the valve to open.
- Do not use adapters to adapt the CGA valve outlet connection to another CGA valve outlet connection unless adapters satisfy the conditions for their use specified in CGA V-1.
- Do not put a reconditioned valve into service unless it has been tested to this standard.
- Do not use internal operating replacement parts unless they were supplied by the valve manufacturer.

Appendix

# Valve Part Numbering Matrix: Global Valves

**GSV A X 0 6 1 - 38 B**

Valve Category	
<b>GSV</b>	= Global Valve
<b>GSRPV</b>	= Global Residual Pressure Valve
<b>GSHV</b>	= Global High-Pressure Valve
<b>NGSV</b>	= Global Valve for Hydrocarbon-Based Gases
<b>NGSHV</b>	= Global Valve for High-Pressure Hydrocarbon-Based Gases

Outlet Designation
Letter or Number from the Associated Specification

Safety Type	
<b>0</b>	= No Safety
<b>1</b>	= Unbacked Frangible Disc
<b>2</b>	= 165° Fuse Plug
<b>3</b>	= 212° Fuse Plug
<b>4</b>	= Backed Frangible Disc with 165° Fusible Metal
<b>5</b>	= Backed Frangible Disc with 212° Fusible Metal
<b>H</b>	= Backed Frangible Disc with 255° Fusible Metal

Plating	
(BLANK)	= Unplated
<b>A</b>	= Chrome Plated

Safety Pressure	
<b>28</b>	= 3000 Max. PSI
<b>32</b>	= 3360 Max. PSI
<b>35</b>	= 3775 Max. PSI
<b>38</b>	= 4000 Max. PSI
<b>39</b>	= 4351 Max. PSI
<b>43</b>	= 4450 Max. PSI
<b>46</b>	= 4833 Max. PSI
<b>47</b>	= 4917 Max. PSI
<b>48</b>	= 5000 Max. PSI
<b>55</b>	= 5833 Max. PSI
<b>63</b>	= 6665 Max. PSI
<b>65</b>	= 6750 Max. PSI
<b>71</b>	= 7500 Max. PSI
<b>78</b>	= 8333 Max. PSI
<b>85</b>	= 9000 Max. PSI
<b>95</b>	= 10,000 Max. PSI
<b>190</b>	= 190 Bar
<b>216</b>	= 216 Bar
<b>250</b>	= 250 Bar
<b>270</b>	= 270 Bar
<b>300</b>	= 300 Bar

Special Features	
<b>00</b>	= Safety Port Machined Safety Not Installed
<b>B</b>	= Cleaned for O <sub>2</sub> Service and Bagged
<b>CC</b>	= Cap and Chain
<b>FT</b>	= Filter
<b>GH</b>	= Gauge Hole
<b>HC</b>	= Rubber Handwheel Cover
<b>LX</b>	= Lexan® Handwheel
<b>MA</b>	= Stamped: Argon
<b>MB</b>	= Stamped: Air Breathing
<b>MC</b>	= Stamped: Carbon Dioxide
<b>MD</b>	= Stamped: CO <sub>2</sub> Med.
<b>MG</b>	= Stamped: Acetylene
<b>MM</b>	= Stamped: Carbon Monoxide
<b>MN</b>	= Stamped: Nitrogen O.F.
<b>MO</b>	= Stamped: Oxygen
<b>MQ</b>	= Stamped: Oxygen-Hel. Med.
<b>MR</b>	= Stamped: Air Industrial
<b>MS</b>	= Stamped: Sulphur Hexafluoride
<b>MY</b>	= Stamped: Hydrogen
<b>M1</b>	= Stamped: Inert O.F.
<b>M2</b>	= Stamped: Inert O.T.
<b>M3</b>	= Stamped: Nitrous Oxide Med.
<b>M4</b>	= Stamped: Oxygen Med.
<b>M7</b>	= Stamped: 6000 PSI
<b>T</b>	= ¼" NPT Tapped Inlet
<b>VS</b>	= Vented Flare Safety (Hydrogen)
<b>-3</b>	= 3 Threads Oversize
<b>-4</b>	= 4 Threads Oversize
<b>-7</b>	= 7 Threads Oversize
<b>-24</b>	= 24 Threads Oversize
<b>When Inlet Designation is 5</b>	
<b>-50</b>	= .500-20 UNF Inlet Thread
<b>-62</b>	= .625-18 UNF Inlet Thread
<b>-75</b>	= .750-16 UNF Inlet Thread
<b>-87</b>	= .875-14 UNF Inlet Thread

Outlet Code	
(NONE)	= CGA Outlet
<b>ABN</b>	= Brazil, ABNT
<b>AS</b>	= Australia, AS2473
<b>BS</b>	= British Standard
<b>DIN</b>	= Germany
<b>IND</b>	= Chile, INDURA
<b>INF</b>	= Mexico, INFRA
<b>IRA</b>	= Argentina, IRAM
<b>JIS</b>	= Japan
<b>NF</b>	= France
<b>SMS</b>	= Sweden

Inlet Designation	
<b>3</b>	= ⅜"-18 NGT
<b>4</b>	= ½"-NGT
<b>4FPT</b>	= ¼"-18 NPT Female
<b>5</b>	= Straight Thread, 1½"-12 UNF (Unless Changed by Special Feature)
<b>6</b>	= ¾"-14 NGT
<b>7</b>	= ¾"-14 SGT
<b>8</b>	= 1"-11½ NGT
<b>8MPT</b>	= ½"-14 NPT
<b>12FRT</b>	= ¾"-14 NPT Female
<b>17E</b>	= 17,4 ISO/DIS 11116
<b>25E</b>	= 25,8 ISO/DIS & DIN 28,8
<b>25P</b>	= M25 x 2
<b>198</b>	= DIN W19,8
<b>313</b>	= DIN W31,3
<b>SP12</b>	= ¾"-14 NPSM
<b>V1</b>	= JIS 20 x 14
<b>V2</b>	= JIS 28 x 14
<b>V3</b>	= JIS 28 x 14 Reduced Length
<b>W1</b>	= 1-14 AS2473
<b>W6</b>	= 0.06-14 AS2473
<b>W71</b>	= 0.715-14 AS2473

**New Part Number Cross Reference**

Previous PN Prefix	New PN Prefix	New PN Example
<b>GV</b>	<b>GSV</b>	<b>GSV58061-32</b>
<b>GVHM</b>	<b>GSHV</b>	<b>GSHV70261-85</b>
<b>GVT</b>	<b>GSVT</b>	<b>GSVT30060</b>
<b>GRPV</b>	<b>GSRPV</b>	<b>GSRPV32061-28</b>
<b>NGV</b>	<b>NGSV</b>	<b>NGSV35065-32</b>
<b>NGVHM</b>	<b>NGSHV</b>	<b>NGSHV69565-55</b>
<b>NGRPV</b>	<b>NGSRPV</b>	<b>NGSRPV35061-38</b>





# Sherwood Valve, LLC Limited Warranty

Revised January 2013

Seller warrants to you, the first purchaser, that it will repair or replace, at its sole discretion, defects in materials or workmanship that occur and are reported to Seller, within the applicable warranty period, subject to the terms, conditions and exclusions set forth in this document. Your acceptance of delivery of the warranty product constitutes your acceptance of the terms of this limited warranty. This limited warranty gives you specific legal rights and you may have other rights which may vary from state to state.

**This limited warranty is the sole and exclusive warranty from Seller and there are no express warranties which extend beyond those outlined in this limited warranty. Under the laws of certain states, there may be no implied warranties from Seller and ALL IMPLIED WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) ARE EXCLUDED AND DISCLAIMED WHERE ALLOWED BY APPLICABLE LAW. ANY IMPLIED WARRANTIES (IF APPLICABLE) ARE LIMITED TO THE SCOPE AND MINIMUM PERIOD OF TIME ALLOWED UNDER APPLICABLE LAW.**

## Coverage Under This Limited Warranty:

The limited warranty period runs for one (1) year from the date the product was shipped from Seller's manufacturing plant to the first purchaser. This WARRANTY EXTENDS ONLY TO THE FIRST PURCHASER of the Seller's product and does not extend to a consumer who purchases Seller's product from a dealer or otherwise.

THIS LIMITED WARRANTY DOES NOT COVER damage caused by misuse or negligence and does not cover or apply to any product, accessory, part or attachment which is manufactured by someone other than Seller.

THE SOLE AND EXCLUSIVE REMEDY UNDER THIS LIMITED WARRANTY AND ANY APPLICABLE IMPLIED WARRANTY IS THE REPAIR OR REPLACEMENT, AT SELLER'S SOLE OPTION, OF WARRANTED PRODUCTS AS SET FORTH HEREIN. SELLER EXCLUDES AND DISCLAIMS ANY LIABILITY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES RESULTING FROM THE DELIVERY, USE OR FAILURE OF THE PRODUCT (INCLUDING, WITHOUT LIMITATION, LOSS OF ANY MATERIALS STORED IN PRODUCT; ANY DISRUPTION OF BUSINESS, DISRUPTION OF MANUFACTURING OR OTHER OPERATIONS; LOSS OF REVENUE OR PROFIT OR DAMAGES RESULTING FROM ANY BREACH OF ANY CONTRACT BETWEEN BUYER AND ANY THIRD PARTY), OR FROM ANY OTHER CAUSE WHATSOEVER. Any legal action alleging breach of any applicable warranty coverage must be brought within one (1) year from the date the alleged breach first occurred.

If Buyer believes that any part of Seller's product is defective, Buyer must give written notice to Seller at the address on the reverse side of this document before the expiration of the initial warranty period, giving details as to date and place of purchase, serial number and alleged defect. Seller will then give written instructions to Buyer regarding the manner in which the defective item is to be repaired or replaced. Buyer may be requested to return the item at Buyer's expense, but no return should be made until Buyer has received written instructions from Seller. Seller will then perform under this limited warranty within thirty (30) days after the defective item is returned to Seller.

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