

# Swagelok® Products Compliant with the Transportable Pressure Equipment Directive (TPED)



## Products

- Double-ended sample cylinders in 304L and 316L stainless steel
- Cylinder valves
- Rupture disc units and rupture disc tees
- Sample cylinder accessories

## Transportable Pressure Equipment Directive (TPED)

The Transportable Pressure Equipment Directive (TPED) provides requirements relating to the design, manufacture, and testing of transportable pressure vessels and accessories, including sample cylinders and cylinder valves, used in gas service. The intent of the directive is to provide a uniform level of product safety throughout the countries of the European Union.

### Swagelok Compliance to TPED

- Swagelok *sample cylinders and cylinder valves* comply with directive 2010/35/EU as established by a Notified Body and include an EC-type examination.
- Swagelok *rupture disc assemblies* comply with TPED by meeting the requirements of the Pressure Equipment Directive (PED) 2014/68/EU, because TPED does not contain technical requirements specific to this type of product.
- Swagelok *rupture disc assemblies* comply with directive 2014/68/EU (PED) as established by a Notified Body and include an EC-type examination.

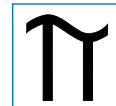
## General Information on TPED-Compliant Products

### Pressure Ratings

The pressure ratings for Swagelok *sample cylinders and cylinder valves* shown in this catalog are in accordance with the EC-type examination for the product.

### Product Markings

Swagelok TPED-compliant *sample cylinders and cylinder valves* are marked with the pi ( $\Pi$ ) symbol and the identification number of the Notified Body which performed the assessment.



Swagelok TPED-compliant *rupture disc assemblies* are marked with the CE (C€) symbol and the identification number of the Notified Body which performed the assessment.



### Testing

Every TPED-compliant *sample cylinder* is hydrostatically tested at 1.5 times the pressure rating.

Every TPED-compliant Swagelok *cylinder valve* is factory tested with nitrogen at 69 bar (1000 psig). Seats have a maximum allowable leak rate of 0.1 std cm<sup>3</sup>/min. Shell testing is performed at 1.5 times the pressure rating to a requirement of no detectable leakage with a liquid leak detector.

### Cleaning and Packaging

All Swagelok TPED-compliant *sample cylinders, rupture disc assemblies, and cylinder valves* are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)* (MS-06-62), page 1174.

Cleaning and packaging in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* (MS-06-63), page 1175, to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C are available as an option for *cylinder valves*. To order, insert **-SC11** into the valve ordering number.

Example: SS-16DPF4-BC-**SC11**-PD

### Ordering Numbers

Swagelok TPED-compliant *sample cylinder and cylinder valve* ordering numbers include a **-PD** designator.

### Documentation

A Declaration of Conformity is available for all Swagelok TPED-compliant products. Contact your authorized Swagelok sales and service representative.

### Related Information

For information on other Swagelok *sample cylinders, overpressure protection devices, and accessories* including cylinders compliant with U.S. DOT and Transport Canada requirements, see the Swagelok *Sample Cylinders, Accessories, and Outage Tubes* catalog (MS-01-177), page 359.

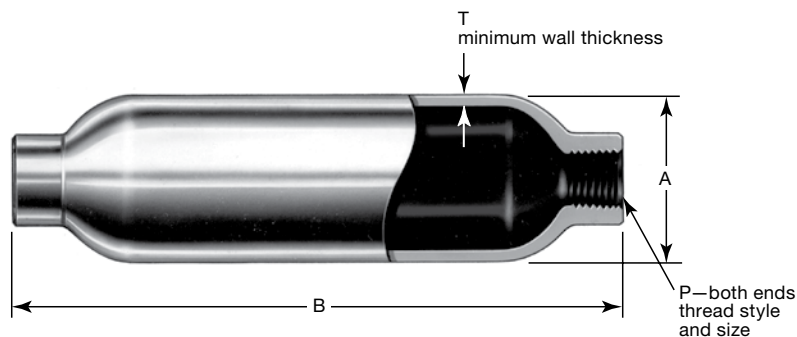
## Double-Ended Sample Cylinders

### Features

- 304L and 316L stainless steel materials
- 40 to 3785 cm<sup>3</sup> (1 gal) sizes
- 1/8 to 1/2 in. female NPT and 1/4 in. female ISO 7/1 end connections

### Ordering Information, Pressure Ratings, and Dimensions

Dimensions, in millimeters (inches), are for reference only and are subject to change.



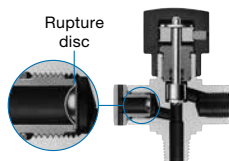
| Material Grade | Pressure Rating at -50 to 50°C (-58 to 122°F)<br>bar (psig) | Internal Volume<br>cm <sup>3</sup> ± 5 % | P Thread          | Ordering Number     | Dimensions, mm (in.) |              |              | Weight<br>kg (lb) |              |          |
|----------------|---|--|-------------------|---------------------|----------------------|--------------|--------------|-------------------|--------------|----------|
|                |   |  |                   |                     | A                    | B            | T            |                   |              |          |
| 304L SS        | 130<br>(1885)   | 40                                       | 1/8 in. NPT       | 304L-HDF2-40-PD     | 31.4 (1.238)         | 98.6 (3.88)  | 1.78 (0.070) | 0.14 (0.31)       |              |          |
|                |   | 50                                       | 1/4 in. NPT       | 304L-HDF4-50-PD     | 37.7 (1.485)         | 95.2 (3.75)  |              | 0.17 (0.38)       |              |          |
|                |   |  |                   | 304L-HDF4-75-PD     |                      | 125 (4.94)   |              | 0.28 (0.62)       |              |          |
|                | 100<br>(1450)   | 150                                      | 1/4 in. NPT       | 304L-HDF4-150-PD    | 50.3 (1.980)         | 133 (5.25)   | 2.29 (0.090) | 0.43 (0.94)       |              |          |
|                |   |  | 1/4 in. ISO 7/1   | 304L-HDF4RT-150-PD  |                      |              |              | 0.73 (1.6)        |              |          |
|                |   | 300                                      | 1/4 in. NPT       | 304L-HDF4-300-PD    |                      | 227 (8.94)   |              | 0.95 (2.1)        |              |          |
|                |   |  | 1/4 in. ISO 7/1   | 304L-HDF4RT-300-PD  |                      | 290 (11.4)   |              | 1.2 (2.6)         |              |          |
|                |   | 400                                      | 1/4 in. NPT       | 304L-HDF4-400-PD    |                      | 351 (13.8)   |              | 4.32 (0.170)      | 2.9 (6.5)    |          |
|                |   |  | 1/4 in. ISO 7/1   | 304L-HDF4RT-500-PD  |                      |              |              |                   |              |          |
|                |   | 1000                                     | 1/4 in. NPT       | 304L-HDF4-1000-PD   |                      | 88.0 (3.465) |              | 277 (10.9)        | 4.95 (0.195) | 6.4 (14) |
|                |   |  | 1/4 in. ISO 7/1   | 304L-HDF4RT-1000-PD |                      |              |              |                   |              |          |
|                |   |  | 1/2 in. NPT       | 304L-HDF8-1000-PD   |                      |              |              |                   |              |          |
|                | 2250  | 1/4 in. NPT                              | 304L-HDF4-2250-PD | 100.6 (3.960)       | 437 (17.2)           | 9.5 (21)     |              |                   |              |          |
|                |   | 1/2 in. NPT                              | 304L-HDF8-2250-PD |                     |                      |              |              |                   |              |          |
|                | 3785<br>(1 gal)   | 1/4 in. NPT                              | 304L-HDF4-1GAL-PD | 678 (26.7)          | 6.4 (14)             | 9.5 (21)     |              |                   |              |          |
| 1/2 in. NPT    |   | 304L-HDF8-1GAL-PD                        |                   |                     |                      |              |              |                   |              |          |
| 316L SS        | 100<br>(1450)   | 150                                      | 1/4 in. NPT       | 316L-HDF4-150-PD    | 50.3 (1.980)         | 133 (5.25)   | 2.24 (0.088) | 0.43 (0.94)       |              |          |
|                |   | 300                                      |                   | 316L-HDF4-300-PD    | 227 (8.94)           | 0.73 (1.6)   |              |                   |              |          |
|                |   | 500                                      |                   | 316L-HDF4-500-PD    | 351 (13.8)           | 1.2 (2.6)    |              |                   |              |          |
|                | 1000  | 316L-HDF4-1000-PD                        | 88.0 (3.465)      | 277 (10.9)          | 4.32 (0.170)         | 2.9 (6.5)    |              |                   |              |          |
|                | 300<br>(4350)   | 150                                      | 316L-50DF4-150-PD | 47.8 (1.881)        | 203 (8.00)           | 5.97 (0.235) | 1.4 (3.0)    |                   |              |          |
|                |   | 300                                      | 316L-50DF4-300-PD |                     |                      |              |              | 368 (14.5)        | 2.5 (5.6)    |          |
|                |   | 500                                      | 316L-50DF4-500-PD |                     |                      |              |              | 597 (23.5)        | 4.1 (9.1)    |          |

## Cylinder Valves

### D Series Nonrotating-Stem Needle Valve

#### Features

- Orifice size 5.6 mm (0.218 in.).
- Flow coefficient ( $C_v$ ) 0.53.
- Compact, rugged design.
- Protective handle prevents contaminants from entering functional valve parts.
- Valve can be configured with rupture disc.



#### Materials of Construction



**⚠ To increase service life, ensure proper valve performance, and prevent leakage, apply only as much torque as is required to achieve positive shutoff.**

| Component        | Material Grade/<br>ASTM Specification  |
|------------------|--|
| 1 Handle         | Anodized aluminum/<br>B221   |
| Set screw        | Nickel cadmium-plated<br>steel   |
| 2 Retaining ring | Zinc-plated steel  |
| 3 Spool          | Aluminum/B209, B211  |
| 4 Packing bolt   | <i>Molybdenum disulfide-coated</i><br>316 SS/A276  |
| 5 Backup ring    | PTFE/D1710   |
| 6 O-ring         | <i>Buna C or ethylene propylene</i>  |
| 7 Washer         | <i>Fluorocarbon-coated</i><br>316 SS/A167  |
| 8 Stem           | 316 SS/A276  |
| Stem tip         | PEEK   |
| Machine screw    | 316 SS/A276  |
| 9 Body           | 316 SS/A182  |
| Lubricants       | <i>Molybdenum disulfide in hydrocarbon carrier; O-ring—silicone-based; machine screw—hydrocarbon thread lock</i> |

Wetted components listed in *italics*.

#### Pressure-Temperature Ratings

- Temperature rating: -20 to 65°C (-4 to 150°F)
- Pressure rating within the range: 172 bar (2496 psig)

#### Ordering Information and Dimensions

Dimensions, in millimeters (inches), are for reference only and are subject to change.

#### Angle-Pattern Valves

Select a valve with a C dimension listed and insert **-A** into the ordering number.

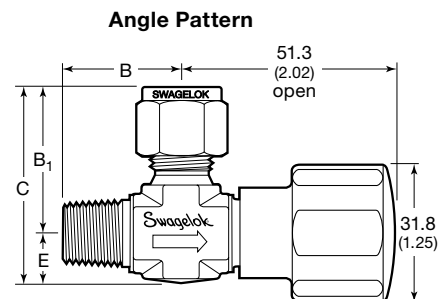
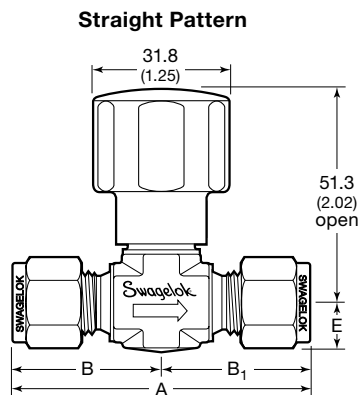
Example: SS-16DPS6-A-BC-PD

#### Valve with Rupture Disc Units

Straight and angle-pattern valves with 1/4 in. female NPT outlets can be assembled with rupture disc units.

To order, insert **-1** for a 131 bar (1900 psig) rupture disc unit or **-2** for a 196 bar (2850 psig) rupture disc unit into the ordering number.

Examples: SS-16DPM4-F4-BC-1-PD  
SS-16DPM8-F4-A-E-2-PD



| End Connections                    |                   | Ordering Number    |                           | Dimensions, mm (in.) |             |                |             |             |
|------------------------------------|-------------------|--------------------|---------------------------|----------------------|-------------|----------------|-------------|-------------|
| Inlet/Outlet                       | Size              | Buna C O-Ring      | Ethylene Propylene O-Ring | A                    | B           | B <sub>1</sub> | C           | E           |
| Female NPT                         | 1/4 in.           | SS-16DPF4-BC-PD    | SS-16DPF4-E-PD            | 53.8 (2.12)          | 26.9 (1.06) |                | —           | 12.7 (0.50) |
| Male NPT                           | 1/4 in.           | SS-16DPM4-BC-PD    | SS-16DPM4-E-PD            | 57.2 (2.25)          | 28.4 (1.12) |                | —           | 12.7 (0.50) |
|                                    | 3/8 in.           | SS-16DPM6-BC-PD    | SS-16DPM6-E-PD            |                      |             |                |             | 14.2 (0.56) |
| Male/<br>female NPT                | 1/4 in.           | SS-16DPM4-F4-BC-PD | SS-16DPM4-F4-E-PD         | 55.6 (2.19)          | 28.4 (1.12) | 26.9 (1.06)    | 39.6 (1.56) | 12.7 (0.50) |
|                                    | 1/2 to<br>1/4 in. | SS-16DPM8-F4-BC-PD | SS-16DPM8-F4-E-PD         | 63.5 (2.50)          | 1.25 (31.8) |                | 46.0 (1.81) | 14.2 (0.56) |
| Male NPT/<br>Swagelok tube fitting | 1/4 to<br>3/8 in. | SS-16DPM4-S6-BC-PD | SS-16DPM4-S6-E-PD         | 60.5 (2.38)          | 28.4 (1.12) | 32.0 (1.26)    | 45.5 (1.79) | 12.7 (0.50) |
| Swagelok tube fittings             | 3/8 in.           | SS-16DPS6-BC-PD    | SS-16DPS6-E-PD            | 65.5 (2.58)          | 32.8 (1.29) |                | 45.5 (1.79) | 12.7 (0.50) |

Additional end connections available on request.

## Cylinder Valves

### N Series Severe-Service Union-Bonnet Needle Valves

#### Features

- Orifice size 4.0 mm (0.156 in.).
- Flow coefficient ( $C_v$ ) 0.35.
- Union-bonnet construction prevents accidental valve disassembly.
- Packing bolt design permits packing adjustments in the open position.
- Safety back seating seals in fully open position.

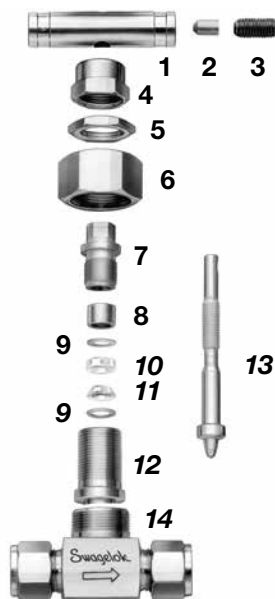
#### Pressure-Temperature Ratings

- Temperature rating: -20 to 65°C (-4 to 150°F)
- Pressure rating within the range: 345 bar (5003 psig)

⚠ A packing adjustment may be required periodically to increase service life and to prevent leakage.

⚠ Valves that have not been cycled for a period of time may have a higher initial actuation torque.

#### Materials of Construction



⚠ To increase service life, ensure proper valve performance, and prevent leakage, apply only as much torque as is required to achieve positive shutoff.

| Component               | Material Grade/<br>ASTM Specification     |
|-------------------------|---|
| 1 Handle                | Stainless steel                           |
| 2 Handle pin            | Nickel cadmium-plated steel/A108          |
| 3 Set screw             | Nickel cadmium-plated steel               |
| 4 Lock nut              | 316 SS/A276 or A479                       |
| 5 Panel nut             | 316 SS/B783                               |
| 6 Union nut             | 316 SS/A276                               |
| 7 Packing bolt          |   |
| 8 Gland                 | PEEK                                      |
| 9 Packing supports      |   |
| 10 Upper packing        | 316 SS/A479                               |
| 11 Lower packing        |   |
| 12 Bonnet               | Silver-plated<br>316 SS/A276              |
| 13 Soft-seat stem shank |   |
| Soft-seat stem tip      | PEEK                                      |
| 14 Body                 | 316 SS/A479                               |
| Lubricant               | Nickel antiseize with hydrocarbon carrier |

Wetted components listed in italics.

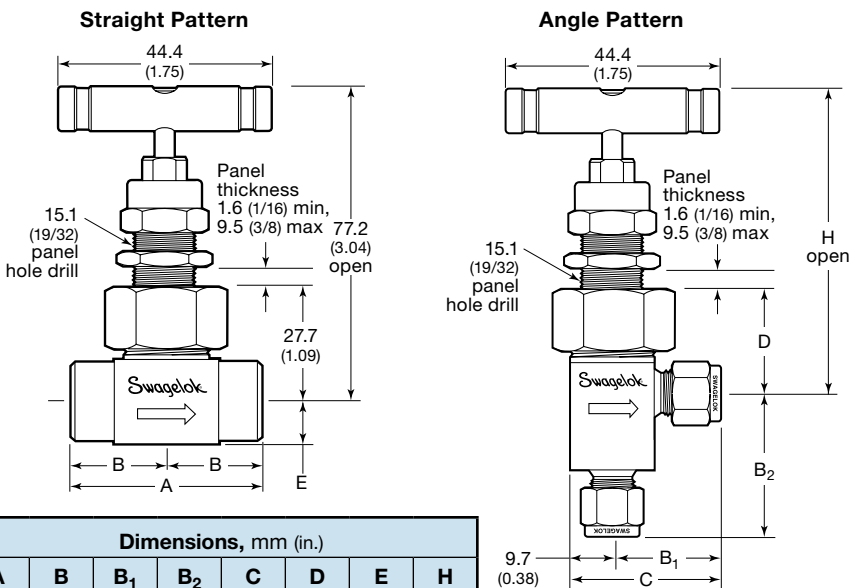
#### Ordering Information and Dimensions

Dimensions, in millimeters (inches), are for reference only and are subject to change.

#### Angle-Pattern Valves

Select a valve with a B<sub>2</sub> dimension listed and insert -A into the ordering number.

Example: SS-3NPRF2-A-PK-SH-PD



| End Connections        |         | Ordering Number       | Dimensions, mm (in.) |             |                |                |             |             |             |             |
|------------------------|---------|-----------------------|----------------------|-------------|----------------|----------------|-------------|-------------|-------------|-------------|
| Inlet/Outlet           | Size    |                       | A                    | B           | B <sub>1</sub> | B <sub>2</sub> | C           | D           | E           | H           |
| Female NPT             | 1/8 in. | SS-3NPRF2-PK-SH-PD    | 50.8 (2.00)          | 25.4 (1.00) | 22.6 (0.89)    | 25.4 (1.00)    | 32.3 (1.27) | 32.5 (1.28) | 9.7 (0.38)  | 82.0 (3.23) |
|                        | 1/4 in. | SS-3NPRF4-PK-SH-PD    | 52.3 (2.06)          | 26.2 (1.03) | 22.6 (0.89)    |                | 32.3 (1.27) | 32.5 (1.28) | 9.9 (0.39)  | 82.0 (3.23) |
| Male NPT               | 1/4 in. | SS-3NPRM4-PK-SH-PD    | 50.8 (2.00)          | 25.4 (1.00) | 25.4 (1.00)    | 35.1 (1.38)    | 27.7 (1.09) | 9.7 (0.38)  | 77.2 (3.04) |             |
| Male/female NPT        | 1/4 in. | SS-3NPRM4-F4-PK-SH-PD | 51.6 (2.03)          | 26.2 (1.03) | 22.6 (0.89)    | 32.3 (1.27)    | 32.5 (1.28) | 9.9 (0.39)  | 82.0 (3.23) |             |
| Swagelok tube fittings | 1/4 in. | SS-3NPRS4-PK-SH-PD    | 61.0 (2.40)          | 30.5 (1.20) | 29.5 (1.16)    | 37.6 (1.48)    | 39.1 (1.54) | 27.7 (1.09) | 9.7 (0.38)  | 77.2 (3.04) |
|                        | 6 mm    | SS-3NPRS6MM-PK-SH-PD  |                      |             | —              | —              | —           | —           |             | —           |
|                        | 8 mm    | SS-3NPRS8MM-PK-SH-PD  |                      |             | —              | —              | —           | —           |             | —           |

## Overpressure Protection

Compressed gas cylinders may require the use of pressure-relief devices depending on the application. The user shall assess the applicable requirements regarding overpressure protection and the selection of pressure-relief devices.

- ⚠ **Be sure to use the correct pressure-relief device for the fluid being used.**
- ⚠ **Proper filling of the cylinder in accordance with the TPED, ADR/RID, and other local regulations, is critical in preventing overpressurization.**

### Rupture Disc Precautions

- Do not use rupture disc devices in a location where the release of the cylinder contents might create a hazard. The rupture disc vents to the atmosphere through six radial holes in the body. Pressure is released suddenly with a loud noise, and gases escape at high velocity.
- Know the burst pressure. This rating is marked on the end face of the rupture disc unit.
- Inspect rupture discs regularly. The strength of rupture discs deteriorates with time due to temperature, corrosion, and fatigue. Pulsating pressure, vacuum/pressure cycling, heat, and corrosive fluids and atmospheres can reduce the disc's burst pressure.
- Do not use rupture discs to protect vessels with volumes greater than 11 355 cm<sup>3</sup> (3 gal) for compressed gases or 5677 cm<sup>3</sup> (1 1/2 gal) for liquefied gases.
- Provide suitable means to isolate the sample cylinder from the system in case the rupture disc bursts while taking a sample.
- In cylinders with liquefied gases, a small temperature increase during transportation or storage will cause the liquid to expand and may cause the rupture disc to release its contents. See local regulations and other appropriate guidelines for safe filling limits for your application.

## Rupture Disc Units

Swagelok rupture disc units protect sample cylinders from overpressurization by venting the cylinder contents to atmosphere. The rupture disc is welded to a body that is threaded into a valve body or a rupture disc tee and sealed by an O-ring. The rupture disc can be easily replaced without removing the valve or the tee from the cylinder.



### Materials of Construction

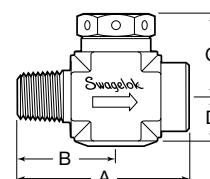
| Component        | Material Grade/<br>ASTM Specification |
|------------------|---------------------------------------|
| Body, inlet ring | 316L/A479 or A213                     |
| O-ring           | Fluorocarbon FKM                      |
| Rupture disc     | Alloy 600/B168                        |

### Ordering Information

| Nominal Burst Pressure at 20°C (70°F)       | Ordering Number |
|---|-----------------|
| 196 bar ± 10 bar<br>(2850 psig ± 150 psig)  | SS-RDK-16-2850  |
| 131 bar ± 6.9 bar<br>(1900 psig ± 100 psig) | SS-RDK-16-1900  |

## Rupture Disc Tees

Tees are made of 316 stainless steel. Each tee includes a rupture disc unit.



Dimensions are for reference only and are subject to change.

### Ordering Information and Dimensions

| End Connections                              |                    | Ordering Number | Dimensions, mm (in.) |                |                |                |
|--|--------------------|-----------------|----------------------|----------------|----------------|----------------|
| Inlet  | Outlet             |                 | A                    | B              | C              | D              |
| <b>With 196 bar (2850 psig) Rupture Disc</b> |                    |                 |                      |                |                |                |
| 1/4 in. male NPT                             | 1/4 in. female NPT | SS-RTM4-F4-2    | 47.7<br>(1.88)       | 26.9<br>(1.06) | 23.9<br>(0.94) | 12.7<br>(0.50) |
| 1/2 in. male NPT                             |                    | SS-RTM8-F4-2    | 55.6<br>(2.19)       | 31.0<br>(1.22) | 30.2<br>(1.19) | 14.2<br>(0.56) |
| <b>With 131 bar (1900 psig) Rupture Disc</b> |                    |                 |                      |                |                |                |
| 1/4 in. male NPT                             | 1/4 in. female NPT | SS-RTM4-F4-1    | 47.7<br>(1.88)       | 26.9<br>(1.06) | 23.9<br>(0.94) | 12.7<br>(0.50) |
| 1/2 in. male NPT                             |                    | SS-RTM8-F4-1    | 55.6<br>(2.19)       | 31.0<br>(1.22) | 30.2<br>(1.19) | 14.2<br>(0.56) |



## Sample Cylinder Options

### PTFE Coating

Internal cylinder surfaces can be coated with PTFE to provide a nonstick surface, which aids in cleaning. To order, insert **-T** into the cylinder ordering number.

Example: 304L-HDF2-40-**T**-PD

### Electropolishing

Electropolishing provides a clean internal surface with a high degree of passivation. To order, insert **-EP** into the cylinder ordering number.

Example: 304L-HDF2-40-**EP**-PD

## Sample Cylinder Accessories

### End Caps

End caps protect valves from damage. Each cap threads onto a neck ring that has been peened to the cylinder neck. End caps are made from plated carbon steel and are available for use on 2250 and 3785 cm<sup>3</sup> (1 gal) cylinders.



To order, insert **-C** into the cylinder ordering number.

Example: 304L-HDF8-2250-**C**-PD



### Carrying Handle

This accessory provides a convenient way to carry sample cylinders. The handle is made from 304 stainless steel and is available for use on 3.

To order a sample cylinder to be shipped with a carrying handle, add **-H** into the cylinder ordering number.

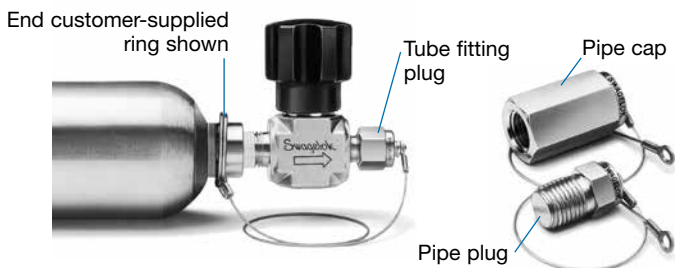
Example: 304L-HDF4-400-**H**-PD

To order a carrying handle as a separate component, use one of the following ordering numbers:

| Cylinder OD<br>mm (in.) | Ordering<br>Number |
|-------------------------|--------------------|
| 48.2, 50.8<br>(1.9, 2)  | MS-5K-CY-2"        |
| 88.9, 102<br>(3.5, 4)   | MS-5K-CY-4"        |

### Caps and Plugs

Caps and plugs protect Swagelok tube fitting or NPT end connections on valves during cylinder transport. To order, contact your authorized Swagelok representative.



## Ordering Multiple Options and Accessories

Insert designators in *alphabetical* order, always keeping **-PD** at the *end* of the ordering number.

Examples: 304L-HDF8-2250-**C-H**-PD for a sample cylinder with end caps and carrying handle  
304L-HDF4-300-**H-T**-PD for a sample cylinder with carrying handle and internal PTFE coating.

## Introduction

Since 1947, Swagelok has designed, developed, and manufactured high-quality, general-purpose and specialty fluid system products to meet the evolving needs of global industries. Our focus is on understanding our customers' needs, finding timely solutions, and adding value with our products and services.

We are pleased to provide this global edition of the book-bound *Swagelok Product Catalog*, which compiles more than 100 separate product catalogs, technical bulletins, and reference documents into one convenient, easy-to-use volume. Each product catalog is up to date at the time of printing, with its revision number shown on the last page of the individual catalog. Subsequent revisions will supersede the printed version and will be posted on the Swagelok website and in the Swagelok electronic Desktop Technical Reference (eDTR) tool.

For more information, visit your Swagelok website or contact your authorized Swagelok sales and service representative.

## Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.

### Safe Product Selection

**When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.**

### WARNING

**Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.**

Not all trademarks listed below apply to this catalog.  
Swagelok, Cajon, Ferrule-Pak, Goop, Hinging-Colleting, IGC, Kenmac, Micro-Fit, Nupro, Snoop, Sno-Trik, SWAK, VCO, VCR, Ultra-Torr, Whitey—TM Swagelok Company  
15-7 PH—TM AK Steel Corp.  
AccuTrak, Beacon, Westlock—TM Tyco International Services  
Atlas—TM Asahi Glass Co., Ltd.  
ASCO, El-O-Matic—TM Emerson  
AutoCAD—TM Autodesk, Inc.  
CSA—TM Canadian Standards Association  
Crastin, DuPont, Kalrez, Krytox, Teflon, Viton—TM E.I. duPont Nemours and Company  
DeviceNet—TM ODVA  
Dyneon, Elgiloy, TFM—TM Dyneon  
Elgiloy—TM Elgiloy Specialty Metals  
FM—TM FM Global  
Grafoil—TM GrafTech International Holdings, Inc.  
Honeywell, MICRO SWITCH—TM Honeywell  
MAC—TM MAC Valves  
Microsoft, Windows—TM Microsoft Corp.  
NACE—TM NACE International  
PH 15-7 Mo, 17-7 PH—TM AK Steel Corp  
picofast—Hans Turck KG  
Pillar—TM Nippon Pillar Packing Company, Ltd.  
Raychem—TM Tyco Electronics Corp.  
Sandvik, SAF 2507—TM Sandvik AB  
Simriz—TM Freudenberg-NOK  
SolidWorks—TM SolidWorks Corporation  
UL—Underwriters Laboratories Inc.  
Xylan—TM Whitford Corporation  
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