

Severe-Service Union-Bonnet Needle Valves— Special Alloy Materials



N Series and HN Series

- Working pressures up to 10 000 psig (689 bar)
- Temperatures from -65 to 450°F (-53 to 232°C) with PTFE packing; up to 1000°F (537°C) with Grafoil[®] packing
- Alloy 625, alloy 825, Alloy 2507, and 6-moly materials

Features

Stem Designs

- Ball tip (NB)—3N, 6N, 12N, and 6HN
- Regulating (NR)—all models

Orifice Sizes

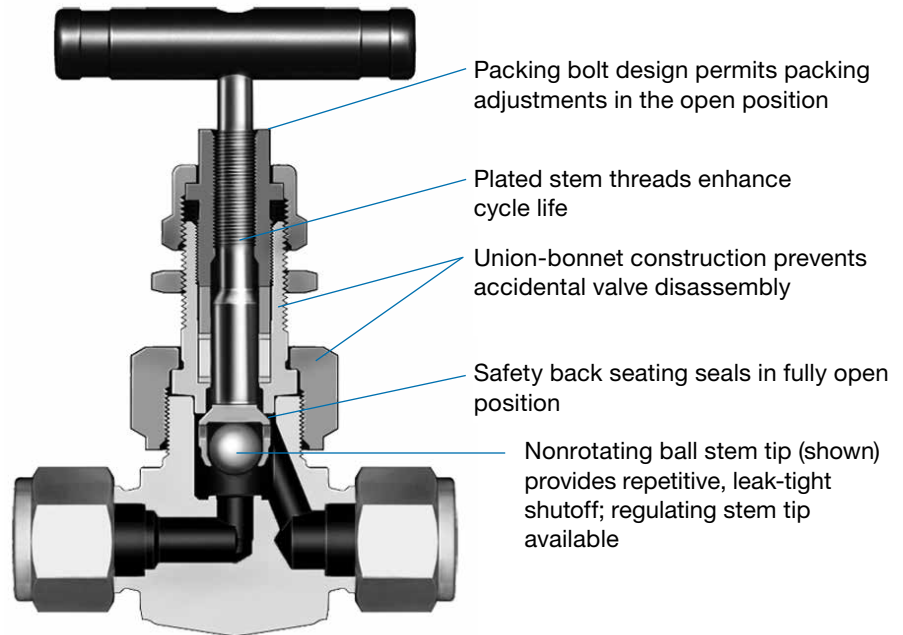
- 0.156 in. (4.0 mm)—3N and 3HN
- 0.250 in. (6.4 mm)—6N and 6HN
- 0.437 in. (11.1 mm)—12N

Flow Coefficients (C_v)

- From 0.35 to 2.4

Flow Pattern

- Straight—all models



Pressure-Temperature Ratings

Ratings are based on manual valves with optional Grafoil packing. Ratings are limited to:

- 250°F (121°C) max with UHMWPE stem packing.
- 450°F (232°C) max with PTFE stem packing.
- 600°F (315°C) max with PEEK stem packing.

See **Stem Packing Materials**, page 7, for more information about packing materials.

N Series

Material	Alloy 625	Alloy 825	Alloy 2507	6-Moly
Temperature, °F (°C)	Working Pressure, psig (bar)			
-65 (-53) to 100 (37)	6000 (413)	6000 (413)	6000 (413) ^①	6000 (413)
200 (93)	6000 (413)	5510 (379)	5980 (412)	5330 (367)
250 (121)	6000 (413)	5370 (369)	5820 (400)	5050 (347)
300 (148)	6000 (413)	5225 (360)	5655 (389)	4775 (328)
350 (176)	5940 (409)	5110 (352)	5555 (382)	4595 (316)
400 (204)	5880 (405)	4995 (344)	5455 (375)	4415 (304)
450 (232)	5815 (400)	4880 (336)	5410 (372) ^②	4285 (295)
500 (260)	5755 (396)	4765 (328)	—	4150 (285)
600 (315)	5670 (390)	4585 (315)	—	3995 (275)
650 (343)	5615 (386)	4505 (310)	—	3925 (270)
700 (371)	5565 (383)	4455 (306)	—	3880 (267)
750 (398)	5510 (379)	4430 (305)	—	3860 (265)
800 (426)	5460 (376)	4380 (301)	—	—
850 (454)	5405 (372)	4380 (301)	—	—
900 (482)	5355 (368)	4350 (299)	—	—
950 (510)	5300 (365)	4325 (297)	—	—
1000 (537)	—	4250 (292)	—	—

HN Series (High Pressure)

Material	Alloy 625	Alloy 825	Alloy 2507
Temperature, °F (°C)	Working Pressure, psig (bar)		
-65 (-53) to 100 (37)	10 000 (689)	10 000 (689)	10 000 (689) ^①
200 (93)	10 000 (689)	9 185 (632)	9 970 (686)
250 (121)	10 000 (689)	8 950 (616)	9 700 (668)
300 (148)	10 000 (689)	8 710 (600)	9 425 (649)
350 (176)	9 900 (682)	8 520 (587)	9 260 (638)
400 (204)	9 795 (674)	8 325 (573)	9 095 (626)
450 (232)	9 695 (667)	8 135 (560)	9 020 (621) ^③
500 (260)	9 590 (660)	7 940 (547)	—
600 (315)	9 445 (650)	7 640 (526)	—
650 (343)	9 360 (644)	7 510 (517)	—
700 (371)	9 270 (638)	7 425 (511)	—
750 (398)	9 185 (632)	7 380 (508)	—
800 (426)	9 095 (626)	7 295 (502)	—
850 (454)	9 010 (620)	7 295 (502)	—
900 (482)	8 920 (614)	7 255 (499)	—
950 (510)	8 835 (608)	7 210 (496)	—
1000 (537)	—	7 080 (487)	—

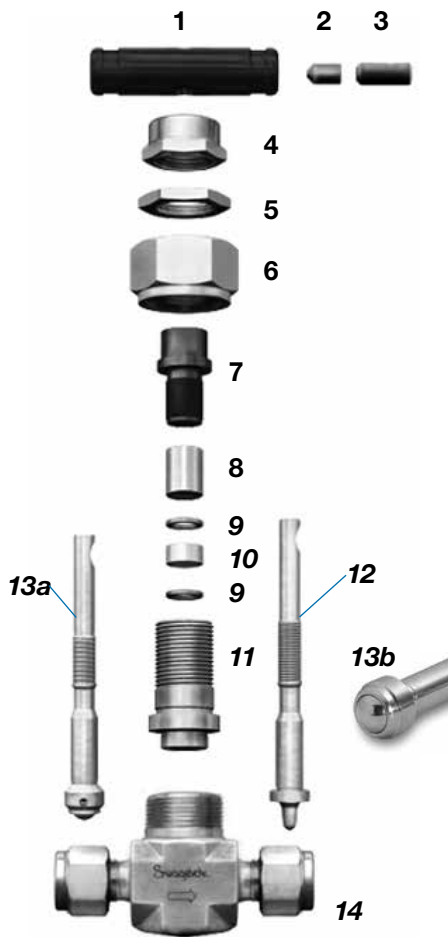
For more information about pressure ratings of valves with tube fitting end connections, see Swagelok® *Tubing Data*, MS-01-107.

① Low temperature rating of -50°F (-48°C), working pressure remains the same.

② Maximum temperature rating of 482°F (250°C) at 5380 psig (370 bar).

③ Maximum temperature rating of 482°F (250°C) at 8970 psig (618 bar).

Materials of Construction



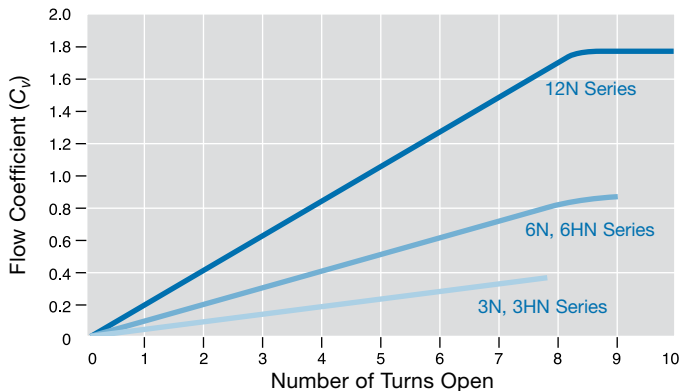
Component	Valve Body Material			
	Alloy 625	Alloy 825	Alloy 2507	6-Moly
	Material Grade/ASTM Specification			
1 Handle	Anodized aluminum 2024T4/B211			
2 Handle pin	Nickel cadmium-plated steel/A108			
3 Set screw	Nickel cadmium-plated steel			
4 Lock nut	316 SS/A276 or A479			
5 Panel nut	316 SS/B783			
6 Union nut	Alloy 625/B446	Alloy 825/B425	Alloy 2507/A479	6-moly/B691
7 Packing bolt	316 SS/A276			
8 Gland	Alloy 625/B446	Alloy 825/B425	Alloy 2507/A479	6-moly/B691
9 Packing supports	Glass-filled PTFE			
10 Packing	PTFE/D1710			
11 Bonnet	Alloy 625/B446	Alloy 825/B425	Alloy 2507/A479	6-moly/B691
12 NR regulating stem	<i>Silver-plated Alloy 625/B446</i>	<i>Silver-plated Alloy 825/B425</i>	<i>Silver-plated Alloy 2507/A479</i>	<i>Silver-plated 6-moly/B691</i>
13a NB ball tip stem shank	<i>Silver-plated Alloy 625/B446</i>	<i>Silver-plated Alloy 825/B425</i>	<i>Silver-plated Alloy 2507/A479</i>	<i>Silver-plated 6-moly/B691</i>
13b NB ball stem tip	<i>Material must be selected; see Ball Stem Tip Materials, page 5.</i>			
14 Body	Alloy 625/B564 or B446	Alloy 825/B564 or B425	Alloy 2507/A479 or A182	6-moly/B691
Lubricants	Nickel antiseize with hydrocarbon carrier (all valves); hydrocarbon-based (NB ball tip)			

Wetted components listed in italics.

Flow Data at 100°F (37°C)

NR Regulating Stem

Flow Coefficient at Turns Open



NB Ball Stem Tip

The NB stem is designed to be used in a fully open or fully closed position. See **Dimensions** for flow coefficients.

Testing

Every N series and HN series needle valve is factory tested with nitrogen at 1000 psig (69 bar). Seats have a maximum allowable leak rate of 0.1 std cm³/min. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

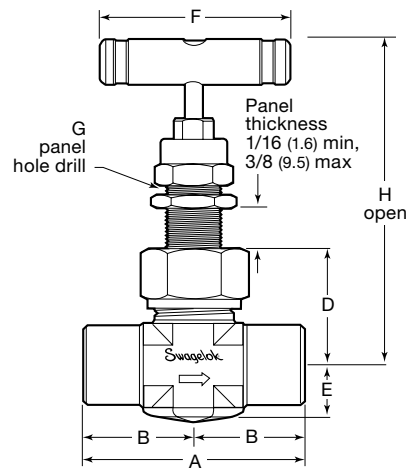
Cleaning and Packaging

All N series and HN series needle valves are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10)*, MS-06-62. Cleaning and packaging in accordance with Swagelok *Special Cleaning and Packaging (SC-11)*, MS-06-63, to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C are available as an option.

Dimensions

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

N Series



End Connections		Flow Coefficient (C _v)	Basic Ordering Number	Dimensions, in. (mm)						
Inlet/Outlet	Size			A	B	D	E	F	G	H
3N Series: 0.156 in. (4.0 mm) Orifice										
Female NPT	1/8 in.	0.35	-3NBF2-	2.00 (50.8)	1.00 (25.4)	1.09 (27.7)	0.47 (11.9)	1.75 (44.5)	19/32 (15.1)	3.04 (77.2)
	1/4 in.		-3NBF4-	2.06 (52.3)	1.03 (26.2)					
Male NPT	1/4 in.		-3NBM4-	2.00 (50.8)	1.00 (25.4)					
Swagelok tube fittings	1/4 in.		-3NBS4-	2.40 (61.0)	1.20 (30.5)					
	6 mm	-3NBS6MM-								
6N Series: 0.250 in. (6.4 mm) Orifice										
Female NPT	1/4 in.	0.86	-6NBF4-	2.25 (57.2)	1.12 (28.4)	1.34 (34.0)	0.59 (15.0)	2.50 (63.5)	25/32 (19.8)	3.70 (94.0)
	3/8 in.		-6NBF6-							
Swagelok tube fittings	3/8 in.		-6NBS6-	2.83 (71.9)	1.41 (35.8)					
	1/2 in.		-6NBS8-	3.04 (77.2)	1.52 (38.6)					
	10 mm		-6NBS10MM-	2.85 (72.4)	1.42 (36.1)					
	12 mm		-6NBS12MM-	3.04 (77.2)	1.52 (38.6)					
12N Series: 0.437 in. (11.1 mm) Orifice										
Female NPT	1/2 in.	2.4	-12NBF8-	3.12 (79.2)	1.56 (39.6)	1.82 (46.2)	0.72 (18.3)	3.50 (88.9)	1 1/32 (26.2)	4.78 (121)
	3/4 in.		-12NBF12-	3.25 (82.6)	1.62 (41.1)	1.91 (48.5)	0.78 (19.8)			4.88 (124)
	1 in.		-12NBF16-	3.62 (91.9)	1.81 (46.0)	2.13 (54.1)	1.00 (25.4)			5.10 (130)
Male/female NPT	1/2 in.	1.9	-12NBM8-F8-	3.12 (79.2)	1.56 (39.6)	1.82 (46.2)	0.72 (18.3)	3.50 (88.9)	1 1/32 (26.2)	4.78 (121)
	3/4 in.		-12NBM12-F12-	3.25 (82.6)	1.62 (41.1)	1.91 (48.5)	0.78 (19.8)			4.88 (124)
	1 in.		-12NBM16-F16-	3.62 (91.9)	1.81 (46.0)	2.13 (54.1)	1.00 (25.4)			5.10 (130)
Swagelok tube fittings	1/2 in.	2.1	-12NBS8-	3.92 (99.6)	1.96 (49.8)	1.82 (46.2)	0.72 (18.3)	3.50 (88.9)	1 1/32 (26.2)	4.78 (121)
	3/4 in.	2.4	-12NBS12-①							
	12 mm	1.9	-12NBS12MM-	3.92 (99.6)	1.96 (49.8)	1.82 (46.2)	0.72 (18.3)			

Dimensions shown with Swagelok tube fitting nuts finger-tight.

① Available only in Alloy 2507 material.

Ordering Information

N Series

You must specify both a valve material and a ball stem tip material.

Select a basic valve ordering number from the **Dimensions** table, page 4.

- Add the valve material designator from the table below.

Example: 625-3NBF2-

Material	Designator
Alloy 625	625
Alloy 825	825
Alloy 2507	2507
6-Moly	6MO

- Add the ball stem tip material designator from the table below.

Example: 625-3NBF2-**HC**

Ball Stem Tip Material/ ASTM Specification	Designator
Alloy 625/B446	625
Alloy 825/B425	825
Alloy 2507/A479	2507
6-Moly/B691	6MO
Cobalt-based alloy	STE
440C SS/A276	440C
Alloy 400/B127 or B164	M
Alloy C-276/B574 or B575	HC
Titanium/B348 or B265	TI

Regulating Stem Design

N series valve ordering numbers specify NB ball stem tips. To order valves with regulating stem tips, replace **NB** in the ordering number with **NR**, and remove the second dash (regulating stems are one piece and do not require a material designator.)

Example: 625-3**NRF**2

Note: Regulating stem tips are not intended for repetitive shutoff in gas applications.

Handles

Anodized black aluminum bar handles are standard. Colored phenolic (with brass insert) and 316 stainless steel bar handles are available. To order, add a handle designator to the valve ordering number.

Examples: 625-3NRS4-**BKP**
625-12NBF16-**SH**-6MO

Handle	Designator
Black phenolic knob	-BKP
Blue phenolic knob	-BLP
Green phenolic knob	-GRP
Orange phenolic knob	-OGP
Red phenolic knob	-RDP
Yellow phenolic knob	-YWP
Stainless steel bar	-SH

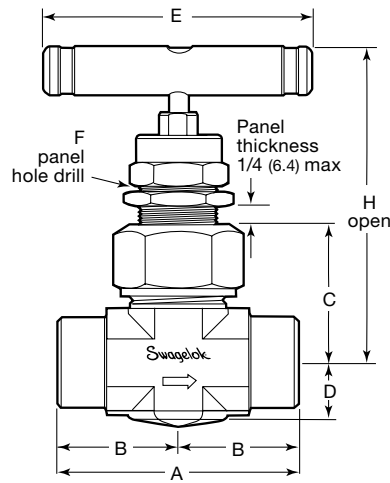
Optional Stem Packing Materials and Cleaning

See page 7 for information about optional stem packings and special cleaning and packaging.

Dimensions

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

HN Series



End Connections		Basic Ordering Number	Dimensions, in. (mm)						
Inlet/Outlet	Size		A	B	C	D	E	F	H
3HN Series: 0.156 in. (4.0 mm) Orifice; 0.35 C_v									
Female NPT	1/8 in.	-3HNRF2	2.25 (57.2)	1.13 (28.7)	1.38 (35.1)	0.59 (15.0)	2.50 (63.5)	0.81 (20.6)	3.31 (84.1)
	1/4 in.	-3HNRF4							
Male NPT	1/4 in.	-3HNRM4							
Swagelok tube fittings	1/4 in.	-3HNRS4	2.82 (71.6)	1.41 (35.8)					
6HN Series: 0.250 in. (6.4 mm) Orifice; 0.86 C_v									
Female NPT	1/4 in.	-6HNRF4	3.13 (79.5)	1.56 (39.6)	1.81 (46.0)	0.71 (18.0)	3.50 (88.9)	1.06 (26.9)	4.13 (105)
	1/2 in.	-6HNRF8	3.25 (82.6)	1.63 (41.4)	1.94 (49.3)	0.78 (19.8)			4.25 (108)
Male NPT	1/2 in.	-6HNRM8	3.13 (79.5)	1.56 (39.6)	1.81 (46.0)	0.71 (18.0)			4.13 (105)
Swagelok tube fittings	3/8 in.	-6HNRS6-	3.39 (86.1)	1.70 (43.2)	1.81 (46.0)	0.71 (18.0)			
	1/2 in.	-6HNRS8-	3.60 (91.4)	1.80 (45.7)					

Dimensions shown with Swagelok tube fitting nuts finger-tight.

Ordering Information

HN Series (High Pressure)

Select a basic valve ordering number from the Table of Dimensions. Add the material designator from the table below.

Example: 625-3HNRF4

Material	Designator
Alloy 625	625
Alloy 825	825
Alloy 2507	2507

Ball Stem Design and Materials

Ordering numbers specify a regulating stem tip. Ball stem tips are available for 6HN series valves. To order, replace **NR** in the ordering number with **NB** and add a ball stem tip material designator to the valve ordering number.

Example: 625-6HNBF4-M

Optional Stem Packing Materials and Cleaning

See page 7 for information about optional stem packings and special cleaning and packing.

Ball Stem Tip Material/ ASTM Specification	Designator
Alloy 625/B446	-625
Alloy 825/B425	-825
Alloy 2507/A479	-2507
6-Moly/B691	-6MO
Cobalt-based alloy	-STE
440C SS/A276	-440C
Alloy 400/B127 or B164	-M
Alloy C-276/B574 or B575	-HC
Titanium/B348 or B265	-TI

Options

N Series and HN Series

Stem Packing Materials

PTFE packing is standard. To order an optional stem packing material, add a stem packing material designator to the valve ordering number. See page 2 for pressure-temperature ratings of valves with optional stem packing materials.

Stem Packing Material	Designator
UHMWPE	-P
PEEK	-PK
Grafoil	-G

UHMWPE (ultrahigh-molecular weight polyethylene) is intended for service where fluorocarbons are not acceptable. UHMWPE packing is lubricated with nickel antiseize with hydrocarbon carrier; it does not require packing supports.

PEEK (polyetheretherketone) packing material is a 2-piece chevron design including PEEK packing supports and molybdenum disulfide, fluorinated tungsten disulfide-based lubricant; stem packing replacement kits also contain nickel antiseize with hydrocarbon carrier.

Grafoil is a high-temperature packing material that does not require packing supports. Factory assemblies contain fluorinated tungsten disulfide-based lubricant and nickel antiseize with hydrocarbon carrier; stem packing replacement kits contain only nickel antiseize with hydrocarbon carrier.

Examples: 625-3HNRF4-**P**
 625-6NBS8-**PK**-625
 625-12NBF8-**G**-625

Stem Packing Kits

PTFE, UHMWPE, PEEK, and Grafoil stem packing kits are available. Kits contain stem packing(s), lubricant, and instructions.

Valve Series	Seal Material and Kit Ordering Number			
	PTFE	UHMWPE	Grafoil	PEEK
3N, 3HN	T-9K-3N	PE-9K-3N	G-9K-3N	PK-9K-3N
6N, 6HN	T-9K-6N	PE-9K-6N	G-9K-6N	PK-9K-6N
12N	T-9K-12N	PE-9K-12N	G-9K-12N	PK-9K-12N
Lubricant	Nickel antiseize with hydrocarbon carrier			Nickel antiseize with hydrocarbon carrier and fluorinated tungsten disulfide-based; molybdenum disulfide-based coating

Special Cleaning and Packaging (SC-11)

To order N series and HN series valves with optional cleaning and packaging to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C, add **-SC11** to the valve ordering number.

Example: 625-3NBF2-**SC11**

Oxygen Service Hazards

For more information about hazards and risks of oxygen-enriched systems, see the Swagelok *Oxygen System Safety* technical report, MS-06-13.

Sour Gas Service

Swagelok special alloy N series severe-service union-bonnet needle valves are available for sour gas service. Materials are selected in accordance with NACE MR0175/ISO 15156.

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

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.

Caution: Do not mix or interchange parts with those of other manufacturers.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

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