

Multijacketed Tubing, Single-Jacketed Tubing, and Insulated Tubing



Features

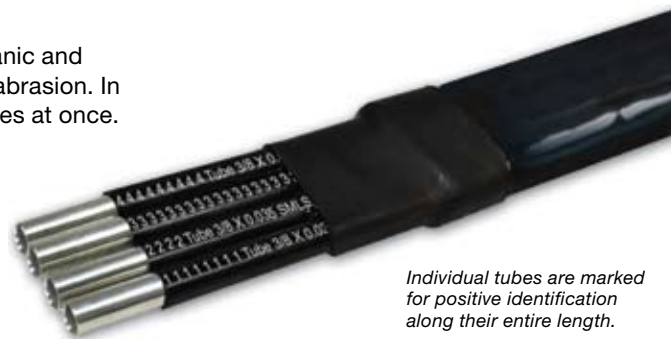
- 1/4 to 1/2 in. and 6 to 12 mm tubing sizes available in 316/316L stainless steel and copper
- Seamless and welded tubing available in stainless steel
- Thermoplastic polyurethane (TPU) and PVC jackets help protect tubing from external corrosion and abrasion
- Fibrous glass insulation reduces heat loss and helps protect personnel

Multijacketed Tubing

Swagelok® multijacketed tubing provides protection against galvanic and atmospheric corrosion and protects the tubing against wear and abrasion. In addition, it reduces costs by enabling installation of up to four tubes at once.

Features

- 316/316L stainless steel instrumentation tubing
- 1/4 to 1/2 in. and 6 to 12 mm tubing sizes
- Low-temperature, UV-resistant thermoplastic polyurethane (TPU) for both individual tube jackets and outer jacket
- Positive identification of individual tubes along entire length
- Tube and jacket marking standard; see **Standard Marking**, below.



Individual tubes are marked for positive identification along their entire length.

Materials of Construction

Component	Material/Grade
Tubing	316/316L / ASTM A269, A213 ^①
Jackets	Thermoplastic polyurethane
Stiffening plate	Aluminum 3003-0
Inner wrap, outer wrap	Polyester film
Foam wrap	Closed cell, EPDM foam rubber

^① Nominal wall thickness, not minimum wall thickness. Seamless metric sizes also meet DIN 17458 test 1 class material 1.4401/1.4404.

Technical Data

Fractional

Tube OD in.	Nominal Wall Thickness in.	Max Process Temperature °F	Min Service and Installation Temperature °F	Pressure Rating at -20 to 100°F psig		Min Bend Radius in.	Support Centers ft	
				Seamless	Welded		Horiz	Vert
1/4	0.035	250	-67 service; -40 installation	5100	4080	8.00	6.00	15.0
3/8	0.035			3300	2640			
1/2	0.035 ^①			2600	2080			
	0.049			3700	2960			

^① Not recommended for use with tube fittings in gas service.

Metric

Tube OD mm	Nominal Wall Thickness mm	Max Process Temperature °C	Min Service and Installation Temperature °C	Pressure Rating at -28 to 37°C bar		Min Bend Radius cm	Support Centers m	
				Seamless	Welded		Horiz	Vert
6	1.0	121	-55 service; -40 installation	420	336	20.3	1.80	4.60
10				240	192			
12				200	160			

Standard Marking

Standard marking includes model, size, materials, specifications, temperature rating, and batch number for traceability.

Individual Tube Example:

- Swagelok Model MJT • 1/2 × 0.049 in. 316/316L SMLS ASTM A269 • TPU Jacket
- Maximum Temperature 250°F/120°C • Caution—May Be Hot • Batch 12345 • www.swagelok.com ...1...1...1...1...1...

Outer Jacket Example:

- 600 ft • Swagelok Model MJT • Two 1/2 × 0.049 in. 316/316L SMLS ASTM A269
- TPU Jacket • Maximum Temperature 250°F/120°C • Caution—May Be Hot • Batch 12345 • www.swagelok.com •

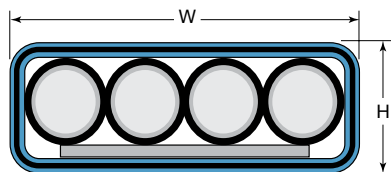
Tubing Data

For additional information, see *Swagelok Tubing Data*, MS-01-107.

For jacket properties information, see page 5.

Dimensions

Dimensions are for reference only and are subject to change.



Tube OD	Wall	2 Tubes	3 Tubes	4 Tubes	H Height	2 Tubes	3 Tubes	4 Tubes	2 Tubes	3 Tubes	4 Tubes
		W, Width				Weight			Max Bulk Length		
Dimensions		in.				lb/ft			ft		
1/4	0.035	1.06	1.41	1.76	0.73	0.37	0.52	0.68	1100	900	725
3/8	0.035	1.31	1.79	2.26	0.86	0.53	0.76	0.99	850	650	500
1/2	0.035	1.56	2.16	2.76	0.98	0.69	1.00	1.30	700	500	375
	0.049	1.59	2.16	2.76	0.98	0.82	1.18	1.55	600	400	325
Dimensions		mm				kg/m			m		
6	1.0	26	35	43	18	0.55	0.78	1.01	395	290	230
10	1.0	34	47	59	22	0.87	1.25	1.63	240	175	135
12	1.0	38	53	67	24	1.03	1.49	1.94	210	150	105

Single-Jacketed Tubing

Swagelok single-jacketed tubing helps provide increased protection against galvanic and atmospheric corrosion. In addition, it helps protect the tubing against wear and abrasion.

Features

- 316/316L stainless steel and copper instrumentation tubing
- 1/4 to 1/2 in. and 6 to 12 mm tubing sizes
- Low-temperature, UV-resistant PVC jacket standard; optional thermoplastic polyurethane (TPU) jacket available for higher-temperature service
- Jacket marking available; see **Optional Jacket Marking**, below.



Technical Data

Fractional

Tube OD in.	Nominal Wall Thickness in.	Max Process Temperature °F	Min Service and Installation Temperature °F	Pressure Rating at -20 to 100°F psig		Min Bend Radius in.	Support Centers ft		Weight lb/ft	Jacket OD in.	Max Bulk Length ± 10 % ft	
				Seamless	Welded		Horiz	Vert			Seamless	Welded
Stainless Steel (ASTM A269, A213^①, TP 316/316L)												
1/4	0.035	220, PVC jacket;	-30, service;	5100	4080	8.00	6.00	15.0	0.12	0.32	2200	2500
3/8	0.035			3300	2640						1300	2500
1/2	0.035 ^②	250, TPU jacket	-10, installation	2600	2080						0.25	0.57
	0.049			3700	2960	0.31	750	1000				
Copper (ASTM B68, B68M, B75, UNS 12200)												
1/4	0.030	220, PVC jacket;	-30, service;	1400	—	8.00	6.00	15.0	0.12	0.32	2600	—
3/8	0.032			900							2000	
1/2	0.035 ^②	250, TPU jacket	-10, installation	800							0.26	
	0.049			1100	0.33							

① Nominal wall thickness, not minimum wall thickness.

② Not recommended for use with tube fittings in gas service.

Metric

Tube OD mm	Nominal Wall Thickness mm	Max Process Temperature °C	Min Service and Installation Temperature °C	Pressure Rating at -28 to 37°C bar		Min Bend Radius cm	Support Centers m		Weight kg/m	Jacket OD mm	Max Bulk Length ± 10 % m	
				Seamless	Welded		Horiz	Vert			Seamless	Welded
Stainless Steel (ASTM A269, A213^①, TP 316/316L)												
6	1.0	104, PVC jacket; 121, TPU jacket	-34, service; -23, installation	420	336	20.3	1.80	4.60	0.18	7.9	610	305
10				240	192						335	90
12				200	160						275	90
Copper (ASTM B68, B68M, B75, UNS 12200)												
6	1.0	104, PVC jacket; 121, TPU jacket	-34, service; -23, installation	94.0	—	20.3	1.80	4.60	0.18	7.9	915	—
10	1.0			60.0							305	
12	1.0 ^②			54.0							305	

① Nominal wall thickness, not minimum wall thickness. Seamless metric sizes also meet DIN 17458 test 1 class material 1.4401/1.4404.

② Not recommended for use with tube fittings in gas service.

Optional Jacket Marking

Optional marking includes model, size, materials, specifications, temperature rating, and batch number for traceability.

Example:

100 ft • Swagelok Model JT • 1/2 × 0.049 in.
 • 316/316L SMLS ASTM A269 • PVC Jacket
 • Maximum Temperature 220°F/104°C •
 Caution—May Be Hot • Batch 12345 •
www.swagelok.com

Tubing Data

For additional information, see *Swagelok Tubing Data*, MS-01-107.

For jacket properties information, see page 5.

Insulated Tubing

Swagelok insulated tubing is designed for use in applications such as steam supply, condensate return, and gas and liquid transport lines, where weatherproofing and energy conservation are important. Swagelok insulated tubing helps protect personnel from hot process and steam lines, reduces heat loss, and offers a cost-effective alternative to field-installed insulation of small-diameter tubing systems.



Features

- 316/316L stainless steel and copper instrumentation tubing
- 1/4 to 1/2 in. and 6 to 12 mm tubing sizes
- Low-temperature, UV-resistant PVC jacket standard; optional TPU jacket available
- Absorption-resistant fibrous glass insulation
- Insulation contains less than 100 ppm of water-soluble chlorides
- Jacket marking standard; see **Standard Jacket Marking**, below.

⚠ Seal insulation ends to prevent contamination of the insulation.

Technical Data

Fractional

Tube OD in.	Nominal Wall Thickness in.	Max Process Temperature °F	Min Service and Installation Temperature °F	Pressure Rating at 400°F psig		Min Bend Radius in.	Support Centers ft		Weight lb/ft	Jacket OD in.	Max Bulk Length ± 10 % ft	
				Seamless	Welded		Horiz	Vert			Seamless	Welded
Stainless Steel (ASTM A269, A213^①, TP 316/316L)												
1/4	0.035	400 ^③	-30, service; -10, installation	4896	3916	8.00	6.00	15.0	0.20	1.00	1100	1250
3/8	0.035			3168	2534				0.30	1.13	1300	
1/2	0.035 ^②			2496	1996				0.45	1.25	1000	800
	0.049			3552	2841				0.75	1.25	750	1000
Copper (ASTM B68, B68M, B75, UNS 12200)												
1/4	0.030	400 ^③	-30, service; -10, installation	700	—	8.00	6.00	15.0	0.26	1.00	1300	—
3/8	0.032			450					0.34	1.13	1000	
1/2	0.035 ^②			400					0.43	1.25	1000	
	0.049			550					0.50	1.25	1000	

① Nominal wall thickness, not minimum wall thickness.

② Not recommended for use with tube fittings in gas service.

③ The maximum jacket surface temperature is 140°F with a process temperature of 400°F, an ambient temperature of 80°F, and a wind of 10 mph.

Metric

Tube OD mm	Nominal Wall Thickness mm	Max Process Temperature °C	Min Service and Installation Temperature °C	Pressure Rating at 204°C bar		Min Bend Radius cm	Support Centers m		Weight kg/m	Jacket OD mm	Max Bulk Length ± 10 % m	
				Seamless	Welded		Horiz	Vert			Seamless	Welded
Stainless Steel (ASTM A269, A213^①, TP 316/316L)												
6	1.0	204 ^②	-34, service; -23, installation	403	322	20.3	1.80	4.60	0.40	24.9	610	305
10				230	184				0.57	28.7	335	90
12				192	153				0.63	30.7	275	90
Copper (ASTM B68, B68M, B75, UNS 12200)												
6	1.0	204 ^②	-34, service; -23, installation	47.0	—	20.3	1.80	4.60	0.40	24.9	455	—
10	1.0			30.0					0.55	28.7	305	
12	1.0 ^③			27.0					0.64	30.7	305	

① Nominal wall thickness, not minimum wall thickness. Seamless metric sizes also meet DIN 17458 test 1 class material 1.4401/1.4404.

② The maximum jacket surface temperature is 60°C with a process temperature of 204°C, an ambient temperature of 26°C, and a wind of 16 km/h.

③ Not recommended for use with tube fittings in gas service.

Standard Jacket Marking

Standard marking includes length, ordering number, temperature rating, and batch number for traceability.

Example:

100 ft • Swagelok SS-ST4-S-035-100-U •
400°F/204°C • Continuous Batch 12345 •
www.swagelok.com

Tubing Data

For additional information, see *Swagelok Tubing Data*, MS-01-107.

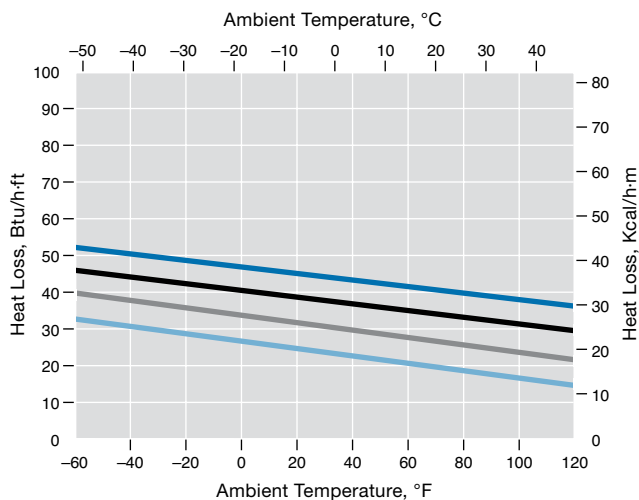
For jacket properties information, see page 5.

Insulated Tubing

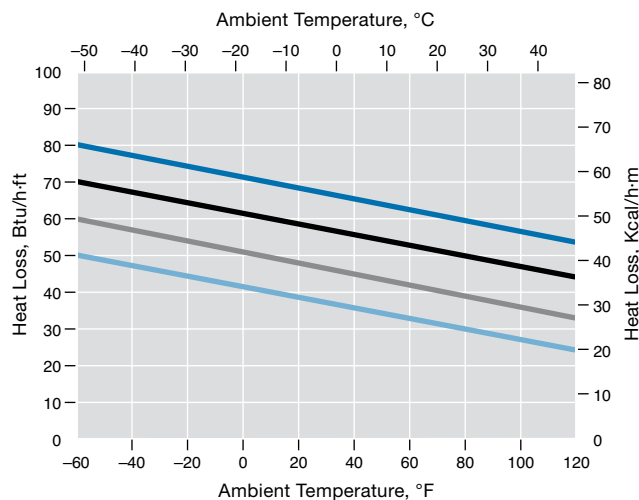
Heat Loss

The information presented represents typical performance data for low-temperature PVC and TPU jackets for the conditions given. Actual results may vary with the conditions of installation. Heat loss calculated with 25 mph (40 km/h) wind.

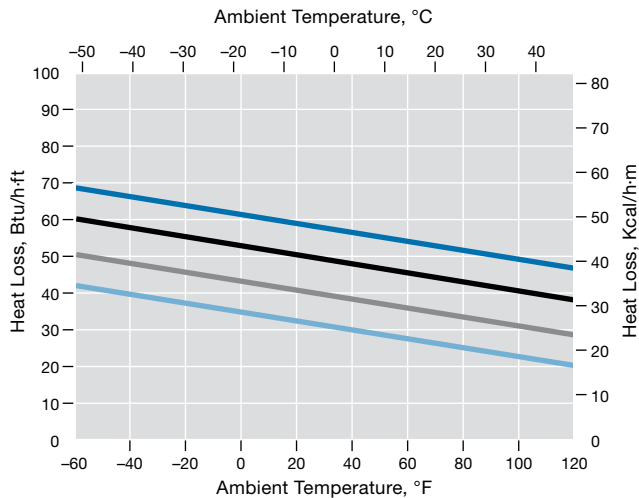
1/4 in. and 6 mm Tubing



1/2 in. and 12 mm Tubing



3/8 in. and 10 mm Tubing



Legend

- 200 psig (13.7 bar) steam 388°F (197°C)
- 125 psig (8.6 bar) steam 353°F (178°C)
- 50 psig (3.4 bar) steam 299°F (148°C)
- 15 psig (1.0 bar) steam 250°F (121°C)

Jacket Properties

Jacket Properties	Low-Temperature PVC	Thermoplastic Polyurethane (TPU)
Tensile strength	2200 psi (151 bar)	3800 psi (261 bar)
Elongation	350 %	700 %
Hardness, Shore A	80	80
Maximum temperature	220°F (104°C)	250°F (121°C)
Minimum installation temperature	-10°F (-23°C)	-40°F (-40°C)
Minimum service temperature	-30°F (-34°C)	-67°F (-55°C)
Halogenated (chlorides)	Yes	No
Water absorption	0.10 %	1.2 to 1.4 %
Flame resistance	24 rating in accordance with ASTM D2863	V2 in accordance with UL94
UV resistance	750 h in accordance with UL-1581	2000 h in accordance with QUV aging test

Ordering Information

Multijacketed Tubing

Build a multijacketed tubing ordering number by combining the designators in the sequence shown below.

A **B** **C** **D** **E** **F**
SS - MJT 2 - 4-S-035 - F 1

A Material

SS = 316/316L stainless steel

B Model

MJT = Multijacketed

C Number of Tubes

2 = 2 tubes of same size

3 = 3 tubes of same size

4 = 4 tubes of same size

D Size: Tube OD and Wall Thickness

Seamless Stainless Steel, Fractional

4-S-035 = $1/4 \times 0.035$ in.

6-S-035 = $3/8 \times 0.035$ in.

8-S-035 = $1/2 \times 0.035$ in.

8-S-049 = $1/2 \times 0.049$ in.

Seamless Stainless Steel, Metric

6M-S-1.0M = 6×1.0 mm

10M-S-1.0M = 10×1.0 mm

12M-S-1.0M = 12×1.0 mm

Welded Stainless Steel, Fractional

4-W-035 = $1/4 \times 0.035$ in.

6-W-035 = $3/8 \times 0.035$ in.

8-W-035 = $1/2 \times 0.035$ in.

8-W-049 = $1/2 \times 0.049$ in.

Welded Stainless Steel, Metric

6M-W-1.0M = 6×1.0 mm

10M-W-1.0M = 10×1.0 mm

12M-W-1.0M = 12×1.0 mm

E Package Length Unit of Measure

F = Feet

M = Meters

F Package Length, Tolerance

Specify a bulk length up to the maximum bulk length shown on page 2.

1 = Continuous length, $\pm 5\%$ (contains one piece)

2 = Exact length, $\pm 0.5\%$ (may contain multiple pieces)

3 = Continuous, exact length, $\pm 0.5\%$ (contains one piece)

4 = Standard length, $\pm 5\%$ (may contain multiple pieces)

Single-Jacketed and Insulated Tubing

Build a single-jacketed or insulated tubing ordering number by combining the designators in the sequence shown below.

A **B** **C** **D** **E**
SS - ST 4-S-035 - 100 - U

A Material

CU = Copper

SS = 316/316L stainless steel

B Model

JT = Single-jacketed

ST = Insulated

C Size: Tube OD and Wall Thickness

Copper, Fractional

4-030 = $1/4 \times 0.030$ in.

6-032 = $3/8 \times 0.032$ in.

8-035 = $1/2 \times 0.035$ in.

8-049 = $1/2 \times 0.049$ in.

Copper, Metric

6M-1.0M = 6×1.0 mm

10M-1.0M = 10×1.0 mm

12M-1.0M = 12×1.0 mm

12M-1.5M = 12×1.5 mm

Seamless Stainless Steel, Fractional

4-S-035 = $1/4 \times 0.035$ in.

6-S-035 = $3/8 \times 0.035$ in.

8-S-035 = $1/2 \times 0.035$ in.

Seamless Stainless Steel, Metric

6M-S-1.0M = 6×1.0 mm

10M-S-1.0M = 10×1.0 mm

12M-S-1.0M = 12×1.0 mm

Welded Stainless Steel, Fractional

4-W-035 = $1/4 \times 0.035$ in.

6-W-035 = $3/8 \times 0.035$ in.

8-W-035 = $1/2 \times 0.035$ in.

Welded Stainless Steel, Metric

6M-W-1.0M = 6×1.0 mm

10M-W-1.0M = 10×1.0 mm

12M-W-1.0M = 12×1.0 mm

D Package Length

Fractional

100 = 100 ft (30.5 m)

250 = 250 ft (76.2 m)

500 = 500 ft (152 m)

xxxx = Bulk length^①

Metric

30M = 30 m (98.4 ft)

75M = 75 m (246 ft)

150M = 150 m (492 ft)

xxxx = Bulk length^①

^① See pages 3 and 4 for the maximum bulk length of tubing.

E Options

For multiple options, add designators in alphabetical order.

M = Jacket marking, 6 ft (2 m) intervals (model JT only; see page 3 for details)

U = TPU jacket

Options

Jacket Colors

The standard jacket is black. For other colors, contact your authorized Swagelok sales and service representative.

Tubing Material and Size

Other materials and sizes are available. Contact your authorized Swagelok representative.

Accessories

Heat-Shrink Adhesive-Lined Sleeves

Used to protect bare tubing and straight fitting connections to jacketed and insulated tubing, these sleeves contain a heat-activated adhesive to provide a watertight seal to the protected area.

Sleeve Description	Ordering Number
0.75 in. (19.0 mm) dia, shrinks to 0.20 in. (5.1 mm) dia	MS-HSB-S075
1.00 in. (25.4 mm) dia, shrinks to 0.30 in. (7.6 mm) dia	MS-HSB-S100
2.00 in. (50.8 mm) dia, shrinks to 0.75 in. (19.0 mm) dia	MS-HSB-S200
3.00 in. (76.2 mm) dia, shrinks to 1.00 in. (25.4 mm) dia	MS-HSB-S300

Multijacketed Tubing Heat-Shrink Sleeve Selection

Tube OD	2 Tubes	3 Tubes	4 Tubes
	Heat Shrink Boot Ordering Number		
1/4 in.	MS-HSB-S100	MS-HSB-S200	MS-HSB-S200
3/8 in.	MS-HSB-S200	MS-HSB-S200	MS-HSB-S300
1/2 in.	MS-HSB-S300	MS-HSB-S300	MS-HSB-S300
6 mm	MS-HSB-S100	MS-HSB-S200	MS-HSB-S200
8 mm	MS-HSB-S200	MS-HSB-S200	MS-HSB-S200
10 mm	MS-HSB-S200	MS-HSB-S200	MS-HSB-S300
12 mm	MS-HSB-S300	MS-HSB-S300	MS-HSB-S300

Silicone Sealing Tape

Silicone sealing tape is used in conjunction with heat-shrink sleeves to seal the ends of jacketed and insulated tubing where the jacket material needs to be removed to assemble a fitting.

Each roll is 10 ft (3.0 m) long and 1.5 in. (38.1 mm) wide.

Ordering number: **MS-SR-B10**

Silicone Sealant

This silicone RTV sealant is used in conjunction with heat-shrink sleeves to seal ends of jacketed and insulated tubing from moisture, and it offers excellent resistance to weather, oil, and many chemicals.

One tube will seal approximately 10 ends; each kit contains 8 tubes.

Service Temperature: -60 to 400°F (-51 to 204°C)

Cure Time: approximately 24 h at 77°F (25°C) and 50 % relative humidity

Ordering number: **MS-RTV-SEAL-KIT**

Jacket Patch Kit

The jacket patch kit can be used to seal a splice in tubing or to repair any incidental field damage to insulation and jacket.

Each kit contains thermal insulation, fiberglass tape, and 10 self-sealing patches.

Ordering number: **MS-JP-KIT**



Weatherproof Strip Insulation

Weatherproof strip insulation provides an effective method of temporarily insulating components.

The jacketed insulation is universal and easy to install. It is approximately 4 in. (102 mm) wide and 1/2 in. (12.7 mm) thick and is available in standard lengths of 10, 30, and 50 ft (3.0, 9.1, and 15.2 m) packages.

Insulation Item	Ordering Number
10 ft (3.0 m) insulation strip	MS-SI-10
30 ft (9.1 m) insulation strip	MS-SI-30
50 ft (15.2 m) insulation strip	MS-SI-50
25 insulation tie straps	MS-SITS-KIT

Heat-Shrink End-Seal Boots (Insulated Tubing)

Made of thermally stabilized, modified polyolefin, these heat-shrinkable boots provide a weatherproof end seal for all sizes of insulated tubing and protect against moisture ingress.

Each kit contains 20 end-seal boots.

Ordering number: **MS-HSB-KIT**



Caps (Insulated Tubing)

Protective end caps temporarily seal insulated tubing ends and insulation during storage and installation.

Each kit contains 20 caps.

Tube OD		Ordering Number
in.	mm	
1/4	6	MS-46-CAP-KIT
3/8		
1/2	10	MS-8-CAP-KIT
	12	

Accessories

Mounting Clips

Stainless steel mounting clips secure jacketed tubing to brackets or tubing trays. Clips consist of a 6 mm bolt and nut and two 6 mm washers.



When using strut-type mounting brackets, also order strut nuts, below.

Multijacketed

Tube OD		Number of Tubes	Ordering Number
in.	mm		
1/4	6	2	MS-K42
		3	MS-K43
		4	MS-K44
3/8	8	2	MS-K62
		3	MS-K63
		4	MS-K64
1/2	10, 12	2	MS-K82
		3	MS-K83
		4	MS-K84

Single-Jacketed

Tube OD		Ordering Number
in.	mm	
1/4	6	MS-K41
3/8	8	MS-K61
1/2	10, 12	MS-K81

Strut Nuts

Strut nuts are used when securing jacketed tubing to strut-type mounting brackets

Ordering number: **MS-M65**



Tools

Breakout and Bending Tools

The tube breakout bender is used with multijacketed tubing to separate and bend individual tubes up to 1/2 in. or 12 mm outside diameter.



Tube Breakout Bender

The bending tools are used to bend 2-, 3-, or 4-tube multijacketed tubing or insulated tubing bundles with up to 1/2 in. or 12 mm outside diameter tubes.

Description	Ordering Number
Tube breakout bender, ^① 1.75 in. (44.4 mm) radius	MS-BT1
Bending tool, ^② 8 in. (20 cm) radius	MS-BBT
Bending tool, ^② 12 in. (30 cm) radius	MS-BBT-12

^① Requires 1/2 in. square drive ratchet, not included.

^② Requires 3/4 in. NPT threaded handle, not included.

Combination Spool Stand/Bundle Straightener

This tool safely pays out and straightens spooled coils of jacketed or insulated tubing. It accepts standard 46 in. (117 cm) spool diameters up to 36 in. (91 cm) wide.



Dimensions: 50 H
by 47 W by 49 D in.
(127 H by 119 by 124 D cm)

Ordering number: **MS-ST4636**

Five-Roll Straightener

The straightener can be mounted to the spool stand for use with single, coiled jacketed or nonjacketed tubing up to 1/2 in. or 12 mm outside diameter. Case included.



Case dimensions: 15.5 H by 19.8 W by 7.25 D in.
(40 H by 50.2 W by 18.4 D cm)

Ordering number: **MS-TST12**

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.

Warranty Information

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