



STOCK TUBING



FITTINGS & VALVES



MICRO-MACHINED PARTS



CUSTOM TUBING



NEEDLES & SYRINGES



CUSTOM COMPONENTS



CUT & DEBURRED TUBING



SPECIALTY TOOLS



CUSTOM ASSEMBLIES



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FDA Registration #1226212

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CUSTOM TUBING



MICRO-MACHINED PARTS



FITTINGS & VALVES

Only MicroGroup Can Offer Such *Agility* Because All Our Options Are "Under One Roof."

Tubing

Abrasive Bead Blasting Abrasive Slurry Cut-Off & Deburr, Laser Deburring, Electrochemical Drawing EDM, Ram EDM, Wire Electropolishing Etching, Chemical Grinding, Centerless Grinding, Centerless CNC Honing Hydrogen Furnace Knurling, Laser Machining, General Passivating Perforating Pipe Polishing, Belt Sawing, Abrasive Sawing, Cold (Milling) Sawing, Electrochemical Sawing, High Speed Carbide Straightening Tubing, Beverage Tubing, Cable Crimp Tubing, Capillary Tubing, Carbide Tubing, Catheter Tubing, Chromatographic Tubing, Custom Tubing, Cut & Deburred Tubing, Fractional Tubing, Hypodermic Tubing, Layered Tubing, Manufactured Types Tubing, Medical Tubing, Metric Tubing, Multi-lumen Tubing, Round Tubing, Shaped Tubing, Specifications Tubing, Stent Tubing, Surplus Tubing, Telescoping Tubing, Tolerances Tumbling, Vibratory & Barrel Turning, CNC Vacuum Stress Relieving

Custom Products

Assemblies, Aircraft & Aerospace Assemblies, Bellows Assemblies, Carbide Assemblies, Exotic Alloys Assemblies, Medical & Dental Assemblies, Stainless Steel Assemblies, Titanium Assemblies, Tubing Bellows, Metal Belts, Metal Blades, Surgical Blades, Tubular Bone Screws Catheters & Stents Fasteners Fittings, Miniature Fittings, Tubular Machined Springs Manifolds, Miniature Medical Devices Needles Perforated Tubing Shaft Couplings Stamping & Punching Tubing Components Tubing Components Valves, Miniature Wire Forms

Contract Services

Brazing & Soldering Hydrogen Furnace Induction Micro-Torch Vacuum Furnace

Cut-Off & Deburring

Abrasive Bead Blasting Cut-Off & Deburr, Laser Deburring, Abrasive Slurry Deburring, Electrochemical EDM, Ram EDM, Wire Electropolishing Sawing, Abrasive Sawing, Cold (Milling) Sawing, Clectrochemical Sawing, High Speed Carbide Tumbling, Vibratory & Barrel Turning, CNC

Drawing & Straightening

Drawing Bright Annealing Straightening

Engineering & Quality

Design Review Inspection Project Management Quality Control Registrations, ISO & FDA SPC Testing, Metallurgy Testing, Pressure Testing, Tensile

Tooling Finishing

Abrasive Bead Blasting Cleaning, Catheter Cleaning, Filtered Ultrasonic Electropolishing Etching, Chemical Laser Engraving Packaging Passivating Pyrolyzation Tumbling, Vibratory & Barrel

Grinding & Polishing

Electropolishing Grinding, Centerless Grinding, Centerless CNC Grinding, CNC Honing Needles Polishing, Belt Surgical Blades

Heat Treating

Hydrogen Furnace Induction Heating Vacuum Oven

Specialty Tools

Benders Blades, Cut-Off Saw Brushes, Deburring Brushes, Hand, Stainless Steel Brushes, Stem, Abrasive Brushes, Stem, Miniature Brushes, Stem, Stainless Steel Brushes, Wheel, Abrasive Brushes, Wheel, Atainless Steel Flexbone® Flexible Hones Lubricants Saws, Cut-Off

Machining, CNC

EDM, CNC Ram EDM, CNC Wire Grinding, CNC Laser, CNC Milling, CNC Prototyping, CNC Turning, CNC

Machining, Electrochemical

Deburring, Electrochemical EDM, Ram EDM, Wire Electropolishing Grinding, Electrochemical Sawing, Electrochemical

Machining, General

Prototype Production

Machining, Laser

Cut-Off & Deburr, Laser Cutting, Laser Drilling, Laser Knurling, Laser Machining, Laser

Perforating, Metals

Cutting, Laser Etching, Photo Perforating, Tubing Punching Ram EDM Stamping

Stamping & Punching

Cutting, Laser Foil & Sheet, Perforated Products, Foil & Sheet

Surface Abrading

Abrasive Bead Blasting Etching, Chemical Knurling, Laser

Tube Forming

Closures End Forming Flaring, Tube Roll Forming Swaging Tube Bending Tube Forming

Welding

Welding, Laser Welding, MIG Welding, Plasma Welding, Resistance (Spot) Welding, TIG

Fluid Handling

Dispensing Bottles Dispensing Needles Dispensing Tips Fittings, Medical Fittings, Miniature Fittings, Tubular Fittings, Tubular Inspection Gages, Luer Manifolds, Miniature Pumps Syringes, Glass Syringes, Plastic Valves, Miniature

PRICING · BIDDING · DELIVERY

General Information

Five Reasons to Buy From MicroGroup, Inc.

It's All About Speed - The MicroGroup Advantage

Speed 1. Greatest Selection

Save time by sourcing through our inventory of over 5 million feet of standard and special size tubing including many configurations of fittings and valves and unique small tools.

Speed 2. Immediate Quoting

Fast quoting over the phone or online. Quick turnaround time on quotes for customs.

Speed 3. Knowledgeable Staff/Great Service and Support

Our Account Representatives and Sales Engineers are tubing experts with years of hands-on experience. They'll be happy to assist you with your needs. Our Customer Service Representatives are always available to help you with any questions or concerns regarding your order.

Speed 4. Four Easy Ways to Pay

- 1. If you don't already have an account, your Sales Representative can usually qualify you within minutes to
- set up a N30 account.
- 2. Credit cards are accepted; MasterCard, VISA, Discover, American Express.
- 3. C.O.D.
- 4. Letter of Credit for our international accounts.

Speed 5. Fast Delivery

With our large inventory and manufacturing facility, MicroGroup can deliver most items promptly to help meet your needs.

Terms and Conditions

1) Payment Terms: Net 30 days. A finance charge of 1 1/2% per month (18% annum) will be charged on past due accounts. Statements will not be mailed unless an account is past due when a finance charge will apply.

2) Freight: All shipments are FOB Medway, MA. A \$5.00 handling charge will apply to all orders. Insurance will be added for all orders over \$100.00.

3) Industry Standard: It is at MicroGroup's discretion to ship +/- 10% on orders unless otherwise requested beforehand by the customer.

4) Returned Goods Policy: Returned merchandise is accepted up to 30 days only after purchase and is subject to a 25% restocking charge, plus freight costs. Returns cannot be accepted without a Return Materials Authorization number which can be obtained from your sales representative. MicroGroup reserves the right to require proof of purchase prior to authorization for returns by requesting invoice copies

5) Specials/Customs: No customs or specials will commence work without con-firming order and associated documentation. Orders for specials for customs may be subject to a non-refundable deposit or payment in advance. Orders for special items are not subject to cancellation unless we are reimbursed for costs incurred. No specials may be returned.

6) Minimum Order: A minimum order of \$100.00 net per order is required, unless order is placed by credit card, at which the minimum order is \$50.00 net per order.

7) Credit Terms: All new accounts must supply financial and credit references if an open account is desired. Other options include check in advance, C.O.D. or credit card orders.

8) Certifications of Material: Certifications are not automatically provided and orders will be shipped without certifications unless otherwise requested by the customer at the time of the order.

All orders are contingent upon availability to secure raw materials and services. No changes will be made without written confirmation and associated documentation and are subject to rescheduling. Prices and terms are subject to change without notice. An Equal Opportunity Employer.

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Stainless Steel Tubing



Custom Small Diameter Tubing	



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Miniature Fittings

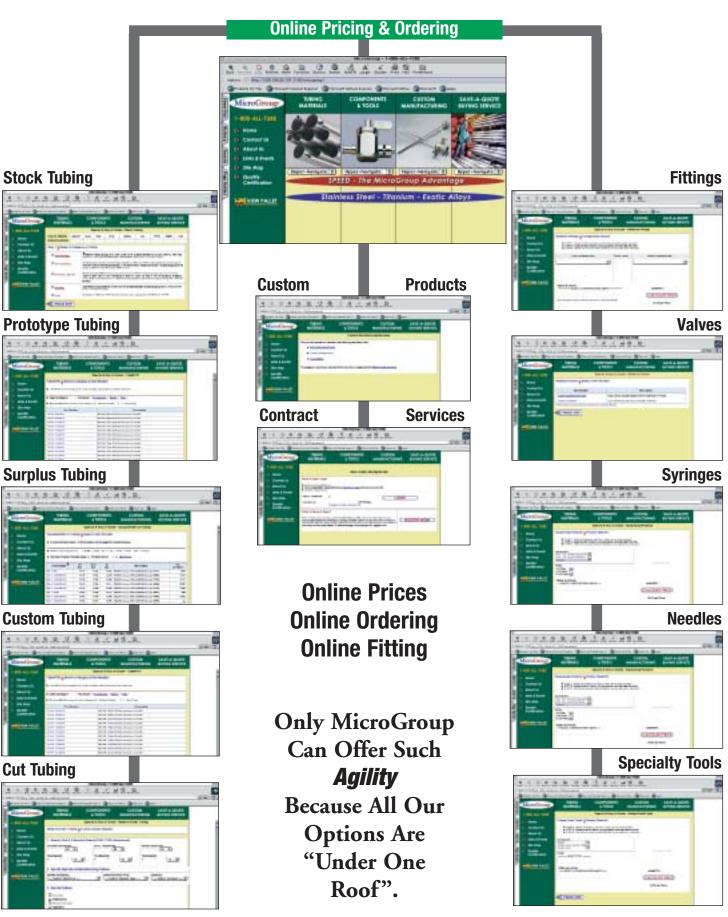


Dispensing Products 49



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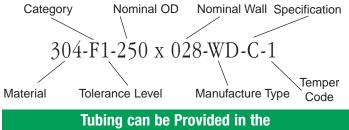
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About Tubing



Item Code Example

The following example is a guideline to assist you in the ordering process. Your MicroGroup representative can help you further with this process if necessary.



Following Configurations

Random Lengths:

2' to 20' unless otherwise specified.

Straight Lengths:

20' straight lengths generally available, 40' maximum.

Coils:

Coils of 5,000 feet or more can be produced in welded and seamless.

Cut-Off:

Commercial practice on Cut-Off tubing does NOT include deburring.

Cut and Deburred:

Commercial practice includes burr-free ends.

* 24 hour delivery is contingent upon materials availability.

The ITEM CODE was initially developed to enable our employees and computer systems to accurately specify and control the ALL-TUBE inventory. It has been so successful that we will use it as an outline. Please use the "Item Code" where possible.

Material:

Specifying "Material" is mandatory and can contain any number of digits (text and/or numeric) between one (1) and four (4).

Dash (-):

Dash (-) is mandatory at this position.

Category:

Specifying "Category" is mandatory and must contain one (1) text digit.

Tolerance Level:

"Tolerance Level" is optional, but can have only one (1) numeric digit.

Dash (-):

Dash (-) is mandatory at this position.

Nominal OD:

Specifying "OD" (outside diameter) is mandatory and must contain between one (1) and five (5) numeric digits and decimals if required.

By sign (x):

Inclusion of a "by sign" (x) is mandatory at this position.

Nominal Wall:

Specifying "Wall" is mandatory and must contain between one (1) and four (4) numeric digits and decimals, if required.

Dash (-):

Inclusion of a dash (-) is mandatory at this position.

Manufactured Type:

"Manufactured Type" is mandatory and can have two (2) text digits.

Dash (-):

Dash (-) is mandatory at this position.

Specification Type:

"Specification Type" is optional, but can have only one (1) numeric digit.

Dash (-):

Dash (-) is mandatory at this position.

Temper:

"Temper" is optional, but if used, must contain only one (1) numeric digit.

Note:

A complete explanation of these specifications and considerations not included in the ALL-TUBE Standard Item Code, are listed in our full-line catalog and at www.alltube.com.

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Order Online!

The industry's best web site just got better. MicroGroup's tubing wizard is up and running and ready to accommodate your buying requirements!

www.microgroup.com

PRICING · BIDDING · DELIVERY

Stock Hypodermic Tubing

Description: Often referred to as "seamless" because of its smooth appearance, hypo tubing is manufactured, welded and drawn to tight O.D. and I.D. tolerances. Stocked in grades 304 & 316 stainless steel in the full hard condition.

T304

Application: Ideal for medical and industrial components that require strength, uniformity, and corrosion resistance. Not manufactured for pressure service. Wide selection, economical and quick delivery.

T316

Gage Size	OD Nom	Wall Nom	ID Nom	GGN 196	OD Max/Min	ID Max/Min	T304 Item #	T316 Item #
6RW	.2030	.015	.173	-	.2040/.2020	.1760/.1700	304H-6RW	316H-6RW
6TW	.2030	.010	.183	-	.2040/.2020	.1850/.1810	304H-6TW	316H-6TW
6X	.2030	.007	.189	-	.2040/.2020	.1910/.1870	304H-6X	
6.5	.1880	.010	.168	-	.1890/.1870	.1710/.1650	304H-6.5	
7RW	.1800	.015	.150	-	.1810/.1790	.1530/.1470	304H-7RW	316H-7RW
7TW	.1800	.010	.160	-	.1810/.1790	.1620/.1580	304H-7TW	
7X	.1800	.007	.166	-	.1810/.1790	.1680/.1640	304H-7X	
'XX	.1800	.004	.173	-	.1810/.1790	.1740/.1720	304H-7XX	
7.5	.1720	.011	.150	-	.1730/.1710	.1530/.1470	304H-7.5	
BRW	.1650	.015	.135	-	.1660/.1640	.1380/.1320	304H-8RW	316H-8RW
BTW	.1650	.010	.145	-	.1660/.1640	.1470/.1430	304H-8TW	
3XX	.1650	.007	.150	-	.1660/.1640	.1530/.1475	304H-8XX	
3.5	.1560	.010	.136	-	.1570/.1550	.1390/.1330	304H-8.5	
RW	.1480	.015	.118	-	.1490/.1470	.1210/.1150	304H-9RW	316H-9RW
ΡΤW	.1480	.010	.128	-	.1490/.1470	.1300/.1260	304H-9TW	316H-9TW
XX	.1480	.006	.135	-	.1490/.1470	.1370/.1330	304H-9XX	
.5	.1410	.011	.119	-	.1420/.1400	.1210/.1170	304H-9.5	
0RW	.1340	.014	.106	-	.1350/.1330	.1080/.1040	304H-10RW	316H-10RW
IOTW	.1340	.010	.114	-	.1350/.1330	.1160/.1120	304H-10TW	316H-10TW
IOX	.1340	.008	.118	-	.1350/.1330	.1200/.1165	304H-10X	2.01110111
10.5	.1260	.010	.106	_	.1270/.1250	.1080/.1040	304H-10.5	
1RW	.1200	.013	.094	-	.1210/.1190	.0960/.0920	304H-11RW	316H-11RW
11TW	.1200	.010	.100	-	.1210/.1190	.1020/.0980	304H-11TW	316H-11TW
1X	.1200	.007	.106	-	.1210/.1190	.1080/.1040	304H-11X	010111111
1XX	.1200	.004	.112	_	.1210/.1190	.1140/.1100	304H-11XX	
1.5	.1150	.010	.095	_	.1160/.1140	.0960/.0930	304H-11.5	
2H	.1090	.016	.033	-	.1100/.1080	.0790/.0750	304H-12H	
2RW	.1090	.012	.085	_	.1100/.1080	.0870/.0830	304H-12RW	316H-12RW
2TW	.1090	.009	.005	-	.1100/.1080	.0930/.0890	304H-12TW	316H-12TW
2X	.1090	.005	.097	_	.1100/.1080	.0990/.0950	304H-12X	51011-12110
2XX	.1090	.005	.100	-	.1100/.1080	.1010/.0990	304H-12XX	
12.5	.1090	.005	.082	-	.1010/.0990	.0840/.0800	304H-12.5	
2.5 3RW		.009	.082	- Y		.0730/.0800	304H-12.5 304H-13RW	316H-13RW
	.0950		.071		.0960/.0940			
I3TW	.0950	.009		-	.0960/.0940	.0790/.0750	304H-13TW	316H-13TW
I3X	.0950	.005	.085	-	.0960/.0940	.0860/.0840	304H-13X	
I3XX	.0950	.003	.090		.0960/.0940	.0910/.0890	304H-13XX	
13.5	.0890	.009	.071	-	.0900/.0880	.0730/.0690	304H-13.5	
I4XH	.0830	.022	.039	-	.0840/.0820	.0410/.0370	304H-14XH	
4H	.0830	.017	.049	-	.0840/.0820	.0510/.0470	304H-14H	
I4RW	.0830	.010	.063	Y	.0840/.0820	.0650/.0610	304H-14RW	316H-14RW
4M	.0830	.008	.068	-	.0840/.0820	.0690/.0660	304H-14M	0401144774
I4TW	.0830	.006	.072	-	.0840/.0820	.0730/.0700	304H-14TW	316H-14TW
4XX	.0830	.003	.077	-	.0840/.0820	.0780/.0760	304H-14XX	
14.5	.0780	.008	.063	-	.0790/.0770	.0640/.0620	304H-14.5	
5RW	.0720	.009	.054	Y	.0725/.0715	.0555/.0525	304H-15RW	316H-15RW
5TW	.0720	.006	.060	-	.0725/.0715	.0615/.0585	304H-15TW	316H-15TW
5X	.0720	.005	.063	-	.0725/.0715	.0640/.0620	304H-15X	
5H	.0720	.011	.050	-	.0725/.0715	.0520/.0480	304H-15H	
5.5	.0680	.007	.054	-	.0685/.0675	.0555/.0525	304H-15.5	
6RW	.0650	.009	.047	Y	.0655/.0645	.0485/.0455	304H-16RW	316H-16RW
I6TW	.0650	.006	.053	-	.0655/.0645	.0545/.0515	304H-16TW	316H-16TW
16X	.0650	.004	.057	-	.0655/.0645	.0580/.0550	304H-16X	
16XX	.0650	.003	.060	-	.0655/.0645	.0610/.0585	304H-16XX	
16H	.0650	.016	.033	-	.0655/.0645	.0350/.0310	304H-16H	316H-16H
16.5	.0620	.005	.052	-	.0625/.0615	.0535/.0505	304H-16.5	316H-16.5
17RW	.0590	.009	.041	Y	.0595/.0585	.0425/.0395	304H-17RW	316H-17RW
7TW	.0590	.007	.046	-	.0595/.0585	.0475/.0445	304H-17TW	316H-17TW

175X 0.580 .004 .050 - .0585/.0575 .0510/.0490 304H-17X 17.5 .0560 .005 .046 - .0565/.0555 .0475/.0445 .304H-17.5 188W .0500 .006 .033 Y .0505/.0495 .0345/.0315 304H-17.5 188W .0500 .006 .038 .0505/.0495 .0345/.0315 304H-18X 316H-185 18X .0500 .004 .042 .0505/.0495 .0460/.0440 304H-18X 316H-181 18X .0500 .003 .045 .0505/.0495 .0320/.0280 304H-18X 316H-181 18K .0500 .003 .0455 .0445/.0420 .0290/.0280 304H-191W 316H-191 19RW .0425 .003 .033 .0430/.0420 .0335/.0315 304H-191W 316H-191 19X .0425 .001 .023 .0430/.0420 .0336/.0355 304H-191X 316H-201 20X .0355 .006 .024 Y .0366/.0355 .0245/.0230 304H-20X 304H-20X <	Gage Size	OD Nom	Wall Nom	ID Nom	GGN 196	OD Max/Min	ID Max/Min	T304 Item #	T316 Item #
175 0580 008 0.42 - 0585/0575 0.435/0405 304H-17S 316H-173 175X 0.590 0.010 0.39 - 0595/0585 0.410/0.0370 304H-17FX 177 0.590 0.005 0.446 - 0595/0585 0.416/0.0370 304H-17FX 178 0.590 0.005 0.446 - 0.565/0495 0.345/0315 304H-18RW 316H-181 188W 0.500 0.004 0.42 - 0.505/0495 0.430/0410 304H-18TW 316H-181 18X 0.500 0.004 0.42 - 0.450/0455 0.352/0225 304H-181W 316H-181 18X 0.500 0.010 0.33 - 0.430/0420 0.335/035 304H-191W 316H-191 19W 0.425 0.003 0.430/0420 0.336/0355 304H-191W 316H-191 19X 0.425 0.03 0.430/0420 0.326/0230 304H-201W 316H-201 19XW 0.425	17X	.0590	.004	.052	-	.0595/.0585	.0530/.0510	304H-17X	
175X 0.680 .004 .050 - 0.6585/.0575 .0510/.0490 304H-17X 17.5 .0560 .005 .046 - .0565/.0455 .0475/.0445 304H-17.5 188W .0500 .006 .033 Y .0505/.0495 .0345/.0315 304H-18X 316H-185 188V .0500 .003 .0505/.0495 .0460/.0440 304H-18XX 316H-185 181K .0500 .004 .042 .0505/.0495 .0460/.0440 304H-18XX 316H-181 184 .0500 .003 .0455/.0495 .0320/.0280 304H-18X 316H-191 197W .0425 .003 .0283 .0430/.0420 .0335/.0355 304H-19X 316H-191 197W .0425 .001 .023 .0430/.0420 .0365/.0355 304H-19X 316H-201 198X .0425 .010 .023 .0430/.0420 .0385/.0255 304H-19X 316H-201 207W .0355 .006 .024 .0366/.	17XX	.0590	.002	.054	-	.0595/.0585	.0550/.0535	304H-17XX	
17H .0590 .010 .039 - .0595/.0585 .0410/.0370 304H-17H 17.5 .0560 .005 .046 - .0565/.0495 .0345/.0315 304H-18RW 316H-181 18KW .0500 .009 .033 Y .0505/.0495 .0340/.0410 304H-18KW 316H-181 18KW .0500 .004 .0422 .0505/.0495 .0320/.0410 304H-18KW 316H-181 18KX .0500 .001 .030 - .0505/.0495 .0320/.0280 304H-18KH 18L5 .0440 .0044 .0326/.0420 .0336/.0325 304H-18KH 18L5 .0440 .003 .0430/.0420 .0385/.0325 304H-19KH 19TW .0425 .003 .0430/.0420 .0386/.0355 304H-19KH 19KX .0425 .003 .038 .0430/.0420 .0386/.0255 304H-20KW 304H-20KW 19KX .0425 .003 .033 .0430/.0420 .0286/.0250 304H-20KW <	17S	.0580	.008	.042	-	.0585/.0575	.0435/.0405	304H-17S	316H-17S
17.5 .0560 .005 .046 - .0565/.0495 .0345/.0315 304H-18RW 316H-18I 18K .0500 .006 .038 - .0505/.0495 .0345/.0315 304H-18KS 316H-18I 18TW .0500 .004 .042 .0505/.0495 .0430/.0440 304H-18KX 316H-18I 18XX .0500 .003 .0505/.0495 .0430/.0440 304H-18KX 316H-18I 18X .0500 .003 .0505/.0495 .0320/.0280 304H-18KX 18H .0500 .006 .034 .0465/.0420 .0290/.0260 304H-19RW 316H-19I 19RW .0425 .003 .038 .0430/.0420 .0385/.0365 304H-19X 316H-19I 19X .0425 .001 .023 .0430/.0420 .0385/.0355 304H-19X 316H-20I 20KW .0355 .006 .024 Y .0360/.0355 .0256/.0250 304H-20X 304H-20X 20XX .0355 .0064 .028					-				
18RW 0.500 .009 .033 Y .0505/.0495 .0345/.0315 304H-18RW 316H-181 18TW .0500 .004 .042 .0505/.0495 .0430/.0410 304H-18TW 316H-181 18XX .0500 .004 .0455/.0495 .0430/.0410 304H-18TW 316H-181 18XX .0500 .003 .0455 .0355/.0285 304H-18TW 316H-181 18X .0500 .001 .030 .0455/.0495 .0320/.0280 304H-18TW 316H-191 18X .0425 .003 .0430/.0420 .0335/.0315 304H-19X 316H-191 19X .0425 .001 .033 .0430/.0420 .0346/.0355 304H-19X 19X .0425 .003 .033 .0430/.0420 .0346/.0210 304H-19X 19X .0425 .003 .033 .0430/.0420 .0346/.0210 304H-19X 19X .0425 .003 .033 .0430/.0420 .0385/.0235 304H-20TW 316H-201 <					-				
18S 0.500 0.006 0.38 - 0.505/0.495 0.395/0.365 304H-18S 316H-183 18TW 0.500 0.03 0.42 - 0.505/0.495 0.440/0.4410 304H-18TW 316H-181 18XX 0.500 0.03 0.42 - 0.505/0.495 0.320/0.280 304H-18TW 316H-181 18.5 0.460 0.06 0.34 - 0.430/0.420 0.335/0.315 304H-19TW 316H-191 19RW 0.425 0.004 0.33 - 0.430/0.420 0.336/0.315 304H-19TW 316H-191 19X 0.425 0.010 0.23 - 0.430/0.420 0.386/0.365 304H-19X 19X 0.425 0.010 0.23 - 0.430/0.420 0.386/0.365 304H-19X 19X 0.425 0.010 0.23 - 0.360/0.355 304H-20TW 316H-20T 20TW 0.355 0.066 0.224 Y 0.366/0.355 0.265/0.2250 304H-21TW 316H-					-				
18TW 0.500 0.04 0.42 - 0.555/0495 0.430/0410 304H-18TW 316H-18T 18XX 0.500 0.010 0.33 - 0.505/0495 0.320/0280 304H-18H 18.5 0.460 0.06 0.34 - 0.465/0455 0.325/0225 304H-18H 18.5 0.440 0.028 Y 0.430/0420 0.335/0315 304H-19K 316H-191 19TW 0.425 0.005 0.33 - 0.430/0420 0.336/0340 304H-19X 316H-191 19XX 0.425 0.010 0.23 - 0.430/0420 0.336/0345 304H-19X 19XX 0.425 0.10 0.23 - 0.430/0420 0.326/0255 304H-20X 20RW 0.355 0.05 0.26 - 0.360/0355 0.265/0250 304H-20X 20X 0.355 0.03 316H-207 20XX 0.355 0.03 0.31 - 0.360/0355 0.285/0250 304H+21XX 316H-21									
18XX .0500 .003 .045 - .0505/.0495 .0320/.0280 304H-18XX 18H .0500 .010 .030 - .0505/.0495 .0325/.0325 304H-18H 18.5 .0460 .006 .034 - .0465/.0455 .0355/.0325 304H-19RW 316H-191 19TW .0425 .003 .033 - .0430/.0420 .0360/.0340 304H-19X 19X .0425 .001 .023 .0430/.0420 .0365/.0355 304H-19X 19X .0425 .001 .023 .0430/.0420 .0245/.0230 304H-20X 20TW .0355 .006 .024 Y .0360/.0355 .0265/.0250 304H-20X 20TW .0355 .003 .028 - .0360/.0355 .0265/.0250 304H-20X 20X .0355 .004 .028 - .0360/.0355 .0265/.0250 304H-20X 20X .0355 .004 .027 .0325/.0320 .0240/.0220									
18H .0500 .010 .030 - .0505/.0495 .0320/.0280 304H-18.5 18E. .0465 .0045 .0355/.0325 304H-18.5 .0445/.0420 .0290/.0260 304H-19RW 316H-191 19RW .0425 .008 .028 Y .0430/.0420 .0335/.0315 304H-19RW 316H-191 19X .0425 .003 .038 .0430/.0420 .0385/.0365 304H-19W 19H-19Y 19X .0425 .001 .023 .0430/.0420 .0240/.0210 304H-19W 316H-201 20RW .0355 .006 .027 .0360/.0355 .0245/.0230 304H-20RW 316H-201 20X .0355 .006 .024 Y .0360/.0355 .0245/.0230 304H-20X 20X .0355 .003 .031 - .0360/.0355 .0245/.0230 304H-20X 20X .0355 .003 .031 - .0326/.0320 .0240/.0220 304H-21X 21H .0320									316H-181W
18.5 .0460 .006 .034 - .0465/.0455 .0355/.0325 304H-18.5 19RW .0425 .005 .033 .0430/.0420 .0290/.0260 304H-19RW 316H-191 19XW .0425 .003 .0430/.0420 .0386/.0340 304H-19RW 316H-191 19XX .0425 .003 .0430/.0420 .0386/.0365 304H-19XX 19XX .0425 .001 .023 .0430/.0420 .0365/.0356 304H-19.5 20RW .0355 .006 .027 .0395/.0355 .0245/.0250 304H-19.5 20TW .0355 .006 .024 Y .0360/.0355 .0245/.0230 304H-20X 20X .0355 .004 .028 - .0360/.0355 .0245/.0230 304H-20X 20X .0355 .0034 .027 .0325/.0320 .0210/.0195 304H-21X 21FW .0320 .006 .027 .0325/.0320 .0240/.0230 304H-21XX 21RW .0320									
19RW .0425 .008 .028 Y .0430/.0420 .0290/.0260 304H-19RW 316H-191 19TW .0425 .004 .035 - .0430/.0420 .0360/.0340 304H-19X 316H-191 19X .0425 .001 .023 - .0430/.0420 .0365/.0365 304H-19X 19H .0425 .010 .023 - .0430/.0420 .0285/.0265 304H-19X 19J.5 .0380 .006 .027 - .0396/.0385 .0245/.0230 304H-20RW 316H-201 20TW .0355 .006 .024 Y .0360/.0355 .0265/.0250 304H-20XW 316H-201 20XX .0355 .003 .031 - .0360/.0355 .0285/.0270 304H-20XX 20.5 .0340 .004 .027 - .0325/.0320 .0240/.0220 304H-21W 316H-21 21KW .0320 .006 .027 - .0325/.0320 .0240/.0220 304H-21KW 316H-21 <td>-</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td>	-				-				
19TW .0425 .005 .033 - .0430/.0420 .0335/.0315 304H-19TW 316H-19T 19XX .0425 .003 .035 - .0430/.0420 .0360/.0340 304H-19X 19XX .0425 .003 .038 .0430/.0420 .0245/.0255 304H-19HX 19.5 .0390 .006 .027 - .0395/.0355 .0245/.0230 304H-19H 20RW .0355 .006 .024 Y .0360/.0355 .0265/.0270 304H-20RW 316H-20T 20X .0355 .004 .028 - .0360/.0355 .0265/.0270 304H-20X 20X3 .0355 .004 .027 - .0345/.0340 .0275/.0255 304H-21X 21H .0320 .006 .027 - .0325/.0320 .0240/.0220 304H-21W 316H-21T 21TX .0320 .002 .0235/.0320 .0240/.0220 304H-21W 316H-21T 21TX .0320 .002 .0225/.0280<					-				216H 10DW
19X .0425 .004 .035 - .0430/.0420 .0360/.0340 304H-19X 19XX .0425 .003 .038 - .0430/.0420 .0385/.0365 304H-19XX 19H .0425 .010 .023 .0396/.0420 .0240/.0210 304H-19FX 20RW .0355 .006 .027 - .0360/.0355 .0265/.0250 304H-19FX 20TW .0355 .006 .024 Y .0360/.0355 .0265/.0250 304H-20TW 316H-20T 20X .0355 .0034 .028 - .0360/.0355 .0265/.0250 304H-20TW 316H-20T 20X .0355 .0034 .004 .027 - .0345/.0340 .0275/.0255 304H-21W 316H-21T 21HW .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21W 316H-21T 21TW .0320 .006 .016 Y .0285/.0280 .0245/.0280 304H-21XX 3227W 316H-221<									
19XX .0425 .003 .038 - .0430/.0420 .0385/.0365 304H-19XX 19H .0425 .001 .023 - .0430/.0420 .0240/.0210 304H-19H 19.5 .0390 .006 .027 - .0395/.0385 .0245/.0250 304H-20RW .316H-20R 20TW .0355 .005 .026 - .0360/.0355 .0245/.0250 304H-20XW .316H-20X 20X .0355 .003 .031 - .0360/.0355 .0245/.0250 .304H-20XX 20.5 .0340 .004 .027 - .0345/.0320 .0210/.0195 .304H-21XW .316H-211 21TW .0320 .006 .027 - .0325/.0320 .0240/.0220 .034H-21XW .316H-211 21TW .0320 .002 .029 - .0325/.0320 .0240/.0220 .034H-21XW .316H-221 21XW .0320 .002 .0228/.0280 .0026/.0190 .044H-22XW .304H-22XWW .316H-221									31011-19177
19H .0425 .010 .023 - .0430/.0420 .0240/.0210 304H-19H 19.5 .0380 .006 .027 - .0395/.0385 .0285/.0255 304H-19.5 20RW .0355 .006 .024 Y .0360/.0355 .0245/.0230 304H-20RW 316H-20T 20X .0355 .004 .028 - .0360/.0355 .0285/.0270 304H-20XX 20X .0355 .004 .027 - .0345/.0340 .0275/.0255 304H-20X 20X3 .0335 .006 .027 - .0325/.0320 .0210/.0150 304H-21W 21H .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21W 316H-21T 21X .0320 .002 .029 - .0325/.0320 .0240/.0220 304H-21W 316H-22T 21X .0320 .002 .02235/.0230 .0240/.0230 304H-21X 316H-22T 22KW .0280 .0016									
19.5 .0390 .006 .027 - .0395/.0385 .0285/.0255 304H-19.5 20RW .0355 .006 .024 Y .0360/.0355 .0245/.0230 304H-20TW 316H-207 20TW .0355 .005 .028 - .0360/.0355 .0265/.0250 304H-20TW 316H-207 20X .0355 .003 .031 - .0360/.0355 .0285/.0270 304H-20X 20.5 .0340 .004 .027 - .0345/.0340 .0275/.0255 304H-21TW 316H-201 21HW .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21H 21TW 316H-211 21TW .0320 .006 .023 - .0325/.0320 .0245/.0280 304H-21TW 316H-221 21X .0320 .006 .016 Y .0285/.0280 .024/.020 304H-22TW 316H-221 22RW .0280 .006 .016 Y .0285/.0280 .024/.0203									
20RW .0355 .006 .024 Y .0360/.0355 .0245/.0230 304H-20RW 316H-201 20TW .0355 .005 .026 - .0360/.0355 .0265/.0250 304H-20RW 316H-201 20X .0355 .003 .031 - .0360/.0355 .0345/.0250 304H-20X 20.5 .0340 .004 .027 - .0345/.0320 .0180/.0155 304H-20X 20.5 .0340 .004 .027 - .0345/.0320 .0210/.0195 304H-21W 316H-211 21H .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21W 316H-211 21XW .0320 .002 .029 - .0325/.0320 .0245/.0230 304H-21XX 316H-221 21XW .0320 .000 .024 - .0285/.0280 .0245/.0230 304H-22XX 304H-22XX 22X .0280 .001 .002 - .0285/.0280 .025/.0210 304H-22XX <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td>					_				
20TW 0355 0.05 0.26 - 0.360/0355 0.265/0250 304H-20TW 316H-20T 20X 0.3355 0.04 0.28 - 0.360/0355 0.265/0.250 304H-20XX 20X 0.3355 0.034 0.028 - 0.360/0355 0.028/0.270 304H-20XX 20.5 0.340 0.04 0.27 - 0.345/0.0350 0.011/50 304H-20XX 21H 0.320 0.06 0.02 Y 0.325/0.320 0.210/0.195 304H-21W 316H-21T 21XX 0.320 0.02 0.29 - 0.325/0.320 0.240/0.220 304H-21W 316H-21T 21XX 0.320 0.06 0.016 Y 0.325/0.320 0.240/0.220 304H-21W 316H-221 21X 0.280 0.004 0.02 - 0.285/0.280 0.0240/0.230 304H-22W 316H-221 22XW 0.280 0.001 0.02 - 0.285/0.280 0.0240/0.230 304H-22X 304H-22X <td></td> <td></td> <td></td> <td></td> <td>Y</td> <td></td> <td></td> <td></td> <td>316H-20RW</td>					Y				316H-20RW
20X .0355 .004 .028 - .0360/.0355 .0285/.0270 304H-20X 20XX .0355 .003 .031 - .0360/.0355 .0315/.0295 304H-20X 20.5 .0340 .004 .027 .0345/.0340 .0275/.0255 304H-20.5 21H .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21W 316H-21 21TW .0320 .005 .023 - .0325/.0320 .0240/.0220 304H-21W 316H-21 21XX .0320 .002 .029 - .0325/.0320 .0245/.0280 304H-21XX 21.5 .0300 .004 .020 - .0285/.0280 .0240/.0230 304H-22X 22RW .0280 .006 .016 Y .0285/.0280 .0205/.0190 304H-22X 22X .0280 .003 .022 - .0285/.0280 .0204/.0230 304H-22X 22X .0280 .003 .022 -									316H-20TW
20XX .0355 .003 .031 - .0360/0355 .0315/.0295 304H-20XX 20.5 .0340 .004 .027 - .0345/.0340 .0275/.0255 304H-20.5 21H .0320 .006 .020 Y .0325/.0320 .0180/.0150 304H-21RW 316H-211 21TW .0320 .005 .023 - .0325/.0320 .0240/.0220 304H-21RW 316H-217 21XX .0320 .002 .023 - .0325/.0320 .0245/.0230 304H-21XX 21X3 .0320 .002 .023 - .0325/.0280 .0245/.0230 304H-21XX 21X .0280 .004 .020 - .0285/.0280 .0205/.0190 304H-22XX 22W .0280 .002 .024 - .0285/.0280 .0209/.0203 304H-22X 22X4 .0280 .003 .022 - .0285/.0280 .0209/.0195 304H-23TW 316H-231 23TW .0250 <									010112011
20.5 .0340 .004 .027 - .0345/.0340 .0275/.0255 304H-20.5 21H .0320 .006 .020 Y .0325/.0320 .0180/.0150 304H-21RW 316H-211 21RW .0320 .006 .020 Y .0325/.0320 .0240/.0220 304H-21RW 316H-211 21XX .0320 .002 .029 - .0325/.0320 .0245/.0230 304H-21XX 316H-215 21.5 .0300 .002 .029 - .0325/.0320 .0245/.0230 304H-21XX 316H-221 22TW .0280 .006 .016 Y .0285/.0280 .0245/.0230 304H-22X 304H-22X 22XX .0280 .003 .022 .0285/.0280 .0240/.0230 304H-22X 22X 22XH .0280 .0011 .007 .0285/.0280 .0240/.0250 304H-22X 22X 22XH .0280 .0011 .007 .0285/.0280 .0240/.0230 304H-22X 22XX 22S .0280					-				
21H .0320 .008 .017 - .0325/.0320 .0180/.0150 304H-21H 21RW .0320 .006 .020 Y .0325/.0320 .0210/.0195 304H-21RW 316H-211 21TW .0320 .005 .023 - .0325/.0320 .0240/.0220 304H-21W 316H-211 21XX .0320 .002 .029 - .0325/.0320 .0245/.0280 304H-21XX 21.5 .0300 .003 .024 - .0365/.0280 .0265/.0280 304H-21XX 22RW .0280 .006 .016 Y .0285/.0280 .0205/.0190 304H-22X 22XX .0280 .003 .022 - .0285/.0280 .0205/.0190 304H-22X 22X .0280 .003 .022 - .0285/.0280 .0201/.0195 304H-23X 22X .0280 .003 .022 - .0285/.0280 .0210/.0195 304H-23X 23RW .0250 .006 .013<					-				
21TW .0320 .005 .023 - .0325/.0320 .0240/.0220 304H-21TW 316H-21T 21XX .0320 .002 .029 - .0325/.0320 .0245/.0220 304H-21TXX 21.5 .0300 .003 .024 - .0325/.0300 .0245/.0230 304H-21.5 22RW .0280 .006 .016 Y .0285/.0280 .0205/.0190 304H-22TW 316H-221 22XX .0280 .002 .024 .0285/.0280 .0204/.0230 304H-22X 22XX .0280 .003 .022 - .0285/.0280 .0240/.0230 304H-22X 22XH .0280 .0011 .007 - .0285/.0280 .0240/.0230 304H-22X 22KH .0280 .0011 .007 - .0285/.0280 .0240/.0125 304H-22X 22KH .0280 .002 .0225/.0250 .0140/.0125 304H-231W 316H-231 23TW .0250 .002 .0225/.0220 .0					-				
21XX .0320 .002 .029 - .0325/0320 .0295/0280 304H-21XX 21.5 .0300 .003 .024 - .0305/0300 .0245/0230 304H-21X5 22RW .0280 .006 .016 Y .0285/0280 .0170/.0155 304H-22RW 316H-22R 22XW .0280 .002 - .0285/0280 .0205/.0190 304H-22RW 316H-22R 22XX .0280 .002 - .0285/0280 .0225/.0210 304H-22X 22X .0280 .003 .022 - .0285/.0280 .0225/.0210 304H-22X 22XH .0280 .003 .022 - .0285/.0280 .0210/.0195 304H-23X 22.5 .0280 .003 .021 - .0255/.0250 .0140/.0125 304H-23XW 316H-231 23XW .0250 .002 .020 .025/.0220 .0130/.0115 304H-24WW 316H-241 24XW .0220 .003 .016 <					Y				316H-21RW
21.5 0300 .003 .024 - .0305/0300 .0245/.0230 304H-21.5 22RW .0280 .006 .016 Y .0285/.0280 .0170/.0155 304H-21.5 22RW .0280 .004 .020 .0285/.0280 .0275/.0280 .0245/.0230 304H-22RW 316H-221 22XX .0280 .002 .024 - .0285/.0280 .0225/.0210 304H-22X 22X .0280 .003 .022 - .0285/.0280 .0209/.0050 304H-22X 22XH .0280 .011 .007 .0285/.0280 .009/.0050 304H-22X 22XH .0280 .001 .07 .0285/.0280 .0090/.0050 304H-23X 23TW .0250 .004 .017 - .0255/.0250 .0180/.0165 304H-23TW 316H-231 23XX .0250 .002 .022 .0226 .023 .044H-23TW 316H-237 23XX .0220 .005 .0172 .0225/.0220 <td>21TW</td> <td>.0320</td> <td>.005</td> <td>.023</td> <td>-</td> <td>.0325/.0320</td> <td>.0240/.0220</td> <td>304H-21TW</td> <td>316H-21TW</td>	21TW	.0320	.005	.023	-	.0325/.0320	.0240/.0220	304H-21TW	316H-21TW
22RW 0.0280 .006 .016 Y .0285/.0280 .0170/.0155 304H-22RW 316H-221 22TW .0280 .002 .0285/.0280 .0205/.0190 304H-22RW 316H-221 22XX .0280 .002 .0285/.0280 .0226/.0210 304H-22X 22XX .0280 .001 .007 .0285/.0280 .0224/.0230 304H-22X 22XH .0280 .0011 .007 .0285/.0280 .0220/.0195 304H-22X 22.5 .0260 .003 .022 .0285/.0280 .0140/.0125 304H-22X 23RW .0250 .006 .013 Y .0255/.0250 .0140/.0125 304H-23RW 316H-231 23TW .0250 .002 .022 .0225/.0220 .0180/.0165 304H-23.5 304H-233.5 24RW .0220 .005 .012 .0225/.0220 .0130/.0115 304H-24XX 316H-241 24XX .0220 .004 .014 .0225/.0220 .0130/.0115 304H-24XX	21XX	.0320	.002	.029	-	.0325/.0320	.0295/.0280	304H-21XX	
22TW 0.0280 .004 .020 - .0285/.0280 .0205/.0190 304H-22TW 316H-22T 22XX .0280 .002 .024 - .0285/.0280 .0225/.0210 304H-22TW 316H-22T 22X .0280 .003 .022 - .0285/.0280 .0225/.0210 304H-22XX 22XH .0280 .011 .007 - .0285/.0280 .0209/.0050 304H-22X 22XH .0280 .003 .022 - .0285/.0280 .0090/.0050 304H-22X 23RW .0250 .004 .017 - .0225/.0250 .0140/.0125 304H-23RW 316H-231 23XX .0250 .002 .020 - .0225/.0220 .0130/.0115 304H-24RW 316H-231 23.5 .0230 .003 .017 - .0225/.0220 .0130/.0115 304H-24RW 316H-247 24TW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24XX 245 <td>21.5</td> <td>.0300</td> <td>.003</td> <td>.024</td> <td>-</td> <td>.0305/.0300</td> <td>.0245/.0230</td> <td>304H-21.5</td> <td></td>	21.5	.0300	.003	.024	-	.0305/.0300	.0245/.0230	304H-21.5	
22XX .0280 .002 .024 - .0285/0280 .0240/.0230 304H-22XX 22X .0280 .003 .022 - .0285/0280 .0225/.0210 304H-22X 22X4 .0280 .011 .007 - .0285/.0280 .009/.050 304H-22X 22.5 .0260 .003 .020 - .0265/.0280 .0209/.0195 304H-22X 23TW .0250 .006 .013 Y .0256/.0250 .0140/.0125 304H-23TW 316H-237 23XX .0250 .002 .0225/.0250 .0180/.0165 304H-23TW 316H-237 23XX .0250 .002 .0225/.0220 .0130/.0115 304H-23TX 316H-237 24RW .0220 .005 .012 .0225/.0220 .0150/.0155 304H-24TW 316H-247 24XX .0220 .003 .016 .0225/.0220 .0170/.0155 304H-24XX 245 245 .0210 .002 .016 .0225/.0220 .	22RW	.0280	.006	.016	Y	.0285/.0280	.0170/.0155	304H-22RW	316H-22RW
22X 0.028 .003 .022 - .0285/0280 .0225/.0210 304H-22X 22XH .0280 .001 .007 - .0285/0280 .0090/.0050 304H-22X 22XH .0280 .003 .020 .0265/.0280 .0090/.0050 304H-22X 23RW .0250 .006 .013 Y .0255/.0250 .0140/.0125 304H-22X 316H-231 23TW .0250 .004 .017 - .0255/.0250 .0140/.0125 304H-23TW 316H-231 23XX .0250 .002 .020 .0225/.0220 .0130/.0115 304H-247W 316H-237 23XX .0220 .003 .017 .0225/.0220 .0130/.0115 304H-247W 316H-247 24TW .0220 .003 .016 .0225/.0220 .0150/.0155 304H-247W 316H-247 24XX .0220 .003 .016 .0225/.0220 .0170/.0155 304H-247W 316H-247 24XW .0220 .003	22TW	.0280	.004		-	.0285/.0280	.0205/.0190		316H-22TW
22XH .0280 .011 .007 - .0285/.0280 .0090/.0050 304H-22XH 22.5 .0260 .003 .020 - .0265/.0260 .0210/.0195 304H-22XH 23RW .0250 .006 .013 Y .0255/.0250 .0140/.0125 304H-23RW 316H-231 23TW .0250 .004 .017 - .0255/.0250 .0180/.0165 304H-23RW 316H-231 23XX .0250 .002 .020 - .0255/.0250 .0180/.0165 304H-23XX 23.5 .0230 .003 .017 - .0255/.0230 .0180/.0155 304H-24XX 24.5 .0220 .005 .012 Y .0225/.0220 .0150/.0135 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0130/.0115 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0200 .004	22XX	.0280	.002	.024	-	.0285/.0280	.0240/.0230	304H-22XX	
22.5 .0260 .003 .020 - .0266/.0260 .0210/.0195 304H-22.5 23RW .0250 .006 .013 Y .0256/.0250 .0140/.0125 304H-22.5 23RW .0250 .004 .017 - .0255/.0250 .0140/.0125 304H-23RW 316H-237 23XX .0250 .002 .0225/.0250 .0210/.0195 304H-23RW 316H-237 23XX .0220 .003 .017 - .0235/.0230 .0180/.0165 304H-23RX 24RW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24RW 316H-241 24XW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24XX 316H-241 24X .0220 .003 .016 - .0215/.0210 .0170/.0155 304H-24XX 316H-261 24.5 .0210 .002 .016 .0205/.0200 .0130/.0115 304H-24XX 325KW 304H-225X 304H-261K									
23RW .0250 .006 .013 Y .0255/.0250 .0140/.0125 304H-23RW 316H-231 23TW .0250 .004 .017 - .0255/.0250 .0180/.0165 304H-23TW 316H-231 23XX .0250 .002 .0225/.0250 .0210/.0195 304H-23XW 316H-237 23X5 .0230 .003 .017 - .0225/.0220 .0180/.0165 304H-23XS 24RW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24RW 316H-241 24TW .0220 .003 .016 - .0225/.0220 .0150/.0155 304H-24RW 316H-241 24XX .0220 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0170/.0155 304H-24XX 25RW .0200 .002 .016 - .0205/.0200 .0110/.0095 304H-25XX 25XX .020					-				
23TW .0250 .004 .017 - .0255/.0250 .0180/.0165 304H-23TW 316H-23T 23XX .0250 .002 .020 - .0255/.0250 .0210/.0195 304H-23XX 23.5 .0230 .003 .017 - .0225/.0230 .0041-23.5 24RW .0220 .005 .012 Y .0225/.0230 .0180/.0165 304H-23.5 24RW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24RW 316H-241 24TW .0220 .003 .016 .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 .0225/.0220 .0170/.0155 304H-24XX 24.5 .0200 .004 .012 .0205/.0200 .0110/.0095 304H-25TW 316H-251 25TW .0200 .004 .012 .0205/.0200 .0170/.0155 304H-25TS 25KX .0200 .004 .014 .0195/.0190 .0150/.0135									
23XX .0250 .002 .020 - .0255/.0250 .0210/.0195 304H-23XX 23.5 .0230 .003 .017 - .0235/.0230 .0180/.0165 304H-23XX 24RW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24RW 316H-24H 24TW .0220 .004 .014 - .0225/.0220 .0150/.0135 304H-24RW 316H-24H 24XX .0220 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 .0225/.0210 .0170/.0155 304H-24XX 25KW .0200 .005 .010 Y .0205/.0200 .0110/.0095 304H-25KW 316H-251 25KX .0200 .002 .014 .0195/.0180 .0110/.0095 304H-25X 25KX .0200 .002 .014 .0195/.0180 .0110/.0095 304H-25X 27RW .0160 .004 .008 .0165/.									
23.5 .0230 .003 .017 - .0235/.0230 .0180/.0165 304H-23.5 24RW .0220 .005 .012 Y .0225/.0220 .0130/.0115 304H-24RW 316H-247 24TW .0220 .004 .014 - .0225/.0220 .0150/.0115 304H-24RW 316H-247 24XX .0220 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0170/.0155 304H-24XX 25RW .0200 .005 .010 Y .0205/.0200 .0110/.0095 304H-25TW 316H-251 25XX .0200 .002 .014 .0205/.0200 .0110/.0155 304H-25TW 316H-251 25XX .0200 .002 .014 .0205/.0200 .0110/.0155 304H-25TW 316H-261 25X .0200 .002 .014 .0195/.0190 .0110/.0095 304H-25RW 316H-261 27RW									316H-231W
24RW 0.020 0.05 0.012 Y 0.025/0.0220 0.0130/.0115 304H-24RW 316H-241 24TW 0.020 .004 .014 - 0.025/0.0220 .0150/.0135 304H-24RW 316H-241 24XX 0.202 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0170/.0155 304H-24XX 25TW .0200 .004 .012 .0205/.0200 .0110/.0095 304H-25TW 316H-251 25TW .0200 .004 .012 .0205/.0200 .0170/.0155 304H-25TW 316H-251 25XX .0200 .002 .016 - .0205/.0200 .0170/.0155 304H-25TW 316H-261 25XX .0200 .002 .016 - .0205/.0200 .0170/.0155 304H-25TW 316H-261 26RW .0180 .004 .010 .0165/.0180 .0110/.0095 304H-27RW 316H-261 <tr< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>									
24TW .0220 .004 .014 - .0225/.0220 .0150/.0135 304H-24TW 316H-24T 24XX .0220 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 - .0225/.0220 .0170/.0155 304H-24XX 25RW .0200 .005 .010 Y .0205/.0210 .0110/.0095 304H-25RW 316H-251 25TW .0200 .004 .012 - .0205/.0200 .0130/.0115 304H-25RW 316H-257 25SX .0200 .002 .016 - .0205/.0200 .0150/.0135 304H-25.5 26RW .0180 .016/.0180 .0110/.0095 304H-25.5 26RW 316H-261 27RW .0160 .004 .008 Y .0165/.0180 .0109/.0075 304H-27RW 316H-261 27RW .0160 .004 .008 Y .0165/.0160 .0090/.0075 304H-27RW 316H-261 2									
24XX .0220 .003 .016 - .0225/.0220 .0170/.0155 304H-24XX 24.5 .0210 .002 .016 - .0215/.0210 .0170/.0155 304H-24XX 25RW .0200 .005 .010 Y .0205/.0200 .0110/.0095 304H-25RW 316H-25I 25TW .0200 .004 .012 - .0205/.0200 .0130/.0115 304H-25TW 316H-25I 25XX .0200 .002 .016 - .0205/.0200 .0130/.0115 304H-25TW 316H-255 25.5 .0190 .002 .016 - .0205/.0200 .0110/.0095 304H-25TW 316H-26I 26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-27RW 316H-26I 27RW .0160 .004 .003 .007 .0145/.0140 .0080/.0065 304H-28RW 316H-28I 29RW .0130 .003 .007 .0145/.0130 .0080/.0065 304H-29RW									
24.5 .0210 .002 .016 - .0215/.0210 .0170/.0155 304H-24.5 25RW .0200 .005 .010 Y .0205/.0200 .0110/.0095 304H-25RW 316H-251 25TW .0200 .004 .012 .0205/.0200 .0130/.0115 304H-25TW 316H-251 25XX .0200 .002 .016 .0205/.0200 .0170/.0155 304H-25TW 316H-251 25XX .0200 .002 .014 .0195/.0190 .0150/.0135 304H-25.5 26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-22RW 316H-261 27RW .0160 .004 .008 Y .0165/.0180 .0100/.0055 304H-22RW 316H-261 29RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-281 30XH .0120 .004 .003 .007 .0135/.0115 .0040/.0020 304H-30H 30XH									51011-2411
25RW .0200 .005 .010 Y .0205/.0200 .0110/.0995 304H-25RW 316H-25I 25TW .0200 .004 .012 - .0205/.0200 .0130/.0115 304H-25RW 316H-25I 25XX .0200 .002 .016 - .0205/.0200 .0130/.0115 304H-25XW 316H-25I 25x5 .0190 .002 .014 - .0195/.0120 .0150/.0135 304H-25xS 26RW .0180 .001 Y .0185/.0180 .0110/.0095 304H-25RW 316H-26I 27RW .0160 .004 .008 Y .0165/.0180 .01090/.0075 304H-27RW 316H-26I 27RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28I 29RW .0130 .007 - .0135/.0130 .0080/.0065 304H-28RW 316H-28I 30XH .0120 .004 .003 .007 - .0135/.0130 .0040/.0020					-				
25TW .0200 .004 .012 - .0205/.0200 .0130/.0115 304H-25TW 316H-25T 25XX .0200 .002 .016 - .0205/.0200 .0170/.0155 304H-25TW 316H-26T 25.5 .0190 .002 .014 - .0195/.0190 .0150/.0135 304H-25XX 26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-27KW 316H-26f 27RW .0160 .004 .008 Y .0165/.0160 .0090/.0075 304H-28RW 316H-26f 28RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28f 30XH .0120 .004 .003 - .0125/.0130 .0080/.0020 304H-30KH 30KH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30H 30RW .0120 .003 .006 .0125/.0120 .0050/.0035 304H-30H 316W </td <td></td> <td></td> <td></td> <td></td> <td>V</td> <td></td> <td></td> <td></td> <td>316H-25RW</td>					V				316H-25RW
25XX .0200 .002 .016 - .0205/.0200 .0170/.0155 304H-25XX 25.5 .0190 .002 .014 - .0195/.0190 .0150/.0135 304H-25XX 25.5 .0190 .002 .014 - .0195/.0190 .0150/.0135 304H-25XX 26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-26RW 316H-26R 27RW .0160 .004 .008 Y .0165/.0160 .0090/.0075 304H-27RW 316H-26R 28RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28R 29RW .0130 .003 .007 - .0135/.0130 .0080/.0065 304H-28RW 316H-28R 30XH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30H 30RW .0120 .003 .006 - .0125/.0120 .0050/.0035 304H-30H 31RW									316H-25TW
25.5 .0190 .002 .014 - .0195/.0190 .0150/.0135 304H-25.5 26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-26RW 316H-26I 27RW .0160 .004 .008 Y .0165/.0180 .0010/.0055 304H-27RW 316H-27RW 316H-27RW 316H-27RW 316H-27RW 316H-27RW 316H-281 29RW .0130 .007 Y .0145/.0140 .0080/.0065 304H-27RW 316H-281 29RW .0130 .007 - .0135/.0130 .0080/.0065 304H-28RW 316H-281 29RW .0130 .003 .007 - .0135/.0130 .0080/.0065 304H-28RW 316H-281 30XH .0120 .004 .00125/.0115 .0040/.0020 304H-30XH 30RW .0120 .004 .00125/.0120 .0050/.0035 304H-30H 30RW 316H-30I 31RW .0100 .002 .005 - .0105/.0100 .0060/.0045 304H-30RW </td <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td>0.01120111</td>					-				0.01120111
26RW .0180 .004 .010 Y .0185/.0180 .0110/.0095 304H-26RW 316H-26I 27RW .0160 .008 Y .0165/.0160 .0090/.0075 304H-22RW 316H-27I 28RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28I 29RW .0130 .003 .007 - .0135/.0130 .0080/.0065 304H-28RW 316H-28I 30XH .0120 .004 .0033 - .0125/.0115 .0040/.0020 304H-30XH 30H .0120 .004 .00125/.0115 .0040/.0020 304H-30XH 30RW .0120 .004 - .0125/.0120 .0050/.0035 304H-30H 30RW .0120 .003 .006 - .0125/.0120 .0070/.0055 304H-30RW 316H-30I 31RW .0100 .002 .005 - .0105/.0100 .0060/.0045 304H-31RW					-				
27RW .0160 .004 .008 Y .0165/.0160 .0090/.0075 304H-27RW 316H-27I 28RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-22RW 316H-28I 29RW .0130 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28I 30XH .0120 .004 .003 - .0125/.0130 .0080/.0065 304H-23RW 316H-29I 30XH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30XH 30RW .0120 .004 .00125/.0120 .0050/.0035 304H-30H 30RW .0120 .003 .006 - .0125/.0120 .0070/.0055 304H-30H 31RW .0100 .002 .005 - .0165/.0100 .0060/.0045 304H-31RW					Y				316H-26RW
28RW .0140 .003 .007 Y .0145/.0140 .0080/.0065 304H-28RW 316H-28I 29RW .0130 .003 .007 - .0135/.0130 .0080/.0065 304H-29RW 316H-28I 30XH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30XH 30H .0120 .004 .004 - .0125/.0112 .0050/.0035 304H-30H 30RW .0120 .003 .006 - .0125/.0120 .0050/.0035 304H-30H 31RW .0100 .002 .005 - .0125/.0120 .0070/.0055 304H-30H 31RW .0100 .002 .005 - .0165/.0100 .0060/.0045 304H-31RW									316H-27RW
30XH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30XH 30H .0120 .004 - .0125/.0120 .0050/.0035 304H-30XH 30RW .0120 .003 .006 - .0125/.0120 .0070/.0055 304H-30RW 31RW .010 .002 .005 - .0105/.0100 .0060/.0045 304H-31RW	28RW	.0140	.003	.007	Y	.0145/.0140		304H-28RW	316H-28RW
30XH .0120 .004 .003 - .0125/.0115 .0040/.0020 304H-30XH 30H .0120 .004 - .0125/.0120 .0050/.0035 304H-30XH 30RW .0120 .003 .006 - .0125/.0120 .0070/.0055 304H-30RW 31RW .010 .002 .005 - .0105/.0100 .0060/.0045 304H-31RW	29RW	.0130		.007	-			304H-29RW	316H-29RW
30RW .0120 .003 .0060125/.0120 .0070/.0055 304H-30RW 316H-30H 31RW .0100 .002 .0050105/.0100 .0060/.0045 304H-31RW	30XH	.0120	.004	.003	-	.0125/.0115		304H-30XH	
31RW .0100 .002 .0050105/.0100 .0060/.0045 304H-31RW	30H		.004	.004	-	.0125/.0120	.0050/.0035		
	30RW	.0120	.003	.006	-	.0125/.0120	.0070/.0055	304H-30RW	316H-30RW
32RW .0090 .002 .0040095/.0090 .0050/.0035 304H-32RW		.0100		.005	-	.0105/.0100	.0060/.0045		
					-				
33RW .0080 .002 .0040085/.0080 .0050/.0035 304H-33RW									
34RW .0060 .002 .0020065/.0060 .0030/.0015 304H-34RW	34RW	.0060	.002	.002	-	.0065/.0060	.0030/.0015	304H-34RW	

All dimensions are measured in inches.

The HYPO tables on this page have been revised to address the inconsistency of past "standards" which vary by vendor. MicroGroup has attempted to meet as many of these old varied standards as possible in these new tables. Please verify your older prints. Although every effort has been made to ensure accuracy, no guarantee is granted or implied. Unlike other tubing and pipe sizes - Hypodermic tubing is specified by a Gage number which determines OD and ID of the tube - Not the WALL thickness.



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T304 T316 T321 Stock Fractional Tubing

C276, Ti

Description: "Fractional" tubing starts at 1/32" O.D. and continues in increments of 1/32" (i.e. 1/16", 3/32", 1/8", 5/32", 3/16" etc.) or 1/16" (i.e. 3/8", 7/16", 1/2", 9/16" etc.). Available in seamless or welded and drawn, fractional tubing is often used in commercial applications that require corrosion resistance and good strength. Also available in other stainless and nickel alloy grades (i.e. 321, 200, 600 etc.). Normally available in aircraft specs. (i.e. MI-T-8504, AMS-5570). Primarily stocked in annealed temper.

Application: Used in many different industries ranging from medical to aircraft, fractional tubing covers small (1/32") to large (up through 3") applications. Welded and drawn can often be substituted for seamless because it usually has the same, if not better, appearance, tolerances, concentricity and specifications.

.006 .011 .010 .011 .006 .05; .010 .042 .016 .033 .020 .022 .023 .011 .026 .012 .028 .001 .006 .082 .010 .074 .016 .066 .020 .022 .026 .033 .027 .035 .026 .035 .035 .022 .006 .111 .010 .102 .012 .101	.002 .004 2.006 0.008 2.009 7.010 .010 .011 2.006 4.009 2.014 4.016	F1-032x006- F1-032x010- F1-062x010- F1-062x010- F1-062x020- F1-062x023- F1-062x023- F1-062x028- F1-093x006- F1-093x010- F1-093x010-	WD SL WD SL WD SL WD SL WD SL WD SL SL SL	WD SL WD SL WD SL WD SL WD SL WD SL SL SL	200 200,321,600 200,321,600 200,276,321,400,600 200,321,600,Ti 200,321,600
.006 .05 ⁵ .010 .042 .016 .033 .020 .022 .023 .011 .026 .011 .028 .003 .006 .082 .010 .074 .028 .003 .020 .054 .028 .033 .020 .054 .028 .033 .025 .024 .035 .024 .006 .111 .0010 .102	.004 .006 .008 .009 .010 .010 .011 2.006 4.009 2.014 4.016	F1-062x006- F1-062x010- F1-062x016- F1-062x020- F1-062x023- F1-062x023- F1-062x028- F1-093x006- F1-093x010-	WD SL WD SL WD SL WD SL SL SL	WD SL WD SL WD SL WD SL SL	200,321,600 200,276,321,400,600 200,321,600,Ti
.010 .042 .016 .033 .020 .022 .023 .011 .026 .011 .028 .000 .0016 .063 .020 .054 .020 .054 .028 .033 .035 .024 .035 .024 .0010 .101	2 .006 .008 2 .009 7 .010 .010 7 .011 2 .006 4 .009 2 .014 4 .016	F1-062x010- F1-062x016- F1-062x020- F1-062x023- F1-062x026- F1-062x028- F1-093x006- F1-093x010-	WD SL WD SL WD SL SL SL	WD SL WD SL WD SL SL	200,276,321,400,60 200,321,600,Ti
.016 .030 .020 .022 .023 .011 .026 .012 .027 .006 .006 .082 .010 .074 .010 .074 .010 .074 .010 .074 .010 .074 .010 .074 .010 .075 .028 .033 .035 .024 .006 .111 .010 .102	0 .008 2 .009 7 .010 .010 7 .011 2 .006 4 .009 2 .014 4 .016	F1-062x016- F1-062x020- F1-062x023- F1-062x026- F1-062x028- F1-093x006- F1-093x010-	WD SL WD SL SL SL	WD SL WD SL SL	200,321,600,Ti
.020 .022 .023 .011 .026 .011 .028 .001 .006 .088 .010 .074 .016 .062 .028 .035 .028 .034 .035 .024 .036 .111 .010 .102	2 .009 .010 .010 .011 2 .006 .009 2 .014 .016	F1-062x020- F1-062x023- F1-062x026- F1-062x028- F1-093x006- F1-093x010-	WD SL SL SL	WD SL SL	
.023 .011 .026 .011 .028 .007 .006 .082 .010 .074 .016 .062 .020 .056 .020 .056 .035 .022 .006 .113 .010 .105	2.010 .010 .011 2.006 4.009 2.014 4.016	F1-062x023- F1-062x026- F1-062x028- F1-093x006- F1-093x010-	SL SL	SL	200,321,60
.026 .01 .028 .00 .006 .082 .010 .074 .016 .062 .020 .054 .028 .038 .035 .024 .006 .115 .010 .105	.010 .011 .006 .009 .014 .016	F1-062x026- F1-062x028- F1-093x006- F1-093x010-	SL		
.028 .007 .006 .082 .010 .074 .016 .062 .020 .054 .028 .038 .035 .024 .006 .113 .010 .108	<u>.011</u> .006 .009 .014 .016	F1-062x028- F1-093x006- F1-093x010-		SL	
.006 .082 .010 .074 .016 .062 .020 .054 .028 .038 .035 .024 .006 .113 .010 .109	.006 .009 .014 .016	F1-093x006- F1-093x010-	SL		000 T
.010 .074 .016 .062 .020 .054 .028 .038 .035 .024 .006 .113 .010 .109	.009 .014 .016	F1-093x010-	WD SL	SL WD SL	200,Ti 200
.016 .062 .020 .054 .028 .038 <u>.035 .024</u> .006 .113 .010 .105	.014 .016		WD SL	WD SL	200,321,60
.020 .054 .028 .038 .035 .024 .006 .113 .010 .108	.016	F1-093x016-	WD SL	WD SL	200,321,600,Ti
.028 .038 .035 .024 .006 .113 .010 .105		F1-093x020-	WD SL	WD SL	200,321,60
.035 .024 .006 .113 .010 .105		F1-093x028-	WD SL	SL	32
.006 .113 .010 .105		F1-093x035-	WD SL	SL	
		F1-125x006-	WD SL	SL	20
012 10	.013	F1-125x010-	WD SL	WD SL	200,276,321,60
	.015	F1-125x012-	SL		
.016 .093	.019	F1-125x016-	WD SL	WD SL	200,321,400,600,Ti
.020 .085		F1-125x020-	WD SL	WD SL	200,276,321,400,60
.025 .075		F1-125x025-	SL		
.028 .069		F1-125x028-	WD SL	WD SL	200,321,400,60
.032 .06		F1-125x032-	WD SL		
.035 .05		F1-125x035-	WD SL	WD SL	200,276,321,400,60
.042 .04		F1-125x042-	SL	SL	22
<u>.049</u> .027		F1-125x049- F1-156x006-	WD SL	<u>SL</u>	32
.000 .144		F1-156x010-	WD SL	SL	60
.016 .124		F1-156x016-	WD SL	WD SL	32
			WD SL		32
			WD SL	WD SL	32
		F1-156x035-	WD SL	WD SL	60
.049 .058	.057	F1-156x049-	SL	SL	
.006 .175	.012	F1-188x006-	WD SL	SL	
					200,321,60
					200,321,60
					200,321,400,60
					200,321,60
					200,321,400,60
					32
					32
					02
		F1-218x028-	ŠĹ	SL	
		F1-218x035-	SL	SL	32
		F1-218x049	SL		
				WD SL	200,60
					321,200,60
.020 .210	.050	F1-250x020-	WD SL	WD SL	321,200,400,600
		Need H	leln	2	
0.	28 .100 35 .086 49 .058 060 .175 10 .167 110 .167 128 .131 35 .148 228 .131 35 .118 449 .058 65 .0577 006 .207 10 .199 10 .187 228 .163 355 .149 49 .238 355 .149 49 .230 110 .230 112 .226 112 .226 112 .226	28 .100 .039 35 .086 .046 49 .058 .057 06 .175 .012 10 .167 .019 16 .156 .030 20 .148 .037 28 .131 .049 35 .118 .058 49 .089 .074 65 .057 .087 06 .207 .014 10 .199 .023 16 .187 .035 20 .179 .043 28 .163 .058 35 .149 .070 49 .238 .016 10 .230 .026 12 .226 .031 16 .218 .041 20 .210 .050	28 .100 .039 F1-156x028- 35 .086 .046 F1-156x035- 40 .058 .057 F1-156x049- 06 .175 .012 F1-188x010- 16 .156 .030 F1-188x010- 16 .156 .030 F1-188x010- 28 .131 .049 F1-188x028- 35 .118 .058 F1-188x028- 35 .118 .058 F1-188x065- 06 .207 .014 F1-218x006- 10 .199 .023 F1-218x016- 20 .179 .043 F1-218x016- 20 .179 .043 F1-218x020- 28 .163 .058 F1-218x020- 28 .163 .058 F1-218x035- 49 .070 F1-218x049- 06 .238 .016 F1-250x006- 10 .230 .026 F1-250x010- 12 .226	28 .100 .039 F1-156x028- WD SL 35 .086 .046 F1-156x035- WD SL 40 .058 .057 F1-156x049- SL 06 .175 .012 F1-156x049- SL 10 .167 .019 F1-188x016- WD SL 20 .148 .037 F1-188x020- WD SL 28 .131 .049 F1-188x028- WD SL 28 .131 .049 F1-188x035- WD SL 26 .057 .087 F1-188x049- WD SL 26 .057 .087 F1-188x049- SL SL 06 .207 .014 F1-218x049- SL SL 06 .207 .014 F1-218x046- SL SL 20 .179 .043 F1-218x046- SL SL 20 .179 .043 F1-218x028-	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$

OD Nom	Wall Nom	ID Nom	Est Wt #/Ft	Item #	Type 304	Туре 316	Other
1/4" cont.	.028	.194 .186	.068 .076	F1-250x028- F1-250x032-	WD SL SL	WD SL	200,321,400,600
	.035 .042	.180	.082	F1-250x035- F1-250x042-	WD SL SL	WD SL	200,276,321,400,600,Ti2
	.042	.152	.108	F1-250x049-	WD SL	WD SL	200,321,400,600
	.058	.134	.122	F1-250x058-	SL	SL SL	321,Ti2
	.065 .083	.120 .084	.131 .151	F1-250x065- F1-250x083-	WD SL WD SL	WD SL WD SL	200,276,321,400,600 321,400
	.095	.060	.161	F1-250x095-	SL	SL	321
9/32"	.006	.269	.018	F1-281x006-	SL	01	
.2813 7.14mm	.010 .016	.261 .249	.030 .046	F1-281x010- F1-281x016-	SL SL	SL SL	
7.1-11111	.020	.241	.057	F1-281x020-	SL	SL	
	.028	.225	.077	F1-281x028-	SL	SL	
5/16"	.035	.211 .301	.094	F1-281x035- F1-312x006-	SL SL	SL SL	
.3125	.010	.293	.033	F1-312x010-	WD SL	SL	321
7.93mm	.016	.280	.052	F1-312x016-	WD SL	SL	321
	.020 .028	.272 .257	.064 .087	F1-312x020- F1-312x028-	WD SL WD SL	WD SL WD SL	321,600 321,600
	.035	.243	.106	F1-312x035-	WD SL	WD SL	276,321,400,600,Ti2
	.049	.215	.141	F1-312x049-	WD SL	WD SL	321,600,Ti2
	.065 .083	.183 .147	.176 .208	F1-312x065- F1-312x083-	WD SL SL	WD SL SL	200,321,400,600,Ti2 321
	.005	.147	.208	F1-312x095-	SL	SL	521
11/32	.010	.324	.037	F1-344x010-	SL	SL	
.3438 8.73mm	.016 .020	.312 .304	.057 .071	F1-344x016- F1-344x020-	SL SL		
0.7511111	.020	.288	.097	F1-344x028-	SL		
	.035	.274	.118	F1-344x035-	SL		
3/8" .3750	.006 .010	.363 .355	.024 .040	F1-375x006- F1-375x010-	SL WD SL	WD SL	
9.52mm	.016	.343	.063	F1-375x016-	WD SL	WD SL	200,321,600
	.020	.335	.078	F1-375x020-	WD SL	WD SL	200,321,600
	.028 .035	.319 .305	.106 .130	F1-375x028- F1-375x035-	WD SL WD SL	WD SL WD SL	200,321,400,600
	.035	.303	.130	F1-375x035-	WD SL	WD SL	200,276,321,400,600,Ti2 200,321,400,600,Ti2
	.065	.245	.220	F1-375x065-	WD SL	WD SL	200,276,321,400,600,Ti2
	.083	.209	.265 .291	F1-375x083-	WD SL WD SL	WD SL WD SL	321,400,600
	.095 .120	.185 .135	.334	F1-375x095- F1-375x120-	SL	SL	321 321
7/16"	.010	.418	.047	F1-438x010-	SL		
.4375 11.10mm	.016 .020	.405 .397	.074 .091	F1-438x016- F1-438x020-	WD SL WD SL	SL SL	321
11.10000	.020	.382	.125	F1-438x028-	WD SL	SL	321
	.035	.368	.154	F1-438x035-	WD SL	SL	321,600
	.049 .065	.340 .308	.208 .264	F1-438x049- F1-438x065-	WD SL WD SL	SL SL	321 321
	.065	.308	.264	F1-438x083-	WD SL	SL	321
	.095	.248	.355	F1-438x095-	SL	SL	
1/2"	.120	.197	.416	F1-438x120-	SL		
.5000	.006 .010	.488 .480	.032 .054	F1-500x006- F1-500x010-	SL WD SL	SL	321
12.69mm	.016	.468	.085	F1-500x016-	WD SL	WD SL	321,600
	.020	.460	.105	F1-500x020-	WD SL	WD SL	200,321,600
	.028 .035	.444 .430	.144 .178	F1-500x028- F1-500x035-	WD SL WD SL	WD SL WD SL	200,321,400,600,Ti2 200,276,321,400,600,Ti2
	.049	.402	.241	F1-500x049-	WD SL	WD SL	200,276,321,400,600,Ti2
	.065	.370	.309	F1-500x065-	WD SL	WD SL	200,276,321,400,600,Ti2
	.083 .095	.334 .310	.378 .420	F1-500x083- F1-500x095-	WD SL WD SL	WD SL WD SL	321,400,600 321,400
	.120	.260	.420	F1-500x035-	WD SL	WD SL	321,400,600
	.156	.188	.586	F1-500x156-	SL	SL	. ,
	.188	.124	.641	F1-500x188-	SL	SL	

All dimensions are measured in inches except where designated mm (millimeters) *Hastelloy® is a registered trademark of Haynes International, Inc. Please contact our sales office regarding availability. Some items may not be available for immediate delivery.

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PRICING · BIDDING · DELIVERY

T30	4		[316	ТЗ	21	S	tock Fract	ional	Ú	101	ng			C276,	Ti
OD Nom	Wall Nom	ID Nom	Est Wt #/Ft	Item #	Туре 304	Туре 316	Other	OD Nom	Wall Nom	ID Nom	Est Wt #/Ft	Item #	Type 304	Туре 316	Other
9/16" .5625 14.28mm	.010 .016 .020 .028 .035 .049 .065 .083 .095 .120 .188	.543 .530 .523 .507 .492 .465 .433 .397 .373 .322 .186	.060 .096 .119 .163 .202 .275 .353 .435 .435 .485 .580 .769	F1-562x010- F1-562x020- F1-562x020- F1-562x028- F1-562x035- F1-562x049- F1-562x049- F1-562x083- F1-562x083- F1-562x188-	SL SL WD SL WD SL WD SL SL SL SL	SL SL SL WD SL WD SL WD SL SL SL	321 321,400,600 321,600 321,600	1-1/4" 1.250 31.75mm 1-3/8" 1.375 34.92mm	.065 .083 .095 .120 .188 .250 .035 .049 .065 .083 .095	1.120 1.084 1.060 1.010 .874 .750 1.305 1.277 1.245 1.209 1.185	.84 1.06 1.20 1.48 2.18 2.73 .50 .71 .93 1.17 1.33	i1-1250x065- i1-1250x083- i1-1250x095- i1-1250x120- i1-1250x120- i1-1375x035- i1-1375x049- i1-1375x065- i1-1375x065- i1-1375x095-	WD SL WD SL WD SL SL SL WD SL WD SL WD SL WD SL WD SL	WD SL WD SL WD SL SL SL WD SL SL WD SL SL SL	200,321,400,600 321,400,600 321,200,600 321,200,600 321 321 321 321 321 321
5/8" .6250 15.86mm	.010 .016 .020	.605 .593 .585	.067 .106 .132	F1-625x010- F1-625x016- F1-625x020-	SL SL WD SL	SL SL SL	321 321		.120 .188 .250	1.135 .999 .875	1.64 2.44 3.07	i1-1375x120- i1-1375x188- i1-1375x250-	WD SL SL	WD SL SL SL	321 321
	.028 .035 .049 .065 .083 .095 .120 .156 .188	.569 .555 .527 .495 .459 .435 .385 .313 .249	.182 .183 .226 .308 .398 .491 .550 .662 .799 .897	F1-625x028- F1-625x028- F1-625x049- F1-625x065- F1-625x083- F1-625x083- F1-625x120- F1-625x120- F1-625x156- F1-625x188-	WD SL WD SL WD SL WD SL WD SL WD SL SL	WD SL WD SL WD SL WD SL WD SL WD SL WD SL SL SL	321 200,276,321,400,600,Ti2 200,321,400,600,Ti2 200,321,400,600,Ti2 321,400,600 321,400,600 321,400,600	1-1/2" 1.500 38.10mm	.028 .035	1.444 1.430 1.305 1.370 1.334 1.310 1.260 1.188 1.124	.45 .56 .76 1.02 1.28 1.46 1.81 2.29 2.69	i1-1500x028- i1-1500x035- i1-1500x049 i1-1500x065- i1-1500x083- i1-1500x195- i1-1500x120- i1-1500x188- i1-1500x188-	SL WD SL WD SL WD SL WD SL WD SL WD SL SL	WD SL WD SL WD SL WD SL WD SL WD SL SL SL	321 321,400,600 200,321,400,600 200,321,400,600 321,400,600 321,600 321,600
11/16 .6875 17.45mm	.020 .028 .035	.648 .632 .617	.146 .198 .249	F1-688x020- F1-688x028- F1-688x035-	SL SL WD SL	WD SL	321 321	4.5/0"	.250 .312 .375	1.000 .876 .750	3.41 4.05 4.61	i1-1500x250- i1-1500x312- i1-1500x375-	SL SL SL	SL SL SL	321 321 321
3/4" .7500 19.04mm	.049 .065 .010 .016 .020	.590 .558 .730 .718 .710	.342 .442 .081 .128 .159	F1-688x049- F1-688x065- F1-750x010- F1-750x016- F1-750x020-	WD SL WD SL SL WD SL	WD SL SL SL SL	321 321 321 321	1-5/8" 1.625 41.27mm	.035 .049 .065 .083 .095	1.555 1.527 1.495 1.459 1.435	.61 .84 1.11 1.40 1.59	i1-1625x035- i1-1625x049- i1-1625x065- i1-1625x083- i1-1625x095- i1_1625x095- i1_1625x120	WD SL WD SL WD SL WD SL SL	WD SL	321 321 321,400 200 200
	.028 .035 .049 .065 .083	.694 .680 .652 .620 .584	.221 .273 .375 .486 .605	F1-750x028- F1-750x035- F1-750x049- F1-750x065- F1-750x083-	WD SL WD SL WD SL WD SL WD SL	WD SL WD SL WD SL WD SL WD SL	321 200,321,400,600,Ti2 200,276,321,400,600,Ti2 200,276,321,400,600,Ti2 200,321,400,600	1-3/4"	.120 .188 .250 .375 .035	1.385 1.249 1.125 .875 1.680	1.97 2.95 3.75 5.12 .66	i1-1625x120- i1-1625x188- i1-1625x250- i1-1625x375- i1-1750x035-	WD SL SL SL SL WD SL	SL SL SL SL SL	321 <u>321</u> 321
	.095 .120 .156 .188 .250	.560 .510 .438 .374 .250	.680 .826 1.012 1.154 1.365	F1-750x095- F1-750x120- F1-750x156- F1-750x188- F1-750x250-	WD SL WD SL SL SL SL	WD SL WD SL SL SL	321,400,600 321,400,600	1.750 44.45mm	.083 .095 .120	1.652 1.620 1.584 1.560 1.510	.91 1.20 1.51 1.72 2.14	i1-1750x049- i1-1750x065- i1-1750x083- i1-1750x095- i1-1750x120-	WD SL WD SL WD SL WD SL WD SL	WD SL WD SL WD SL WD SL WD SL	321 321,400,600 321 321 321 321
13/16 .8125 20.62mm	.028 .035 .049 .065	.757 .742 .715 .683	.240 .297 .409 .531	F1-812x028- F1-812x035- F1-812x049- F1-812x065-	SL SL SL SL	SL SL SL	321 321		.156 .188 .250 .375	1.438 1.374 1.250 1.000	2.72 3.21 4.10 5.63	i1-1750x156- i1-1750x188- i1-1750x250- i1-1750x375-	SL SL SL SL	SL SL SL	321 321
7/8" .8750 22.21mm	.010 .016 .020 .028 .035 .049 .065 .083	.855 .843 .835 .819 .805 .777 .745 .709	.095 .150 .187 .259 .321 .442 .575 .718	F1-875x010- F1-875x016- F1-875x020- F1-875x028- F1-875x035- F1-875x049- F1-875x065- F1-875x083-	SL SL WD SL WD SL WD SL WD SL WD SL	SL WD SL WD SL WD SL WD SL	321 321,400,600 321,400,600 200,321,400,600 321	1-7/8" 1.875" 47.62mm 2-"	.035 .049 .065 .083 .095 .120 .188 .250	1.805 1.777 1.745 1.709 1.685 1.635 1.499 1.375	.70 .96 1.28 1.62 1.85 2.30 3.46 4.44	i1-1875x035- i1-1875x049- i1-1875x065- i1-1875x083- i1-1875x095- i1-1875x120- i1-1875x188- i1-1875x250-	WD SL WD SL SL WD SL WD SL WD SL SL	SL WD SL SL SL SL SL	321 321 321 200 321 321 321
1-"	.095 .120 .156 .188 .250	.685 .635 .563 .499 .375	.809 .989 1.225 1.410 1.706	F1-875x095- F1-875x120- F1-875x156- F1-875x188- F1-875x250-	WD SL WD SL SL SL SL	WD SL WD SL SL SL	321 321 321 321 321 321 321	2- 2.000 50.80mm	.028 .035 .049 .065 .083 .095	1.944 1.930 1.902 1.870 1.834 1.810	.59 .75 1.04 1.37 1.74 1.93	i1-2000x028- i1-2000x035- i1-2000x049- i1-2000x065- i1-2000x083- i1-2000x095-	WD SL WD SL WD SL WD SL WD SL WD SL	WD SL WD SL WD SL WD SL WD SL	321 321 321 200,321,400,600 200,321,400,600 321,600
1- 1.000 25.4mm	.016 .020 .028 .035 .049 .065 .083 .095 .120	.968 .960 .944 .930 .902 .870 .834 .810 .760	.17 .21 .30 .37 .51 .66 .83 .94 1.15	i1-1000x016- i1-1000x020- i1-1000x028- i1-1000x049- i1-1000x045- i1-1000x083- i1-1000x083- i1-1000x095- i1-1000x120-	WD SL WD SL WD SL	WD SL WD SL WD SL	321 321 321 200,321,400,600,Ti2 200,276,321,400,600,Ti2 200,321,400,600 321,400,600 321,400,600		.120 .156 .188 .250 .312 .375 .437 .500	1.760 1.688 1.624 1.500 1.376 1.250 1.126 1.000	2.46 3.14 3.72 4.78 5.75 6.65 7.46 8.19	i1-2000x120- i1-2000x156- i1-2000x250- i1-2000x250- i1-2000x375- i1-2000x375- i1-2000x437- i1-2000x500-	WD SL SL SL SL SL SL SL		321,400,600 321 321 321 321 321 321 321
1-1/8"		.688 .624 .500 1.055	1.44 1.67 2.05 .42	i1-1000x156- i1-1000x188- i1-1000x250- i1-1125x035-	SL SL SL WD SL	SL SL SL WD SL	321 321 321 321 321	2-1/8" 2.125 53.97mm	.035 .049 .065 .083	2.055 2.027 1.995 1.959	.78 1.11 1.46 1.85	i1-2125x035- i1-2125x049- i1-2125x065- i1-2125x083- i1-2125x095- i1-2125x095-	WD SL WD SL WD SL WD SL		321 321 321
1.125 28.57mm	.065 .083 .095 .120 .188	1.027 .995 .959 .935 .885 .749	.58 .75 .94 1.07 1.32 1.92	i1-1125x049- i1-1125x065- i1-1125x083- i1-1125x095- i1-1125x120- i1-1125x188-	WD SL WD SL WD SL WD SL SL	WD SL WD SL SL SL SL	321 321 321 321 321 321 321	2-1/4"	.095 .120 .188 .250 .375 .500 .035	1.935 1.885 1.749 1.625 1.375 1.125 2.180	2.08 2.63 3.98 5.12 7.17 8.87	i1-2125x120- i1-2125x188- i1-2125x250- i1-2125x375- i1-2125x500-	WD SL WD SL SL SL SL SL SL	SL SL SL SL SL SL	321 321 321 321 321
1-1/4" 1.250 31.75mm	.035	.625 1.194 1.180 1.152	2.39 .37 .46 .64	i1-1125x250- i1-1250x028- i1-1250x035- i1-1250x049-	SL WD SL WD SL WD SL	SL SL WD SL WD SL	321 321 321,400,600 321,400,600	2-1/4 2.250 57.15mm	.049	2.180 2.152 2.120 2.084 2.060 2.010 1.874 1.750	.83 1.18 1.55 1.96 2.19 2.73 4.23 5.46	i1-2125x035- i1-2250x049- i1-2250x083- i1-2250x083- i1-2250x095- i1-2250x120- i1-2250x188- i1-2250x250-	WD SL WD SL WD SL WD SL WD SL SL	SL WD SL WD SL SL WD SL SL SL	321 321 321 321 321 321 321
									.230 .375 .500	1.500 1.250	7.68 9.56	i1-2250x250- i1-2250x375- i1-2250x500-	SL SL	SL SL SL	321 321 321

All dimensions are measured in inches except where designated mm (millimeters) *Hastelloy® is a registered trademark of Haynes International, Inc. Please contact our sales office regarding availability. Some items may not be available for immediate delivery.

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T316 T304

Stock Fractional Tubing

C276, Ti

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2-3/8" .035 2.305 .89 i1-2375x035- WD SL 2.375 .049 2.277 1.24 i1-2375x049- WD SL 60.32mm .065 2.245 1.64 i1-2375x065- SL SL .083 2.209 2.08 i1-2375x065- SL SL .095 2.185 2.37 i1-2375x095- SL .120 2.135 2.96 i1-2375x120- SL .188 1.999 4.49 i1-2375x250- SL .375 1.625 8.19 i1-2375x250- SL .350 1.875 5.80 i1-2375x250- SL	321 321 321 321 321 321 321
60.32mm .065 2.245 1.64 i1-2375x065- SL SL .083 2.209 2.08 i1-2375x085- WD SL WD SL .095 2.185 2.37 i1-2375x095- SL .120 2.135 2.96 i1-2375x120- SL .188 1.999 4.49 i1-2375x128- SL .250 1.875 5.80 i1-2375x250- SL	321 321 321
.083 2.209 2.08 i1-2375x083- WD SL WD SL .095 2.185 2.37 i1-2375x095- SL SL 120 2.135 2.96 i1-2375x1095- SL SL .188 1.999 4.49 i1-2375x188- SL SL .250 1.875 5.80 i1-2375x250- SL SL	321 321
.095 2.185 2.37 i1-2375x095- SL .120 2.135 2.96 i1-2375x120- SL .188 1.999 4.49 i1-2375x188- SL SL .250 1.875 5.80 i1-2375x250- SL SL	321 321
.120 2.135 2.96 i1-2375x120- SL .188 1.999 4.49 i1-2375x188- SL SL .250 1.875 5.80 i1-2375x250- SL SL	321 321
.188 1.999 4.49 i1-2375x188- SL SL .250 1.875 5.80 i1-2375x250- SL SL	321 321
.250 1.875 5.80 i1-2375x250- SL SL	321 321
	321
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	321
.500 1.375 10.24 i1-2375x500- SL SL	321
2-1/2" .035 2.430 .92 i1-2500x035- WD SL SL	
2.500 .049 2.402 1.31 i1-2500x049- WD SL WD SL	321
	200,321,400
	200,321,400
.095 1.810 1.93 i1-2500x095- WD SL WD SL	321
.120 2.260 3.12 i1-2500x120- WD SL WD SL	321
.188 2.124 4.75 i1-2500x188- SL SL	321
.250 2.000 6.14 i1-2500x250- SL SL	321
.375 1.750 8.70 i1-2500x375- SL SL	321
.500 1.500 10.68 i1-2500x500- SL SL	321
2-5/8" .049 2.527 1.38 i1-2625x049- WD SL	321
2.625 .065 2.495 1.82 i1-2625x065- WD SL WD SL	321
66.67mm .095 2.435 2.59 i1-2625x095- SL	
.120 2.385 3.28 i1-2625x120- SL S	321
.188 2.249 5.00 i1-2625x188- SL SL	321
.250 2.125 6.48 i1-2625x250- SL SL	
.375 1.875 9.21 i1-2625x375- SL SL	321
.500 1.625 11.35 i1-2625x500- SL SL	321
2-3/4" .035 2.680 1.02 i1-2750x035- WD SL	321
2.750 .049 2.660 1.41 i1-2750x049- WD SL	321
69.85mm .065 2.620 1.91 i1-2750x065- WD SL WD SL	321
.083 2.584 2.36 i1-2750x083- WD SL WD SL	321
.120 2.510 3.45 i1-2750x120- WD SL WD SL	321
.188 2.374 5.26 i1-2750x188- SL SL	321
.250 2.250 6.83 i1-2750x250- SL SL	321
.375 2.000 9.73 i1-2750x375- SL SL	321
.500 1.750 12.29 i1-2750x500- SL SL	321

T321

OD Nom	Wall Nom	ID Nom	Est Wt #/F		Type 304	Туре 316	Other
3-"	.035	2.930	1.11	i1-3000x035-	WD SL	SL	321
3.000	.049	2.902	1.58	i1-3000x049-	WD SL	WD SL	321
76.20mm	.065	2.870	2.08	i1-3000x065-	WD SL	WD SL	200,321,400,600
	.083	2.834	2.64	i1-3000x083-	WD SL	WD SL	321,400
	.095	2.810	2.95	i1-3000x095-	WD SL	WD SL	321
	.120	2.760	3.77	i1-3000x120-	WD SL	WD SL	321,600
	.156	2.688	4.84	i1-3000x156-	SL	SL	
	.188	2.624	5.77	i1-3000x188-	SL	SL	321
	.250	2.500	7.51	i1-3000x250-	SL	SL	321
	.312	2.376	9.16	i1-3000x312-	SL	SL	
	.375	2.250	10.75	i1-3000x375-	SL	SL	321
	.500	2.000	13.65	i1-3000x500-	SL	SL	321
	.625	1.750	16.21	i1-3000x625-	SL	SL	321
	.750	1.500	18.43	i1-3000x750-	SL	SL	321

Iolerance Table: Fractional Tubing											
Tolerances	Standard Tol		Close Tol								
OD Inches	OD Tolerance Inches	Wall Tolerance %	OD Tolerance Inches	Wall Tolerance %							
< 3/32 3/32 to < 3/16 3/16 to < 1/2 1/2 to < 1-1/2 1-1/2 to < 3-1/2	+.002/002 +.003/003 +.004/004 +.005/005 +.010/010	+ /- 15% + /- 15% + /- 15% + /- 10% + /- 10%	+.002/000 +.003/000 +.004/000 +.005/000 NA	+ /- 10% + /- 10% + /- 10% + /- 10% NA							

T316

Stock Metric Tubing

T316

Description: Metric tubing is stocked in seamless 304 and 316 stainless steel, from 1 millimeter to 24 mm. Can be supplied in other grades on a custom basis. Primarily stocked in annealed temper.

Application: Commonly used with standard metric compression fittings, metric tubing can also be used in other commercial applications that require corrosion resistance, strength, and uniformity.

OD Nom	Wall Nom	ID Nom	Est Wt #/Ft	Item #	Type 304	Туре 316
1 (.0394)	.20 (.008)	.59 (.023)	.003	m1-1x.2-	SL	
2 (.0787)	.50 (.020)	.98 (.039)	.013	m1-2x.5-	SL	
3 (.1181)	.50 (.020)	1.98 (.078)	.021	m1-3x.5-	SL	SL
4 (.1575)	.50 (.020)	2.98 (.118)	.030	m1-4x.5-	SL	SL
5 (.197)	.50 (.020)	3.98 (.157)	.039	m1-5x.5-	SL	SL
. ,	.70 (.028)	3.58 (1.41)	.052	m1-5x.7-	SL	SL
6 (.2362)	.50 (.020)	4.98 (.196)	.047	m1-6x.5-	SL	SL
	1.00 (.039)	4.02 (.158)	.084	m1-6x1.0-	SL	SL
7 (.2758)	.50 (.020)	5.98 (.236)	.056	m1-7x.5-	SL	SL
	1.00 (.039)	5.02 (.198)	.101	m1-7x1.0-	SL	SL
8 (.315)	.50 (.020)	6.98 (.275)	.064	m1-8x.5-	SL	SL
	1.00 (.039)	6.02 (.237)	.118	m1-8x1.0-	SL	SL
	1.50 (.059)	5.00 (.197)	.165	m1-8x1.5-	SL	

All dimensions are measured in inches except where designated mm (millimeters) Please contact our sales office regarding availability. Some items may not be available for immediate delivery.

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OD Nom	Wall Nom	ID Nom	Est Wt #/Ft	Item #	Type 304	Туре 316
9 (.3543)	.50 (.020)	7.98 (.314)	.073	m1-9x.5-	SL	SL
	1.00 (.039)	7.01 (.276)	.134	m1-9x1.0-	SL	SL
	1.50 (.059)	6.00 (.236)	.188	m1-9x1.5-	SL	SL
10 (.394)	.50 (.020)	8.98 (.354)	.082	m1-10x.5-	SL	SL
	1.00 (.039)	8.02 (.316)	.151	m1-10x1.0-	SL	SL
	1.50 (.059)	7.01 (.276)	.216	m1-10x1.5-	SL	
	2.00 (.079)	5.99 (.236)	.272	m1-10x2.0-	SL	
11 (.4331)	1.00 (.039)	9.01 (.355)	.168	m1-11x1.0-	SL	SL
12 (.4728)	.50 (.020)	10.98 (.433)	.099	m1-12x.5-	SL	SL
	.70 (.028)	10.58 (.417)	.136	m1-12x.7-	SL	
	1.00 (.039)	10.02 (.395)	.185	m1-12x1.0-	SL	SL
	1.50 (.059)	9.01 (.355)	.267	m1-12x1.5-	SL	
	2.00 (.079)	7.99 (.315)	.340	m1-12x2.0-	SL	
14 (.5512)	1.50 (.059)	10.99 (.433)	.317	m1-14x1.5-	SL	SL
16 (.6299)	1.50 (.059)	12.99 (.512)	.368	m1-16x1.5-	SL	SL
20 (.7874)	1.50 (.059)	17.00 (.748)	.428	m1-20x1.5-	SL	SL
20 (.7874)	1.50 (.059)	16.99 (.669)	.469	m1-20x1.5-	SL	SL
22 (.8661)	1.50 (.059)	18.99 (.748)	.520	m1-22x1.5-	SL	SL
24 (.9449)	1.50 (.059)	20.99 (.827)	.571	m1-24x1.5-	SL	SL

Tolerance Table: Metric Tubing								
OD (mm)	OD Tolerance	Wall Tolerance						
< 3mm	+.000/050	+15%/-0%						
3mm to < 6mm	+.000/080	+15%/-0%						
6mm to < 14mm	+.000/100	+20%/-0%						
14mm to < 24mm	+.000/130	+20%/-0%						

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Stock Medical Grade Tubing

T316L

Description: Medical-quality grade ("MQ") tubing is 316L welded and mandrel drawn, manufactured to tight I.D. dimensions. Supplied in 1/8 hard to 1/4 hard temper, stock sizes range from 1/8" to 1" O.D.

T316L

OD Nom	Wall Nom	ID Min/Max	OD Min/Max	Est Wt #/Ft	Item #
1/8"	.006	.1120/.1140	.1228/.1272	.008	316L-F9-125x006-MQ
.125	.010	.1040/.1060	.1220/.1280	.013	316L-F9-125x010-MQ
3.17mm	.016	.0920/.0940	.1208/.1292	.019	316L-F9-125x016-MQ
	.020	.0840/.0860	.1200/.1300	.020	316L-F9-125x020-MQ
5/32"	.006	.1433/.1453	.1541/.1585	.010	316L-F9-156x006-MQ
.156	.010	.1353/.1373	.1533/.1593	.016	316L-F9-156x010-MQ
3.97mm	.016	.1233/.1253	.1521/.1605	.025	316L-F9-156x016-MQ
	.020	.1153/.1173	.1513/.1613	.030	316L-F9-156x020-MQ
3/16"	.006	.1745/.1765	.1853/.1897	.012	316L-F9-188x006-MQ
.188	.010	.1665/.1685	.1845/.1905	.019	316L-F9-188x010-MQ
4.76mm	.016	.1545/.1565	.1833/.1917	.030	316L-F9-188x016-MQ
	.020	.1465/.1485	.1825/.1925	.037	316L-F9-188x020-MQ
1/4"	.006	.2370/.2390	.2478/.2522	.016	316L-F9-250x006-MQ
.250	.010	.2290/.2310	.2470/.2530	.026	316L-F9-250x010-MQ
6.35mm	.016	.2170/.2190	.2458/.2542	.041	316L-F9-250x016-MQ
	.020	.2090/.2110	.2450/.2550	.050	316L-F9-250x020-MQ
3/8"	.006	.3620/.3640	.3728/.3772	.026	316L-F9-375x006-MQ
.375	.010	.3540/.3560	.3720/.3780	.040	316L-F9-375x010-MQ
9.52mm	.016	.3420/3440	.3708/.3792	.063	316L-F9-375x016-MQ
	.020	.3340/.3360	.3700/.3800	.078	316L-F9-375x020-MQ
1/2"	.006	.4865/.4895	.4973/.5027	.032	316L-F9-500x006-MQ
.500	.010	.4785/.4815	.4965/.5035	.054	316L-F9-500x010-MQ
12.69mm	.016	.4665/.4695	.4953/.5047	.085	316L-F9-500x016-MQ
	.020	.4585/.4615	.4945/.5055	.105	316L-F9-500x020-MQ
5/8"	.010	.6035/.6065	.6215/.6285	.067	316L-F9-625x010-MQ
.625	.020	.5835/.5865	.6195/.6305	.132	316L-F9-625x020-MQ
3/4"	.010	.7285/.7315	.7465/.7535	.081	316L-F9-750x010-MQ
.750	.020	.7085/.7115	.7445/.7555	.159	316L-F9-750x020-MQ
7/8"	.010	.8535/.8565	.8715/.8785	.095	316L-F9-875x010-MQ
.875	.016	.8415/.8445	.8703/.8797	.150	316L-F9-875x016-MQ
22.21mm	.020	.8335/.8365	.8695/.8805	.187	316L-F9-875x020-MQ
1"	.010	.9785/.9815	.9965/1.0035	.108	316L-i9-1000x010-MQ
1.000	.020	.9585/.9615	.9945/1.0055	.214	316L-i9-1000x020-MQ
25.38mm					

Application: Ideal for applications requiring tighter than normal tolerances. Some temper is added for applications that require more rigidity, such as in medical instrumentation.



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T304

Pipe

Description: A special range of tubing sizes designated by dimension and wall thickness. Generally available in any drawable metal or alloy, with method of manufacture (seamless or welded) dictated by material, to OD/Wall ratio and wall thickness. Standards cover actual dimensions, tolerances, chemical and physical requirements. Call for pricing and availability.

Application: Pipe is a tubular product intended primarily for such purposes as the conveying of water, fuel, gas, air, steam, etc. It has also been found to be a convenient form for use as structural members, such as columns and railings.

Nominal	OD			Schedule	Schedule Number (Wall Thickness Shown in table below)					
Pipe Size	Inches	Sch# 5S	Sch# 5	Sch# 10/S	Sch# 40S	Sch# 40Std	Sch# 40	Sch# 80/S	Sch# 160	Sch# XXH
1/8	0.405	.035	.035	.049	.068	.068	.068	.095	N/A	N/A
1/4	0.54	.049	.049	.065	.088	.088	.088	.119	N/A	N/A
3/8	0.675	.049	.049	.065	.091	.091	.091	.126	N/A	N/A
1/2	0.84	.065	.065	.083	.109	.109	.109	.147	.187	.294
3/4	1.05	.065	.065	.083	.113	.113	.113	.154	.218	.308
1	1.315	.065	.065	.109	.133	.133	.133	.179	.250	.358
1-1/4	1.66	.065	.065	.109	.140	.140	.140	.191	.250	.382
1-1/2	1.9	.065	.065	.109	.145	.145	.145	.200	.281	.400
2	2.375	.065	.065	.109	.154	.154	.154	.218	.343	.436
2-1/2	2.875	.083	.083	.120	.203	.203	.203	.276	.375	.552

Tolerance Table: Pipe STAINLESS STEEL PIPE TOLERANCES (ASTM A-312) Nom Size OD Tol Wall Tol 1/8 to 1-1/2 1/64 (.015) 1/32 (.031) 12.5% 12.5% 1-1/2+ thru 4 1/32 (.031) 1/32 (.031) 12.5% 12.5% 1/16 (.062) 1/32 (.031) 12.5% 4+ thru 8 12.5% 8+ thru 18 3/32 (.093) 1/32 (.031) 12.5% 12.5% 18+ thru 24 1/8 (.125) 1/32 (.031) 12.5% 12.5%

T316

All dimensions are measured in inches except where designated mm (millimeters).

Please contact our sales office regarding availability. Some items may not be available for immediate delivery.

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Seamless Fractional Tubin	g
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Description: "Fractional" refers to any tubing that is less than 3" in outside diameter and whose outside diameter is an even increment of 1/64" (.016). Fractional tubing can generally be produced by any method of manufacture and in any drawable metal. Available in random lengths and TubeKITS[™]. Material is manufactured to O.D. and wall dimensions.

Application: Fractional tubing is most common in T304 and T316 stainless steel for general commercial applications due to availability and relatively low cost.

Size	Wall Nom	ID Theo	T304 Item #	\$ ea	T316 Item #	\$ ea Meter
1/16"	.010	.043	TK4FS-062x010	Call or	TK6FS-062x010	Call or
3/32"	.016	.061	TK4FS-093x016	access	TK6FS-093x016	access
1/8"	.016	.093	TK4FS-125x016	web	TK6FS-125x016	web
	.028	.069	TK4FS-125x028	for	TK6FS-125x028	for
3/16"	.028	.132	TK4FS-188x028	pricing	TK6FS-188x028	pricing
1/4"	.028	.194	TK4FS-250x028		TK6FS-250x028	- i j ^s ·
	.035	.180	TK4FS-250x035		TK6FS-250x035	
	.049	.152	TK4FS-250x049		TK6FS-250x049	
	.065	.120	TK4FS-250x065		TK6FS-250x065	
5/16"	.028	.257	TK4FS-312x028		TK6FS-312x028	
3/8"	.028	.319	TK4FS-375x028		TK6FS-375x028	
	.035	.305	TK4FS-375x035		TK6FS-375x035	
	.049	.277	TK4FS-375x049		TK6FS-375x049	
	.065	.245	TK4FS-375x065		TK6FS-375x065	
1/2"	.028	.444	TK4FS-500x028		TK6FS-500x028	
	.035	.430	TK4FS-500x035		TK6FS-500x035	
	.049	.402	TK4FS-500x049		TK6FS-500x049	
	.065	.370	TK4FS-500x065		TK6FS-500x065	
5/8"	.028	.569	TK4FS-625x028		TK6FS-625x028	
	.035	.555	TK4FS-625x035		TK6FS-625x035	
	.049	.527	TK4FS-625x049		TK6FS-625x049	
	.065	.495	TK4FS-625x065		TK6FS-625x065	
3/4"	.035	.680	TK4FS-750x035		TK6FS-750x035	
	.049	.652	TK4FS-750x049		TK6FS-750x049	
	.065	.620	TK4FS-750x065		TK6FS-750x065	
1"	.035	.930	TK4FS-1000x035		TK6FS-1000x035	
	.049	.920	TK4FS-1000x049		TK6FS-1000x049	
	.065	.870	TK4FS-1000x065		TK6FS-1000x065	
1-1/4"	.049	1.152	TK4FS-1250x049	V	TK6FS-1250x049	V

Seamless Metric Tubing

Description: With its OD expressed evenly in millimeters (mm), metric tubing can generally be produced by any method of manufacture and in any drawable material. Standards cover actual dimensions and tolerances plus chemical and physical requirements. Due to its custom nature, metric tubing is sometimes limited in availability.

Application: Stocked metric tubing is most common in T304 and T316 stainless steel for general commercial applications with standard metric compression fittings.

\$ ea Meter	T316 Item #	\$ ea	T304 Item #	ID Nom Inches	ID Nom mm	Wall Nom Inches	Wall Nom mm	OD Nom Inches	OD Nom mm
Call or	TK6mS-1x.20	Call or	TK4mS-1x.20	.024	.60	.008	.20	.039	1
access	TK6mS-2x.50	access	TK4mS-2x.50	.039	1.00	.020	.50	.079	2
web	TK6mS-3x.50	web	TK4mS-3x.50	.079	2.00	.020	.50	.118	3
for	TK6mS-4x.50	for	TK4mS-4x.50	.118	3.00	.020	.50	.158	4
pricing	TK6mS-5x.50	pricing	TK4mS-5x.50	.158	4.00	.020	.50	.197	5
pricing	TK6mS-6x1.00	pricing	TK4mS-6x1.00	.158	4.00	.039	1.00	.236	6
1	TK6mS-8x1.00		TK4mS-8x1.00	.236	6.00	.039	1.00	.315	8
	TK6mS-10x1.00		TK4mS-10x1.00	.315	8.00	.039	1.00	.394	10
	TK6mS-12x1.00		TK4mS-12x1.00	.394	10.00	.039	1.00	.473	12
	TK6mS-14x1.50		TK4mS-14x1.50	.433	11.00	.059	1.50	.552	14
	TK6mS-16x1.50		TK4mS-16x1.50	.512	13.00	.059	1.50	.630	16
	TK6mS-20x1.50		TK4mS-20x1.50	.670	17.00	.059	1.50	.788	20
	TK6mS-22x1.50	1	TK4mS-22x1.50	.749	19.00	.059	1.50	.867	22
	TK6mS-24x1.50		TK4mS-24x1.50	.827	21.00	.059	1.50	.945	24

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Hypodermic Tubing

Description: Often referred to as "seamless" because of its smooth appearance, hypo tubing is manufactured, welded and drawn to tight O.D. and I.D. tolerances. Stocked in grades 304 & 316 stainless steel in the full hard condition.

Application: Ideal for medical and industrial components that require strength, uniformity, and corrosion resistance. Not manufactured for pressure service. Wide selection, economical and quick delivery.

6RW .2030 .015 .173" TK4H-6RW Call or TK6H-6RW Call or 7RW .1800 .015 .150 TK4H-7RW access TK6H-7RW access 9RW .1480 .015 .118 TK4H-9RW web TK6H-9RW web 10RW .1340 .014 .106 TK4H-10RW for TK6H-9RW web 11RW .1200 .013 .094 TK4H-11RW pricing TK6H-11RW pricing 11TW .1200 .010 .004 TK4H-12TW TK6H-11RW pricing 12RW .090 .009 .091 TK4H-12TW TK6H-13RW TK6H-13RW 13TW .0950 .009 .077 TK4H-14RW TK6H-14RW TK6H-14RW 14RW .0830 .010 .063 TK4H-14RW TK6H-14RW TK6H-14RW 14RW .0830 .006 .072 TK4H-14RW TK6H-15RW TK6H-17RW 15RW .0720 .00	Gage	OD Nom	Wall	ID Nom	T304	\$ ea	T316 Item #	\$ ea Meter
7RW .1800 .015 .150 TK4H-7RW access TK6H-7RW access 8RW .1650 .015 .135 TK4H-8RW web TK6H-8RW web 10RW .1340 .014 .106 TK4H-10RW pricing TK6H-10RW for 11RW .1200 .013 .094 TK4H-11RW pricing TK6H-10RW pricing 11TW .1200 .010 .004 TK4H-11RW pricing TK6H-11RW pricing 11TW .1200 .011 .007 TK4H-12RW TK6H-13RW TK6H-12RW pricing 13TW .0950 .012 .077 TK4H-13TW TK6H-13RW TK6H-13RW tK6H-13RW 14RW .0830 .006 .072 TK4H-14RW TK6H-13RW tK6H-15RW tK6H-15RW 14RW .0830 .006 .072 TK4H-14RW TK6H-16RW tK6H-15RW 15FW .0720 .009 .047 TK4H-16RW TK6H-17RW tK6H-	6DW					Call or		
BRW .1650 .015 .135 TK4H-BRW web TK6H-BRW web 9RW .1480 .015 .118 TK4H-I0RW for TK6H-BRW web 10RW .1200 .013 .094 TK4H-11RW pricing TK6H-10RW for 11RW .1200 .010 .004 TK4H-11TW TK6H-12RW TK6H-12RW pricing 12RW .1090 .012 .085 TK4H-12RW TK6H-12RW TK6H-12RW tK6H-13RW tK6H-14RW tK6H-16RW tK								
9RW .1480 .015 .118 TK4H-9RW for for pricing TK6H-9RW for TK6H-10RW for pricing 11RW .1200 .013 .094 TK4H-11RW pricing TK6H-11RW pricing 11TW .1200 .010 .100 TK4H-12RW TK6H-11RW pricing 11TW .1200 .010 .004 TK4H-12RW TK6H-11RW pricing 12TW .1090 .002 .091 TK4H-12RW TK6H-14RW tK6H-14RW 13RW .0950 .012 .071 TK4H-13RW TK6H-14RW tK6H-14RW 14RW .0830 .006 .072 TK4H-13RW TK6H-14RW tK6H-14RW 14TW .0830 .006 .072 TK4H-16RW TK6H-16RW tK6H-16RW 15TW .0720 .006 .060 TK4H-17RW TK6H-16RW tK6H-16RW 16RW .0650 .009 .047 TK4H-16RW TK6H-16RW tK6H-17TW 17RW .0590 .009 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
10RW .1340 .014 .106 TK4H-10RW <i>ind</i> TK6H-10RW <i>ind</i> 11RW .1200 .013 .094 TK4H-11RW <i>pricing</i> TK6H-11RW <i>pricing</i> 11TW .1200 .010 .100 TK4H-11RW TK6H-11TW TK6H-11TW 12RW .1090 .012 .085 TK4H-12RW TK6H-13RW TK6H-13RW 13TW .0950 .012 .071 TK4H-13TW TK6H-13RW TK6H-14RW 13RW .0950 .009 .077 TK4H-14RW TK6H-14RW TK6H-14RW 14RW .0830 .006 .072 TK4H-14RW TK6H-14RW TK6H-14RW 14RW .0830 .006 .072 TK4H-14RW TK6H-16RW TK6H-16RW 16RW .0650 .009 .047 TK4H-17KW TK6H-16RW TK6H-16RW 16RW .0650 .006 .053 TK4H-17RW TK6H-16TW TK6H-16TW 17RW .0590 .009 .033 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>web</td><td></td><td></td></t<>						web		
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11TW .1200 .010 .100 TK4H-11TW TK6H-11TW 12RW .1090 .012 .085 TK4H-12RW TK6H-12TW 13RW .0950 .012 .071 TK4H-12TW TK6H-12TW 13RW .0950 .012 .071 TK4H-13RW TK6H-14TW 14RW .0830 .010 .063 TK4H-14RW TK6H-14RW 14RW .0830 .006 .072 TK4H-14RW TK6H-14RW 14TW .0830 .006 .072 TK4H-15RW TK6H-14RW 14TW .0830 .006 .072 TK4H-15RW TK6H-16RW 15TW .0720 .006 .060 TK4H-15RW TK6H-16RW 16RW .0650 .009 .047 TK4H-16RW TK6H-17TW 17RW .0590 .009 .041 TK4H-17W TK6H-18RW 17RW .0590 .009 .033 TK4H-18W TK6H-18RW 17RW .0500 .004 .042						pricing		pricing
12RW .1090 .012 .085 TK4H-12RW TK6H-12RW 12TW .1090 .009 .091 TK4H-12TW TK6H-12TW 13RW .0950 .012 .071 TK4H-13TW TK6H-13RW 13TW .0950 .009 .077 TK4H-13TW TK6H-13RW 14RW .0830 .010 .063 TK4H-14RW TK6H-14RW 14TW .0830 .006 .072 TK4H-14RW TK6H-14TW 15RW .0720 .009 .054 TK4H-15RW TK6H-15RW 15RW .0720 .006 .060 TK4H-15RW TK6H-16RW 16RW .0650 .009 .047 TK4H-17RW TK6H-16TW 17RW .0590 .009 .033 TK4H-17RW TK6H-17RW 17RW .0590 .009 .033 TK4H-17RW TK6H-18TW 18TW .0500 .004 .042 TK4H-18TW TK6H-18TW 19RW .0425 .005 .023								
12TW .1090 .009 .091 TK4H-12TW TK6H-12TW 13RW .0950 .012 .071 TK4H-13RW TK6H-13TW 13TW .0950 .009 .077 TK4H-13RW TK6H-13TW 14RW .0830 .010 .063 TK4H-14RW TK6H-13TW 14RW .0830 .006 .072 TK4H-14TW TK6H-15RW 15RW .0720 .009 .054 TK4H-16RW TK6H-16FW 15TW .0720 .006 .060 TK4H-16RW TK6H-16FW 16TW .0650 .009 .047 TK4H-16RW TK6H-16TW 17RW .0590 .009 .041 TK4H-17RW TK6H-18TW 17RW .0590 .007 .046 TK4H-17TW TK6H-18TW 18RW .0500 .009 .033 TK4H-18TW TK6H-18RW 18RW .0500 .009 .033 TK4H-19RW TK6H-19RW 19RW .0425 .005 .033								
13RW .0950 .012 .071 TK4H-13RW TK6H-13RW 13TW .0950 .009 .077 TK4H-13TW TK6H-14RW 14RW .0830 .010 .063 TK4H-14RW TK6H-14RW 14TW .0830 .006 .072 TK4H-14TW TK6H-14RW 14TW .0830 .006 .072 TK4H-15RW TK6H-14RW 14TW .0830 .006 .072 TK4H-15RW TK6H-14RW 15TW .0720 .006 .060 TK4H-15RW TK6H-16TW 15TW .0720 .006 .065 .14H-15RW TK6H-16TW 16RW .0650 .009 .047 TK4H-16RW TK6H-17TW 17RW .0590 .007 .046 TK4H-17W TK6H-18TW 17TW .0590 .009 .033 TK4H-18RW TK6H-18TW 18TW .0500 .004 .042 TK4H-18RW TK6H-18TW 19RW .0425 .006 .028								
13TW .0950 .009 .077 TK4H-13TW TK6H-13TW 14RW .0830 .010 .063 TK4H-14RW TK6H-14RW 14TW .0830 .006 .072 TK4H-14RW TK6H-14TW 15RW .0720 .009 .054 TK4H-15RW TK6H-14TW 15RW .0720 .006 .060 TK4H-15TW TK6H-16RW 16RW .0650 .009 .047 TK4H-16TW TK6H-16RW 16TW .0650 .009 .041 TK4H-17RW TK6H-16RW 17RW .0590 .009 .033 TK4H-17RW TK6H-18RW 17TW .0590 .009 .033 TK4H-18RW TK6H-18RW 18TW .0500 .004 .042 TK4H-18RW TK6H-18RW 19RW .0425 .008 .028 TK4H-19RW TK6H-19RW 19RW .0425 .005 .023 TK4H-19RW TK6H-19RW 19RW .0425 .005 .023								
14RW .0830 .010 .063 TK4H-14RW TK6H-14RW 14TW .0830 .006 .072 TK4H-14TW TK6H-14RW 15RW .0720 .009 .054 TK4H-15RW TK6H-15RW 15TW .0720 .006 .060 TK4H-15RW TK6H-16RW 16TW .0650 .009 .047 TK4H-16RW TK6H-16TW 16TW .0650 .006 .053 TK4H-17RW TK6H-16TW 17RW .0590 .009 .041 TK4H-17RW TK6H-16TW 17RW .0590 .007 .046 TK4H-17RW TK6H-18TW 18RW .0500 .009 .033 TK4H-18TW TK6H-18RW 18RW .0500 .004 .042 TK4H-19RW TK6H-19RW 19RW .0425 .008 .028 TK4H-19RW TK6H-19RW 20RW .0355 .006 .024 TK4H-19RW TK6H-20RW 21TW .0320 .005 .023								
14TW .0830 .006 .072 TK4H-14TW TK6H-14TW 15RW .0720 .009 .054 TK4H-15RW TK6H-15TW 15TW .0720 .006 .060 TK4H-15RW TK6H-15TW 16RW .0650 .009 .047 TK4H-16RW TK6H-16TW 16RW .0650 .006 .053 TK4H-16TW TK6H-17TW 17RW .0590 .009 .041 TK4H-17TW TK6H-17TW 17RW .0590 .007 .046 TK4H-17TW TK6H-18TW 17TW .0590 .009 .033 TK4H-18RW TK6H-18TW 18TW .0500 .004 .042 TK4H-19RW TK6H-18TW 19RW .0425 .008 .028 TK4H-19RW TK6H-19RW 19TW .0425 .005 .033 TK4H-19RW TK6H-20RW 20RW .0355 .005 .026 TK4H-20RW TK6H-21RW 21TW .0320 .006 .012								
15RW .0720 .009 .054 TK4H-15RW TK6H-15RW 15TW .0720 .006 .060 TK4H-15TW TK6H-16RW 16RW .0650 .009 .047 TK4H-16TW TK6H-16RW 16TW .0650 .006 .053 TK4H-16TW TK6H-16RW 17TW .0590 .009 .041 TK4H-17RW TK6H-17TW 17TW .0590 .007 .046 TK4H-17RW TK6H-18TW 18TW .0500 .009 .033 TK4H-18TW TK6H-18TW 18TW .0500 .004 .042 TK4H-18TW TK6H-19TW 19RW .0425 .008 .028 TK4H-19TW TK6H-19TW 19TW .0425 .005 .033 TK4H-20RW TK6H-19TW 20RW .0355 .006 .020 TK4H-20RW TK6H-21RW 21RW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .006 .016								
15TW .0720 .006 .060 TK4H-15TW TK6H-15TW 16RW .0650 .009 .047 TK4H-16RW TK6H-16TW 16TW .0650 .006 .053 TK4H-16RW TK6H-16TW 17RW .0590 .009 .041 TK4H-17RW TK6H-16TW 17RW .0590 .007 .046 TK4H-17TW TK6H-18TW 18RW .0500 .009 .033 TK4H-18TW TK6H-18RW 18TW .0500 .004 .042 TK4H-19RW TK6H-19RW 19RW .0425 .008 .028 TK4H-19RW TK6H-19TW 19TW .0425 .006 .024 TK4H-19RW TK6H-19TW 20RW .0355 .006 .024 TK4H-20RW TK6H-20TW 21TW .0320 .006 .020 TK4H-21TW TK6H-21RW 21TW .0320 .006 .016 TK4H-22RW TK6H-21RW 22TW .0280 .006 .016								
16RW .0650 .009 .047 TK4H-16RW TK6H-16RW 16TW .0650 .006 .053 TK4H-16TW TK6H-16RW 17RW .0590 .009 .041 TK4H-17TW TK6H-17RW 17TW .0590 .007 .046 TK4H-17TW TK6H-17RW 17TW .0500 .009 .033 TK4H-18RW TK6H-18TW 18TW .0500 .004 .042 TK4H-18RW TK6H-18TW 19RW .0425 .008 .028 TK4H-19RW TK6H-18TW 19RW .0425 .005 .033 TK4H-19RW TK6H-20RW 20RW .0355 .005 .026 TK4H-20RW TK6H-21RW 21TW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .006 .013 TK4H-32RW TK6H-22RW 22RW .0280 .006 .013 TK4H-23RW TK6H-23RW 23TW .0220 .006 .013								
16TW .0650 .006 .053 TK4H-16TW TK6H-16TW 17RW .0590 .009 .041 TK4H-17RW TK6H-17RW 17TW .0590 .007 .046 TK4H-17RW TK6H-17TW 18RW .0500 .009 .033 TK4H-18RW TK6H-18RW 18TW .0500 .004 .042 TK4H-18RW TK6H-18TW 19RW .0425 .008 .028 TK4H-19RW TK6H-19TW 19TW .0425 .005 .033 TK4H-20RW TK6H-19TW 20RW .0355 .006 .024 TK4H-20RW TK6H-21RW 21RW .0320 .006 .026 TK4H-21RW TK6H-21RW 21TW .0320 .006 .016 TK4H-22RW TK6H-22RW 22RW .0280 .004 .020 TK4H-22RW TK6H-22RW 22RW .0250 .006 .013 TK4H-23RW TK6H-24RW 24RW .0220 .004 .020								
17RW .0590 .009 .041 TK4H-17RW TK6H-17RW 17TW .0590 .007 .046 TK4H-17TW TK6H-17RW 18RW .0500 .009 .033 TK4H-17TW TK6H-18RW 18TW .0500 .004 .042 TK4H-18TW TK6H-18RW 18TW .0500 .004 .042 TK4H-19RW TK6H-19RW 19TW .0425 .008 .028 TK4H-19RW TK6H-19TW 19TW .0425 .005 .033 TK4H-19RW TK6H-19TW 20RW .0355 .006 .024 TK4H-12RW TK6H-20TW 21RW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .004 .020 TK4H-22RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23TW TK6H-23TW 24RW .0220 .005 .012								
17TW .0590 .007 .046 TK4H-17TW TK6H-17TW 18RW .0500 .009 .033 TK4H-18RW TK6H-18TW 18TW .0500 .004 .042 TK4H-18RW TK6H-18TW 19RW .0425 .008 .028 TK4H-19RW TK6H-18TW 19RW .0425 .005 .033 TK4H-19TW TK6H-18TW 20RW .0355 .006 .024 TK4H-20RW TK6H-20RW 20TW .0355 .005 .026 TK4H-21RW TK6H-21RW 21TW .0320 .006 .020 TK4H-21RW TK6H-21TW 22RW .0280 .006 .012 TK4H-22RW TK6H-22RW 22TW .0280 .006 .016 TK4H-22RW TK6H-22RW 23TW .0250 .006 .013 TK4H-33RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23RW TK6H-23RW 24RW .0220 .005 .012								
18RW .0500 .009 .033 TK4H-18RW TK6H-18RW 18TW .0500 .004 .042 TK4H-18TW TK6H-18RW 19RW .0425 .008 .028 TK4H-18TW TK6H-19RW 19TW .0425 .005 .033 TK4H-19TW TK6H-19RW 19TW .0425 .005 .033 TK4H-20RW TK6H-19RW 20RW .0355 .006 .024 TK4H-20RW TK6H-20RW 20TW .0355 .006 .026 TK4H-21RW TK6H-21RW 21RW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .006 .016 TK4H-22RW TK6H-22RW 22TW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .006 .013 TK4H-24RW TK6H-24RW 24RW .0220 .005 .012								
18TW .0500 .004 .042 TK4H-18TW TK6H-18TW 19RW .0425 .008 .028 TK4H-19RW TK6H-19TW 19TW .0425 .005 .033 TK4H-19RW TK6H-19TW 20RW .0355 .006 .024 TK4H-20RW TK6H-19TW 20TW .0355 .006 .024 TK4H-20RW TK6H-20RW 21RW .0320 .006 .020 TK4H-21TW TK6H-21RW 21TW .0320 .005 .023 TK4H-21TW TK6H-21RW 21TW .0320 .006 .016 TK4H-22RW TK6H-22TW 22TW .0280 .006 .016 TK4H-23RW TK6H-22TW 23TW .0250 .004 .020 TK4H-23TW TK6H-23TW 24RW .0220 .005 .012 TK4H-24TW TK6H-24TW 24RW .0220 .004 .017 TK4H-23TW TK6H-24RW 24RW .0220 .004 .014								
19RW .0425 .008 .028 TK4H-19RW TK6H-19RW 19TW .0425 .005 .033 TK4H-19TW TK6H-19RW 20RW .0355 .006 .024 TK4H-20RW TK6H-20RW 20TW .0355 .005 .026 TK4H-20RW TK6H-20RW 21TW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .006 .023 TK4H-21RW TK6H-21TW 22TW .0280 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .006 .016 TK4H-22RW TK6H-23RW 23TW .0250 .006 .013 TK4H-132RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23RW TK6H-24RW 24TW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .005 .010 TK4H-24RW TK6H-24TW 25TW .0200 .005 .010								
19TW .0425 .005 .033 TK4H-19TW TK6H-19TW 20RW .0355 .006 .024 TK4H-20RW TK6H-20TW 20TW .0355 .005 .026 TK4H-20RW TK6H-20TW 21RW .0320 .006 .020 TK4H-21RW TK6H-21RW 21RW .0320 .005 .023 TK4H-21TW TK6H-21RW 21RW .0320 .006 .016 TK4H-21TW TK6H-22RW 22RW .0280 .006 .016 TK4H-22RW TK6H-22TW 22TW .0280 .006 .013 TK4H-23RW TK6H-22TW 23TW .0250 .006 .013 TK4H-23TW TK6H-23RW 24RW .0220 .005 .012 TK4H-24RW TK6H-24RW 24RW .0220 .005 .011 TK4H-24RW TK6H-24RW 24RW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .010								
20RW .0355 .006 .024 TK4H-20RW TK6H-20RW 20TW .0355 .005 .026 TK4H-20TW TK6H-21RW 21RW .0320 .006 .020 TK4H-21TW TK6H-21RW 21TW .0320 .005 .023 TK4H-21TW TK6H-21RW 21TW .0320 .006 .016 TK4H-22TW TK6H-22RW 22TW .0280 .006 .016 TK4H-22RW TK6H-22TW 22TW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23TW TK6H-24RW 24RW .0220 .005 .012 TK4H-24TW TK6H-24RW 24RW .0220 .005 .012 TK4H-24TW TK6H-24RW 24TW .0220 .005 .011 TK4H-25RW TK6H-25RW 25TW .0200 .005 .010 TK4H-25RW TK6H-26RW 25TW .0200 .004 .010								
20TW .0355 .005 .026 TK4H-20TW TK6H-20TW 21RW .0320 .006 .020 TK4H-21RW TK6H-21TW 21TW .0320 .005 .023 TK4H-21RW TK6H-21TW 22TW .0280 .006 .016 TK4H-22RW TK6H-22TW 22TW .0280 .006 .016 TK4H-22TW TK6H-22RW 23TW .0250 .006 .013 TK4H-23TW TK6H-23RW 23TW .0250 .004 .017 TK4H-23TW TK6H-24RW 24TW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .005 .011 TK4H-23TW TK6H-24TW 25TW .0200 .005 .010 TK4H-25RW TK6H-24TW 25TW .0200 .005 .010 TK4H-25RW TK6H-26RW 25TW .0200 .004 .012 TK4H-27RW TK6H-26RW 26RW .0180 .004 .010								
21RW .0320 .006 .020 TK4H-21RW TK6H-21RW 21TW .0320 .005 .023 TK4H-21TW TK6H-21RW 22RW .0280 .006 .016 TK4H-21TW TK6H-22RW 22RW .0280 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .004 .020 TK4H-22RW TK6H-22RW 23TW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23W TK6H-24RW 24RW .0220 .005 .012 TK4H-24RW TK6H-24RW 24RW .0220 .005 .011 TK4H-25RW TK6H-24RW 24RW .0200 .004 .014 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-25TW 26RW .0180 .004 .010 TK4H-26RW TK6H-27RW 27RW .0160 .004 .008								
21TW .0320 .005 .023 TK4H-21TW TK6H-21TW 22RW .0280 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .004 .020 TK4H-22TW TK6H-22TW 23RW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23TW TK6H-24RW 24RW .0220 .005 .012 TK4H-24TW TK6H-24RW 24RW .0220 .005 .012 TK4H-24TW TK6H-24RW 24TW .0220 .005 .011 TK4H-25RW TK6H-26RW 24FW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-26RW 25FW .0160 .004 .010 TK4H-27RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007								
22RW .0280 .006 .016 TK4H-22RW TK6H-22RW 22TW .0280 .004 .020 TK4H-22TW TK6H-22RW 23RW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .006 .017 TK4H-23RW TK6H-23RW 24TW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .004 .014 TK4H-24RW TK6H-24TW 24TW .0220 .005 .010 TK4H-25RW TK6H-24TW 25FW .0200 .005 .010 TK4H-25RW TK6H-26RW 25TW .0200 .004 .012 TK4H-25RW TK6H-26RW 26RW .0180 .004 .010 TK4H-27RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007								
22TW .0280 .004 .020 TK4H-22TW TK6H-22TW 23RW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23RW TK6H-23RW 24RW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .005 .012 TK4H-24TW TK6H-24RW 24TW .0200 .004 .014 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-25TW 26RW .0180 .004 .010 TK4H-25RW TK6H-25TW 26RW .0180 .004 .010 TK4H-27RW TK6H-27RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-28RW								
23RW .0250 .006 .013 TK4H-23RW TK6H-23RW 23TW .0250 .004 .017 TK4H-23TW TK6H-23TW 24RW .0220 .005 .012 TK4H-24TW TK6H-24RW 24TW .0220 .005 .014 TK4H-24TW TK6H-24RW 24TW .0220 .004 .014 TK4H-24TW TK6H-24RW 25TW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-25TW 26RW .0160 .004 .010 TK4H-27RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-28RW								
23TW .0250 .004 .017 TK4H-23TW TK6H-23TW 24RW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .004 .014 TK4H-24RW TK6H-24RW 24TW .0220 .004 .014 TK4H-24RW TK6H-25RW 25FW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25TW TK6H-25RW 26RW .0180 .004 .010 TK4H-26RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-28RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
24RW .0220 .005 .012 TK4H-24RW TK6H-24RW 24TW .0220 .004 .014 TK4H-24TW TK6H-24TW 25RW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-25TW 26RW .0180 .004 .010 TK4H-26RW TK6H-25TW 26RW .0160 .004 .000 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-28RW								
24TW .0220 .004 .014 TK4H-24TW TK6H-24TW 25RW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25RW TK6H-25TW 26RW .0180 .004 .010 TK4H-26RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-28RW								
25RW .0200 .005 .010 TK4H-25RW TK6H-25RW 25TW .0200 .004 .012 TK4H-25TW TK6H-25TW 26RW .0180 .004 .010 TK4H-26RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-28RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
25TW .0200 .004 .012 TK4H-25TW TK6H-25TW 26RW .0180 .004 .010 TK4H-26RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-28RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
26RW .0180 .004 .010 TK4H-26RW TK6H-26RW 27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
27RW .0160 .004 .008 TK4H-27RW TK6H-27RW 28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
28RW .0140 .003 .007 TK4H-28RW TK6H-28RW 29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
29RW .0130 .003 .007 TK4H-29RW TK6H-29RW								
30KW .0120 .003 .000 TR4H-30KW TR0H-30KW	30RW	.0120	.003	.006	TK4H-30RW	\	TK6H-30RW	¥

Convenient TubeKIT

Sizes Shipped

Within 24 Hours

Seamless Pipe

Description: A special range of tubing sizes designated by dimension and wall thickness. Generally available in any drawable metal or alloy, with method of manufacture (seamless or welded) dictated by material, to OD/Wall ratio and wall thickness.

Application: Pipe is a tubular product intended primarily for such purposes as the conveying of water, fuel, gas, air, steam, etc. It has also been found to be a convenient form for use as structural members such as columns and railings.

\$ ea Meter	T316 Item #	\$/ea	T304 Item #	Schedule #	Pipe Size
Call or	TK6PS-125x10	21.00	TK4PS-125x10	10	1/8
access	TK6PS-125x40	18.19	TK4PS-125x40	40	1/8
web	TK6PS-250x10	28.51	TK4PS-250x10	10	1/4
- for	TK6PS-250x40	23.15	TK4PS-250x40	40	1/4
	TK6PS-375x10	34.89	TK4PS-375x10	10	3/8
pricing	TK6PS-375x40	29.98	TK4PS-375x40	40	3/8
	TK6PS-500x5	40.92	TK4PS-500x5	5	1/2
	TK6PS-500x10	47.26	TK4PS-500x10	10	1/2
	TK6PS-500x40	36.46	TK4PS-500x40	40	1/2
	TK6PS-750x5	49.64	TK4PS-750x5	5	3/4
	TK6PS-750x10	59.44	TK4PS-750x10	10	3/4
	TK6PS-750x40	43.73	TK4PS-750x40	40	3/4
	TK6PS-1000x5	72.28	TK4PS-1000x5	5	1
	TK6PS-1000x10	82.41	TK4PS-1000x10	10	1
V	TK6PS-1000x40	53.42	TK4PS-1000x40	40	1

Convenient TubeKIT Sizes Shipped Within 24 Hours

Medical Grade Tubing

Description: A medical-quality ("MQ"), T316L certified, stainless steel tubing manufactured in IDs from .020" to .500" with +/-.001" OD tolerances, or .500" to 1.000" ID with +/- .0015" ID tolerances. Available in thin wall fractional OD (Category-F).

Application: Ideal for any application requiring the highest quality tubing. Extremely close ID tolerances meet Class-9 applications. Tubing is welded and drawn to approximately 1/8-1/4 hard temper.

\$ ea	T316	ID	Wall	OD
Meter	Item #	Nom	Nom	Theo
Call or	TK6MQ-125x006	.113	.006	1/8"
access	TK6MQ-125x010	.105	.010	1/8"
web	TK6MQ-156x006	.144	.006	5/32"
for	TK6MQ-156x010	.136	.010	5/32"
	TK6MQ-188x006	.176	.006	3/16"
pricing	TK6MQ-188-010	.168	.010	3/16"
1	TK6MQ-250x006	.238	.006	1/4"
	TK6MQ-250x010	.230	.010	1/4"
	TK6MQ-375x006	.363	.006	3/8"
	TK6MQ-375x010	.355	.010	3/8"
	TK6MQ-500x006	.488	.006	1/2"
¥	TK6MQ-500x010	.480	.010	1/2"



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MicroGroup's selection of ODD-LOT surplus tubing is bigger and better than ever. Great for prototyping requirements, customs without the long lead times, short runs and much more, ODD-LOT is the best value for many of your tubing purchases. What's more, this wide assortment of surplus is now available online, updated daily in a easy-to-order and secure environment.

ODD-LOT's wide variety of choices many at bargain prices include:

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- Hypo, metric, fractional and pipe
- Types 304, 310, 316, 321, Ni200, 400, 600, C276 and more

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- Unique sizes
- Bargain prices

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- Prototyping needs
- Customs in-stock
- Short runs
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Selection, pricing and the service MicroGroup is known for. That's what you get when you purchase ODD-LOT Surplus Tubing. For availability and pricing information, log on to www.stainlesssteeltubing.com or call 1-800-255-8823. 100% Prime Material

Most orders shipped

within 5 DAYS!

Custom Small Diameter Tubing

Round • Shaped • Composite

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- MINI-REDRAW MILL
- STRAIGHTENING
- HYDROGEN ANNEALING
- DRAW DIES MANUFACTURED IN-HOUSE
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- **100% BURR-FREE CUTTING**

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Drawing & Centerless Grinding

Drawing is the process used to size tubing by reducing a larger tube to a smaller one while maintaining or reducing the wall thickness based on the specifications required.

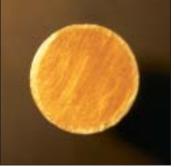
This is accomplished by using a draw bench and dies. Pulling the material through a die and over a mandrel at the same time controls both the Outside Diameter (OD) and usually the Wall thickness, or the Inside Diamter (ID).

MicroGroup can draw most metals, although we specialize in Stainless Steel and Nickel Based Alloys.

Centerless Grinding reduces the Outside Diameter (OD) of the tubing length and cylindrical parts. Tight tolerances can be maintained. Selecting standard Inside Diameter (ID) sizes and grinding to the desired OD size can often be a cost effective approach to producing a custom sized tube. This eliminates the sometimes costly set-up charges of redrawing. See table below for other alloys.







Round

Custom Round tubing can generally be produced by MicroGroup in most metals. Customs are achievable with tolerances to meet your needs, from standard to tight.

Delivery of customs are set-up to meet your needs. Prompt deliveries are our goal, however, they depend on volume and availability of raw material.

Shape

Shaped tubing can be produced by different methods. Most materials that can be drawn or rolled are capable of being formed into various shapes. Examples are; squares, rectangles, ovals, keyholes, triangles and teardrops.

> ISO 9002 Registered

Composite

Composite refers to any tubing that is drawn (layered) over another tube (tubes) or solid. No standards apply please call for details. Typically used to produce extremely high pressure (heavy walls) or add a layer of corrosion resistance to a less resistant tube, most applications are extremely specialized. Delivery of composites are dependent on process required to manufacture.

> We Also Work with Aluminum, Brass and Copper

Prototypes (Production Othe	r Materials	
Stainless Steels303Se303Se Stainless Steel304304 Stainless Steel304304 Stainless Steel305305 Stainless Steel309S309S Stainless Steel310S310S Stainless Steel316316 Stainless Steel316316 Stainless Steel317317 Stainless Steel317317 Stainless Steel317317 Stainless Steel347347 Stainless Steel347348 Stainless Steel348348 Stainless Steel408408 Stainless Steel408408 Stainless Steel410410 Stainless Steel430430 Tiainless Steel430430 Tiainless Steel446446 Stainless Steel466446 Stainless Steel476446	177 17-7 PH Stainless Steel 2169 21Cr-6Ni-9Mn Stainless Steel A286 A-286 Stainless Steel 261 Alloy 26-1 Stainless Steel N55 N-55 Stainless Steel C20 Carpenter-20® (4) Carbon and Alloy Steels 1010 1010 Steel 1012 1012 Steel 1015 1015 Steel 1016 1012 Steel 1017 1020 Steel 1020 1020 Steel 1021 1021 Leaded Steel Nickel and Nickel Alloys 188 Alloy 188 200 Nickel 201 (Low Carbon Nickel 201 Nickel 211 ("D" Nickel) 207 Nickel 270 301 Duranickel Alloy 301® (1) materials availability.	500 Monel Alloý K-500 ("K" Monel)® (1) 600 inconel Alloy 600® (1) 601 inconel Alloy 601® (1) 617 inconel Alloy 601® (1) 618 inconel Alloy 601® (1) 619 inconel Alloy 601® (1) 617 inconel Alloy 601® (1) 618 inconel Alloy 702® (1) 702 inconel Alloy 702® (1) 718 inconel Alloy 800® (1) 800 inconel Alloy 800® (1) 825 inconel Alloy 825 (incoloy)® (1) 902 NI-SPAN ALLOY 902 (Ni-Span C)® 8020 Alloy 8-20 C276 Alloy C-276 CN30 30% Cupronickel HX Alloy HX® L605 Alloy L605	HASC HASTELLOY alloy C° (2) X750 Inconel Alloy X-750° (1) Nickel-Iron Alloys NI36 36% Nickel-Iron Alloy NI42 42% Nickel-Iron Alloy NI52 52% Nickel-Iron Alloy N4 #4 Alloy 2917 Alloy 29-17 (Kovar) Other Materials and Alloys A-40 Unalloyed Titanium A-44 32.5 Titanium Alloy 3AI-2.5V 6-4V Titanium Alloy 3AI-2.5V 6-4V Titanium Alloy 6AI-4V Mo Molybdenum 15-3 Titanium Alloy 15-3

For electropolishing and other finishing services, please refer to the web.



Most orders shipped within **48** HOURS!

100% Burr-Free Cutting

Tubing • Solids

- ELECTROCHEMICAL
- COLD SAWING
- **ABRASIVE CUTTING**
- PASSIVATION
- ELECTROPOLISHING

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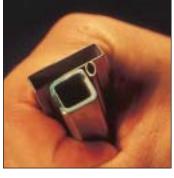


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100% Burr-Free Cuts: Tubing & Solids

MicroGroup can supply 100% burr free cuts on diameters from .004". This is the superior method for cutting small diameter thin walled tubes and shapes where edge quality is critical. Various edge conditions can be achieved from sharp to well radiused. Many catheters are cut in this manner. This process also does not change the physical characteristics of the material.

* See cutting tolerance options chart below.

Deburring

Deburring can be accomplished from state of the art Electrochemical methods to more traditional vibratory and wire wheel, depending on the specifications. Selecting a cost effective method is based on the number of parts, size, shape and length. Electrochemical is very well suited for controlling edge breaking.



Abrasive Cutting

Abrasive Cutting can be performed on most metals. Tubing, solids and shapes can be cut using this method. Both Dry and Wet cutting is done with wet cutting minimizing burrs. Sizes range from .008" diameter and up. Fairly tight tolerances can be maintained with this process, which is dependent on diameter and lengths.



144.01" (12') to 288.0" (24')

Cold Sawing

Cold sawing is primarily used for precise length cuts in heavier walled tubes and solids. Diameters range from .062" and up. Most metals can be cold sawed, and deburred at MicroGroup.

<u>+</u>.100

* 48 hour delivery is contingent upon materials availability.

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www.microgroup.com

100% Burr-Free Cutting Tolerance Options							
For cutting lengths:	Standard Tolerance "C1"	Optional Tolerance "C2"					
up to 1.0"	<u>+</u> .010	<u>+</u> .005					
1.01" to 6.0"	<u>+</u> .015	<u>+</u> .010					
6.01" to 12.0" (1')	<u>+</u> .030	<u>+</u> .015					
12.01" (1') to 72.0" (6')	<u>+</u> .060	<u>+</u> .030					
72.01" (6') to 144.0" (12')	<u>+</u> .100	<u>+</u> .060					

<u>+</u>.250



MicroGroup provides complete final assembly services for your tubing and miniature component requirements. From start to finish, MicroGroup is the only source you'll ever need. **FDA Registration #1226212**

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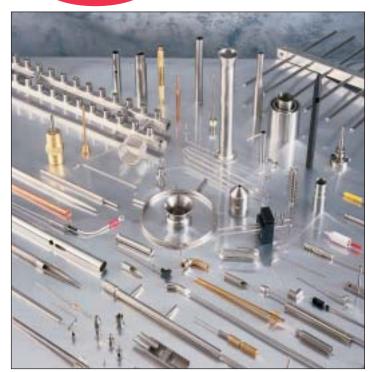
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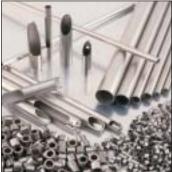
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Tube Forming







100% Burr-Free Holes & Slots

100% Burr-Free holes and slots can be achieved by the electrochemical processes referred to as ECG. ECG is well suited for slotting, applying angles, radiusing the walls on the end of tubes and finishing the ends of shaped tubes which are normally very difficult to deburr by conventional means.

Bending

MicroGroup employs compression, rotary and mandrel bending techniques to provide quality bent components in prototype to production quantities. Stock bent tubes and fittings are also available.



Flaring

MicroGroup performs flaring on stainless steel and other metals, in angles from 1 degree to 180 degrees (depending on thickness of the tube), and wall thicknesses from .003". Its many applications include stops, as a lead in or guide to aid insertion. Flaring is highly repeatable with proper preparation, cost effective and well-suited for volume applications.



Swaging

Rotary Swaging is generally used to reduce the diameter of tubing and solids or to forge a tube over another tube or solid. Diameters from .020" to 1.0" in tubing and solids can be rotary swaged, overall lengths can vary from 1/4" to 20 feet or more, with a maximum tapered length of 3" in a single pass. The ideal swage angle is 15 degrees included, but angles to 90 degrees included are possible. Most metals can be rotary swaged.



Upsetting/Bulging/Bending

Cost effective hose barbs and stops for orientation or registration can be created by bulging or upsetting the tube wall, as pictured. Wall thickness and temper will affect the size and ease of the bulge. Process is best suited for precision applications in high volumes.

Closures

Tube ends can be closed to customer specifications, with radius, flat and bullet nose tip options available. Wall thickness can be maintained throughout the end if desired. Dimensional and tolerance requirements on these features determine the manufacturing process. MicroGroup's closures are used for a variety of products from sensor housings to inner and outer matched arthroscopic surgery cutters. Different end configurations are available.



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Computer Automated Micro-Machining

Specialists in Stainless Steel and Titanium











ECG • Electrochemical Grinding

Burr-free, tight tolerance slots, angled bevels and cut lengths are produced by MicroGroup's electrochemical grinders. Most metals can be electrochemically cut and ground in diameters from .004" to 1-1/2", in tubing and solids. Tolerances of +/- .0001" or better can be maintained using electrochemical processes. ECG can be applied to almost any part that can be fixtured on a conventional surface grinder, with results considerably beyond those provided by conventional methods.

Punching

Shaped dies are used to pierce tubing or flat stock to create a hole of a specific size or shape, or a component from flat stock. Punching can be performed on various metals (from stainless steel to brass), is cost effective and suitable for medium and high volume applications. Thickness of material to be punched affects size and tolerance of punch. Circles are most common, however, since we make dies in-house other shapes are available. MicroGroup is ready to consult and execute your requirements that will benefit from punching services.



Twin Spindle CNC Machining

Almost every metal can be efficiently cut and machined using our state-of-the-art twin spindle CNC micro-machining centers. These twin spindle machines are extremely competitive – eliminating all secondary operations and handling resulting in repetitive orientation of holes, slots, etc. All machining operations are accomplished within the machine for outstanding accuracy and control – turning, milling, drilling, deburring, etc.

EDM • Electrochemical Discharge Machining

MicroGroup has CNC RAM and five axis wire capability in house. We fabricate our own electrodes which are used to create precision holes, slots, angles and skives – used primarily for precision, holding tolerances to .0001 MicroGroup can handle prototype to production quantities, is able to convert dxf files to EDM programs and can cut any conductive material as well as odd shapes like snap lock.

Laser Machining

YAG laser with varying beam widths is used for a variety of applications, including slotting, cutting and creating holes. Conventional and fiber optic beam delivery are suited for unique machining applications. Its proper fixturing allows for tight tolerances to be held. Laser machining is highly repeatable, fast and efficient. Plus, MicroGroup can handle prototype to production volumes.

Prototyping/Tooling

Our engineering group designs tooling for small prototype through large production runs. We are capable of working on your projects from the design phase through production. In-house prototyping services save time and money, as well as guarantee quality and consistency from concept to completion.



MicroGroup provides complete final assembly services for your tubing and miniature component requirements. From start to finish, MicroGroup is the only source you'll ever need.

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Micro-Welding/Brazing

Short Lead Times Tough Jobs









Induction Brazing

Induction is ideally suited as a closely controlled heat source for brazing. A wide variety of materials can be brazed, including some combinations that are unweldable. Brazing can be more economical than welding smaller parts and is often preferred for joining thin sections to thick sections because reduced heat minimizes distortion. Brazing is used extensively for joining many dissimilar material combinations. Inaccessible joint areas that could not be made by gas metal arc, gas tungsten arc, and spot or seam welding can be joined by brazing.

Fixturing

Customized to meet stringent requirements, MicroGroup performs fixturing services in-house for prototype and production quantities. We handle fixturing of both single and multiple parts. And since MicroGroup has welding experience, we understand what requirements the fixturing must meet. We also know the idiosyncrasies of tubing, enabling us to always create the proper fixtures.





Laser Micro-Welding

Laser welding offers several advantages which include: minimal heat effect in the weld zone, welding of walls as thin as .002" and process repeatability in prototype through production quantities because of CNC control. Most metals can be laser beam welded. It's also ideal for welding small, thin-walled objects such as hypodermic tubing, pacemaker cases, diaphragms and bellows.

TIG Micro-Welding

MicroGroup uses TIG welding techniques suited for precision components and assemblies. MicroGroup designs fixturing in-house for each application which results in superior tolerencing and joint finishes. Walls as thin as .002" can be welded, but TIG is better suited for thicker walls. MicroGroup has also developed expertise in TIG fusion welding, which eliminates the use of unwanted filler materials.

Micro-Torch Brazing

A wide variety of materials can be brazed, including some combinations that are unweldable. Brazing can be more economical than welding smaller parts and is often preferred for joining thin sections to thick ones since reduced heat minimizes distortion. MicroGroup uses state-of-the-art equipment to join components, where other welding techniques are not applicable, such as dissimilar materials and complex joint configurations.

MIG Welding

Used typically in thicknesses .020" and up for tubing, sheet and solids, this process uses filler metals for joining materials. Exacting assembly tolerances of +/-.001 can be maintained if specified and with proper fixturing. Most metals can be precision MIG welded. It's also perfect for producing welds that require a fillet or for building thickness. MIG is applicable for prototype to high quantity production applications.



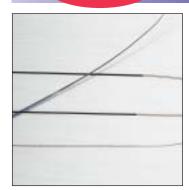
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Finishing/Post Processing

Short Lead Times Tough Jobs



Catheter Cleaning

Microgroup's custom cleaning equipment is designed to perform production volume cleaning on an individual tube basis. ID and OD cleanliness problems associated with batch cleaning processes are eliminated by employing automated systems to clean, rinse, flush solvents, passivate and purge.



Tough Jobs

Electropolishing

Electropolishing is a controlled chemical process that removes a slight amount of the component or tube's surface. It helps create a clean and bright surface, enhances corrosion resistance and removes feather burrs.

Vibratory Polishing

with media and detergent removes burrs,

breaks edges, cleans and creates a nice

and other media are used, as well as dif-

surface finish. Metal, ceramic, plastic

ferent detergents. MicroGroup is also

able to meet custom requests.

Vibrating parts in a special container



Vacuum Oven

The use of high vacuum ovens enhance cleaning and stress relieving. When employed during the cleaning process drying is ensured and cleanliness is improved by the outgassing of trace elements of contaminants. Additionally, pyrogens are removed and corrosion resistance is improved. High vacuum furnaces also provide contaminant and discoloration free stress relieving.







In pyrolization, a nitrogen purged container is loaded with components and heated in an oven. The resulting pyrogen free parts are immediately packaged.



Ultrasonic with Filtration

Ultrasonic cleaning is a primary method of removing contaminants and debris from tubing that has been processed. High frequency soundwaves combine with liquid media to remove dirt, grease, oil and residual contaminants. The process is quick and involves a limited handling of parts.

MicroGroup has custom ultrasonic tanks capable of cleaning small parts of tubing up to 6 feet in length, in both single pieces and batches.



Microblasting

In microblasting, the surface of a component is roughened through blasting with abrasive media (including glass beads, Aluminum Oxide, Silicone carbide and Sodium carbonate) and air. The roughened surface allows for better adhesion of plastics to metal during injection molding. Microblasting creates a non-reflective surface and can be used to deburr and clean.

Passivation

Passivation is a chemical process used to increase the corrosion inhibiting properties of stainless steel and clean discoloration from welding and cutting. MicroGroup performs passivation to customer requirements, as well as QQP35 Type VI, Type II and A967-96.



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Assembly Services

With over 25 years of stainless steel tubing experience and support manufacturing services, MicroGroup welcomes the opportunity to produce your final product or subassembly components. Whether you acquire your raw materials from our inventory of over 5 million feet of tubing or supply your own, MicroGroup is prepared to be your one-stop source – from materials to complete product manufacturing.

The following outlines the process we've designed to both help your work teams and manage all of the details. It's a process that guarantees your quality and delivery requirements are always exceeded.





Project Review

When you work with MicroGroup, our initial step is conducting a thorough project review. This allows us to go over all of the project's specifications, ensuring that we fully understand your objectives. We'll then discuss your quality requirements, determine if prints or additional drawings are necessary and create a production schedule with milestones.



Drafting Services

MicroGroup capabilities include creating internal drawings for fixtures, as well as component and assembly drawings, if required (with AutoCAD used most often). We can e-mail drawings to you and if a complete drawing package is needed, MicroGroup can provide this service as well.



Project Engineers

The MicroGroup advantage includes an exceptional staff of the industry's finest engineers. This hard working group of highly-trained professionals will work with you from design concept through manufacturing and assembly. Our dedicated project engineers closely monitor all details – and work with you every step of the way.



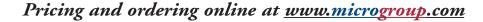
Quality Control

MicroGroup's quality system has earned us ISO 9002 certification. What's more, although ISO registered, MicroGroup offers continuous employee training programs, assuring that the highest level of quality systems and products are produced.

From raw materials to manufacturing and assembly, MicroGroup is your vendor partner offering all of the services you need in one place. This means that every one of your stainless steel tubing and related manufacturing requirements can be taken care of by one supplier.

From concept through completion, you'll get the kind of control over production, delivery and product consistency you're looking for. And we're not only are focused on taking care of all of the details of every project, we're also able to respond to your custom design requests and tight deadlines. Our skills are focused on creating the highest caliber products, as quickly as possible.

MicroGroup: integrated services for guaranteed results.



Stainless Steel Tube & Hose Fittings

Economical!

- 1/32" TO 1" DIAMETERS
- T316 STAINLESS STEEL
- LIGHTWEIGHT
- STOCK AND CUSTOM
- EASY TO USE
- WELD/SOLDER/EPOXY/BRAZE

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About Tube Fittings

Offering a Unique Concept...

These Stainless Steel tube fittings are fabricated from thin wall tubing in actual tube OD sizes. Braze/HozeTyte® was created to satisfy the need for a standard line of versatile fittings compatible with thin wall stainless steel tubing and suitable for reliable permanent type assemblies.

Material

Over the years, the use of the "Modern Metal" (stainless steel) has increased steadily. Its corrosion resistant qualities and high strength characteristics have inspired design engineers to specify stainless. Now with Braze/HozeTyte[®], quality is available at a reasonable cost.

Application

Braze/HozeTyte[®] fittings lend themselves ideally to industrial applications in the beverage, chemical, food, marine, medical, photography, refrigeration industries and many other areas.

How to Specify BrazeTyte® Tube Fittings

Nomenclature:

BrazeTyte[®] fitting part numbers are constructed from symbols that identify the size and style of the fitting.

The dash numbers indicate tube OD size by 1/16 inches, thus -4 means 4/16" or 1/4", -10 means 10/16" or 5/8", etc. The first series of numbers identifies the style or configuration of the fitting. The letters designate combinations of male, female and swivel ends of the part (see below).

	Letter Designation	Exa	Example: 15MF-8		
FF	All Female	15	MF	-8	
MM MF SF SM	All Male Male and Female Swivel and Female Swivel and Male	style TEE male run	male and female	tube OD size 1/2"	

How to Specify HozeTyte® Tube Fittings

Nomenclature:

HozeTyte[®] fitting part numbers are constructed from symbols that identify the size and style of the fitting.

The first dash number indicates hose ID size by 1/16 inches, thus -4 means 4/16" or 1/4", -10 means 10/16" or 5/8", etc. The first series of numbers identifies the style or configuration of the fitting. The letters designate combinations of male, hose and pipe ends of the part.

Pipe ends are designated by the dash number. These are not outside diameters, but rather standard NPTF screw thread sizes.

L	etter Designation	Ex	ample: 901	VH-8
HH	All Hose	90	MH	-8
MH PH	Male and Hose Pipe and Hose	style 90° elbow	male and hose	Hose ID size 1/2"

Advantages

This new line of fittings, as its name implies, is fabricated from thin wall type 316L stainless steel tubing to provide maximum corrosion resistance with minimum bulk and weight. All elbows incorporate smooth radius bends for maximum flow and minimum turbulence.

Because Braze/HozeTyte[®] fittings utilize thin wall tubing, they are light in weight and provide larger tube inside dimensions for increased capacity and flow. These fittings afford a substitute for the present heavy machined fittings produced from bulky expensive forgings. Braze/HozeTyte's construction facilitates the use of thin wall tubing throughout the complete system.

Installation costs are reduced, because Braze/HozeTyte fittings are easy to use. Special tools are not required and quick connections may be made utilizing standard processing.

Methods for Installing BrazeTyte® Fittings

The most effective means for making a stainless connection is by either soldering, brazing or welding. Such joints are strong, leak-tight, corrosion resistant, economical and have a good appearance. BrazeTyte tube fittings are designed to provide for these assembly methods.

Soldering and Brazing

Soldered or brazed joints resist most corrosive media. The very nature of the process leaves only a small seam exposed to atmosphere. It is important to choose the proper solder or brazing alloy and this is usually determined by the application and environment of the assembly being fabricated. Certain alloys are formulated with precious metals which give them corrosive resistance equal to stainless steel itself.

Soldered or brazed stainless steel connections are extremely strong in both tensile and shear strength. This high strength characteristic is based on the ability of molten brazing alloy to penetrate and fill the gap between bonding areas through "capillary action."

Welding

The other means of making a permanent joint with BrazeTyte fittings is by welding. Depending upon the configuration chosen, connections may be made by either of two basic methods, Butt or Lap welding. The technique chosen will be governed by the actual tubing application, the welding equipment available and the skill of the welding operator.

Bonding with Epoxy

BrazeTyte fittings can also be assembled using epoxy adhesives. Epoxy provides a permanent joint for low pressure assemblies and is an easy, inexpensive method to accomplish a connection. A joint may be made quickly, using unskilled labor and simple techniques.

There are many types of commercial and industrial epoxy adhesives on the market. These usually are offered as two component kits, one part being the catalyst which activates the curing of the material. Curing methods of these epoxy adhesives vary. Some cure at room temperatures and in other cases curing is accelerated by the application of heat.

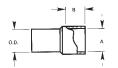
Properly prepared and fully cured bonds are possible that will yield tensile shear strengths of up to 3,500 psi when tested at room temperature.

Epoxy adhesive is not recommended for systems where temperatures exceed 200° or for use with certain chemicals that might tend to attack the epoxy joint. The manufacturer usually supplies this type of information in the form of chemical corrosion resistance table.

MicroGroup provides complete final assembly services for your tubing and miniature component requirements. From start to finish, MicroGroup is the only source you'll ever need. **FDA Registration #1226212**

PRICING · BIDDING · DELIVERY

Brazetyte®Fittings



<u> </u>			
Cup	IIIm	en	sinn
Jup			

The chart below is a reference guide to be used for your convenience listing the dimensions of each item number by size.

	B(Cup Depth)	Α	Wall	0.D.	Item #
Call o	1/4	.254	.025	1/4	-4
acces	1/4	.316	.025	5/16	-5
	1/4	.379	.028	3/8	-6
web	5/16	.504	.032	1/2	-8
for	7/16	.629	.035	5/8	-10
pricin	1/2	.754	.042	3/4	-12
1	3/4	1.005	.049	1	-16
	13/16	1.255	.049	1-1/4	-20
¥	15/16	1.505	.049	1-1/2	-24

Tol: A = ± .005 B = ± .032

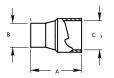


Cap

Female Closed

Used to terminate a line or fitting. Fits over male end of BrazeTyte fitting or over the O.D. of tubing.

Item #	Sizes	Wall	Α	\$ ea
10F-4	1/4	.032	1/4	Call or
10F-5	5/16	.032	1/4	access
10F-6	3/8	.032	1/4	web
10F-8	1/2	.032	5/16	for
10F-10	5/8	.032	7/16	
10F-12	3/4	.049	1/2	pricing
10F-16	1	.049	3/4	
10F-20	1-1/4	.049	13/16	
10F-24	1-1/2	.049	15/16	*



Expander

Male OD <> Female ID

Used as an adapter where an expansion from a smaller OD to a larger OD is required. Can be employed in conjunction with the 10FF union to join different OD sizes of tubing. May also be utilized with any MF, FF or SF style fitting.

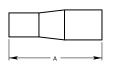
em #	Sizes	Wall	Α	В	С	\$ ea
0MF-4-5	1/4 x 5/16	.025	15/16	1/4	.316	Call or
0MF-4-6	1/4 x 3/8	.025	7/8	1/4	.379	access
0MF-5-6	5/16 x 3/8	.025	1-1/32	5/16	.379	web
0MF-6-8	3/8 x 1/2	.032	1-9/32	3/8	.504	
0MF-8-10	1/2 x 5/8	.035	1-3/8	1/2	.629	for
0MF-8-12	1/2 x 3/4	.035	1-3/8	1/2	.754	pricing
0MF-10-12	5/8 x 3/4	.035	1-3/8	5/8	.754	1
0MF-12-16	3/4 x 1	.049	2-7/16	3/4	1.005	
0MF-16-20	1" x 1-1/4	.049	2-7/16	1	1.255	
0MF-16-24	1" x 1-1/2	.049	2-1/16	1	1.505	
0MF-20-24	1-1/4 x 1-1/2	.049	2-3/8	1-1/4	1.505	V



Union Female <> Female

Used as a coupling. Both ends will accept either tube OD or male end of BrazeTyte fitting. When connecting different OD sizes, either the 5MF reducer or the 10MF expander should be employed.

\$ ea	В	Α	Wall	Sizes	Item #
Call o	11/16	15/16	.025	1/4	10FF-4
	3/4	1	.025	5/16	10FF-5
acces	3/4	1	.028	3/8	10FF-6
web	27/32	1-5/32	.032	1/2	10FF-8
for	29/32	1-11/32	.035	5/8	10FF-10
pricin	1-1/16	1-9/16	.042	3/4	10FF-12
,	1-1/2	2-1/4	.049	1	10FF-16
		2-1/2	.049	1-1/4	10FF-20
¥		2-11/16	.049	1-1/2	10FF-24

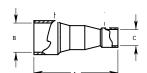


Male <> Male Used as a reducer or expander to accomplish a change in O.D. size. Can be employed in conjunction with any MF, FF or SF style fitting to obtain a reduced or expanded male end. Also

can be used as a butt weld connector when a

Transition

\$ ea	Α	Wall	Sizes	ltem #
Call or	31/32	.025	1/4 x 5/16	5MM-4-5
access	15/16	.025	1/4 x 3/8	5MM-4-6
web	1-1/165	.025	5/16 x 3/8	5MM-5-6
	1-5/16	.032	3/8 x 1/2	5MM-6-8
for	1-7/16	.035	1/2 x 5/8	5MM-8-10
pricing	1-7/16	.035	1/2 x 3/4	5MM-8-12
	1-7/16	.035	5/8 x 3/4	5MM-10-12
	2-1/2	.049	3/4 x 1	5MM-12-16
	2-1/2	.049	1 x 1-1/4	5MM-16-20
1	2-1/8	.049	1 x 1-1/2	5MM-16-24
V	2-7/16	.049	1-1/4 x 1-1/2	5MM-20-24

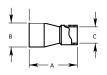


Reducing Union

Female <> Female: in tube OD sizes

Used as a coupling. Both ends will accept either tube OD or male end of BrazeTyte fitting.

\$ ea	С	В	Α	Wall	Sizes	ltem #
Call or	.254	.316	7/8	.025	5/16 x 1/4	5FF-5-4
access	.254	.379	2-7/32	.025	3/8 x 1/4	5FF-6-4
	.316	.379	1	.025	3/8 x 5/16	5FF-6-5
web	.379	.504	1-1/4	.032	1/2 x 3/8	5FF-8-6
for	.504	.629	1-5/16	.035	5/8 x 1/2	5FF-10-8
pricing	.504	.754	1-5/16	.035	3/4 x 1/2	5FF-12-8
	.629	.754	1-5/16	.035	3/4 x 5/8	5FF-12-10
	.754	1.005	2-3/8	.049	1 x 3/4	5FF-16-12
	1.005	1.255	2-3/8	.049	1-1/4 x 1	5FF-20-16
	1.005	1.505	2	.049	1-1/2 x 1	5FF-24-16
V	1.255	1.505	2-5/16	.049	1-1/2" x 1-1/4"	5FF-24-20



Reducer

Male OD <> Female ID Used as an adapter where a reduction from larger OD to a smaller OD is required. Can be employed in conjunction with any MF, FF or SF style fitting to reduce female BrazeTyte end.

\$ ea	С	В	Α	Wall	Sizes	Item #
Call or	.254	5/16	15/16	.025	5/16 x 1/4	5MF-5-4
access	.254	3/8	7/8	.025	3/8 x 1/4	5MF-6-4
web	.316	3/8	1-1/32	.025	3/8 x 5/16	5MF-6-5
for	.379	1/2	1-9/32	.032	1/2 x 3/8	5MF-8-6
	.504	5/8	1-3/8	.035	5/8 x 1/2	5MF-10-8
pricing	.504	3/4	1-3/8	.035	3/4 x 1/2	5MF-12-8
1	.629	3/4	1-3/8	.035	3/4 x 5/8	5MF-12-10
	.754	1	2-7/16	.049	1- x 3/4	5MF-16-12
	1.005	1-1/4	2-7/16	.049	1-1/4 x 1	5MF-20-16
1	1.005	1-1/2	2-1/16	.049	1-1/2 x 1	5MF-24-16
	1.225	1-1/2	2-3/8	.049	1-1/2 x 1-1//4	5MF-24-20

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Brazetyte®Fittings



45° Elbow

Male <> Male

For direct assembly into machined ports and flanges or into female BrazeTyte expansions. can be used as a Butt-Weld fitting.

\$ ea	Α	R	Wall	Sizes	Item #
Call or	19/32	3/8	.025	1/4	45MM-4
access	5/8	15/32	.025	5/16	45MM-5
	21/32	9/16	.028	3/8	45MM-6
web	25/32	3/4	.032	1/2	45MM-8
for	1	15/16	.035	5/8	45MM-10
pricing	1-7/32	1-1/8	.042	3/4	45MM-12
	1-19/32	1-1/2	.049	1	45MM-16
	1-27/32	1-7/8	.049	1-1/4	45MM-20
	2-1/16	2-1/4	.049	1-1/2	45MM-24

45° Elbow

Male <> Female

For direct assembly into machined ports or into female BrazeTyte expansions, female end will accept tube OD or male end of BrazeTyte fitting. When connecting different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

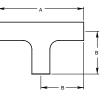
Item #	Tube O.D.	Tube Wall	Radius R	Α	в	\$ ea
45MF-4	1/4	.025	3/8	19/32	17/32	Call or
45MF-5	5/16	.025	15/32	5/8	9/16	access
45MF-6	3/8	.028	9/16	21/32	19/32	
45MF-8	1/2	.032	3/4	25/32	25/32	web
45MF-10	5/8	.035	15/16	1	1	for
45MF-12	3/4	.042	1 1/8	1 7/32	1 7/32	pricing
45MF-16	1	.049	1 1/2	1 19/32	1 19/32	
45MF-20	1 1/4	.049	1 7/8	1 27/32	1 27/32	
45MF-24	1 1/2	.049	2 1/4	2 1/16	2 1/16	¥

45° Elbow

Female <> Female

Used as a coupling. Both ends will accept either tube OD or male end of BrazeTyte fitting. When connecting different OD sizes, either the 5MF reducer or the 10MF expander should be employed.

Item #	Sizes	Wall	R	В	\$ ea
45FF-4	1/4	.025	3/8	17/32	Call or
45FF-5	5/16	.025	15/32	9/16	access
45FF-6	3/8	.028	9/16	19/32	
45FF-8	1/2	.032	3/4	25/32	web
45FF-10	5/8	.035	1-5/16	1	for
45FF-12	3/4	.042	1-1/8	1-7/32	pricing
45FF-16	1	.049	1-1/2	1-19/32	
45FF-20	1-1/4	.049	1-7/8	1-27/32	
45FF-24	1-1/2	.049	2-1/4	2-1/16	V



Male three ends

For direct assembly into machined ports and flanges or into female BrazeTyte expansions. Can be used as a Butt- Weld fitting.

Tee

\$ ea	В	Α	Wall	Sizes	Item #
Call o	19/32	1-3/16	.025	5/16	30MM-5
access	11/16	1-3/8	.028	3/8	30MM-6
web	13/16	1-5/8	.032	1/2	30MM-8
for	1	2	.035	5/8	30MM-10
pricing	1- 3/16	2-3/8	.042	3/4	30MM-12
pricing	1- 5/8	3-1/4	.049	1	30MM 16
	1- 13/16	3-5/8	.049	1-1/4	30MM 20
V	2-1/16	4-1/8	.049	1-1/2	30MM 24

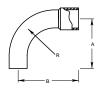


90° Elbow

Male <> Male

For direct assembly into machined ports and flanges or into female BrazeTyte expansions. Can be used as a Butt-Weld fitting.

\$ ea	Α	R	Wall	Sizes	ltem #
Call or	13/16	3/8	.025	1/4	90MM-4
access	29/32	15/32	.025	5/16	90MM-5
web	1	9/16	.028	3/8	90MM-6
for	1-1/4	3/4	.032	1/2	90MM-8
pricing	1-9/16	15/16	.035	5/8	90MM-10
pricing	1-7/8	1-1/8	.042	3/4	90MM-12
	2-15/32	1-1/2	.049	1	90MM-16
	2-15/16	1-7/8	.049	1-1/4	90MM-20
¥	3-13/32	2-1/4	.049	1-1/2	90MM-24

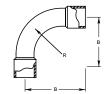


90° Elbow

Male <> Female

For direct assembly into machined ports or into female BrazeTyte expansions, female end will accept tube OD or male end of BrazeTyte fitting. When connecting different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

Item #	Sizes	Wall	R	А	в	\$ ea
90MF-4	1/4	.025	3/8	13/16	3/4	Call or
90MF-5	5/16	.025	15/32	29/32	27/32	access
90MF-6	3/8	.028	9/16	1	15/16	web
90MF-8	1/2	.032	3/4	1-1/4	1-1/4	
90MF-10	5/8	.035	15/16	1-9/16	1-9/16	for
90MF-12	3/4	.042	1-1/8	1-7/8	1-7/8	pricing
90MF-16	1	.049	1-1/2	2-15/32	2-15/32	1
90MF-20	1-1/4	.049	1-7/8	2-15/16	2-15/16	
90MF-24	1-1/2	.049	2-1/4	3-13/32	3-13/32	V

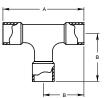


90° Elbow

Female expansions both ends

Both ends will accept either tube OD or male end of BrazeTyte fittings When connecting different OD sizes, either the 5MF reducer or the I0MF expander should be employed.

\$ ea	В	R	Wall	Sizes	Item #
Call or	3/4	3/8	.025	1/4	90FF-4
access	27/32	15/32	.025	5/16	90FF-5
	15/16	9/16	.028	3/8	90FF-6
web	1-1/4	3/4	.032	1/2	90FF-8
for	1-9/16	15/16	.035	5/8	90FF-10
pricing	1-7/8	1-1/8	.042	3/4	90FF-12
1 1	2-15/32	1-1/2	.049	1	90FF-16
	2-15/16	1-7/8	.049	1-1/4	90FF-20
¥	3-13/32	2-1/4	.049	1-1/2	90FF-24



Tee Female <> Female - Female

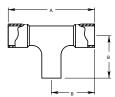
All ends accept either tube OD or male end of BrazeTyte fitting. When used to join different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

\$ ea	В	Α	Wall	Sizes	Item #
Call of	19/32	1-3/16	.025	1/4	30FF-4
acces	11/16	1-3/8	.025	5/16	30FF-5
	11/16	1-3/8	.028	3/8	30FF-6
web	13/16	1-5/8	.032	1/2	30FF-8
for	1	2	.035	5/8	30FF10
pricing	1-3/16	2-3/8	.042	3/4	30FF-12
	1-5/8	3-1/4	.049	1	30FF-16
	1-13/16	3-5/8	.049	1-1/4	30FF-20
¥	2-1/16	4-1/8	.049	1-1/2	30FF-24



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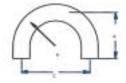


Female <> Female - Male

Male for direct assembly into machined ports or into female BrazeTyte expansions. Female ends to accept tube OD or male ends of BrazeTyte fittings. When used to join different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

Tee

Item #	Sizes	Wall	Α	В	\$ ea
20MF-5	5/16	.025	1-1/16	19/32	Call or
20MF-6	3/8	.028	1-1/4	11/16	access
20MF-8	1/2	.032	1-5/8	13/16	
20MF-10	5/8	.035	2	1	web
20MF-12	3/4	.042	2-3/8	1-3/16	for
20MF-16	1	.049	3-1/4	1-5/8	pricing
20MF-20	1-1/4	.049	3-5/8	1-13/16	1 5
20MF-24	1-1/2	.049	4-1/8	2-1/16	

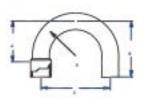


180° Return Bend

Male <> Male

For direct assembly into machined ports and flanges or into female BrazeTyte expansions. Can be used as a Butt-Weld fitting.

\$ ea	С	Α	Radius R	Tube Wall	Tube O.D.	Item #
Call or	3/4	13/16	3/8	.025	1/4	180MM-4
access	15/16	29/32	15/32	.025	5/16	180MM-5
	1 1/8	1	9/16	.028	3/8	180MM-6
web	1 1/2	1 1/4	3/4	.032	1/2	180MM-8
for	1 7/8	1 9/16	15/16	.035	5/8	180MM-10
pricing	2 1/4	1 7/8	1 1/8	.042	3/4	180MM-12
1	3	2 15/32	1 1/2	.049	1	180MM-16
	3 3/4	2 15/16	1 7/8	.049	1 1/4	180MM-20
¥	4 1/2	3 13/32	2 1/4	.049	1 1/2	180MM-24

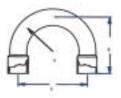


180° Return Bend

Male <> Female

For direct assembly into machined ports or into female BrazeTyte expansions, female end will accept tube OD or male end of BrazeTyte fitting. When connecting different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

Item #	Tube O.D.	Tube Wall	Radius R	Α	в	С	\$ ea
180MF-4	1/4	.025	3/8	13/16	3/4	3/4	Call or
180MF-5	5/16	.025	15/32	29/32	15/16	27/32	access
180MF-6	3/8	.028	9/16	1	1 1/8	15/16	web
180MF-8	1/2	.032	3/4	1 1/4	1 1/2	1 1/4	
180MF-10		.035	15/16	1 9/16	1 7/8	1 9/16	for
180MF-12		.042	1 1/8	1 7/8	2 1/4	1 7/8	pricing
180MF-16		.049	1 1/2	2 15/32	3	2 15/32	1
180MF-20		.049	1 7/8	2 15/16	3 3/4	2 15/16	
180MF-24	1 1/2	.049	2 1/4	3 13/32	4 1/2	2 13/32	V



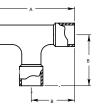
180° Return Bend

Female <> Female

Both ends will accept either tube OD or male end of BrazeTyte fittings. When connecting different OD sizes, either the 5MF reducer or the 10MF expander should be employed.

\$ ea	в	С	Radius R	Tube Wall	Tube O.D.	Item #
Call or	3/4	3/4	3/8	.025	1/4	180FF-4
access	27/32	15/16	15/32	.025	5/16	180FF-5
	15/16	1 1/8	9/16	.028	3/8	180FF-6
web	1 1/4	1 1/2	3/4	.032	1/2	180FF-8
for	1 9/16	1 7/8	15/16	.035	5/8	180FF-10
pricing	1 7/8	2 1/4	1 1/8	.042	3/4	180FF-12
	2 15/32	3	1 1/2	.049	1	180FF-16
	2 15/16	3 3/4	1 7/8	.049	1 1/4	180FF-20
V	2 13/32	4 1/2	2 1/4	.049	1 1/2	180FF-24

All dimensions are in inches unless designated millimeters (mm).



Tee

Male <> Female - Female

Male run for direct assembly into machined ports or into female BrazeTyte expansions. Female ends to accept tube OD or male ends of BrazeTyte fittings. When used to join different OD sizes, either the 5MF reducer or the 10MF expander can be employed.

Item #	Sizes	Wall	Α	В	\$ ea
15MF-5	5/16	.025	1-1/8	17/32	Call or
15MF-6	3/8	.028	1-5/16	5/8	access
15MF-8	1/2	.032	1-5/8	13/16	web
15MF-10	5/8	.035	2	1	
15MF-12	3/4	.042	2-3/8	1-3/16	for
15MF-16	1	.049	3-1/4	1-5/8	pricing
15MF-20	1-1/4	.049	3-5/8	1-13/16	1
15MF-24	1-1/2	.049	4-1/8	2-1/16	¥

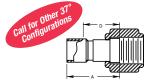


Adapter

Male <> Flare

Used to provide an easy sub-assembly disconnect Male end assembles into machine ports or female BrazeTyte expansions. Swivel end mates with SAE 37°, JIC 37° and AN/MS 37° flare type fittings. Type 303 Nut &Sleeve

\$ ea	Α	Thread	HEX	Wall	Sizes	Item #
Call or	1-1/32	7/16-20	9/16	.025	1/4	10SM-4
access	1-1/8	1/2-20	5/8	.025	5/16	10SM-5
	1-1/8	9/16-18	11/16	.028	3/8	10SM-6
web	1-9/32	3/4-16	7/8	.032	1/2	10SM-8
for	1-15/32	7/8-14	1	.035	5/8	10SM-10
pricing	1-29/32	1-1/16-12	1-1/4	.042	3/4	0SM-12
	2-9/16	1-5/16-12	1-1/2	.049	1	0SM-16
	3-1/32	1-5/8-12	2	.049	1-1/4	0SM-20
¥	3-7/32	1-7/8-12	2-1/4	.049	1-1/2	10SM-24



Adapter

Used to provide an easy sub-assembly disconnect. Female end to accept tube OD or male ends of BrazeTyte fittings. Swivel end mates with SAE 370, JIC 37° and AN/MS 37° flare

type fittings. Type 303 Nut &Sleeve

Item #	Sizes	Wall	HEX	Thread	Α	D	\$ ea
10SF-4	1/4	.025	9/16	7/16-20	1-1/32	25/32	Call or
10SF-5	5/16	.025	5/8	1/2-20	1-1/8	7/8	access
10SF-6	3/8	.028	11/16	9/16-18	1-1/8	7/8	web
10SF-8	1/2	.032	7/8	3/4-16	1-9/32	31/32	
10SF-10	5/8	.035	1	7/8-14	1-15/32	1-1/32	for
10SF-12	3/4	.042	1-1/4	1-1/16-12	1-29/32	1-13/32	pricing
10SF-16	1	.049	1-1/2	1-5/16-12	2-9/16	1-13/16	
10SF-20	1-1/4	.049	2	1-5/8-12	3-1/32		
10SF-24	1-1/2	.049	2-1/4	1-7/8-12	3-7/32		¥

Female <> Flare



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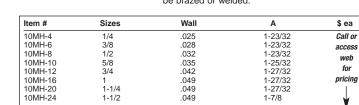
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HozeTyte® Fittings

Ideally suited for industrial applications in the following industries:

- Beverage
- Medical Photography
- Chemical
- Food
- Hydraulic
- Marine
- Refrigeration And Others

Please refer to page 24 for How to Specify HozeTyte information.





Connector

Hose Bead <> Hose Bead

Used as a connector to join flexible non-metallic hoses

\$ ea	Α	Wall	Sizes	Item #
Call or	3	.025	1/4	10HH-4
access	3	.028	3/8	10HH-6
	3	.032	1/2	10HH-8
web	3	.035	5/8	10HH-10
for	3	.042	3/4	10HH-12
pricing	3	.049	1	10HH-16
1 1	3	.049	1-1/4	10HH-20
¥	3	.049	1-1/4	10HH-24

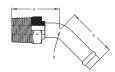


45° Elbow

Male Tube <> Hose Bead

Used to connect a flexible non-metallic hose to a vessel (feed tank, reservoir, etc.) where a 45° angle is required. Male end can be brazed or welded.

Item #	Sizes	Wall	R	Α	В	\$ ea
45MH-4	1/4	.025	3/8	3/4	1-13/16	Call or
45MH-6	3/8	.028	9/16	7/8	1-15/16	access
45MH-8	1/2	.032	3/4	1-3/32	2-3/32	web
45MH-10	5/8	.035	7/8	1-5/16	2-3/16	for
45MH-12	3/4	.042	1-1/8	1-5/8	2-3/8	
45MH-16	1	.049	1-1/2	2-5/32	2-11/16	pricing
45MH-20	1-1/4	.049	1-7/8	2-17/32	2-31/32	
45MH-24	1-1/2	.049	2-1/4	2-15/16	3-1/4	
						¥



Male Pipe Thread <> Hose Bead

Used to connect a flexible non-metallic hose to a female pipe port where a 45° angle 50 Pie is required.

45° Elbow

				·				Minimum
Item #	Sizes	Wall	R	Α	В	HEX	NPT	\$ ea
45PH-4	1/4	.025	3/8	1-1/8	1-13/16	7/16	1/8	Call or
45PH6	3/8	.028	9/16	1-13/32	1-15/16	5/8	1/4	access
45PH-8 45PH-10	1/2 5/8	.032 .035	3/4 7/8	1-3/4 21/32	2-3/32 2-3/16	11/16 7/8	3/8 1/2	web
45PH-12	3/4	.042	1-1/8	2-11/32	2-3/8	1-1/16	3/4	for
45PH16	1	.049	1-1/2	3	2-11/16	1-3/8	1	pricing
45PH20 45PH24	1-1/4 1-1/2	.049 .049	1-7/8 2-1/4	3-19/32 4-1/32	2-31/32 3-1/4	1-3/4 2	1-1/4 1-1/2	¥

		Used to connect a flexible non-metallic hose to a vessel (feed tank, reservoir, etc). Male end can be brazed or welded.					
n #	Sizes	Wall	Α	\$ ea			
VH-4	1/4	.025	1-23/32	Call or			
VH-6	3/8	.028	1-23/32	access			

Call or	1-23/32	.025	1/4	10MH-4
access	1-23/32	.028	3/8	10MH-6
web	1-23/32	.032	1/2	10MH-8
	1-25/32	.035	5/8	10MH-10
for	1-27/32	.042	3/4	10MH-12
pricing	1-27/32	.049	1	10MH-16
1	1-27/32	.049	1-1/4	10MH-20
	1-7/8	.049	1-1/2	10MH-24
			=	
				1



90° Elbow

Male Tube <> Hose Bead

Male Tube <> Hose Bead

Used to connect a flexible non-metallic hose to a vessel (feed tank, reservoir etc.) where a 90° angle is required. Male end can be brazed or welded.

Adapter

\$ ea	в	Α	R	Wall	Sizes	Item #
Call of	1-7/8	13/16	3/8	.025	1/4	90MH-4
access	2-1/16	1	9/16	.028	3/8	90MH-6
	2-1/4	1-1/4	3/4	.032	1/2	90MH-8
web	2-3/8	1-1/2	7/8	.035	5/8	90MH-10
for	2-5/8	1-7/8	1-1/8	.042	3/4	90MH-12
pricing	3	2-15/32`	1-1/2	.049	1	90MH-16
1	3-3/8	2-15/16	1-7/8	.049	1-1/4	90MH-20
¥	3-3/4	3-13/32	2-1/4	.049	1-1/2	90MH-24



Adapter

Male Pipe Thread <> Hose Bead

Used to connect a flexible non-metallic hose to a female pipe port.

50 Piec

PH-6 3/8 .028 2-1/4 5/8 1/4 access PH-8 1/2 .032 2-3/8 11/16 3/8 web PH-18 1/2 .032 2-3/8 11/16 3/8 web PH10 5/8 .035 2-1/2 7/8 1/2 for PH-12 3/4 .042 2-9/16 1-1/16 3/4 for PH-16 1 .049 2-11/16 1-3/8 1 pricess PH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4	\$ ea	NPT	HEX	Α	Wall	Sizes	Item #
DPH-8 1/2 .032 2-3/8 11/16 3/8 web DPH10 5/8 .035 2-1/2 7/8 1/2 web DPH-12 3/4 .042 2-9/16 1-1/16 3/4 for DPH-16 1 .049 2-11/16 1-3/8 1 pricing DPH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4	Call o	1/8	7/16	2-1/8	.025	1/4	10PH-4
PPH-8 1/2 .032 2-3/8 11/16 3/8 web PPH10 5/8 .035 2-1/2 7/8 1/2 web PPH-12 3/4 .042 2-9/16 1-1/16 3/4 for PPH-16 1 .049 2-11/16 1-3/8 1 pricing PPH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4	acces	1/4	5/8	2-1/4	.028	3/8	10PH-6
IPH10 5/8 .035 2-1/2 //8 1/2)PH-10 3/4 .042 2-9/16 1-1/16 3/4 for)PH-16 1 .049 2-11/16 1-3/8 1 pricing)PH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4		3/8	11/16	2-3/8	.032	1/2	10PH-8
)PH-16 1 .049 2-11/16 1-3/8 1 pricin)PH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4		1/2	7/8	2-1/2	.035	5/8	10PH10
)PH-20 1-1/4 .049 2-13/16 1-3/4 1-1/4	for	3/4	1-1/16	2-9/16	.042	3/4	10PH-12
	pricin	1	1-3/8	2-11/16	.049	1	10PH-16
DPH-2/ 1-1/2 0/9 3 2 1-1/2	1	1-1/4	1-3/4	2-13/16	.049	1-1/4	10PH-20
		1-1/2	2	3	.049	1-1/2	10PH-24



90° Elbow

Male Pipe Thread <> Hose bead

Used to connect a flexible non-metallic hose to a pipe port where a 90° angle is 50 Pie required.

								Minimum
Item #	Sizes	Wall	R	Α	в	HEX	NPT	\$ ea
90PH-4	1/4	.025	3/8	1-7/32	1-7/8	7/16	1/8	Call or
90PH-6	3/8	.028	9/16	1-17/32	2-1/16	5/8	1/4	access
90PH-8	1/2	.032	3/4	1-29/32	2-1/4	11/16	3/8	web
90PH-10	5/8	.035	7/8	2-7/32	2-3/8	7/8	1/2	
90PH-12	3/4	.042	1-1/8	2-19/32	2-5/8	1-1/16	3/4	for
90PH-16	1	.049	1-1/2	3-5/16	3	1-3/8	1	pricing
90PH-20	1-1/4	.049	1-7/8	3	3-3/8	1-3/4	1-/14	1
90PH-24	1-1/2	.049	2-1/4	4-17/32	3-3/4	2	1-1/2	¥

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FITTINGS

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- **d** BARBED
- THREADED
- PIPE

MATERIALS OFFERED

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- NICKEL PLATED BRASS
- TITANIUM
- **d** BRASS

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ISO 594/1,-2 or ANSI/HIMA

ModuLUER Luer Fittings, Valves & Inspection Gauges

Short Lead Times Tough Jobs



- Highest Level Medical Quality
- Manufactured to ISO 594/1,-2
- Immediate Delivery
- Over 2,000 Combinations
- T316 Stainless Steel
- Nickel Plated Brass
- Delrin
- Titanium & Other Materials
- Specials Become Standard

ISO 594/1,2

All fittings are made to the ISO 594/1-1986 and ISO 594/2-1991 Standards which cover conical fittings with a 6% luer taper. Together, these ISO Standards replace the ISO Recommendation R 594-1967 for conical fittings made of rigid and semi-rigid materials for use with hypodermic syringes and needles and with certain other apparatus for medical use.

• Stock LUERS

Machined Parts

Custom

Laser Welded Assemblies

See our extensive list of standards on the following pages. If you cannot find the one you're looking for in our standards, send us any drawings or application descriptions you have. We will be glad to work with you to get you the exact fitting you need.

The basic concept of the ModuLUER line of LUER fittings is that all standards and components are in stock. With our extensive precision welding capabilities and these stocked parts, almost any fitting configuration has a short lead time.

Your "special" is probably already sitting on our shelf.

Applying the most recent ISO Standards to the manufacturing processes of our LUER fittings allows us to offer our customers the most up-to-date products available on the market. If you do require LUERS made to ANSI/HIMA standards, they are still being manufactured and there are many in stock in both brass and stainless steel. Feel free to call for more information if you need a special fitting designed, or if you are unsure of the fitting to correctly suit your needs.



Over 2,000 Combinations Available!

Do you have a special application that requires a unique configuration? Let MicroGroup assist you in designing a configuration from over 2,000 combinations available from ModuLUER components listed. Call now and let's work together on that new design!

SPEED – the MicroGroup [®] Advantage PRICING · BIDDING · DELIVERY										
ISO 594/1,-2 or ANSI/HIMA ModuLUER Luer Fittings, Valves & Inspection Gauges Short Lead Times Tough Jobs										
	Male LUER (ML) [*] Female Straight T									
	Male LUER-Lock (MLL)*		Female Pipe Thread (FP)							
, <u>+</u>	Female LUER (FL)		Barb (B)							
	Female LUER Thread (FLT)		Caps (CAP)							
	Male Straight Thread (MT)	L	Elbows (LB)							
	Male Pipe Thread (MP)		Tees (T)							
Standard Part Numbering										
	ex.: P/N #316 - N	MLL/BHB062-	6H2							
Alloy - 316	Left Termination - Right Termination MLL BHB062	Body Diameter - 6	Body Type - Inside Diameter - H 2							

	Ex.	: P/N	#316 - M	LL	_/BHB062-(6H2			
Lef	t Termination - MLL	Righ	t Termination - BHB062		Body Diameter - 6		Body Type - H	m	side Diameter - 2
B032	1/32" Barb	B032	1/32" Barb	1	1/16"	H	Hex Body	5 1	.018/.020
B062	1/16" Barb	B062	1/16" Barb	2	1/8"	K	Knurl Body	2	.060/.062
B125	1/8" Barb	B125	1/8" Barb	3	3/16"	R	Round Body	3	.093/.094
B188	3/16" Barb	B188	3/16" Barb	4	1/4"	S	Square Body	В	No Bore
B250	1/4" Barb	B250	1/4" Barb	5	5/16"				smallest I.D.
Cap252	8 1/4-28 Cap	BHB032	1/32" Bulkhead Barb	6	3/8")			
Cap253	2 1/4-32 Cap	BHB062	1/16" Bulkhead Barb	7	7/16"				
		BHB125	1/8" Bulkhead Barb						
FL	Female Luer	FL	Female Luer	8	1/2"				
FLT	Female Luer Thread	FLT	Female Luer Thread	9	9/16"				
FP125	1/8" Female Pipe			10	5/8"				
FT1032	10-32 Female Thread	FT1032	10-32 Female Thread	11	11/16"				
FT2528	1/4-28 Female	FT2528	1/4-28 Female	12	3/4"				
	Thread		Thread						
FT2532	1/4-32 Female	FT2532	1/4-32 Female						
	Thread		Thread		11/0 0		ustom man	ufactu	
		Hub	Hub						
ML	Male Luer	ML	Male Luer		with 1	uohy	Borst com	pressi	on
MLL	Male Luer Lock	MLL	Male Luer Lock				ctors. Pleas		
MP062		MP062	1/16" Male Pipe						
MP125	1/8" Male Pipe	MP125	1/8" Male Pipe		www.mi	crogro	oup.com fo	r addit	ional
MP250	1/4" Male Pipe	MP250	1/4" Male Pipe				pricing in		
MT1032		MT1032	10-32 Male Thread		produc		pricing in	ormati	
MT2528		MT2528	1/4-28 Male Thread						
MT2532		MT2532	1/4-32 Male Thread						
NUT	Nut								

Sinker • As an option we can add "O-Rings" to male LUERS and LUER Locks.

• Actual barb O.D.'s are manufactured oversized (refer to page 42).

303

304

316

NPB

BRS

ΤI

DEL

NYL

upon request.

303 Stainless Steel

304 Stainless Steel

Nickel Plated Brass

360 Brass

Titanium

Note: Other materials available

Delrin

Nylon

316 Stainless Steel B125

SK

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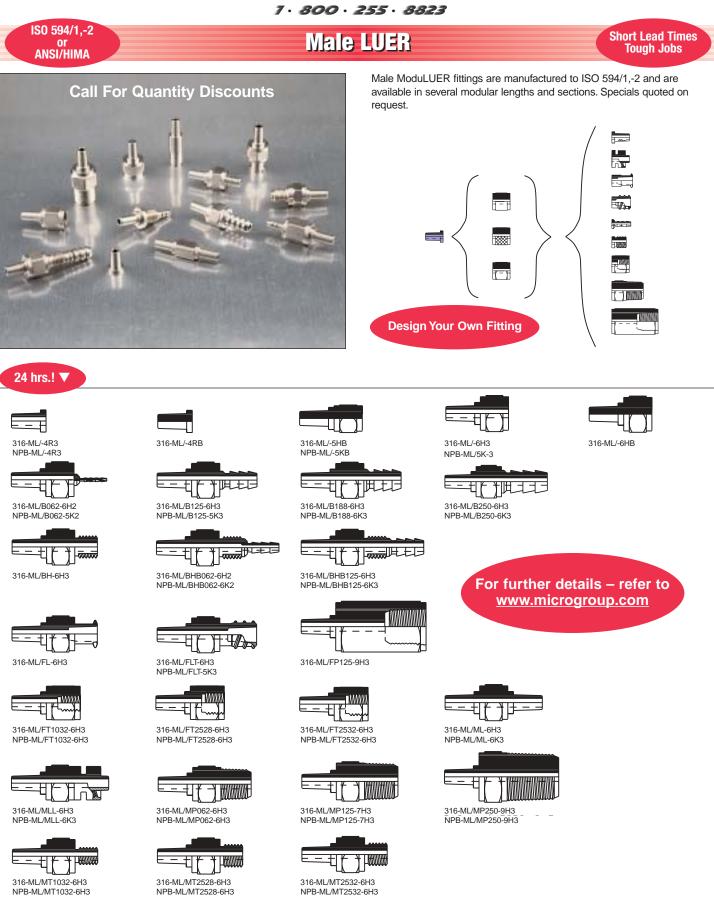
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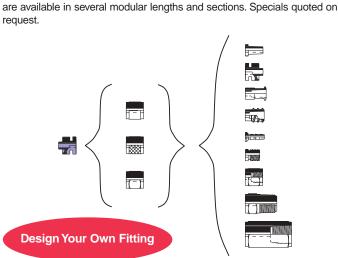


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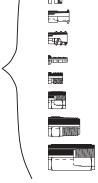
Male LUER Lock

Short Lead Times **Tough Jobs**





Male-LUER-Lock ModuLUER fittings are manufactured to ISO 594/1,-2 and





ISO 594/1,-2







316-MLL/BH-6H3









316-MLL/-6HB NPB-MLL/-6KB







316-MLL/FLT-6H3 NPB-MLL/FLT-6K3





316-MLL/MP125-7H3 NPB-MLL/MP125-7H3





NPB-MLL/-6RB



NPB-MLL/B125-6K3







316-MLL/MP250-9H3 NPB-MLL/MP250-9H3















316-MLL/B250-6H3

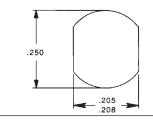
NPB-MLL/B250-6K3

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316-MLL/FP125-9H3 NPB-MLL/FP125-9H3



Bulkhead fittings come equipped with panel nuts and lock washers. The 1/4"-32 thread is finished with flats on either side to prevent turning. The recommended panel hole size is shown below.



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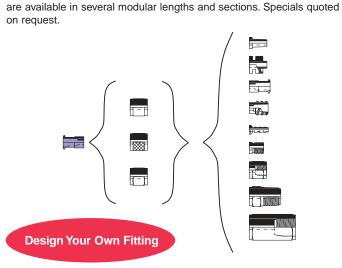
Female LUER

Short Lead Times Tough Jobs



ISO 594/1,-2

24 hrs.! V



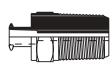
Female ModuLUER fittings are manufactured to ISO 594/1,-2 and

316-FL/-5H3 316-FL/HUB-5HB 316-FL/-4R3 316-FL/-5HB 316-FL/-6H3 NPB-FL/-5KB NPB-FL/HUB-5KB Tree THE THEE 316-FL/B125-5H3 316-FL/B188-6H3 316-FL/B250-6H3 316-FL/B032-5H1 316-FL/B062-5H2 NPB-FL/B062-5K2 NPB-FL/B125-5K3 NPB-FL/B188-6K3 NPB-FL/B250-6K3 For further details – refer to THE REAL TRACK -COCKAR www.microgroup.com 316-FL/BHB125-6H3 NPB-FL/BHB125-6K3 316-FL/BH-6H3 316-FL/BHB032-6H1 316-FL/BHB062-6H2 316-FL/FL-5H3 316-FL/FT2528-6H3 316-FL/FT2532-6H3

316-FL/FP-125-9H3 NPB-FLT/FP125-9H3



316-FL/MP125-7H3	
NPB-FL/MP125-7H3	



316-FL/MP250-9H3

316-FL/6HB







NPB-FL/FT2528-6H3

316-FL/MT2532-5H3 NPB-FL/MT2532-5H3

NPB-FL/FT2532-6H3

NPB-FL/MT1032-5H3

NPB-FL/FL-5K3

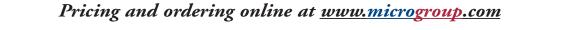
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316-FL/MT1032-5H3









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ISO 594/1,-2 or ANSI/HIMA		Female LU	JER Thread		Short Lead Times Tough Jobs	
Call For	r Quantity Disc	ounts		ModuLUER fittings are m vailable in several modula uest.		
24 hrs.! ▼			Design Your Ow	n Fitting		
316-FLT/-4R3	316-FLT/-5H3 NPB-FLT/-5K3	316-FLT/-5HB NPB-FLT/-5KB	316-FLT/HUB-5HB NPB-FLT/HUB-5KB	316-FLT/-6H3 NPB-FLT/6K3	316-FLT/-6HB NPB-FLT/6KB	
	316-FLT/B062-5K2	316-FLT/B125-5H3 NPB-FLT/B125-5K3	316-FLT/B188-6H3 NPB-FLT/B188-6K3	316-FLT/B250-6K3		
316-FLT/BH-6H3	316-FLT/BHB032-6H1	316-FLT/BHB062-6K2	316-FLT/BHB12 NPB-FLT/BHB12			
	316-FLT/FT1032-6H3 NPB-FLT/FT1032-6H3	316-FLT/FT2528-6H3 NPB-FLT/FT2528-6H3	316-FLT/FT2532-6H3 NPB-FLT/FT2532-6H3	316-FLT/FP125-9H3		
	316-FLT/MT2528-5H3 NPB-FLT/MT2528-5H3	316-FLT/MT2532-5H3 NPB-FLT/MT2532-5H3	316-FLT/MP062-6H3	316-FLT/MP125-7H3 NPB-FLT/MP125-7H3	316-FLT/MP250-9H3	

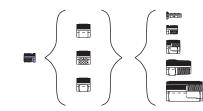
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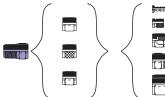
ISO 594/1,-2 Male Straight Thread

ModuLUER straight thread fittings are manufactured to applicable standards in 10-32, 1/4-28, and 1/4-32.



ANSI/HIMA **Tough Jobs** Male Pipe Thread (NPT)

Pipe fittings are manufactured to applicable standards in 1/16 NPT (spl order), 1/8 NPT, and 1/4 NPT. Specials quoted on request.



316-MT2528/-5H3

316-MP125-7HB

316-MP125-7H3

NPB-MP125-7HB

316-MP125/B062-7H2

NPB-MP125/B062-7H2

316-MP125/B125-7H3

NPB-MP125/B125-7H3

316-MP125/B188-7H3

NPB-MP125/B188-7H3







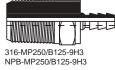
316-MP250-9HB 316-MP250-9H3 NPB-MP250-9HB



FLED



NPB-MP250/B062-9H2







316-MT1032/-5H3 316-MT2532/-4R3 NPB-MT1032/-6H3



316-MP062-6H3













NPB-MT2532/B250-6H3

316-MP062-6HB

NPB-MP062-6HB



316-MP062/B032-6H1



316-MP125/B032-7H1



316-MP062/B062-6H2 NPB-MP062/B062-6H2







40

316-MT1032/B250-6H3



316-MT1032/-6H3

24 hrs.! V



316-MT1032/B032-5H1



316-MT1032/B062-5H2



NPB-MT1032/B125-5H3



316-MT1032/B188-6H3 NPB-MT1032/B188-6H3





316-MT2528/-6H3 NPB-MT2528/-6H3



316-MT2528/B032-5H1 NPB-MT2528/B032-5H1



316-MT2528/B062-5H2 NPB-MT2528/B062-5H2



NPB-MT2528/B125-5H3





NPB-MT2528/B250-6H3



316-MT2532/B062-5H2 NPB-MT2532/B062-5H2

316-MT2532/B032-5H1

HHIIH

316-MT2532/-6H3

NPB-MT2532/-6H3





316-MT2532/B188-6H3









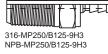
十四日 316-MP125/B250-7H3

316-MP250/B062-9H2

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NPB-MP250/B188-9H3



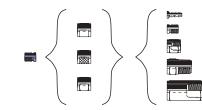


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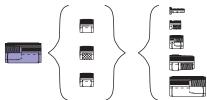
Short Lead ISO 594/1,-2 Female Straight Thread Times

ModuLUER straight thread fittings are manufactured to applicable standards in 10-32, 1/4-28, and 1/4-32.



ANSI/HIMA ight angle Female Pipe Thread (NPT) **Tough Jobs**

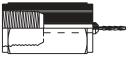
Pipe fittings are manufactured to applicable standards in 1/16 NPT (spl order), 1/8 NPT, and 1/4 NPT. Specials quoted on request.



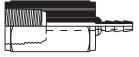




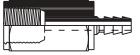
316-FP125-9H3



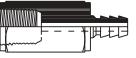
316-FP125/B032-9H1



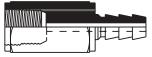
316-FP125/B062-9H2



316-FP125/B125-9H3



316-FP125/B188-9H3



316-FP125/B250-9H3

24 hrs.! V



316-FT1032-6H3 NPB-FT1032-6H3



316-FT1032/B032-6H1 NPB-FT1032/B032-6H1



316-FT1032/B062-6H2 NPB-FT1032/B062-6H2



316-FT1032/B125-6H3 NPB-FT1032/B125-6H3



316-FT1032/B188-6H3 NPB-FT1032/B188-6H3



316-FT1032/B250-6H3 NPB-FT1032/B250-6H3

316-FT2528-6H3



316-FT2528/B032-6H1 NPB-FT2528/B032-6H1



316-FT2528/B062-6H2 NPB-FT2528/B062-6H2



316-FT2528/B125-6H3

NPB-FT2528/B125-6H3



316-FT2528/B188-6H3



316-FT2528/B250-6H3 NPB-FT2528/B250-6H3



316-FT2532-6H3

316-FT2532/B032-6H1



316-FT2532/B062-6H2

NPB-FT2532/B062-6H2



316-FT2532/B125-6H3



316-FT2532/B188-6H3



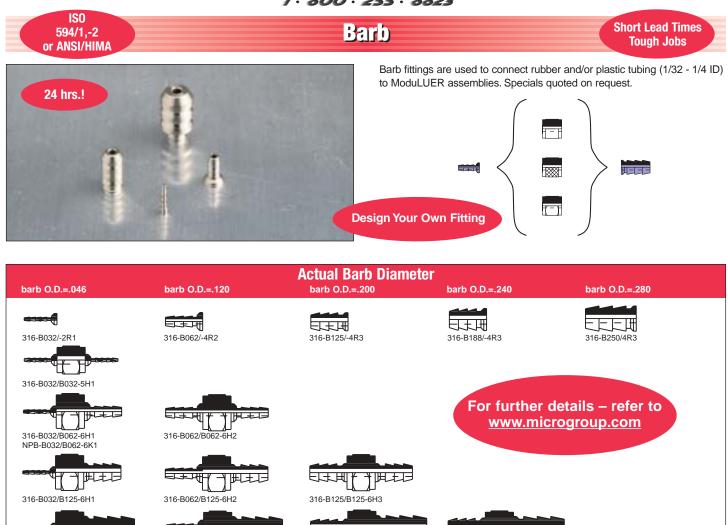
316-FT2532/B250-6H3 NPB-FT2532/B250-6H3

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Contact us for expert and courteous service at _____ 7 · 800 · 255 · 8823



Sinkers

FII

316-B125/B188-6H3

316-B125/B250-6H3



EIII

316-B062/B188-6H2

316-B062/B250-6H2

316-B032/B188-6H1

316-B032/B250-6H1

비녀

Sinkers are used to terminate plastic and/or rubber tubing when the application requires the end to be submerged.



EEE

316-B188-B188-6H3

316-B188-B250-6H3

旧

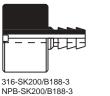
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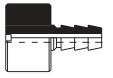
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川

316-B250/B250-6H3 NPB-250/B250-6K3



316-SK100/B125-3



NPB-SK200/B250-3

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Caps

Caps are used to provide a leak tight, metal-to-metal closure on 1/4-28 male thread ModuLUER fittings.

316-CAP2528-6HB







IS0

Elbows

Elbows are readily available as special order items, usually fabricated from 1/4", 3/8", or 1/2" solid stock.





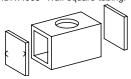


Tees are readily available as special order items, usually fabricated from 1/4", 3/8", or 1/2" solid stock.



Manifolds

Manifolds are readily available as special order items, usually fabricated from 3/8"O.D. x .065" Wall square tubing.



 Short Lead Times Tough Jobs

 Short Lead Times Tough Jobs

 Short Lead Times Tough Jobs

 A full line of Luer Standards Documentation and Taper Gauges are available for either the ANSI/HIMA MD70. 1-1983 or the newer ISO 594/1,2 1986-1991 Standards. All Gauges are hardened and ground. Each gauge is available with written certification at an additional charge. When inquiring, please specify the type of material from which the Luers to be checked are made, since differences occur between rigid and non-rigid materials.

 Iso 594/1.2

Item #	Description	\$ ea
ISO 594/1-	86 E Paragraph 5.1 Gage Testing	Cal. for
LTG-3A	Female stepped cone ring gage for testing dimensional characteristics and taper size of rigid male luer fittings.	pricii
LTG-3B	Female stepped cone ring gage for testing dimensional characteristics and taper size of semi-rigid male luer fittings.	
LTG-3C	Male stepped cone plug gage for testing dimensional characteristics and taper size of female luer fittings in all materials.	
ISO 594/1-	86 E Paragraph 5.2 Liquid Leakage	
LTG-4	Female conical fitting for leak testing male luer fittings. Requires application of water at 300 kpa, not for use with lock nut in place.	
LTG-5M	Male conical fitting for leak testing female luer fittings. Requires application of water at 300 kpa.	
ISO 594/2-	91 E Paragraph 5.2 Leak Testing	
LTG-5F	Female conical fitting with lugs for leak testing male luer fittings with lock nut in place. Requires application of water at 300 kpa.	
LTG-7	Male conical fitting with lock nut in place for leak testing female luer fittings with lugs. Requires application of water at 300 kpa.	
ISO 594/2-	91 E Paragraph 5.4 Separation Force	
LTG-6	Female conical fitting with lugs for separation force testing male luer fittings with lock nut in place.	
LTG-8	Male conical fitting with lock nut for separation force testing female luer fittings with lugs in place.	V



Item # Description \$ ea. Call ANSI/HIMA MD70.1-83 Paragraph 4.2 Gage Testing for LTG-4-AH Female stepped cone ring gage for testing dimensional characteristics and taper size of rigid and nonrigid male luer fittings. pricing LTG-5-AH Male stepped cone plug gage for testing dimensional characteristics and taper size of rigid and nonrigid female luer fittings. ANSI/HIMA MD70.1-83 Paragraph 5.2.1 Liquid Leakage LTG-6A-AH Female conical fitting for leak testing male luer fittings. Requires application of water at 310 kpa, not for use with lock nut in place. LTG-6B-AH Male conical fitting for leak testing female luer fittings. Requires application of water at 310 kpa. ANSI/HIMA MD70.1-83 Paragraph 8.2.1 Leak Testing LTG-8-AH Female conical fitting with lugs place for leak testing male luer fittings with lock nut in place. Requires application of water at 310 kpa. LTG-9-AH Male conical fitting with lock nut in place for leak testing female luer fittings with lugs. Requires application of water at 310 kpa.

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✓ Check Here	LEFT TERMIN		VALVE BODY	RIGHT TEF	RMINATION	Check Here	√
O Male LUER (ML)		PLUG (Special)		Male LUER (N	ML)	О
O Male LUER-I	Lock (MLL)				Male LUER-L	ock (MLL)	0
O Female LUE	R (FL)		or		Female LUEF	R (FL)	О
O Female LUE	R-Thread (FLT)		SPINDLE (Stock)		Female LUER-	-Thread (FLT)	O
O Male Thread MT1032 MT2528 MT2532	I (MT)		1/8"		Male Thread MT1032 MT2528 MT2532	(MT)	0
O Female Thre FT1032 FT2528 FT2532	ad (FT)	··()	or BALL (Special)		Female Threa FT1032 FT2528 FT2532	ad (FT)	О
O Barb (B) For Tube I.D. 1/32" (B032) 1/16" (B062) 1/8" (B125) 3/16" (B188) 1/4" (B250)	Actual Barb O.D. .046 .120 .200 .240 .280		(Special) 25 Dia. Thru		Barb (B) For Tube I.D. 1/32" (B032) 1/16" (B062) 1/8" (B125) 3/16" (B188) 1/4" (B250)	Actual Barb .046 .120 .200 .240 .280	O o.d.
O Female Pipe 1/8" NPT (FP128			1/8" Ball .062" Dia. Thru		Female Pipe 1/8" NPT (FP125)		О
O Male Pipe Th 1/16" NPT (MP0 1/8" NPT (MP12 1/4" NPT (MP25	62) (5)		or TRUMPET (Stock)		Male Pipe Th 1/16" NPT (MP06 1/8" NPT (MP125 1/4" NPT (MP250	2)	0
O Specials (SP	L) SPEC	CIALS	.059" Dia. Thru	SPECIALS	Specials (SPL	_)	0

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Miniature Valves

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- TRUMPET
- BALL
- PLUG

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Updates



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FDA Registration #1226212 Contact us for expert and courteous service at = 1 · 800 · 255 · 8823

Miniature Spindle and Trumpet Valves

Spindle Valves

A breakthrough in miniature valve construction, MicroGroup's Spindle Valve is the preferred choice for your medical, lab and analytical device designs. Constructed of 316 stainless steel, the Spindle Valve is sturdier and more reliable than plastic or nickle plated brass valves.

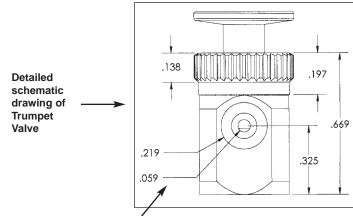
What's more, these replaceable viton o-rings and seal, combined with a stainless steel body help ensure consistent performance and long life.

Trumpet Valves

MicroGroup's new Trumpet Valve was developed for a wide variety of applications. Featuring stainless steel construction, the Trumpet Valve can be custom made in less than 5 days. Consult your MicroGroup representative for a complete listing of stock fittings.

If custom materials are your preference, this innovative new product can be produced in titanium and other hard-to-find materials.





Stocked with:

• MaleLUER-Lock (MLL) and FemaleLUER (FL)

Features:

- Durable 316 stainless steel body construction
- Viton o-rings, other o-ring materials available upon request
- Up to 150 PSI liquid and gas with proper fittings
- .059 orifice
- Lubricant used to minimize friction
- Wide range of fittings for right and left terminations
- Detailed schematic drawing of Spindle Valve Stocked with: • MaleLUER-Lock (MLL) and FemaleLUER (FL) • 10-32F x 10-32F
- Features:
- Up to 130 PSI liquid and 75 PSI air with proper fittings
- Patent pending design that requires no lubrication
- .125" straight-thru bore
- Vary bore I.D. with fittings

Stock - 24 hrs.

- Replaceable seal and o-rings available in silicone and other custom materials upon request
- Body components available in titanium and other custom materials
 upon request

* Please call to discuss in-stock designs and applications

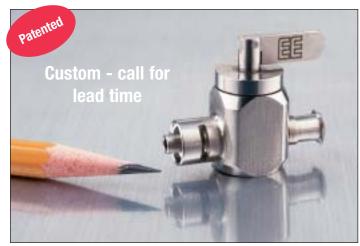
PRICING · BIDDING · DELIVERY

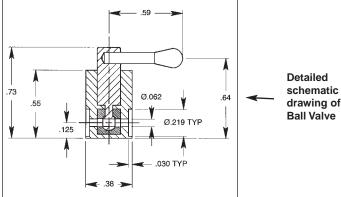
Miniature Ball and Plug Valves

Ball Valves

These custom designed 2-way valves feature a unique seal design, which allows liquid ratings up to 100 PSI and helps eliminate galling of metal-to-metal contact points. Their miniature size and the availability of custom configurations from stock - including ModuLUER fittings - allow maximum flexibility in making connections to standard, small diameter components. A variety of inlet and outlet configurations may be specified.

Our patented design requires no lubrication, features low and constant torque, the ability to interchange parts for additional applications, and low cost replaceable seals to ensure long life.





Customs only with stock design!

Features:

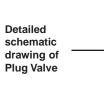
- Durable 316 stainless steel body construction. Also available in titanium, brass and other custom materials
- Seal is made of Buna-N
- Interchangeable parts
- Long life (replaceable seals)
- Smooth, low torque operation
- Straight-thru bore (low loss)

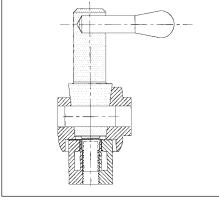
Plug Valves

Customized to your requirements, these 2-way tapered Plug Valves can be used to serve a wide variety of low pressure applications. Featuring stainless steel and brass construction with lubricated metal-to-metal contacts, these valves utilize the same ModuLUER connections as the Ball Valves, enhancing the flexibility of their use.

Other features include low torque operation, straight-thru bore and a variety of fittings to select from. The valves are also fully autoclavable and easily disassembled for cleaning. Custom Miniature Plug Valves are manufactured in accordance with our high quality standards.







Customs only with stock design!

Features:

- Durable 316 stainless steel and brass body construction. Also available in titanium, brass and other custom materials
- Autoclavable
- Straight-thru bore (low loss)
- · Wide range of fittings for right and left terminations
- · Easily disassembled for cleaning
- * Please call to discuss custom designs and applications

Contact us for expert and courteous service at 1 · 800 · 255 · 8823							
✓ Check Here LEFT	TERMINATION	VALVE BODY	RIGHT TERM	IINATION	Check Here	✓	
O Male LUER (ML)		PLUG (Special)		Male LUER	(ML)	О	
O Male LUER-Lock (MLL)				Male LUER-	Lock (MLL)	О	
O Female LUER (FL)	, <u> </u> + [−] −	or		Female LUE	R (FL)	О	
O Female LUER-Thread (F		SPINDLE (Stock)		Female LUEF	R-Thread (FL	ŊО	
O Male Thread (MT) MT1032 MT2528 MT2532		1/8"		Male Thread MT1032 MT2528 MT2532	d (MT)	О	
O Female Thread (FT) FT1032 FT2528 FT2532	/////// 	or BALL (Special)		Female Thre FT1032 FT2528 FT2532	ead (FT)	О	
Barb (B) Actual Barb For Tube I.D. Actual Barb 1/32" (B032) .046 1/16" (B062) .120 1/8" (B125) .200 3/16" (B188) .240 1/4" (B250) .280	0.D.	25 Dia. Thru	TTTT	Barb (B) For Tube I.D. 1/32" (B032) 1/16" (B062) 1/8" (B125) 3/16" (B188) 1/4" (B250)	Actual Bart .046 .120 .200 .240 .280		
O Female Pipe Thread (FP) 1/8" NPT (FP125)		1/8" Ball .062" Dia. Thru		Female Pipe	e Thread (FF		
O Male Pipe Thread (MP) 1/16" NPT (MP062) 1/8" NPT (MP125) 1/4" NPT (MP250)		or TRUMPET (Stock)		Male Pipe T 1/16" NPT (MPC 1/8" NPT (MP12 1/4" NPT (MP23	062) 25)	О	
O Specials (SPL)	SPECIALS	.059" Dia. Thru	SPECIALS	Specials (SF	PL)	_0	

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INTERCHANGEABLE

INTERCHANGEABLE EngineersEXPRESS®

in in in in in in it

FDA Registration #1226212

Disposable Dispensing Tips



- Stainless Blunt Tips are standard for epoxies, glues, solvents, grease, sealants, etc...
- Flexible Poly Tips prevent surface scratching use for all basic applications, including CA's.
- Tapered Max Flow Tips are Ideal for highly filled compounds such as solder pastes.

	EA Serie	s Stainless	Blunt Needle	es	
Item #	OD	ID	Std. Length	Hub	\$ ea.
EEA-30S-5/16 EEA-27S-5/16 EEA-26S-1/2 EEA-25S-1/2 EEA-23S-1/2 EEA-23S-1 EEA-22S-1 EEA-22S-1 EEA-22S-1/2 EEA-21S-1/2 EEA-20S-1 EEA-19S-1/2 EEA-19S-1 EEA-15S-1 EEA-15S-1 EEA-15S-1	.012" (.30mm) .016" (.41mm) .016" (.41mm) .020" (.51mm) .025" (.63mm) .025" (.63mm) .028" (.71mm) .032" (.81mm) .032" (.81mm) .035" (.89mm) .042" (1.07mm) .042" (1.07mm) .042" (1.24mm) .049" (1.24mm) .049" (1.24mm) .072" (1.83mm)	.006" (.15mm) .008" (.20mm) .009" (.23mm) .010" (.25mm) .013" (.33mm) .013" (.33mm) .016" (.41mm) .020" (.51mm) .020" (.51mm) .023" (.58mm) .023" (.58mm) .027" (.69mm) .023" (.84mm) .033" (.84mm) .033" (.84mm) .034" (1.37mm) .054" (1.37mm)	.312" (8mm) .312" (8mm) .500" (13mm) .500" (13mm) .500" (13mm) 1.000" (25mm) 1.000" (25mm)	Female Luer Female Luer	\$ ea. Call or access web for pricing
EEA-14S-1/2 EEA-14S-1 EEA-14S-2	.083" (2.11mm) .083" (2.11mm) .083" (2.11mm)	.063" (1.60mm) .063" (1.60mm) .063" (1.60mm)	.500" (13mm) 1.000" (25mm) 2.000" (51mm)	Female Luer Female Luer Female Luer	¥

P Series Flexible Poly Tips						
Item #	OD	ID	Std. Length	Hub	\$ ea	
EEA-25P-1-1/2	.029" (.74mm)	.013" (.33mm)	1.500" (38mm)	Female Luer	Call or	
EEA-22P-1-1/2	.032" (.81mm)	.015" (.38mm)	1.500" (38mm)	Female Luer	access	
EEA-20P-1-1/2	.039" (.99mm)	.024" (.61mm)	1.500" (38mm)	Female Luer	web	
EEA-18P-1-1/2	.053" (1.35mm)	.032" (.81mm)	1.500" (38mm)	Female Luer	for	
EEA-14T-1-1/4	.062" (1.57mm)	.024" (.61mm)	1.500" (38mm)	Female Luer	pricing	
EEA-16P-1-1/2	.067" (1.70mm)	.047" (1.19mm)	1.500" (38mm)	Female Luer	1	
EEA-15P-1-1/2	.072" (1.83mm)	.024" (.61mm)	1.500" (38mm)	Female Luer	۲	

Poly Tapered Rigid Tips						
Item # ID Lgth. Hub \$ ea						
EEA-22T-1-1/4 EEA-22GT-1-1/4 EEA-20GT-1-1/4 EEA-18T-1-1/4 EEA-18GT-1-1/4 EEA-18GT-1-1/4 EEA-16GT-1-1/4 EEA-16GT-1-1/4	.015" (.38mm) .015" (.38mm) .024" (.61mm) .024" (.61mm) .032" (.81mm) .032" (.81mm) .047" (1.19mm) .062" (1.57mm)	1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm) 1.250" (32mm)	Female Luer Female Luer Female Luer Female Luer Female Luer Female Luer Female Luer Female Luer Female Luer	Call or access web for pricing		

Dispensing Poly Bottles

Squeez-Drop • No drip!

- Designed to apply accurate drops of epoxies, fluxes, Cyanoacrylate, Approximate advantage
- Anaerobics and solvent adhesives.
- Use with any flowable liquid.
- Variety of "locking" needles (tips) available, see above.
- Economy of bulk and transfer to these low cost dispensers saves money.



Item #	Description	\$ ea
EEA-S507	.5 oz. Dispensing Bottle Male Luer	Call or
EEA-S50-5	.75 oz. Dispensing Bottle Male Luer	access
EEA-S70-3	2 oz. Dispensing Bottle Male Luer	web for
EEA-S90-2	4 oz. Dispensing Bottle Male Luer	pricing
		J.

LUER CONNECTIONS

Johnson Pump

Hand-Held!

850 P.S.I.!

Features:

- Self priming, will siphon
- Pumps wide range of viscosities
- Adapts to standard luer fittings, accepts syringes on input side for prepackaged dispensing of fluids, adhesives, etc.

Material: Length: Width: Cross Sectio Pressure: Capacity/ST Fittings:	Up to 850 PSI		
Item #	Description		\$ ea
J-800	Johnson Pump	Call or access web	

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for pricing



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Company History

1971 MicroGroup® was founded in 1971 as MicroWELD, Inc. by William Hulbig and a partner, both former employees of Metal Bellows, Inc. MicroWELD initially began business as a micro-welding job shop, which performed intricate and complex TIG welding of small diameter precision tubing primarily for medical devices. The company quickly gained



a reputation for extremely high quality work and the ability to solve complex welding problems involving stainless steel and exotic alloys. MicroGroup was first in national direct marketing high technology contract manufacturing services.

1978 As the company continued to grow during the late 1970's, it recognized a substantial opportunity in stocking and producing small diameter tubing to expand its device fabrication sales while providing a more predictable source of revenue. Tubing uniquely enabled the company to provide additional value to its customers while enhancing and stabilizing its revenues. With this addition, customers could procure tubing and have it fabricated at one location with exceptionally short lead times. The concept of continually looking to expand the breadth of products and services to its customers has been and continues to be the central focus of MicroGroup's "Diversity By Design" strategy. Hulbig purchased his partner's interest in the company.

During the 1980's, the Company broadened its scope of in-house processes and services and added tools to enable customers to do some of their own prototyping – technologically advanced cutting methods, laser welding, and superior finishing and cleaning methods. In addition, it began distributing third party valves and fittings. Customers could combine these components with the company's tubing products to create finished products. MicroGroup was first to use informational tabular ads in Thomas Register.

- 1983 The company purchased a 37,000 SF facility in Medway, MA.
- 1985 MicroGroup became the first Thomas Register super-advertiser.

Hulbig bought the Macintosh Division of Desktop Software to provide state-of-the-art information systems mandatory to grow MicroGroup. Incorporated as 1stDESK* Systems, Inc., and it operates as independent corporation.

- **1990** MicroGroup concluded that the tubing market was declining at such an accelerated pace it would be unable to grow sufficiently without becoming a production manufacturer verses historically being a low volume specialty job shop.
- 1992 Hulbig founded EngineersEXPRESS® to sell products other than tubing to MicroGroup's customer base and to diversify into other markets. Products included the MINITUL® small tool line previously sold by MicroGroup, shaft couplings, and miniature valves and fittings. It was a visionary idea, but ahead of its time due to a lack of marketing technology (e.g. Internet/ e.commerce) which resulted primarily in expanding MicroGroup's customer base and securing itself as the dominate supplier of luer fittings.
- **1993** 1stDESK was commissioned to create a next generation real-time database for MicroGroup.
- 1996 MicroGroup received ISO 9002 registration.
- 1998 A "Build It And They Will Come" philosophy resulted in a significant expansion into CNC micro-machining, a 42,000 SF plant expansion, and \$6,000,000 in capital expenses. MicroGroup could exponentially slash lead times compared to all other suppliers and competitors – from months to weeks, weeks to days, days to hours, providing it with a substantial competitive advantage. The new facility would allow the company to focus on high volume production work for the first time.
- 1999 MicroGroup is swamped with first-time jobs for preferred accounts, considers future growth through acquisitions, became FDA registered, continues to enhance its quality, image, and dominance within the medical industry.
- 2000 MicroGroup seeks ISO-EN-46002 (medical device specific) registration continuing to enhance its quality and image within the medical industry.

Manufacturing bookings show an exciting transition from "Our Work" based on exotic technology with a high capital costs needed to purchase expensive equipment, to generating vertical business within "Our Customer," thereby offering more services to satisfy the customers' needs, both exotic and traditional. Most new business is being generated for long term production components and assemblies where it has truly "partnered" with the customer. The new state-of-the-art micro-machining capability dramatically expanded MicroGroup's unmatched breadth of products and services and expected to contribute substantially to the company's growth.



Glass Borosilicate Syringes

Made of durable borosilicate glass. Precision ground

	\$ ea	Hub	Graduation	Size	Item #
Call or	lale Luer-Lock	Ni-Plated Brass Ma	.01 ml	1 ml	GL 1
access	Slip	Glass Male Luer-S	.10 ml	2 ml	GT 2
web fo	lale Luer-Lock	Ni-Plated Brass Ma	.10 ml	2 ml	GL 2
pricing	lale Luer-Slip	Ni-Plated Brass Ma	.10 ml	2 ml	GM 2
. 1	Slip	Glass Male Luer-S	.20 ml	5 ml	GT 5
	lale Luer-Lock	Ni-Plated Brass Ma	.20 ml	5 ml	GL 5
	lale Luer-Slip	Ni-Plated Brass Ma	.20 ml	5 ml	GM 5
	Slip	Glass Male Luer-S	1 ml	10 ml	GT 10
	lale Luer-Lock	Ni-Plated Brass Ma	1 ml	10 ml	GL 10
	lale Luer-Slip	Ni-Plated Brass Ma	1 ml	10 ml	GM 10
	Slip	Glass Male Luer-S	1 ml	20 ml	GT 20
	lale Luer-Lock	Ni-Plated Brass Ma	1 ml	20 ml	GL 20
	lale Luer-Slip	Ni-Plated Brass Ma	1 ml	20 ml	GM 20
	Slip	Glass Male Luer-S	1 ml	30 ml	GT 30
	lale Luer-Lock	Ni-Plated Brass Ma	1 ml	30 ml	GL 30
	lale Luer-Slip	Ni-Plated Brass Ma	1 ml	30 ml	GM 30
	Slip	Glass Male Luer-S	1 ml	50 ml	GT 50
	lale Luer-Lock	Ni-Plated Brass Ma	1 ml	50 ml	GL 50
	lale Luer-Slip	Ni-Plated Brass Ma	1 ml	50 ml	GM 50
	Slip	Glass Male Luer-S	5 ml	100 ml	GT 100
	lale Luer-Lock	Ni-Plated Brass Ma	5 ml	100 ml	GL 100
	lale Luer-Slip	Ni-Plated Brass Ma	5 ml	100 ml	GM 100

Disposable Poly Plastic Syringes

 Disposat Economi Non-toxic 	cal		 Laboratory Industrial Scientific 	Call for box quantity pricing
Item #	Size	Graduation	Туре	\$ ea
5001-DV	1 ml	.10 ml	Male Luer-Slip	Call or
5002-DV	2 ml	.20 ml	Male Luer-Slip	access web
				400000 1100

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Call or	Male Luer-Slip	.10 ml	1 ml	5001-DV
access web	Male Luer-Slip	.20 ml	2 ml	5002-DV
for pricing	Male Luer-Slip	.10 ml	5 ml	5005-DV
ior pricing	Male Luer-Slip	.20 ml	10 ml	5010-DV
¥	Male Luer-Slip	.20 ml	20 ml	5020-DV

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CUSTOM TUBING



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Tubing

Abrasive Bead Blasting Abrasive Slurry Cut-Off & Deburr, Laser Deburring, Electrochemical Drawing EDM, Ram EDM, Wire Electropolishing Etching, Chemical Grinding, Centerless Grinding, Centerless CNC Honing Hydrogen Furnace Knurling, Laser Machining, General Passivating Perforating Pipe Polishing, Belt Sawing, Abrasive Sawing, Cold (Milling) Sawing, Electrochemical Sawing, High Speed Carbide Straightening Tubing, Beverage Tubing, Cable Crimp Tubing, Capillary Tubing, Carbide Tubing, Catheter Tubing, Chromatographic Tubing, Custom Tubing, Cut & Deburred Tubing, Fractional Tubing, Hypodermic Tubing, Layered Tubing, Manufactured Types Tubing, Medical Tubing, Metric Tubing, Multi-lumen Tubing, Round Tubing, Shaped Tubing, Specifications Tubing, Stent Tubing, Surplus Tubing, Telescoping Tubing, Tolerances Tumbling, Vibratory & Barrel Turning, CNC Vacuum Stress Relieving

Custom Products

Assemblies, Aircraft & Aerospace Assemblies, Bellows Assemblies, Carbide Assemblies, Exotic Alloys Assemblies, Medical & Dental Assemblies, Stainless Steel Assemblies, Titanium Assemblies, Tubing Bellows, Metal Belts, Metal Blades, Surgical Blades, Tubular Bone Screws Catheters & Stents Fasteners Fittings, Miniature Fittings, Tubular Machined Springs Manifolds, Miniature Medical Devices Needles Perforated Tubing Shaft Couplings Stamping & Punching Tubing Components Tubing Components Valves, Miniature Wire Forms

Contract Services

Brazing & Soldering Hydrogen Furnace Induction Micro-Torch Vacuum Furnace

Cut-Off & Deburring

Abrasive Bead Blasting Cut-Off & Deburr, Laser Deburring, Abrasive Slurry Deburring, Electrochemical EDM, Ram EDM, Wire Electropolishing Sawing, Abrasive Sawing, Cold (Milling) Sawing, Clectrochemical Sawing, High Speed Carbide Tumbling, Vibratory & Barrel Turning, CNC

Drawing & Straightening

Drawing Bright Annealing Straightening

Engineering & Quality

Design Review Inspection Project Management Quality Control Registrations, ISO & FDA SPC Testing, Metallurgy Testing, Pressure Testing, Tensile

Tooling Finishing

Abrasive Bead Blasting Cleaning, Catheter Cleaning, Filtered Ultrasonic Electropolishing Etching, Chemical Laser Engraving Packaging Passivating Pyrolyzation Tumbling, Vibratory & Barrel

Grinding & Polishing

Electropolishing Grinding, Centerless Grinding, Centerless CNC Grinding, CNC Honing Needles Polishing, Belt Surgical Blades

Heat Treating

Hydrogen Furnace Induction Heating Vacuum Oven

Specialty Tools

Benders Blades, Cut-Off Saw Brushes, Deburring Brushes, Hand, Stainless Steel Brushes, Stem, Abrasive Brushes, Stem, Miniature Brushes, Stem, Stainless Steel Brushes, Wheel, Abrasive Brushes, Wheel, Stainless Steel Flexhone® Flexible Hones Lubricants Saws, Cut-Off

Machining, CNC

EDM, CNC Ram EDM, CNC Wire Grinding, CNC Laser, CNC Milling, CNC Prototyping, CNC Turning, CNC

Machining, Electrochemical

Deburring, Electrochemical EDM, Ram EDM, Wire Electropolishing Grinding, Electrochemical Sawing, Electrochemical

Machining, General

Prototype Production

Machining, Laser

Cut-Off & Deburr, Laser Cutting, Laser Drilling, Laser Knurling, Laser Machining, Laser

Perforating, Metals

Cutting, Laser Etching, Photo Perforating, Tubing Punching Ram EDM Stamping

Stamping & Punching

Cutting, Laser Foil & Sheet, Perforated Products, Foil & Sheet

Surface Abrading

Abrasive Bead Blasting Etching, Chemical Knurling, Laser

Tube Forming

Closures End Forming Flaring, Tube Roll Forming Swaging Tube Bending Tube Forming

Welding

Welding, Laser Welding, MIG Welding, Plasma Welding, Resistance (Spot) Welding, TIG

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Dispensing Bottles Dispensing Needles Dispensing Tips Fittings, Medical Fittings, Miniature Fittings, Tubular Fittings, Tubular Inspection Gages, Luer Manifolds, Miniature Pumps Syringes, Glass Syringes, Plastic Valves, Miniature

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BLADES

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MINITUL® Model - 500 Small Diameter Cut-Off Saw



The easy-to-use MINITUL® Model-500 Cut-Off Saw is a portable tool for small diameter cutting requirements. This solidly built saw comes assembled and is ready to perform efficiently on a variety of materials from aluminum to stainless steel. 90 Day Warranty

Features

- Cuts lengths from 1/16"
- Cuts with Minimal Burr
- Mitres to 30°
- Easy Blade Changes
- Portable 115v AC
- Cuts to 1/2" Cross Section .
- **Double-Acting Vise**
- Cut to +/- .005" Tol.
- Positive Drive Belt
- Economical
- 2 Free BLADES (5-080-030A)

A	pplications
•	Aluminum

- Brass •
- Copper Glass
- Plastic
- •
- Stainless Steel •
- Most Materials
- Composites •
 - **Braided Cables**
 - Coax
- · Armored Cable

Item #	Description	\$ ea.
Mod500	Model 500 Miniature Cut Off Saw	Call or access web for pricing

•

Tube Cutter

Applications:

- Stainless steel
- Monel •
- Copper •

- Titanium
 - Other tubing applications
 - Brass

Item #	Description	\$ ea.
RR274	Tube Cutter for 1/8" to 1 1 /8"	Call or
	OD Tubing	access
RR105	Optional - Tube Cutter with	web for
	SKH Cutting Wheel	pricing
RR374	Tube Constrictor and Cutter	<i>پ</i> ارس
	Combo for 1/8" to 1 1/8" OD	V

* Prices subject to change without notice.



Sec.	Stock Tubing - 24 Hours	Hypodermic Medical Grade Pipe Fractional Metric	Need quality small diameter stainless steel tubing, fast?
			Call the industry leaders for over 25 years –
and in the	Custom Tubing - 5 Days	Round Shaped	ioi over 25 years –
	Short Lead Time Mini-mill Small Quantities Welcome	Composites Drawing Grinding	MicroGroup 1-800-ALL-TUBE

PRICING · BIDDING · DELIVERY

Model - 500 Saw & Other Abrasive Cut-Off Blades



EngineersEXPRESS sells a wide variety of saw blades for most applications and requirements. The following is a comprehensive listing of our stocked blades. However, if you don't see what you need listed, please call and we'll find it.

	Custom Blades Available	Dia.	Grit /# Teeth	Thickness	Type	Arbor Size	Alum < 1/4"	Alum > 1/4"	Brass < 1/4"	Brass > 1/4"	Copper < 1/8"	Copper > 1/8"	Glass Plastics < 1/8"	Plastics > 1/8"	Steel Stainless	Steel	Mood	\$ ea
Item #	General Purpose Saw Blades		_						_		_		_			_		
4-240-013A 4-120-016A	Non-Reinforced Rubber Abrasive Blade with Special Mixed Abrasive Sizes for minimum burr. Most commonly used for cutting any steels up to 1/2" diameter.	4	240 120	013 016	A A	1/2 1/2			•	•					•	•		Call or access
5-120-015A	Non-Reinforced Rubber Abrasive Blade. Recommended for cutting metals when #5-80-030 causes motor to labor excessively or when burrs are unacceptable. The blade is somewhat fragile and used for very light wall to 1/2" diameter.	5	120	015	A	1/2			-	-					•0	•0	,	web for pricing
4-90-025A	Non-Reinforced Rubber Abrasive Blade. Rugged blade cuts metals, reduces motor load. Best blade if used only occasionally), due to rugged construction, to be used on most stock over 3/8" dia.	4	90	025	A	1/2			•	•					•	•	Γ	+
4-060-030AR	Heavy Duty Reinforced Resin Abrasive Blade Can be used for cutting	4	60	030	А	1/2									•	•		
5-060-030AR	Titanium	5	60	030	А	1/2									•	•		
5-080-030A	Heavy Duty Non-Reinforced Rubber Abrasive Blade. Similar to 4-90-025A	5	80	030	А	1/2			•	•					•>	••		+
6-080-030A	The best all purpose blade. For heavy cuts.	6	80	030	А	1/2;5/8			•	•					•>	••		
7-080-030A		7	80	030	А	1/2;5/8			•	•					•>	•>		
5-080-060A	For extra-heavy cuts.	5	80	060	A	1/2			•	•		T			•	•	T	+
5-046-060AR	Heavy Duty Reinforced Resin Abrasive Blade. Similar to 4-90-025A For heavy cuts.	5	46	060	A	1/2			•	•	T							1
4-SPL-009S	Non-Reinforced Rubber/Silicon Carbide Blade. Silicon abrasive allows this blade to cut through very small diameter hypodermic tubing, drill blanks and glass; However, this blade requires extreme care in handling to prevent breakage since it is only .009" thick. Use with a Boelube [®] .	4	-	009	S	1/2						a	>					
4-120-025S	Non-Reinforced Rubber/Silicon Carbide Heavy Duty Blade for cutting glass, ceramics, and thermocouple cable. Should be used with Boelube [®] .	4	120	025	S	1/2					Τ	0	>					
5-150-015S	Non-Reinforced Rubber/Silicon Carbide Heavy Duty Blade for cutting glass, ceramics, and thermocouple cable. Should be used with Boelube [®] .	5	150	015	S	1/2						0	>					
4-028-024HS	High-Speed Steel Blade.Used for plastics and wood without lubricant.	4	28	024	HS	1/2	0	0	•		0	с						+
5-028-024HS	Excellent for cutting copper, aluminum and brass. Use with a Boelube [®] . except on brass (cut dry).	5	28	024	HS	1/2	0	0	•		0	С						
4-010-030HG	Hollow-Ground High-Speed Steel Blade. Used on larger sections of soft	4	10	030	HG	1/2	0	0	•		0			•		•		+
5-010-030HG	metals and wood due to hollow ground side which prevents jamming in cut. Excellent for cutting copper, aluminum and brass. Should be used with Boelube [®] , except on brass (cut dry).	5	10	030	HG	1/2	0	0	•		0			•		•		
7-600-015A	Non-Reinforced Rubber Abrasive Blade with Fine Abrasive	7	600	015	А	22mm									•	•		\top
7-600-020A	Sizes for Minimum Burr. Most commonly used for cutting any steels up to1/2" diameter.	7	600	020	А	22mm									•	•		
7-220-030A	*Italicized part numbers are	7	220	030	А	5/8									•	•		
7-240-015A	for Model 660 not Model 500 Saw. Customs Available!	7	240	015	А	5/8									•	•		
7-320-020A		7	320	020	А	5/8									•	•		
MK-200	Premium MK-200 Wet Cutting Blades (for cutting tile, limestone, marble, glass and blocks.)	7			D	5/8						0	>					¥

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We also carry other size blades up to 12" diameter, call for availability.

* Prices subject to change without notice.

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DUO-MITE Industrial Bending Kit

Item #

Hand Bender



50000	Duo-Mite [®] Hand Bender Kit Gauge and Pin 3/16" Diameter Pin 1/4" Diameter Pin 1/2" Diameter Pin 1" Diameter Circle Sharp Angle Die Form Pin Follower	Call acce we fo. prici
54000	Jewelry Kit Pivot Lock Handle Delrin Follower Pin Bend Stop Pin Allen Wrench Narrow Jaw Faces (2) Jaw Face Pad 3/8" Diameter Pin 1/4" Diameter Pin Ring Shank Dies (4) Sharp Angle Die Steel Dies (2) Delrin Dies (2) Gauge 1/2" Pin (2) Form-Matic Handle Tapered Jaw Face	
55000 Best V	Value Same as #50000 Except Includes Vari-Vise an Pivot Lock For Production Jobs and Small Par	

DUO-MITE Kits

\$ ea

Description

DUO-MITE Accessories

Circle Pins

Item #	Description	\$ ea
51002	1/8" Diameter Pin	Call or
51003	3/16" Diameter Pin	access
51004	1/4" Diameter Pin	web
51006	3/8" Diameter Pin	for
51352	1/2" Diameter Pin	pricing

Circle Dies (1/2" ID)

Item #	Description	\$ ea
51012	3/4" Diameter Circle	Call or
51014	7/8" Diameter Circle	access
51016	1" Diameter Circle	web
51018 51019	1 1/4" Diameter Circle (Steel) 1 1/4" Diameter Circle (Delrin)	for
51020	2" Diameter Circle51003	pricing
51022	2 1/4" Diameter Circle	1
51025	2 1/2" Diameter Circle (Steel)	
51026	2 1/2" Diameter Circle (Delrin)	
51028	2 3/4" Diameter Circle	
51030	3" Diameter Circle	1
51040	4" Diameter Circle	V

Circle Loops (for hand forming)

Item #	Description	\$ ea
51050 51060 51070 51080	5" Diameter Circle 6" Diameter Circle 7" Diameter Circle 8" Diameter Circle	Call or access web for pricing

Close Follower (for best results use with #53100 handle)

Item #	Description	\$ ea
51200	Close Follower (for bending small wire forms)	Call or access web for pricing

Handles

Item #	Description	\$ ea
53100	Form-Matic Handle	Call or
53115	Delrin Follower	access
54500	YR Handle	web
54501	YRT Handle - Optional	for
		pricina

Miscellaneous

Item #	Description	\$ ea
52000	Edgebending Kit	Call of
53008	Bench Bracket	acces
53110	Small Bracelet Die (Child's) 5"-5 1/2"	web
53120	Medium Bracelet Die (Lady's) 5 3/4"	
53125	Large Bracelet Die (Men's) 6"-6 1/2"	for
60100	Tube Bending with YRT Tooling,	pricin
60200	1/16, 1/8, 3/16, 1/4" tool set consisting of 4 groove jaw and follower roll. 3/4" centerline radius. Tube Bending with YRT Tooling, 3/32, 5/16, 3/8 tool set consisting of 3 groove jaw and follower roll - 3/4" centerline radius.	↓

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SPEED – the MicroGroup[®] Advantage PRICING · BIDDING · DELIVERY

Red Goo #2

Red Goo #2 is an incredible oil lubricant developed when MicroGroup was researching new tube drawing compounds. Red Goo #2 multiplies tool life by significantly reducing heat on all metals. Red Goo #2 as the name implies is a heavy, sticky lubricant usually applied directly to a tool.

Applications:

Item #

RED - 1/2

RED - 4

RED - 32

RED - 64

RED - 128

- Spinning
- Machining
- Swaging

Description

1/2 oz.

4 07.

1 qt.

1/2 gal.

1 gal.

Coining

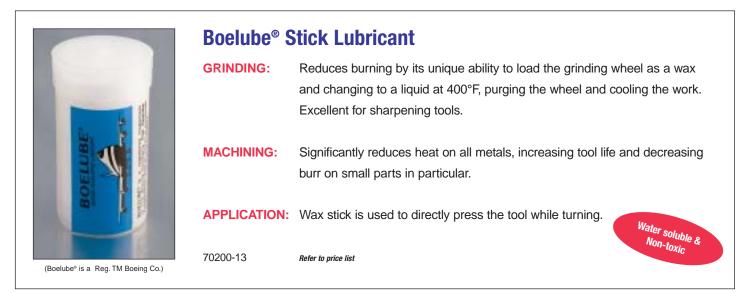


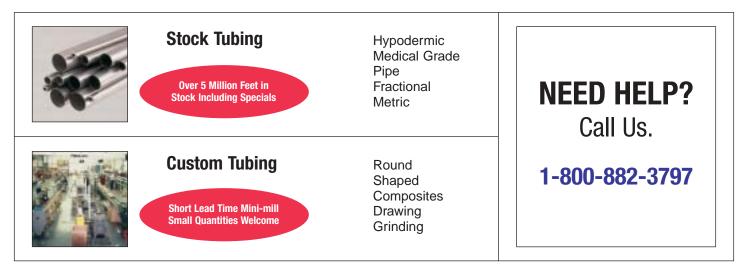
for

pricing

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The Use of Industrial Brushes

Wheel Brush

The most widely used is called the standard wheel brush and the most popular diameters are 6 and 8 inch, although they are made anywhere from 3 to 15 inch. MicroGroup carries a wide assortment of sizes to select from. They come in many wire sizes depending on the work piece and the type of finish that you want. The wire fill is invariably CRIMPED. Crimping is done for mainly two purposes. The first is to make the wires stand apart form each other, and the second is to absorb the flexing and the vibrations as well as to help prevent wire fatigue and wire breakage. Be sure to investigate all of the elements that you need before ordering a very inexpensive brush.

When ordering brushes you should always pay attention to the length of trim, which is the length of the wire from the hub, and also the running face width. The running face width is the width of the brush when it is in operation and normally is a different dimension than when you get it out of the box. It is very important to reverse the brush from time to time so that the brush is then running in the opposite direction. This will extend the life of the brush and improve its cutting action. They may also be dressed in the same manner as a grinding wheel. For maximum performance a wheel brush should be operated at the highest possible safe speed within its quoted safe speed limits and the lightest possible pressure being applied by the work piece to the brush face. Your best performance should be with a soft brush. But if the cutting action required is severe or if the brush is not cutting fast enough, then you must switch to a coarser wire or to a shorter trim. Wheel diameters are important because of surface speeds. With a 3,450 RPM motor, a 4" diameter brush has a speed of 3,600 linear feet per minute (LFM). A 6" brush 5,400 LFM, a 8" diam. LFM, a 10" diam. 9,000 LFM, a 12" diam. 11,000 LFM and a 15" diam. brush 13,500 linear feet per minute. MicroGroup's wide assortment of wheel brushes assures the right tool for any job.

Narrow Face Wheel Brush

The narrow face wheel brush is normally one with a much longer trim which is used against an irregular surface enabling the wire to get down into the crevices. The longer trim is also used quite often for polishing because of the softer brushing action. As with all wheel brushes, you should use the largest diameter spindle possible because with a large wheel brush at the proper RPM, a great deal of force is exerted at its periphery.

Tampico Wheels

Tampico used to be the standard in the polishing trade. A fibre from a cactus type plant that grows in northern Mexico, it is tough as well as resistant to oils and heat. Treated tampico (the wheel is coated with a sticky type of varnish that will hold dry abrasives) also polishes such items as chromed parts, eye-glass frames, etc.

Abrasive Impregnated Nylon Wheels, etc.

Nylon mixed with abrasive and then extruded gives a filament that also polishes well. At the present there are ten sizes of filaments extruded, with fine grit in the small diameters (500 grit in .018 nylon), and coarse grit in the large diameter filaments (80 grit in .040 nylon). These are available in silicon carbide or aluminum oxide. Maximum safe free running speeds are about 3600 surface feet per minute. It's important to remember that the bristle tips are set hot, the nylon will melt and you may also have some nylon contamination on the part.

Copper Center Wheel Brushes

Copper centers are small wheel brushes from 1" to 4" in diameter. They usually have copper centers and are normally available from 1/4" to 5/8" arbor holes, depending upon the diameter. One of our major customers uses 1" to 13/4" copper centers with three or four of them stacked together on a speed controlled air drill for cleaning oil well tool bits prior to rewelding the hard facing. Small diameters in this type of work do have the advantage of being much easier to control by the operator, as the rotary motion does not have the same tendency to push itself away from the work area as larger diameters. These also make excellent tube brushes and can be stacked together or spaced apart by putting washers in between the brushes in order to reach an area in which dirt, scale, and other things can accumulate. These copper centers come in higher tempered carbon wire, stainless steel, nylon, tampico, and silicon carbide or aluminum oxide impregnated nylon.

Hand Scratch Brushes

These are available in many variations, which include normal long curved handle or shoe handle, in three or four row widths, 19 row lengths and variable trim lengths. They are available in bronze for non-sparking operations, and in nylon. One of our most popular is a small toothbrush-type with a stainless steel handle and fill wire, which is very useful in stainless steel welding, cleaning of threads, and a variety of other applications. Increasingly, plastic handles are used as a cost-efficient alternative to wood.

Tube Brushes

As the name implies, these are for tubes or cylinders and are not what some engineers like to call a bottle brush. These are cleaning tools and are available in almost any size of wire in carbon steel, stainless steel or nylon, etc. They come in almost any length of handle, with ring handles or loop handles, whichever fits your particular operation and is easier for your operator to use. It is easy to engineer this brush type to your particular job, saving you time and labor. One of the greatest fallacies is that you need one that is grossly oversized, or it is not going to clean well. Remember that the tips of the brush are the cutting tools even in a tube brush. Another great fallacy is the preference of a very long brush part. We list them in the catalog as balanced brush, because usually only the first third or half of the brush does the cleaning. A long brush part will only give you a tool which creates a lot of friction and, therefore, is very difficult to use. In this particular area brush terminology is very simple. Everybody in the world knows what a 2×4 is and to order, specify a 2×4 eight feet long in fir, for example.

The standard brush terminology in the tube brush field is the diameter by the length of the brush part by the length overall. Therefore, a 2 x 4 x 8 will mean a brush 2" in diameter, 4" of brush part and 8" overall. Also specify what type of fill you want, whether it is carbon steel, stainless steel or nylon, or natural bristle or abrasive impregnated nylon. Next, pick out a the size of filament that is going to do the job you need, whether it is cleaning, deburring, or finishing. Finally, order it by its correct size. These tube brushes come in all varieties, from miniatures on up. As for the wires in the brush itself, the tips of the stainless have a tendency to work harden. The stainless stem, in being twisted. work hardens very quickly, and so you will have a stem wire which is extremely hard and relatively flexible. The majority are made with galvanized stem wire with a high tensile strength. but with a nylon tube brush there is a tendency for the ends to become sharp after much use, reducing its cleaning power. Nylon can be used in almost all cleaning solvents and mild acids without damage. For very fine and delicate work, natural bristle and pig bristle is important because it won't scratch, and the ends of the bristle will split or flag and are excellent in picking up and removing small particles of dust. The natural bristles will not pick up and carry static electricity as the nylon brush is apt to do. MicroGroup's wide assortment of these brushed ensures you will find one that is the perfect match for your job.

Four Common Factors Governing the Horsepower Necessary to Drive a Power Brush

- 1. Brushing pressure required.
- 2. Resistance between work surface and brush (trim length).
- 3. Speed of the brush.
- 4. Brush face width.

For exact specifications, please refer to www.microgroup.com or call your MicroGroup representative.

For further information on industrial brushes - refer to www.microgroup.com

PRICING · BIDDING · DELIVERY

Flexhone[®] Flexible Hones & Accessories



The FLEX-HONE[®], a resilient, flexible honing tool with a soft-cutting action produces a controlled surface condition unobtainable by any other method. A construction which includes abrasive (points) globules independently suspended, assures the FLEX-HONE[®] to be self-centering and self aligning to the bore, as well as self-compensating for wear.

The particular type of Flex-Hone crosshatch is extremely efficient in providing a multiplicity of oil grooves or valleys for oil retention, as opposed to the often unidirectional or uneven valleys common to the conventional type of rigid hone. A crosshatch that usually remains as the cylinder wall has been wear-reduced by the Flex-Hone. This hone will deburr a peaked finish very rapidly without the danger of much metal removal, and will aid in rapid ring seating, oil control, seepage in hydraulics, longer ring or seal life. It has also been approved by more major original equipment manufacturers than probably any other single tool of its kind.

The Flex-Hone[®] tool might effectively deburr your cross holes, put a radius on those ports and finish your cylinder in the one operation. It is self-centering, self-aligning, self-compensating for wear – and does not require elaborate set-up and may be used by a novice worker giving you the same consistent finish. Depending upon your particular job, it might give you 150 cylinders per hone or as high as 2,200.

BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	.157 .177 .188 .197 .216 .250 .276 .315 .355 .355 .375 .394 .433 .472 .500 .750 .750 .750 .750 .750 .750 .750	$\begin{array}{r} 4.0\\ 4.5\\ 4.8\\ 5.0\\ 5.5\\ 6.4\\ 7.0\\ 8.0\\ 9.5\\ \hline 10.0\\ 12.0\\ 12.0\\ 12.0\\ 12.7\\ 14.0\\ 15.9\\ 19.0\\ 20.0\\ 22.2\\ 25.4\\ 28.6\\ 31.7\\ 34.9\\ 38.1\\ 38.1\\ \end{array}$	6.0 6.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8	Call or access web for pricing	Call or access web for pricing	Call or access web for pricing	Call or access web for pricing	GBD 9" GBD 9-1/2" GBD 10" GBD 10-1/2" GBD 11" GBD 12" GBD 12" GBD 13" GBD 13" GBD 14" GBD 14" GBD 15" GBD 16" GBD 16" GBD 17" GBD 18" GBD 17" GBD 20" GBDX 21" GBDX 22"	9.000 9.500 10.500 11.500 11.500 12.500 13.500 13.500 14.000 15.000 15.000 16.000 17.000 19.000 20.000 21.000 22.000	241.1 253.8 266.5 279.2 291.9 304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00	ac N 1	ell or cess veb for icing		Call o. acces. web for pricing	s	acc W fo	ll or cess reb cor cing		Call c acces web for pricin	ss)
BC 3/16" BC 5.mm BC 6.4m BC 7.mm BC 8mm BC 9mm BC 9.5mm BC 10mm BC 11mm BC 11mm BC 12" BC 14mm BC 1/2" BC 14mm BC 5/8" BC 14mm BC 3/4" BC 20mm BC 7/8" BC 1-1/8" GB 1-1/4" BC 1-1/2"	.188 .197 .216 .250 .276 .315 .355 .394 .433 .500 .552 .625 .709 .750 .788 .875 .1000 1.125 1.250 1.375 1.250 1.500 1.625	4.8 5.0 5.5 6.4 7.0 8.0 9.0 9.5 10.0 11.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	6.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8	web for	web for	web for	web for	GBD 10" GBD 10-1/2" GBD 11-1/2" GBD 12-1/2" GBD 12-1/2" GBD 13 1/2" GBD 13 1/2" GBD 14" GBD 16" GBD 16" GBD 16" GBD 18" GBDX 19" GBDX 20" GBDX 21"	10.000 10.500 11.000 11.500 12.000 12.500 13.500 13.500 14.000 15.000 16.000 17.000 19.000 20.000 21.000	253.8 266.5 279.2 291.9 304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00	и 1	veb for		web for		w fi	eb or		web for)
BC 5mm BC 5.5mm BC 6.4m BC 7mm BC 8mm BC 9mm BC 9.5mm BC 10mm BC 12mm BC 12mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 14mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2"	.197 .216 .250 .276 .315 .355 .355 .375 .394 .433 .472 .552 .625 .709 .750 .788 .875 1.200 1.1000 1.125 1.250 1.375 1.500 1.500	5.0 5.5 6.4 7.0 9.0 9.5 10.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	for	for	for	for	GBD 10-1/2" GBD 11" GBD 11" GBD 12" GBD 12-1/2" GBD 13" GBD 13" GBD 13" GBD 13" GBD 15" GBD 15" GBD 15" GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20"	10.500 11.000 11.500 12.500 13.000 13.500 14.000 15.000 16.000 17.000 18.000 20.000 21.000	266.5 279.2 291.9 304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00	1	for		for	g 	f	or		for	
BC 5.5mm BC 6.4m BC 7mm BC 8mm BC 9.5mm BC 10mm BC 12mm BC 12mm BC 12mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 18mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" BC 1-1/2"	$\begin{array}{c} 216\\ .250\\ .276\\ .315\\ .355\\ .375\\ .394\\ .472\\ .500\\ .552\\ .625\\ .709\\ .750\\ .788\\ .875\\ .1.250\\ 1.1000\\ 1.125\\ 1.250\\ 1.250\\ 1.500\\ 1.625\\ \end{array}$	5.5 6.4 7.0 8.0 9.5 10.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0					GBD 11" GBD 11-1/2" GBD 12-1/2" GBD 12" GBD 13 1/2" GBD 13 1/2" GBD 13 1/2" GBD 16" GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20" GBDX 21"	11.000 11.500 12.000 12.500 13.500 13.500 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000	279.2 291.9 304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00					g 					
BC 6.4m BC 7mm BC 7mm BC 9mm BC 95mm BC 10mm BC 11mm BC 12mm BC 12mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2"	250 276 315 355 375 394 433 472 500 552 625 709 750 750 788 1.000 1.125 1.250 1.375 1.375 1.500 1.625	6.4 7.0 8.0 9.5 10.0 11.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0					GBD 11-1/2" GBD 12-1/2" GBD 13" GBD 13" GBD 14" GBD 14" GBD 14" GBD 16" GBD 16" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	11.500 12.000 12.500 13.500 13.500 14.000 15.000 16.000 17.000 18.000 20.000 21.000	291.9 304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00 34.00					g 					
BC 7mm BC 8mm BC 9mm BC 9.5mm BC 10mm BC 12mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 14mm BC 5/8" BC 3/4" BC 2/8" BC 1" BC 1-1/8" BC 1-1/4" BC 1-1/2"	.276 .315 .355 .355 .375 .394 .433 .472 .500 .552 .625 .709 .750 .875 1.000 1.125 1.250 1.375 1.500 1.625	7.0 8.0 9.5 10.0 12.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0					GBD 12" GBD 12-1/2" GBD 13" GBD 13" GBD 14" GBD 15" GBD 15" GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	12.000 12.500 13.000 13.500 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000	304.6 317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00 34.00				-					-	
BC 8mm BC 9mm BC 10mm BC 11mm BC 11mm BC 1/2" BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1-1/8" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2"	.315 .355 .375 .375 .394 .433 .472 .500 .552 .625 .709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.625	8.0 9.0 9.5 10.0 11.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_	_ _	_ _		GBD 12-1/2" GBD 13" GBD 13 1/2" GBD 14" GBD 14" GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	12.500 13.000 13.500 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000	317.3 329.9 342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00 34.00		_		-					-	
BC 9mm BC 9.5mm BC 10mm BC 11mm BC 12mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 14mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2"	.355 .375 .394 .433 .472 .500 .552 .709 .750 .709 .750 .788 .875 1.000 1.125 1.375 1.500 1.500 1.625	9.0 9.5 10.0 11.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_	_ _	_ _		GBD 13" GBD 13 1/2" GBD 14" GBD 15" GBD 16" GBD 16" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	13.000 13.500 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000	329.9 342.6 355.3 380.7 406.1 431.5 <u>456.9</u> 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00 34.00		_		-					-	_
BC 9.5mm BC 10mm BC 11mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 18mm BC 5/8" BC 7/8" BC 1" BC 1-1/8" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2"	.375 .394 .433 .472 .500 .552 .625 .709 .750 .750 .750 .788 .875 1.000 1.375 1.500 1.500 1.625	9.5 10.0 11.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _	_ _		GBD 13 1/2" GBD 14" GBD 15" GBD 16" GBD 17" <u>GBD 17"</u> GBDX 19" GBDX 20" GBDX 21" GBDX 22"	13.500 14.000 15.000 16.000 17.000 18.000 19.000 20.000 21.000	342.6 355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 17.50 17.50 34.00 34.00 34.00		_		-			_		-	
BC 10mm BC 11mm BC 12mm BC 1/2" BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" BC 1-1/8" BC 1-1/2" BC 1-1/2"	.433 .472 .500 .552 .625 .709 .758 .778 .778 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.500	10.0 11.0 12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0					GBD 15" GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	15.000 16.000 17.000 18.000 19.000 20.000 21.000	355.3 380.7 406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 17.50 17.50 <u>17.50</u> 34.00 34.00 34.00		_		-			_		-	_
BC 12mm BC 1/2" BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2"	.472 .500 .552 .625 .709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.500 1.625	12.0 12.7 14.0 15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _			GBD 16" GBD 17" GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	16.000 17.000 18.000 19.000 20.000 21.000	406.1 431.5 456.9 482.2 507.6 533.0	17.50 17.50 <u>17.50</u> 34.00 34.00 34.00		_		-		_			-	_
BC 1/2" BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1-1/8" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2"	.500 .552 .625 .709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.500 1.625	12.7 14.0 15.9 18.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0		_ _	_ _		GBD 17" <u>GBD 18"</u> <u>GBDX 19"</u> <u>GBDX 20"</u> <u>GBDX 21"</u> <u>GBDX 22"</u>	17.000 18.000 19.000 20.000 21.000	431.5 456.9 482.2 507.6 533.0	17.50 <u>17.50</u> 34.00 34.00 34.00		_		-		_	_		-	_
BC 14mm BC 5/8" BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2"	.552 .625 .709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.500 1.625	14.0 15.9 18.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _		_ _	GBD 18" GBDX 19" GBDX 20" GBDX 21" GBDX 22"	18.000 19.000 20.000 21.000	456.9 482.2 507.6 533.0	17.50 34.00 34.00 34.00		-		-		_	_		-	_
BC 5/8" BC 18mm BC 3/4" BC 7/8" BC 1-1" BC 1-1/8" GB 1-1/4" BC 1-1/2" DBC 1-1/2"	.625 .709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.500 1.625	15.9 18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _	_ _	_ _	GBDX 19" GBDX 20" GBDX 21" GBDX 22"	19.000 20.000 21.000	482.2 507.6 533.0	34.00 34.00 34.00		-		-		_	_		-	_
BC 18mm BC 3/4" BC 20mm BC 7/8" BC 1-1/8" BC 1-1/8" BC 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	.709 .750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.625	18.0 19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _		_ _	GBDX 20" GBDX 21" GBDX 22"	20.000 21.000	507.6 533.0	34.00 34.00										
BC 3/4" BC 20mm BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	.750 .788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.625	19.0 20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _	_ _	_ _	GBDX 21" GBDX 22"	21.000	533.0	34.00										
BC 20mm BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	.788 .875 1.000 1.125 1.250 1.375 1.500 1.500 1.625	20.0 22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _	_ _	- -	GBDX 22"													
BC 7/8" BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	.875 1.000 1.125 1.250 1.375 1.500 1.500 1.625	22.2 25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0 8.0 8.0	_ _	_ _	_ _	- -		22.000												
BC 1" BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	1.000 1.125 1.250 1.375 1.500 1.500 1.625	25.4 28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0 8.0				1 1		23.000	583.8	34.00		1								
BC 1-1/8" GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	1.125 1.250 1.375 1.500 1.500 1.625	28.6 31.7 34.9 38.1 38.1	8.0 8.0 8.0			1		GBDX 23 GBDX 24"	23.000		34.00										
GB 1-1/4" BC 1-3/8" DBC 1-1/2" BC 1-1/2"	1.250 1.375 1.500 1.500 1.625	31.7 34.9 38.1 38.1	8.0 8.0					GBDX 25"	25.000		34.00										
BC 1-3/8" DBC 1-1/2" BC 1-1/2"	1.375 1.500 1.500 1.625	34.9 38.1 38.1	8.0					GBDX 26"	26.000		34.00										
BC 1-1/2"	1.500 1.625	38.1	50					GBDX 27"	27.000	685.3	34.00										
	1.625		J.U					GBDX 28"	28.000	710.7	34.00				-					-	
DC 1 E/0"			8.0					GBDX 29"	29.000	736.0	34.00										
		41.2	8.0					GBDX 30"	30.000	761.4	34.00										
	1.750	44.4	5.0					GBDX 31"	31.000	786.8	34.00										
	1.750	44.4	8.0	_ _	_ _	_ _	_ _	GBDX 32"	32.000	812.2	34.00										
	1.875	48.0 50.8	8.0 8.0					GBDX 33" GBDX 34"	33.000 34.000		34.00 34.00										
	2.000 2.000	50.8 50.8	8.0					GBDX 34 GBDX 35"	35.000		34.00										
	2.000	54.0	8.0					GBDX 35 GBDX 36"	36.000		34.00	'									
	2.125	53.9	5.0					ODDA 30	30.000	315.7	54.00										
	2.250	57.1	8.0																		
BC 2-3/8"	2.375	60.0	8.0					Grit Ty	nes						Gri	t Size	s				
DBC 2-1/2"	2.500	63.5	5.0					0	P00			pecia	lo			Standa			- Co.c	nial	
	2.500	63.5	8.0								3	pecia								ecial	
	2.625	67.0	8.0								20	40	60	80	120	180	240	320	400	600	800
	2.750	69.8	5.0					00 011000	0		v	v				V				V	~
	2.750	69.8	8.0					SC = Silicon	Carbide		Х	Х	Х	X	Х	х	хI	х	Х	X	Х
	2.875	73.0	8.0					AO = Alumin	um Oxide		X	х	х	X	х	X	x	х	X	X	Х
	3.000 3.000	76.1 76.1	8.0 8.0																		
	3.125	79.3	5.0	_ _	- -	_ _	- -	BC = Boron (Carbide		X	Х	Х	X	Х	Х	X	Х	Х	X	Х
	3.250	82.5	13.5					WC - Tupget	on Carbid	-	x	x	x	x	v		\sim	х			
	3.250	82.5	13.5					WC = Tungst		5	^	^	^	^	Х	X	X	^			
	3.500	88.8	13.5					(either 100%	01 50/50)												
	3.500	88.8	13.5					Z Grain = Alu	imina Zirc	onia			х	X	х	х	x	X		X	
	3.750	95.2	13.5																		
	3.750	95.2	13.5					No. 1525 (25	% Zirconia	a/75% Alumina											
	4.000	101.5	13.5					Levigated Alu	Imina		A.	ailabl	o in o	ovtra f	ino ar	it only					
	4.125	104.7	13.5					Levigated Alt				anabli	0 11 0	Aual	nie gi	it only					
	4.250	107.9 114.2	13.5	_	_ _	_ _	- -	Diamond			22	0/240	mes	h ava	ailable	for ex	perim	ental	i honi	ng	
	4.500 4.625	114.2	13.5 17.50					0.001												•	
	4.625	126.9	17.50					CBN			14	0/170	mes	n ava	allable	for ex	perim	ental	nonir	ng	
	5.500	139.6	17.50								1										
	6.000	152.3	17.50									_									
	6.500	165.0	17.50							S	pecia	IS A	vaila	able							
	7.000	177.7	17.50																		
	7.500	190.4	17.50													_	_	_			
	8.000	203.0	17.50						Abou	+ Othor E	lov	Ha	20	10	000	0.0	, D	rod			
	8.000	203.0	17.50	🖌	🖌	🖌	_ 🖌 _	ASK	ADUU	t Other F	Tex-	пυ	ne_	AC	CES	50r	ΓP	TUU	IUC	LS_	
GBD 8-1/2"	8.500	215.7	17.50	v —	V		v —		٨٠	ailable Fi	om	En	ain	0.01			EC	0			

All dimensions are measured in inches unless designated millimeters. Flexhone[®] is a trade mark of Brush Research.

Stock Stainless Steel Brushes

Crimped Wire Wheel Brushes

Copper Center Wheel Brushes

Thread Cleaning Brushes



Multi-Duty Narrow-Face							
Item #	Brush Dia	Wire Size	Arbor Hole	Trim Lgth	Face Width	Max RPM	\$ ea.
BDM-3S	3	.006	3/8,1/2	1/2	3/8	6000	Call or
	3	.0118	3/8,1/2		3/8	6000	access
BDM-4S	4	.006	3/8,1/2		3/8	6000	web
	4	.008	3/8,1/2		3/8	6000	for
	4	.0104	3/8,1/2		3/8	6000	pricing
	4	.0118	3/8,1/2		3/8	6000	,
BDM-6S	4 6	.014 .006	3/8,1/2 2	7/8 1-1/8	3/8 1/2	6000	
BDIVI-05	ь 6	.006	2	1-1/8		4500 4500	
	6	.008	2	1-1/8		4500	
	6	.0118	2	1-1/8		4500	
	6	.0110	2	1-1/8		4500	
BDM-8S	8	.006	2	1-1/2		4500	
22	8	.0104	2	1-1/2		4500	
	8	.014	2	1-1/2	1/2	4500	
BDM-10S	10	.0118	2	2-3/4	5/8	3600	
BDM-12S	12	.0104	2	3	11/16	3000	
<u>Standa</u>	ard D	uty N	lediur	n-Fa	ce		
BDA-4S	4	.014	2	5/8	7/8	6000	
BDA-6S	6	.006	2	1-1/8	7/8	4500	
	6	.008	2	1-1/8		4500	
	6	.0118	2	1-1/8		4500	
	6	.014	2	1-1/8		4500	
BDA-7S	7	.014	2	1-5/8		4500	
BDA-8S	8	.006	2	1-1/2		4500	
	8	.0104	2	1-1/2		4500	
	8 8	.0118	2	1-1/2		4500	
BDA-10S	8 10	.014	2 2	1-1/2		4500	
BDA-105	10	.006 .014	2	2-1/8 2-1/8			
Heerer	Dut			_			
Heavy-				9			
BDH-4S	4	.014	2	5/8	1-3/8		
BDH-6S	6	.006	2	1-1/8			
BDH-7S	7	.0118	2	1-1/8			
		.014	2	1-1/8			
BDH-8S	8	.006 .014	2 2	1-1/2 1-1/2			
			-	1 1/2	1 0,0		Ŧ

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<u>Wheel</u>					
Item #	Brush Dia	Arbor Hole	Wire Size	Max RPM	\$ ea.
C-1	1	3/8	.006	20000	Call or
C-1-1/4	1-1/4	3/8	.006	20000	access
C-1-3/8	1-3/8	3/8	.008	20000	web
C-1-1/2	1-1/2	3/8	.006	20000	
C-1-5/8	1-5/8	3/8	.008	20000	for
C-2	2	1/2	.006	20000	pricing
C-2	2	1/2	.008	20000	
C-2	2	1/2	.0104	20000	
C-2	2	1/2	.0118	20000	
C-2	2	1/2	.014	20000	
C-2-1/2	2-1/2	1/2	.006	20000	
C-2-1/2	2-1/2	1/2	.0104	20000	
C-2-1/2	2-1/2	1/2	.0118	20000	
C-2-1/2	2-1/2	1/2	.014	20000	
C-2-1/2	2-1/2	5/8	.006	20000	
C-2-1/2	2-1/2	5/8	.0104	20000	
C-2-1/2	2-1/2	5/8	.0118	20000	
C-2-1/2	2-1/2	5/8	.014	20000	
C-3	3	1/2	.006	20000	
C-3	3	1/2	.008	20000	
C-3	3	1/2	.0118	20000	
C-3	3	1/2	.014	20000	
C-3	3	5/8	.006	20000	
C-3	3	5/8	.008	20000	
C-3	3	5/8	.0118	20000	
C-3	3	5/8	.014	20000	
C-3-1/2	3-1/2	1/2	.006	20000	
C-3-1/2	3-1/2	1/2	.008	20000	
C-3-1/2	3-1/2	1/2	.0104	20000	
C-3-1/2	3-1/2	1/2	.0118	20000	
C-3-1/2	3-1/2	1/2	.014	20000	
C-4	4	1/2	.006	20000	
C-4	4	1/2	.008	20000	
C-4	4	1/2	.0104	20000	
C-4	4	1/2	.0118	20000	
C-4	4	1/2	.014	20000	
C-4	4	5/8	.006	20000	
C-4	4	5/8	.008	20000	
C-4	4	5/8	.0104	20000	
C-4	4	5/8	.0118	20000	V
C-4	4	5/8	.014	20000	V

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Butterfly	/ Brush	<u>ı - Wir</u>	<u>e Fill</u>		
Item #	Brush		Brush	Stem	\$ ea.
	Dia	Size	Part	Dia	
BS-1/4	1/4	.005	9/16	3/32	Call or
BS-5/16	5/16	.005	9/16	3/32	access
BS-3/8	3/8	.005	9/16	3/32	web
BS-7/16	7/16	.005	9/16	3/32	for
BS-1/2	1/2	.005	9/16	3/32	
BS-9/16	9/16	.005	5/8	1/8	pricing
BS-5/8	5/8	.005	5/8	1/8	1
BS-3/4	3/4	.005	5/8	1/8	
BS-7/8	7/8	.005	5/8	1/8	
BS-1	1	.005	5/8	1/8	4
BS-1-1/4	1-1/4	.005	5/8	1/8	V
Stem Br	ush - S	Series	#83		
Item #	Brush	Wire	Brush	OAL	\$ ea.
	Dia	Size	Part		
		.004	1-1/2	41/2	Call or
83-S250	1/4				
83-S312	5/16	.004	1-1/2	41/2	access
83-S312 83-S375	5/16 3/8	.004 .005	1-1/2	41/2	
83-S312 83-S375 83-S437	5/16 3/8 7/16	.004 .005 .005	1-1/2 1-1/2	41/2 5	web
83-S312 83-S375 83-S437 83-S500	5/16 3/8 7/16 1/2	.004 .005 .005 .006	1-1/2 1-1/2 1-1/2	41/2 5 5	web for
83-S312 83-S375 83-S437 83-S500 83-S562	5/16 3/8 7/16 1/2 9/16	.004 .005 .005 .006 .006	1-1/2 1-1/2 1-1/2 1-1/2 1-1/2	41/2 5 5 5 5	web
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625	5/16 3/8 7/16 1/2 9/16 5/8	.004 .005 .005 .006 .006 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4	41/2 5 5 5 5 5	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S750	5/16 3/8 7/16 1/2 9/16 5/8 3/4	.004 .005 .005 .006 .006 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4	41/2 5 5 5 5 5 5 5	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S625 83-S750 83-S875	5/16 3/8 7/16 1/2 9/16 5/8 3/4 7/8	.004 .005 .005 .006 .006 .008 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4 2	41/2 5 5 5 5 5 5 6	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S750 83-S875 83-S1000	5/16 3/8 7/16 1/2 9/16 5/8 3/4 7/8 1	.004 .005 .005 .006 .006 .008 .008 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4 2 2	41/2 5 5 5 5 5 5 6 6	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S750 83-S875 83-S1000 83-S1250	5/16 3/8 7/16 1/2 9/16 5/8 3/4 7/8 1 1-1/4	.004 .005 .005 .006 .006 .008 .008 .008 .008 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4 2 2 2-1/2	41/2 5 5 5 5 5 5 6 6 6	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S750 83-S750 83-S875 83-S1000 83-S1250 83-S1500	5/16 3/8 7/16 1/2 9/16 5/8 3/4 7/8 1 1-1/4 1-1/2	.004 .005 .005 .006 .006 .008 .008 .008 .008 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4 2 2 2-1/2 2-1/2	41/2 5 5 5 5 5 6 6 6 6	web for
83-S312 83-S375 83-S437 83-S500 83-S562 83-S625 83-S750 83-S875 83-S1000 83-S1250	5/16 3/8 7/16 1/2 9/16 5/8 3/4 7/8 1 1-1/4	.004 .005 .005 .006 .006 .008 .008 .008 .008 .008 .008	1-1/2 1-1/2 1-1/2 1-1/2 1-3/4 1-3/4 2 2 2-1/2	41/2 5 5 5 5 5 5 6 6 6	web for

Hand Scratch Brushes



Hand Brushes								
Item #	No of Rows	Handle Width	OAL	Handle	\$ ea.			
B-39S B-49S B-740 B-741 B-744 93A-S29 93A-S3 93A-S50 93-AP 93-AW 1685SS	75 00	1-1/8 1-1/8 1-1/8 1-1/8 1-1/8 1-1/8 1/4 3/8 1/2	14 14 14 10" 7-1/4 7-1/4 7-1/4 7-1/4 7-1/4 7-1/4	Curved Handle Curved Handle Curved Handle Curved Handle Lam. Wood Lam. Wood Lam. Wood Lam. Wood Poly Handle Wood Handle Galvanized	Call or access web for pricing			

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Tube Brushes

Brush Accessories



Cross Ho	le De	burrin	g - Se	ries #81	
Item #	Wire	Brush	Stem	OAL	\$ ea.
	Size	Part	Dia.		
81-A024	.003	1/4	.015	3	Call or
81-A032	.002	5/8	.016	3	access
81-A047	.003	3/4	.026	3	web
81-A054	.003	3/4	.026	3	
81-A063	.003	3/4	.026	3	for
81-A079	.003	3/4	.034	3 3 3	pricing
81-A094	.003	3/4	.043	3	1
81-A109	.003	3/4	.055	3	
81-A125	.003	1	.055	3	
81-A142	.003	1	.055	3	
81-A156	.003	1	.072	3	
81-A.172	.003	1	.072	3	
81-A189	.003	1	.072	3	
81-B-7/32	.003	1-1/2	.072	3 3	
81-B-1/4	.003	1-1/2	.110	3	
81-B-5/16	.004	1-1/2	.125	3 3	
81-B-3/8	.004	1-1/2	.160	3	
81-B-7/16	.004	1-1/2	.160	3	
81-B-1/2	.005	1-1/2	.160	3 3	
81-A-1mm	.002	5/8	.016		
81-A-1.5mm	.003	5/8	.026	3 3	
81-A-2mm	.003	3/4	.026	3	
81-A-2.5mm	.003	3/4	.043	3	
81-A-3mm	.003	1	.055	3	
81-A-3.5mm	.003	1	.055	3	
81-A-4mm	.003	1	.055	3	
81-A-4.5mm	.003	1	.072	3	1
81-A-5mm	.003	1	.072	3	
81-A-5.5mm	.003	1	.110	3	1
81-A-6mm	.003	1	.110	3	4
81-A-6.5mm	.003	1	.110	3	, v

Mandrel Mounted

Mandr	el M	ounted - Se	ries #	<u>82</u>	
Item #	Dia.	Fill	Shank	Thickne	ss \$ea
82C-427 82C-428		.005 cr. Stainless .005 cr. Stainless		single double	Call or access web for pricing
Mandr	el Mo	ounted Copy	per Ce	enter	
Item #	Brush Diam.		Face Width	Max RPM	\$ ea.
BMC-16 BMC-16	1-3/4 1-3/4		5/16 5/16	25000 25000	Call or access
BMC-16 BMC-20		.0118 .006	5/16 5/16	25000 25000	web for
BMC-20 BMC-20	2 2	.008 .0104	5/16 5/16	25000 25000	pricing
Mount	ed Fl	ared Wheel			
BMF-14 BMF-14 BMF-16 BMF-16 BMF-16 BMF-20 BMF-20 BMF-20	1-1/2 1-1/2 1-3/4 1-3/4 1-3/4 2 2 2	.008 .0104 .006 .008		25000 25000 25000 25000 25000 25000 25000 25000 25000	



Thru-H	ole Ste	m Brus	h - Ser	ies #84	
Item #	Brush	Wire	Brush	OAL	\$ ea.
84-S125	Dia 1/8	Size .002	LSD 11/4	8	Call or
84-S187	3/16	.002	11/2	8	access
84-S250	1/4	.004	2	8	web
84-S312	5/16	.004	2	8	for
84-S375	3/8	.004	2	8	pricing
84-S437 84-S500	7/16 1/2	.004 .005	21/2 21/2	10 10	pricing
84-S562	9/16	.006	21/2	10	
84-S625	5/8	.008	21/2	10	
84-S750	3/4	.008	21/2	10	
84-S875 84-S1000	7/8 1	.010 .010	3 3	12 12	
84-S1125	1-1/8	.010	3	12	
84-S1250	1-1/4	.010	3	12	
84-S1375	1-3/8	.010	3	12	
84-S1500 84-S1625	1-1/2 1-5/8	.010 .010	3 31/2	12 18	
84-S1750	1-3/4	.012	31/2	18	
84-S2000	2	.012	31/2	18	
84-S2250	2-1/4	.012	4	18	
84-S2500 84-S2750	2-1/2 2-3/4	.012 .012	4 4	18 18	
84-S3000	3	.012	4	18	
Closed	Hole S	tem Bru	ushes -	Series	#85
85-S2-125	1/8	.002	1	4	Call or
85-S3-125	1/8	.003	1	4	access
85-S156 85-S187	5/32 3/16	.003 .003	1 1	4 4	web
85-S219	7/32	.003	1	4	for
85-S250	1/4	.004	1-1/4	4-1/2	pricing
85-S281 85-S312	9/32 5/16	.004 .004	1-1/4 1-1/4	4-1/2 4-1/2	
	5/10	.004		4-1/2	
85-S344	11/32	.004	1-1/4	4-1/2	
85-S344 85-S375	11/32 3/8	.004 .004	1-1/4 1-1/4	4-1/2 4-1/2	
85-S375 85-S406	3/8 13/32	.004 .004	1-1/4 1-1/4	4-1/2 4-1/2	
85-S375 85-S406 85-S437	3/8 13/32 7/16	.004 .004 .004	1-1/4 1-1/4 1-1/4	4-1/2 4-1/2 4-1/2	
85-S375 85-S406	3/8 13/32	.004 .004 .004 .005	1-1/4 1-1/4	4-1/2 4-1/2	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562	3/8 13/32 7/16 15/32 1/2 9/16	.004 .004 .005 .005 .005	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625	3/8 13/32 7/16 15/32 1/2 9/16 5/8	.004 .004 .005 .005 .006 .008	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16	.004 .004 .005 .005 .006 .008 .008	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5 5 5	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625	3/8 13/32 7/16 15/32 1/2 9/16 5/8	.004 .004 .005 .005 .006 .008 .008 .008	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S812 85-S812 85-S875	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8	.004 .004 .005 .005 .006 .008 .008 .008 .008 .008 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 5 6 6	
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S625 85-S687 85-S750 85-S812 85-S875 85-S937	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S750 85-S875 85-S875 85-S875 85-S937 85-S1000	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16 1	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6	
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S625 85-S687 85-S750 85-S812 85-S875 85-S937	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2	4-1/2 4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S625 85-S687 85-S750 85-S812 85-S812 85-S937 85-S1000 85-S12500 85-S1500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16 1 1-1/4 1-1/4 1-1/2 1-3/4	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 3	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6	
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S687 85-S750 85-S812 85-S875 85-S937 85-S1000 85-S1250 85-S1250 85-S1750 85-S1750	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16 1 1-5/16 1 1-1/4 1-1/2 1-3/4 2	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2 2-1/2 2-1/2 3 3	4-1/2 4-1/2 4-1/2 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 1/2 7 8	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S625 85-S687 85-S750 85-S812 85-S812 85-S937 85-S1000 85-S12500 85-S1500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 7/8 1-5/16 1 1-1/4 1-1/4 1-1/2 1-3/4	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 3	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6	
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S625 85-S687 85-S750 85-S875 85-S875 85-S937 85-S1250 85-S1250 85-S1500 85-S1500 85-S1500 85-S2500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 3/4 13/16 3/4 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3	.004 .004 .005 .005 .006 .008 .008 .008 .010 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 3 3-1/2 4	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 1/2 6-1/2 7 8 9	V
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S875 85-S875 85-S937 85-S1250 85-S1250 85-S1250 85-S1250 85-S2000 0 85-S3000 0 0 0 0 0 1 0 1 1 1 1 1 1 1 1 1 1	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 11/16 7/8 1-5/16 1 1-1/4 1-3/4 2 2-1/2 3 ISEET - S 1/2	.004 .004 .005 .005 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 2-1/2 3 3 3-1/2 4 89 4	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 1/2 6-1/2 7 8 9	Call or
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S625 85-S687 85-S750 85-S750 85-S750 85-S812 85-S875 85-S937 85-S1000 85-S1250 85-S1750 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 ISEF - S 5/8	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 3 3 3-1/2 4 89 4	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6	access
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S812 85-S875 85-S937 85-S1250 85-S1250 85-S12500 85-S12500 85-S	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 11/16 5/16 1 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 (Ser - S) 1/2 5/8 3/4	.004 .004 .005 .005 .006 .008 .008 .008 .010 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 3 3-1/2 4 89 4 4 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 7 7 8 9 10 7 7 7 7-1/2	
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S625 85-S687 85-S750 85-S750 85-S750 85-S812 85-S875 85-S937 85-S1000 85-S1250 85-S1750 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000 85-S2000	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 ISEF - S 5/8	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 3 3 3-1/2 4 89 4	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6	access web for
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S875 85-S875 85-S937 85-S1750 85-S1750 85-S1750 85-S1750 85-S1750 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 85-S2500 89-S500 89-S1000 89-S1250	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 11/16 5/8 1-5/16 1 1-1/4 1-3/4 2 2-1/2 3 ISEF - S 1/2 5/8 1 1/4 11/4	.004 .004 .005 .005 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 2-1/2 3 3-1/2 4 89 4 4 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6	access web
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S687 85-S750 85-S750 85-S1250 85-S1250 85-S1250 85-S2000 85-S1250 85-S2000 85-S2500 85-S2500 89-S625 89-S750 89-S750 89-S1250 89-S1250	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 13/4 13/16 7/8 1-5/16 1 1-1/4 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 1/2 5/8 3/4 1/2 1/2 1/2 1/2 1/2 1/3/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1	.004 .004 .005 .005 .006 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 3 3-3-1/2 4 4 4 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	access web for
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S1250 85-S1250 85-S1750 85-S1750 85-S1750 85-S1750 85-S1750 85-S2500 85-S2500 85-S2500 85-S2500 89-S625 89-S75 89-S875 89-S1500 89-S1550 89-S1500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2-1/2 3 1/2 5/8 3/4 7/8 1 1/2 5/8 3/4 1/2 1/2 3/4	.004 .004 .005 .005 .006 .008 .008 .008 .010 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 2-1/2 3 3-1/2 4 89 4 4 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6	access web for
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S687 85-S750 85-S750 85-S1250 85-S1250 85-S1250 85-S1250 85-S1250 85-S2500 89-S625 89-S750 89-S625 89-S1250 89-S1250 89-S1250 89-S12500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 13/4 13/16 7/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 1/2 5/8 3/4 7/8 1 11/4 11/2 13/4 2 21/2	.004 .004 .005 .005 .006 .008 .008 .008 .010 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 3 3-3-1/2 4 4 4 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6	access web for
85-S375 85-S406 85-S437 85-S469 85-S500 85-S562 85-S625 85-S687 85-S750 85-S1250 85-S1250 85-S1250 85-S1250 85-S1250 85-S1250 85-S2500 85-S2500 89-S625 89-S75 89-S1250 89-S1250 89-S1500 89-S12500 89-S12500 89-S2500 89-S2500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 11/16 5/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2-1/2 3 1/2 5/8 3/4 7/8 1 11/4 11/4 11/4 13/4 2 21/2 3	.004 .004 .005 .005 .008 .008 .008 .008 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 3 3-1/2 4 89 4 4 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	access web for
85-S375 85-S406 85-S437 85-S469 85-S562 85-S625 85-S687 85-S750 85-S750 85-S1250 85-S1250 85-S1250 85-S1250 85-S1250 85-S2500 89-S625 89-S750 89-S625 89-S1250 89-S1250 89-S12500	3/8 13/32 7/16 15/32 1/2 9/16 5/8 11/16 5/8 13/4 13/16 7/8 1-5/16 1 1-1/4 1-1/2 1-3/4 2 2-1/2 3 1/2 5/8 3/4 7/8 1 11/4 11/2 13/4 2 21/2	.004 .004 .005 .005 .006 .008 .008 .008 .010 .010 .010 .010 .010	1-1/4 1-1/4 1-1/4 1-1/4 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 1-1/2 2-1/2 2-1/2 2-1/2 3 3-3-1/2 4 4 4 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2 4-1/2	4-1/2 4-1/2 4-1/2 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6	access web for



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Item #	Arbor	Stem	Мах	\$ ea
	Dia	Dia	Brush Dia	
AT1	1/2	1/4	4	Call o
UA1	1/2	1/4	4	acces
UA4	3/8	1/4	4	web
UA2 UA3	3/8 1/4	1/4 1/4	4 2	for
1300	1/4	1/4	2	pricin
		., .	4	
Cardbo	ard Adapte			
Item #	Fits Inside	Stk Arbor Hole	Max Arbor	\$ ea Call o
AF3	3-1/4	5/8	2	
AF4	4-1/4	5/8	2	acces
AF5	5-1/4	5/8	3-1/2	web
				for
Metal A	dapters			pricin
Item #	Fits	Inside	Arbor Hole	\$ ea
	or Use With BD		and NIV Childre	
AL3/8	2	л, в р а, туу,	3/8	<i>,</i>
AL3/0 AL1/2	2		1/2	acces
AL5/8	2		5/8	web
AL5/8-1/2	2		5/8-1/2	for
AL3/4	2		3/4	pricin
AL7/8	2		7/8	1
AL1	2		1	
	2		1-1/8	
AL1-1/8			1-1/4	
AL1-1/8 AL1-1/4	2		1-1/4	
AL1-1/4 AL1-3/8	2 2		1-3/8	
AL1-1/4 AL1-3/8 AL1-1/2	2 2 2		1-3/8 1-1/2	
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8	2 2 2 2		1-3/8 1-1/2 1-5/8	
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4	2 2 2 2 2 2		1-3/8 1-1/2 1-5/8 1-3/4	
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F	2 2 2 2 2 0 Tor Use With Nyl		1-3/8 1-1/2 1-5/8 1-3/4 Ind Tampico Sty	rles)
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F MA3	2 2 2 2 or Use With Nyl 3-1/4		1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.)	rles)
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F MA3 MA4	2 2 2 for Use With Nyl 3-1/4 4-1/4		1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.) 5/8 (2 Max.)	rles)
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F MA3	2 2 2 2 or Use With Nyl 3-1/4		1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.)	rles)
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F MA3 MA4 MA5	2 2 2 for Use With Nyl 3-1/4 4-1/4		1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.) 5/8 (2 Max.)	rles) ▼
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-3/4 (MA Type F MA3 MA4 MA5	2 2 2 2 or Use With Nyl 3-1/4 4-1/4 5-1/4 ut Adapte		1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.) 5/8 (2 Max.)	¥
AL1-1/4 AL1-3/8 AL1-1/2 AL1-5/8 AL1-5/8 AL1-3/4 (MA Type F MA3 MA4 MA5 Snap-0	2 2 2 2 or Use With Nyl 3-1/4 4-1/4 5-1/4 ut Adapte	<u>'S</u>	1-3/8 1-1/2 1-5/8 1-3/4 ind Tampico Sty 5/8 (2 Max.) 5/8 (2 Max.) 5/8 (2 Max.)	¥
AL1-1/4 AL1-3/8 AL1-5/8 AL1-5/8 AL1-3/4 (MA Type F MA3 MA4 MA5 Snap-0 Item #	2 2 2 2 5 or Use With Nyl 3-1/4 4-1/4 5-1/4 ut Adapte Fits	<u>'S</u>	1-3/8 1-1/2 1-5/8 1-3/4 nd Tampico Sty 5/8 (2 Max.) 5/8 (2 Max.) 5/8 (2 Max.) 5/8 (2 Max.)	\$ ea



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Abrasive Nylon & Tampico Brushes

Mini Abrasive Nylon Brushes

Stem Brus	sh					
Item #	Brush Dia	Brush Part	Stem Part	OAL	Stk Grit	\$ ea.
$\begin{array}{l} 81-AY-0.32\\ 81-AY-1mm\\ 81-AY-0.54\\ 81-AY-0.54\\ 81-AY-0.54\\ 81-AY-0.63\\ 81-AY-0.63\\ 81-AY-0.79\\ 81-AY-0.79\\ 81-AY-0.94\\ 81-AY-0.95\\ $	0355 043 0559 0655 0669 087 103 103 103 103 1103 1103 1103 1103 11	$\begin{array}{c} 5/8\\ 5/8\\ 3/4\\ 3/4\\ 5/8\\ 3/4\\ 3/4\\ 3/4\\ 3/4\\ 3/4\\ 3/4\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\ 1\\$	016 016 026 026 026 026 026 026 034 043 043 055 055 072 055 072 055 072 072 072 072 072 072 072 072 072 072	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Silicate Sil	Call or access web for pricing

Tampico Brushes



About Tampico Brushes ...

Produced from the leaf of the Mexican Agave plant, which has a soft to medium texture with good durability. Used in power brushes with and without compounds, resulting in somewhat finer finishes.

Tampico Wheel Brush							
Item #	Wire Size	Arbor Hole	Face Width	Max RPM	\$ ea.		
CT-2	2	1/2	3/8	20000	Call or		
CT-2-1/2	2-1/2	1/2	3/8	20000	access		
CT-3	3	1/2	3/8	20000	web		
CT-3-1/2	3-1/2	1/2	1/2	20000	for		
TWA-6	6	3-1/4	1/2	6000	pricina		
TWA-8	8	3-1/4	5/8	5000	pricing		
TWA-10	10	3-1/4	3/4	4500			
TWA-12	12	4-1/4	7/8	4000			
TWA-14	14	4-1/4	7/8	3000	V		
(-14	14	4-1/4	110	3000	,		

Call for other types of Fibres available for special applications

Abrasive Nylon Brushes

Flexhone Accessories

Flex-Hone Oil

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				111 Martin	27
-3	200		and the second second	and and	
		the state	the st	E/	

About Abrasive Nylon Brushes ...

Nylon filaments with abrasive grain impregnated throughout. This allows sides to cut as well as the tips with new grains constantly being exposed as brush wears.

Tube Br	ushe	s - Se	eries	#85			
Item #	Hole Dia	Brush Dia	Brush Part	OAL	Stem Dia	Stocked Abras.	l\$ea.
85-AY125 85-AY156 85-AY187 85-AY219 85-AY250 85-AY281 85-AY312 85-AY341 85-AY345 85-AY406 85-AY437 85-AY460 85-AY500 85-AY562	0.125 0.156 0.187 0.219 0.250 0.281 0.312 0.344 0.375 0.406 0.437 0.469 0.500 0.562	0.138 0.172 0.206 0.241 0.275 0.309 0.343 0.378 0.413 0.413 0.447 0.481 0.516 0.550 0.6181	1 1 1 1 1/4 1 1/4 1 1/4 1 1/4 1 1/4 1 1/4 1 1/4 1 1/4 1 1/2	4 4 4 4 1/2 4 1/2 4 1/2 4 1/2 4 1/2 4 1/2 4 1/2 4 1/2 4 1/2 5 5	.083 .097 .097 .112 .112 .112 .140 .140 .140 .140 .168 .168 .168 .168 .190 .190	600AO 600AO 600AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO	Call or access web for pricing
85-AY625 85-AY687 85-AY867 85-AY812 85-AY812 85-AY875 85-AY937 85-AY1250 85-AY1250 85-AY1750 85-AY1750 85-AY2000 85-AY2000	0.625 0.687 0.750 0.812 0.875 0.937 1.0000 1.250 1.500 1.750 2.000 2.500 3.000	0.688 0.756 0.825 0.893 0.963 1.031 1.100 1.375 1.650 1.925 2.200 2.750 3.300	1 1/2 1 1/2 1 1/2 1 1/2 1 1/2 2 1/2 2 1/2 2 1/2 3 3 3 1/2 4	5 5 5 6 6 6 6 6 6 6 1/2 6 1/2 7 8 9 10	.190 .220 .220 .220 .220 .220 .220 .220 .2	500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 500AO 320AO 320AO 320AO	
Copper					-		
CY-1 CY-1-1/4 CY-1-1/2 CY-2 CY-2-1/2 CY-3 CY-3-1/2 CY-4 Wheel	1 1-1/4 1-1/2 2 2-1/2 3 3-1/2 4	1/8 1/4 3/8 1/2 3/4 1 1-3/1 1-7/1		60 60 50 50 50 32	00SC 00SC 00SC 00SC 00SC 00SC 20SC 20SC	20000 20000 20000 20000 20000 20000 20000 20000	
NY-6 NY-8 NY-10 NY-12 NY-14	6 8 10 12 14	2 3-1/4 3-1/4 4-1/4 5-1/4	4 2-7) 4 3-3) 4 3-7)	/8 50 /8 50 /8 50 /8 50	00SC 00SC 00SC 00SC 00SC	6000 5000 4500 4000 3000	
Mandre							
BMC-12AY BMC-13AY BMC-16AY BMC-20AY BMC-20AY BMC-20AY BMC-30AY BMF-14AY BMF-16AY BMF-20AY BMF-20AY BMF-20AY	1-1/4 1-3/8 1-1/2 1-3/4 2 2-1/2 3 1-1/2 1-3/4 2 2-1/2 3	1/8 3/16 1/4 3/8 1/2 11/1 1/4 3/8 1/2 11/1 13/1	6 1/4 1/4 1/4 1/4 6 1/4	50 50 50 50 50 50 50 50 50 50 50	0A00 0A00 0A00 0A00 0A00 0A00 0A00 0A0	25000 25000 25000 25000 25000 25000 25000 25000 25000 25000 25000 25000	V

Quantity	\$ ea				
1/2 Pint 1 Quart 1 Gallon 5 Gallon	Call or access web for				
Cylinder Washing Brush					
Brush OD	\$ ea				
3-1/2" 4" 4-1/2" 5" 5-1/2" 6" 6-1/2"	Call or access web for pricing				
	1/2 Pint 1 Quart 1 Gallon 5 Gallon Brush OD 3-1/2" 4" 4-1/2" 5" 5-1/2"				

Pipe Nipple Adapters & Extensions

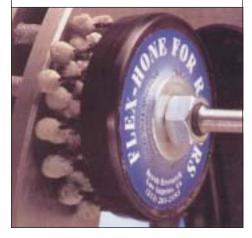
Item #	OD Thread	FH Sizes	\$ ea
832A Adapter 18NPT Adapter 14NPT Adapter 38NPT Adapter 12NPT Adapter	8-32 Adapters 1/8" NPT 1/4" NPT 3/8" NPT 1/2" NPT se with pipe nipple ada	7mm>1/2" 5/8">3" 3">5-1/2" 6">8" 8">12"	Call or access web for pricing
18 x 18 Ext. 18 x 36 Ext. 14 x 18 Ext. 14 x 36 Ext. 14 x 36 Ext.	1/8" NPT x 18" w/Cplg 1/8" NPT x 36" w/Cplg 1/4" NPT x 18" w/Cplg 1/4" NPT x 18" w/Cplg 1/4" NPT x 36" w/Cplg	j. j. j.	

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- More Passes Per Hone Lasts Longer
- Produces a Non-Directional Pattern
- Lowers Harmonic Vibrations
- Is Ideal for New or Re-Turned Rotors
 and Flywheels
 Call or

#RMFH240Z25 #RMFH120Z25 #RMFH60Z25	Fine Medium Coarse	access web for pricing
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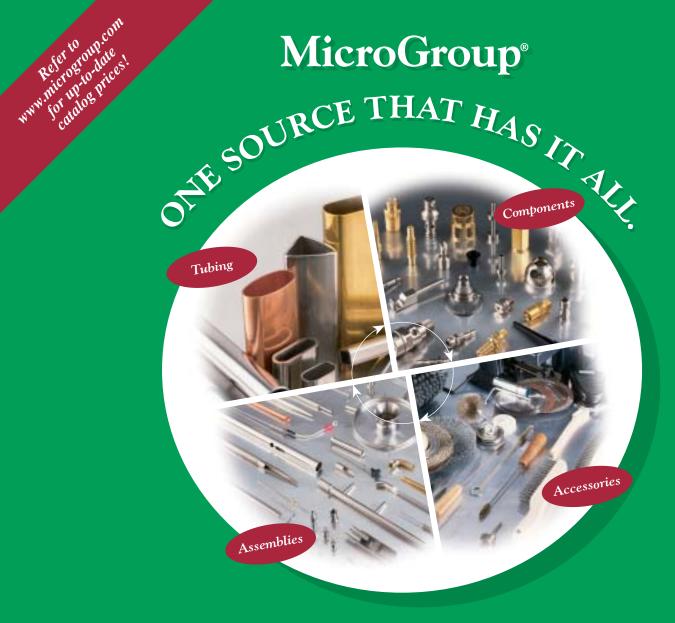
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