ANALYTICAL FLOW PRODUCTS

Product overview

AFP PRE-CUT TUBES

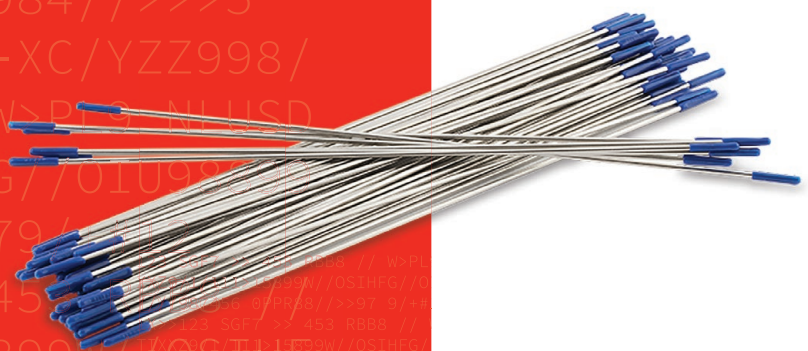
Manufactured for reliability and exceptional performance.

Seamless nickel and stainless steel alloy coil tubing.

IN ORDER TO BE A ONE STOP SOURCE FOR YOUR CUSTOMERS, AFP IS PROUD TO ANNOUNCE THAT WE HAD MADE A PARTNERSHIP WITH A WELL-KNOWN TUBE MANUFACTURER. HANDYTUBE LOCATED IN DELAWARE, NORTH EAST OF THE UNITED STATES HAS SPECIALIZED IN THE MANUFACTURE OF LONG LENGTH SEAMLESS COIL TUBING OF OUTER DIAMETER SIZES SMALLER THAN 1" (25.4MM) FOR OVER 35 YEARS. THEIR SEAMLESS COIL TUBING IS AVAILABLE IN A NUMBER OF HIGH PERFORMANCE CORROSION RESISTANT STAINLESS STEEL AND HIGH NICKEL ALLOYS, CAPABLE OF WITHSTANDING A VARIETY OF ENVIRONMENTAL CONDITIONS. THEIR SPECIFIC ADVANTAGE IS BEING ABLE TO MAKE LONG LENGTHS OF TUBE WHICH ARE FREE OF WELDS UP TO AND EXCEEDING 5,000 FEET LONG. THIS REDUCES INSTALLATION EFFORTS AND THE NEED FOR EXCESS FITTINGS AS WELL AS MINIMIZES THE RISK OF LEAKS.

AFP WILL BE STOCKING HANDYTUBE'S ULTRA-SMALL DIAMETER (USD™) CAPILLARY TUBING THAT IS PRECISELY ENGINEERED FOR CHROMATOGRAPHY, FLOW MEASUREMENT AND SENSING APPLICATIONS. THEY CAN WITHSTAND OVER 36,000 PSI (2500 BAR). OUR CAREFUL DESIGN AND TIGHT MANUFACTURING SPECIFICATIONS CREATE SMOOTHER, CLEANER CAPILLARY TUBING WITH CONSISTENTLY UNIFORM ID CHARACTERISTICS.

IN ORDER TO UNDERSTAND WHY AFP TUBING IS SUPERIOR OF WHAT'S AVAILABLE ON THE MARKET WE NEED TO EXPLAIN ALL THE STEPS OF ITS PRODUCTION BY STARTING WITH THE RAW MATERIAL.



Manufactured for reliability and exceptional performance

We utilizes seamless nickel alloy and stainless steel tube hollows to produce the longest seamless coils available in the world today. The HandyTube manufacturing process consists of sequential cold draws, cleaning cycles and solution anneals to achieve the finished size requirements. The manufacturing process does not include welded raw materials, in-process welds or welds at finish to achieve the spectacular lengths.

In a typical welded tube manufacturing process, coils of flat strips are formed into a tubular shape. The raw edges of the formed tube pass under the weld point where they are melted and held together until the molten pool solidifies, creating a continuous longitudinal weld seam. Although advances in welding technology have improved weld integrity, many welding process variables can contribute to welded tube defects.

Continuous longitudinal welds are susceptible to failure and poor tube quality, such as :

- Strip edge damage before welding, resulting in leaks and holes
- Strip edge contamination with lubricant, creating porosity
- Misaligned strip edges and/or off-seam condition, resulting in incomplete penetration
- Improperly adjusted or worn weld box rolls, causing improper weld seam thickness
- Weld bead protrusion into the tube's inside diameter, impeding flow

In-addition, welded tube manufacturers often butt-weld adjacent strip coils together to produce welded products. When assessing a welded tube's manufacturer, consider the risks. Ask if they :

- Produce each coil from a single heat
- Identify the location of strip weld joints
- Produce perpendicular strip joint welds
- Utilize bias welds

These practices and procedures can create quality issues that design engineers may not realize. There are many other weld process parameters that can introduce other types of weld defects. Tubing system design engineers should have one main concern with welded tubing: the continuous weld seam in every inch of every type of welded tube.

In comparison, HandyTube's seamless coil tubular products are homogeneous along the entire length and cross-section.

Seamless coil eliminates costly orbital welds and fitting joints to achieve lengths beyond what is typically offered by straight length tube manufacturers. ASME recognizes the superiority of seamless tube with a **20 percent increase in working pressure** as compared to welded tubing.

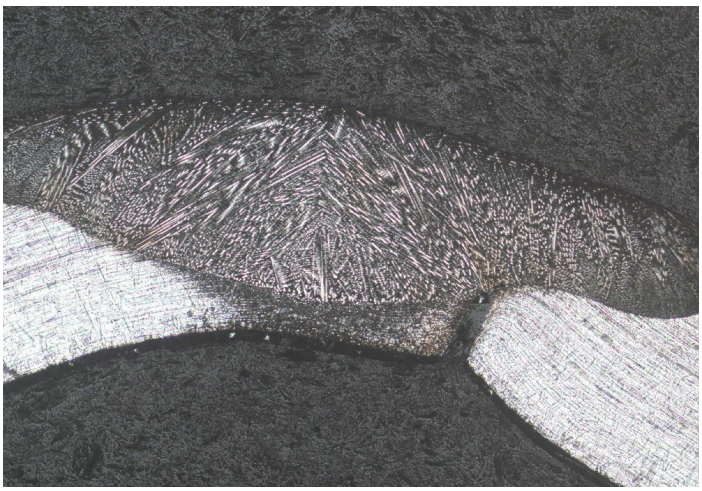


FIGURE 1 :
Misaligned strip edges create an off-seam condition and incomplete penetration.

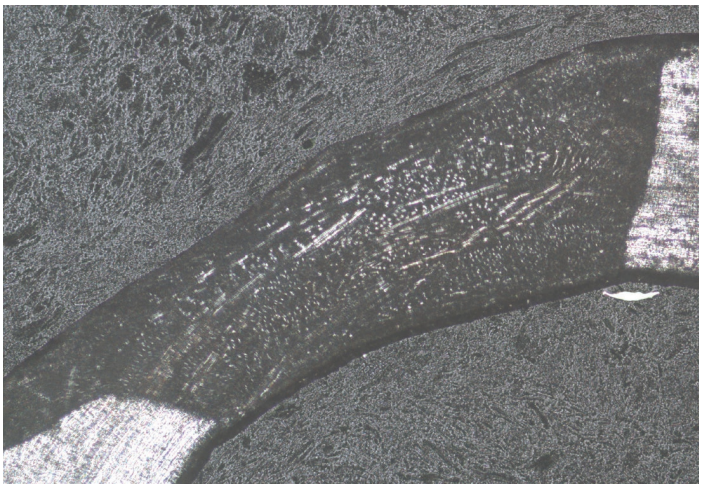


FIGURE 2 :
Improperly adjusted or worn weld box rolls cause incorrect weld seam thickness.

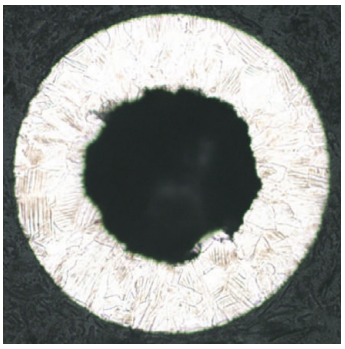


FIGURE 3

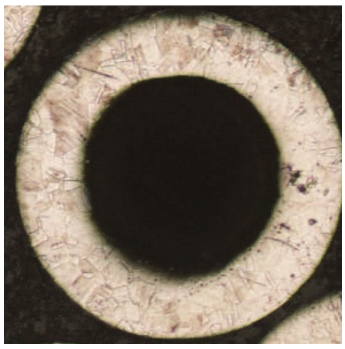


FIGURE 4

Seamless coil tubing eliminates the potential leak points of welds providing the highest integrity tubing-runs available.

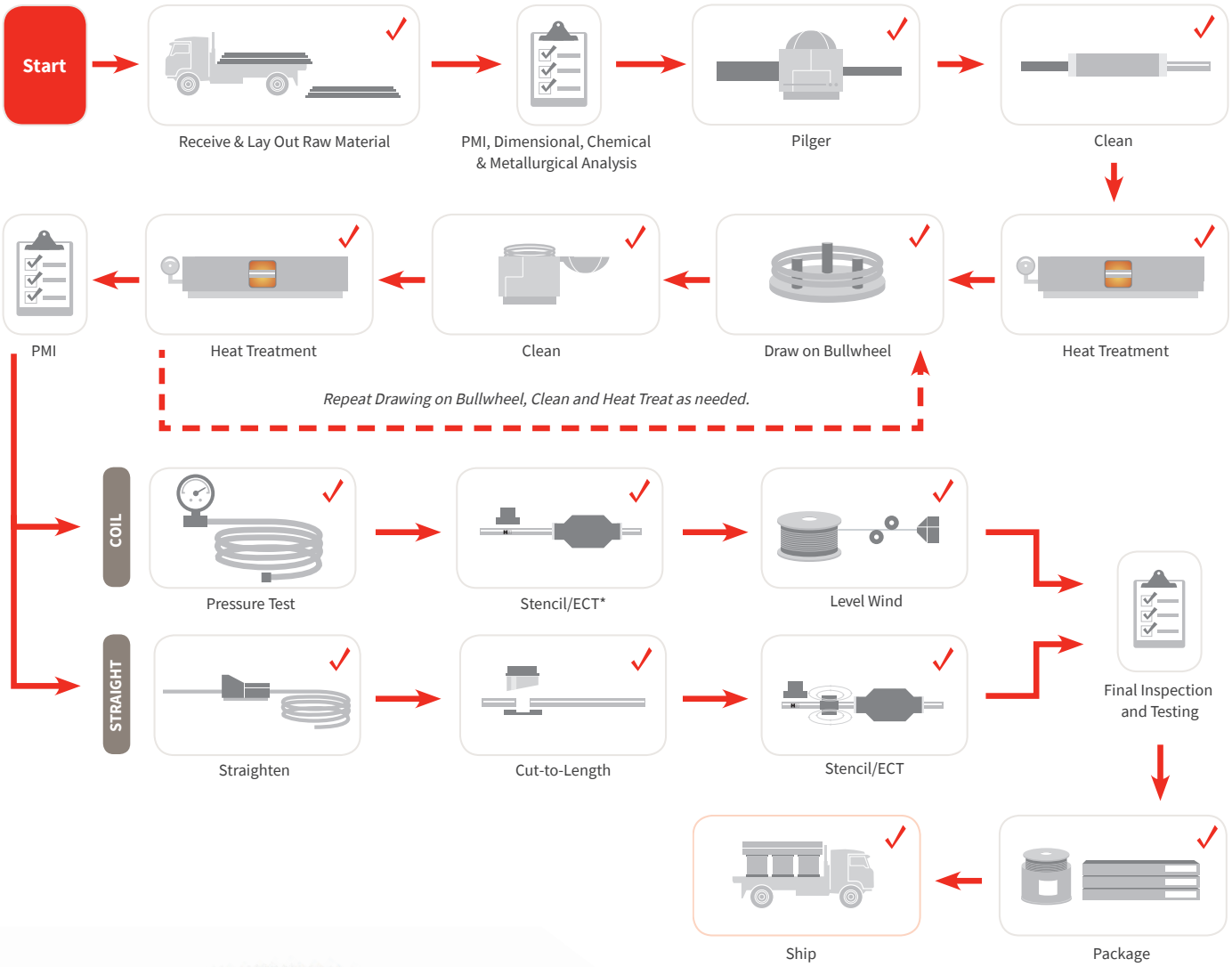


FIGURE 5

ID surface roughness

Ultra-small diameter tubing used in laboratory equipment, medical devices and other high-precision applications requires a smooth ID surface finish to ensure high-purity delivery of gas, solvents, chemicals and other media. Achieving proper ID smoothness is determined by two things: how the tube is first drawn, as well as the engineering expertise of the manufacturing supplier. Drawing, which reduces the tube's dimensions, is one of three main operations that occurs during the manufacturing process. The others are cleaning, to remove drawing lubricants, and heat treatment, to reset the mechanical properties and prepare the tube for redrawing.

There are two main types of drawing operations :

Floating plug

Tubing is pulled through a conical die with a floating plug in the ID. Both the die and the plug determine the drawn OD and ID. This type of drawing involves more tooling and lubrication than other methods, but it yields tubing with more precise dimensions and a smoother surface finish.

Sink drawing

Unlike floating plug drawing, sink drawing does not utilize an internal support. Tubing is pulled through a conical die, reducing the inside and outside diameters. The resulting ID is determined by several factors, including the inner and outer diameters of the stock tube, die angle and drawing stress.

Answering the need for smaller tubing dimensions and smoother ID surfaces, HandyTube has developed proprietary tube drawing processes and equipment that can draw stainless steel in coil form, resulting in more reliable flow rates and faster sampling cycles in HPLC applications. Supporting the ID further along in the drawing process and holding tooling to more stringent requirements produces surface finishes as smooth as 20 Ra.

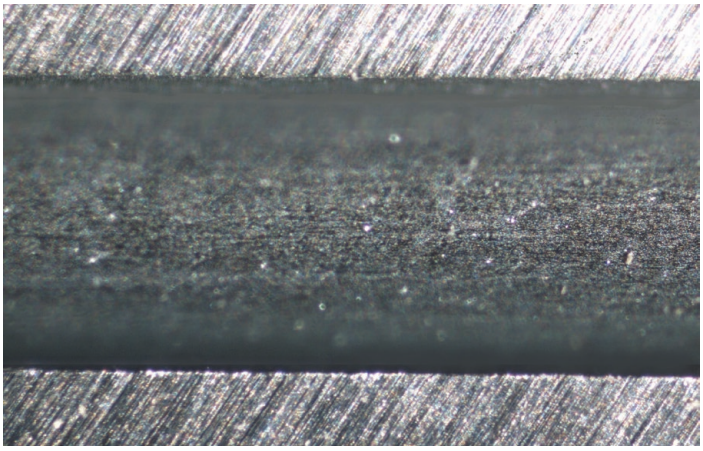


FIGURE 6

ID cleanliness

Impurities in USD tubing, such as oil, grease, and other foreign material left over from the manufacturing process, can result in cross-contamination and inaccurate sample readings for the end user. To prevent this, conventional tubing requires additional cleaning prior to installation. For many end users, figuring out a way to effectively clean stainless-steel tubing in long lengths and with such small diameters poses a big challenge. Not only that, but as tube length increases and the ID decreases, the pressure needed to push any media through the coil tubing skyrockets. As a result, standard cleaning methods and equipment aren't effective in cleaning high-precision USD tubes.

HandyTube's proprietary cleaning methods can effectively degrease USD coil tubing several hundred feet long. After a tube is drawn, lubricant on the outer diameters is removed by this special degreasing process. The tube is then subjected to high pressures to remove ID lubricants. The specialized cleaning equipment allows us to process small-diameter tubing in long coils.

Having ability to clean in coil form significantly reduces the amount of cleaning time required by OEMs and end users who would otherwise have to flush each straight length individually.

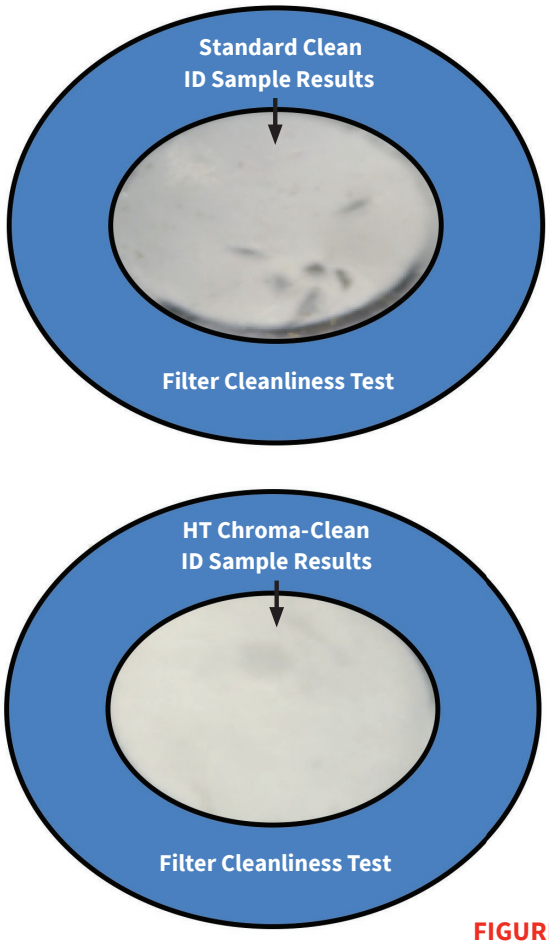


FIGURE 7

Measurement quality

When measuring the inside diameter (ID) size of USD tubing, the small dimensions make physical gaging problematic. The ID becomes more star-burst-shaped as the tubing is drawn to smaller sizes. This unique geometry yields imprecise results when pinned with circular gauge pins to measure ID size. We uses a variety of proprietary measuring techniques to ensure that these geometric fluctuations are accounted for.

HandyTube facilities are ISO 9001-Certified

Serving with the latest testing equipment and trained personnel.

Traceability throughout the entire manufacturing process :

- Material Test Reports accompany every shipment
- In-house, climate controlled laboratory
- Samples retained from every lot for peace of mind
- 100% Positive Material Identification (PMI)
- 100% Pressure Testing of all coils

Destructive and non-destructive tests :

Hydrostatic Testing :
a non-destructive test (NDT) for strength and leaks. The test involves filling the tubing with deionized water until it reaches a specified hold pressure. The tubing is then observed for leaks and pressure loss.

Splitflow Testing :
a non-destructive test (NDT) used on small diameter tubing to ensure that the interior is free of blockages and the surface is free of leaks. Testing involves holding a tube underwater and flowing Nitrogen through the tube.

Eddy Current Testing :
eddy current testing (ECT) is one of many non-destructive electromagnetic (NDE) testing methods. ECT makes use of electromagnetic induction to detect and characterize surface and sub-surface flaws in tubing.

Surface Roughness :
smoothness of the OD or ID surface of the tubing. Measurements are taken by a Surfometer verified against certified roughness standards.

Dimensional Analysis :
a measurement of the OD, ID, and/or Wall Thickness of the tube using a variety of calibrated micrometers and gauge pins.

Hydraulic Diameter :
measure of the cross-sectional fluid flow through the inner diameter of the tube. Hydraulic diameter is obtained through a back pressure flow test.

Positive Material Identification (PMI) :
the analysis of a metallic sample to identify the material grade. This is accomplished by measuring the % composition of its constituent elements and matching it to a database of known alloys. Typical methods for PMI include X-ray fluorescence (XRF).

Yield Strength :
the stress at which a specific amount of plastic deformation is produced, usually taken as 0.2 percent of the unstressed length.

Tensile Strength :
a measurement of the force required to pull something to the point where it breaks. The tensile strength of a material is the maximum amount of tensile stress that it can take before failure.

Elongation :
a measure of the ductility; the amount of strain deformation a material can experience before failure in tensile testing.

Grain Size :
a measure of the density of metallic crystals with the same configuration within the microstructure of a material. Grain size serves as an indicator of temper within a sample of material.

Rockwell Hardness :
a hardness scale based on indentation hardness of a material. The Rockwell test determines the hardness by measuring the depth of penetration of an indenter under a large load compared to the penetration made by a preload.

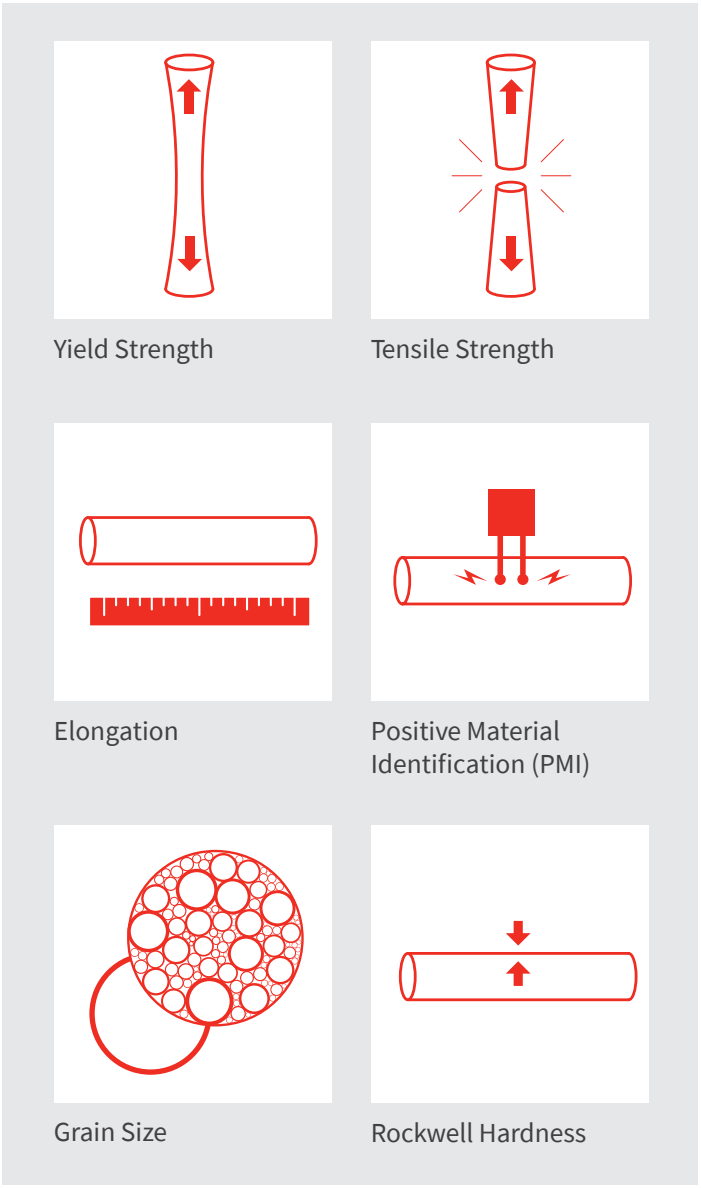


FIGURE 8

We will keep in stock those tubes lengths combination for quick ordering through our webstore. These tubes are standard grade ID surface finish for gas chromatography around 70 Ra. They will have been manufactured with standard cleaning practice for analytical chemistry. This is the most cost effective tubes available used by the major OEM and system integrator around the world :

Part Number	Description	Material	OD	ID	Length	Coating
TU-SS-16-020-0017	Tube 1/16'' OD x .020'' ID x 5 cm, SS-316L	SS-316L	1/16''	.020''	5 cm	N/A
TU-SS-16-020-0037	Tube 1/16'' OD x .020'' ID x 10 cm, SS-316L	SS-316L	1/16''	.020''	10 cm	N/A
TU-SS-16-020-0077	Tube 1/16'' OD x .020'' ID x 20 cm, SS-316L	SS-316L	1/16''	.020''	20 cm	N/A
TU-SS-16-020-0116	Tube 1/16'' OD x .020'' ID x 30 cm, SS-316L	SS-316L	1/16''	.020''	30 cm	N/A
TU-SS-16-020-0195	Tube 1/16'' OD x .020'' ID x 50 cm, SS-316L	SS-316L	1/16''	.020''	50 cm	N/A
TU-SS-16-020-0393	Tube 1/16'' OD x .020'' ID x 100 cm, SS-316L	SS-316L	1/16''	.020''	100 cm	N/A
TU-SS-16-030-0017	Tube 1/16'' OD x .030'' ID x 5 cm, SS-316L	SS-316L	1/16''	.030''	5 cm	N/A
TU-SS-16-030-0037	Tube 1/16'' OD x .030'' ID x 10 cm, SS-316L	SS-316L	1/16''	.030''	10 cm	N/A
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TU-SS-16-030-0393	Tube 1/16'' OD x .030'' ID x 100 cm, SS-316L	SS-316L	1/16''	.030''	100 cm	N/A
TU-SS-16-040-0017	Tube 1/16'' OD x .040'' ID x 5 cm, SS-316L	SS-316L	1/16''	.040''	5 cm	N/A
TU-SS-16-040-0037	Tube 1/16'' OD x .040'' ID x 10 cm, SS-316L	SS-316L	1/16''	.040''	10 cm	N/A
TU-SS-16-040-0077	Tube 1/16'' OD x .040'' ID x 20 cm, SS-316L	SS-316L	1/16''	.040''	20 cm	N/A
TU-SS-16-040-0116	Tube 1/16'' OD x .040'' ID x 30 cm, SS-316L	SS-316L	1/16''	.040''	30 cm	N/A
TU-SS-16-040-0195	Tube 1/16'' OD x .040'' ID x 50 cm, SS-316L	SS-316L	1/16''	.040''	50 cm	N/A
TU-SS-16-040-0393	Tube 1/16'' OD x .040'' ID x 100 cm, SS-316L	SS-316L	1/16''	.040''	100 cm	N/A
TL-SS-0001	Tube 1/8'' OD x .085'' ID x 20 Feet, SS-316L	SS-316L	1/8''	.085''	20 Feet	N/A
TU-S2-16-040-0060	Tube 1/16'' OD x .040'' ID x 15 cm, SS-316L coated SilcoNert 2000®	SS-316L	1/16''	.040''	15 cm	SilcoNert 2000®
TC-SS-16-020-050	Tube Coil 1/16x.020''x 50 FT	SS-316L	1/16''	.020''	50 FT	N/A
TC-SS-16-020-100	Tube Coil 1/16x.020''x 100 FT	SS-316L	1/16''	.020''	100 FT	N/A
TC-SS-16-020-250	Tube Coil 1/16x.020''x 250 FT	SS-316L	1/16''	.020''	250 FT	N/A
TC-SS-16-030-050	Tube Coil 1/16x.030''x 50 FT	SS-316L	1/16''	.030''	50 FT	N/A
TC-SS-16-030-100	Tube Coil 1/16x.030''x 100 FT	SS-316L	1/16''	.030''	100 FT	N/A
TC-SS-16-030-250	Tube Coil 1/16x.030''x 250 FT	SS-316L	1/16''	.030''	250 FT	N/A
TC-SS-16-040-050	Tube Coil 1/16x.040''x 50 FT	SS-316L	1/16''	.040''	50 FT	N/A
TC-SS-16-040-100	Tube Coil 1/16x.040''x 100 FT	SS-316L	1/16''	.040''	100 FT	N/A
TC-SS-16-040-250	Tube Coil 1/16x.040''x 250 FT	SS-316L	1/16''	.040''	250 FT	N/A
TC-SS-08-085-050	Tube Coil 1/8x.085''x 50 FT	SS-316L	1/8''	.085''	50 FT	N/A
TC-SS-08-085-100	Tube Coil 1/8x.085''x 100 FT	SS-316L	1/8''	.085''	100 FT	N/A
TC-SS-08-085-250	Tube Coil 1/8x.085''x 250 FT	SS-316L	1/8''	.085''	250 FT	N/A
TC-SS-08-085-500	Tube Coil 1/8x.085''x 500 FT	SS-316L	1/8''	.085''	500 FT	N/A
TC-S2-16-040-050	Tube Coil 1/16x.040''x 50 FT coated with SilcoNert 2000®	SS-316L	1/16''	.040''	50 FT	SilcoNert 2000®
TC-S2-16-040-100	Tube Coil 1/16x.040''x 100 FT coated with SilcoNert 2000®	SS-316L	1/16''	.040''	100 FT	SilcoNert 2000®
TC-S2-16-040-250	Tube Coil 1/16x.040''x 250 FT coated with SilcoNert 2000®	SS-316L	1/16''	.040''	250 FT	SilcoNert 2000®

If you need Premium Tubing for your most critical application, AFP is the only one who can provides you with pre-cut having the Chromat I.D.® and Chroma Clean I.D.

Chromat I.D.®
HandyTube's proprietary drawing process that promotes ID support during the reduction process for a smoother ID surface.

Chroma Clean I.D.®
HandyTube's proprietary cleaning process aimed at removing oil, grease, and other contaminants from the tubing interior. This cleaning is critical for use in chromatography and other industries where any foreign particles can skew precise results.

Please contact our sales department to get a quote at **sales@afproducts.ca**

meta4.0
SMART PROCESS MANUFACTURING

Powering performance with data

APN GLOBAL HAS BUILT A REPUTATION ON DEVELOPING PRACTICAL, EFFECTIVE SOLUTIONS THAT ARE PERFECTLY ADAPTED TO YOUR BUSINESS CONTEXT AND STANDARDS. WE GO WELL BEYOND THEORY AND DESIGN. WE CARE ABOUT DELIVERING CONCRETE AND TANGIBLE RESULTS THAT WILL BE NOTICEABLE ON THE SHOP FLOOR. EMPOWER YOUR BUSINESS DATA!

APN Global

APN GLOBAL IS MADE UP OF SIX OF NORTH AMERICA'S MOST INNOVATIVE AND BEST-PERFORMING COMPANIES. EACH ONE SPECIALIZES IN THE MANUFACTURING OF COMPLEX PARTS AND PRODUCTS IN ACCORDANCE WITH SPECIFIC CUSTOMER REQUIREMENTS AND THE HIGHEST INTERNATIONAL STANDARDS FOR INDUSTRIES SUCH AS AEROSPACE, DEFENSE, LIFE SCIENCES, AND THE COMMERCIAL SECTOR.

AFP
ANALYTICAL FLOW PRODUCTS

APNGLOBAL
PERFECTION MULTIPLIED

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