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# Top 10

## Guidelines for ordering stainless steel tubing

You are a business expert. Your design needs stainless steel tubing, so you call up your favorite manufacturer. You speak to a tubing expert who is friendly, helpful, and knowledgeable, but you still feel bombarded with questions. This guide walks you through the top 10 things to know when ordering stainless products.

### **1 WHICH ALLOY?**

To start your order, your supplier will want to know what kind of material you need. Saying, "stainless steel," is too broad since there are a series of alloys that fall under this designation. These include 300 series austenitic, 400 series martensitic, 400 series ferritic, precipitation hardening, and duplex grades. The higher alloys in 300s and precipitation hardening series resist chemical corrosion and are the most popular and readily available alloys. The most common alloys are T304, T304L, T316, and T316L, which are stocked in most standard fractional and hypodermic sizes.

### **2 WHAT TEMPER OR HARDNESS?**

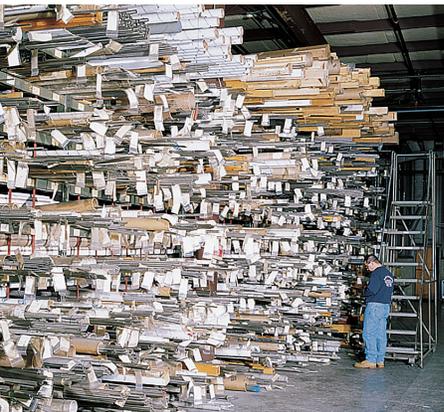
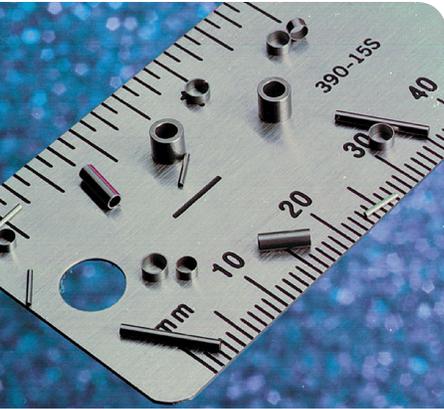
You will also have to specify the temper of your stainless steel. Hardness is often used as a surrogate measure for strength because it is easier to measure. Temper is specified by description, Annealed to Full Hard, or by mechanical properties such as hardness, tensile strength, yield strength, and/or elongation. For example, full hard #3 temper is common for hypodermic grade tubing made from T304 and T316 stainless steels.

### **3 WELDED, WELDED AND DRAWN, OR SEAMLESS?**

Welded tubes start as long coils of cold-rolled stainless steel strip that are rolled into tube form. A welding head melts the strip edges together to form a strong weld without flux or filler metal. Cold-working operations are followed by annealing to recrystallize the weld area and make it as strong as the parent metal. Seamless tube is made from tube hollows that are then drawn down to desired diameters.



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#### **4 WHAT SPECIFICATIONS DO YOU NEED TO MEET?**

Tubing can be made to a variety of specifications; ASTM, AMS, ASME, and ISO designations are the most popular. For example, Eagle-welded tubes with outer diameters up to 5 in. are certified to ASTM A-249/A-269, ensuring tensile, yield, elongation, flaring, flattening, flanging, hardness, and hydrostatic or non-destructive electrical tests have been performed. Seamless tubes are typically made to ASTM-A213.

#### **5 WHAT CROSS-SECTIONAL DIMENSIONS?**

Which cross-sectional dimensions are critical to your tubing order? Most standard tubing is produced to meet exact outside diameter and wall thickness dimensions. If your application is more sensitive to inside diameter, you can special order tubing using that dimension plus wall thickness. Some applications need tight tolerances on both inside and outside diameters, in which case the wall thickness is taken as theoretical.

#### **6 HOW LONG?**

Stainless steel tubing is typically made in either 10-ft or 20-ft random lengths; however, tubing may be cut to shorter lengths for delivery purposes. Furthermore, Eagle Stainless can cut and deburr tubing to 0.008 in. and longer. Depending upon the tube OD and length, tolerance such as  $\pm 0.010$  in. or  $\pm 0.005$  in. can be held on small diameter tubing applications. If you require a smaller tolerance please ask.

#### **7 WHAT SURFACE FINISH?**

Stainless steel is often chosen for its aesthetic appearance, so make sure to specify the surface finish you need. The most common is the shiny, silvery finish manufacturers refer to as "bright"; alternatively, you can request a "pickled" or dull finish. Polishing and centerless grinding operations can be performed as secondary processes to produce desired RMS finishes as needed.

#### **8 HOW STRAIGHT?**

Stainless steel is typically produced in "reasonable" straight conditions; however, where straightness is critical, then additional straightening operations can be performed to ensure desired requirements.

#### **9 DO YOU NEED OVALITY, CONCENTRICITY, OR ECCENTRICITY?**

Ovality is the roundness or the difference between the max and min OD, obtained by measurement for high and low points at any one cross section of the tube. Also, the concentricity or eccentricity is the difference between the center of the OD of the tube when compared to the center of the ID of the tube.

#### **10 HOW CLEAN DOES IT NEED TO BE?**

Commercially cleaned tubes are defined as tubes that are free from drawing compounds, oils, dirt, grease, or other compounds and are visually inspected with an unaided eye. Precision cleaned parts can be specified where the parts are visually inspected under magnification and/or have a lint-free cloth or tissue passed through the ID. Cloth should be free from compounds, dirt, and oils; however, a light gray discoloration is not cause for rejection.