304V

Melt Practice

This austenitic stainless steel is initially electric-arc melted. Then as a refinement to the purity and homogeneity of the metal, 304V is Vacuum Arc Remelted (VAR). This process yields a more uniform chemistry with minimal voids and contaminants.

Typical Chemistry

	FWM Avg. Wt. %	ASTM A313-95
Chromium	18.58	18.0-20.0
Nickel	8.65	8.00-10.50
Carbon	0.073	.08
Manganese	1.310	2.00
Molybdenum	.16	-
Silicon	0.70	1.00
Phosphorus	0.021	.045
Copper	.17	-
Cobalt	.10	-
Nitrogen	.034	.10
Iron	Balance	Balance

FWM chemistry is for reference only, and is not to be used for specification purposes.

Physical Properties

Density	0.286 lbs/in^3
Modulus of Elasticity	28.5 psi x 10^6
Electrical Resistivity	720 µohms-mm
Thermal Conductivity	16.36 W/m K (100°C)

Thermal Treatment

In wire form, 304V will gain tensile strength when stress relieved at 350-427°C . A reducing atmosphere is preferred but inert gas can be used. 304V will fully anneal at 1010-1121°C in just a few minutes. There is a carbide precipitation phenomenon that occurs between 427 and 899°C that reduces the corrosion resistance of the alloy. American Society for Testing Materials has described a test method to ensure the alloy has not been damaged.

Applications

This alloy is the most popular for medical appliances. The ease of joining with solder or welding, combined with excellent strength makes it desirable. This alloy is also one of the least expensive medical materials. Some examples of end products are stylets, catheters, guide wires, springs and needles. Fort Wayne Metals routinely makes cables, strands, flat wire and shapes from this alloy.

Mechanical Properties

% CW	Y.S. (psi)	U.T.S. (psi)	% Elongation (10" gage length)
0%	50,000	107,000	41%
20%	70,000	140,000	14%
37%	90,000	184,000	4%
50%	140,000	208,000	3%
60%	160,000	229,000	2.6%
68%	180,000	247,000	2.7%
75%	200,000	265,000	2.6%
80%	215,000	272,000	2.9%
84%	230,000	289,000	2.5%
90%	245,000	306,000	2.6%
93%	250,000	316,000	2.7%
95%	280,000	334,000	2.6%

Values are typical and may not represent all diameters. Test method will affect results.

Surface Conditions

Stainless steels develop a highly polished appearance as they are drawn to fine diameters. Surface roughness can be less than 5 RMS when processed using SCND* dies and measured with a profilometer. Diameters over .040" are finished with polycrystalline dies and exhibit a rougher surface than natural diamond dies. Diameters over .100" have an even rougher surface because they are drawn with carbide dies.

*SCND means single crystal natural diamond.