TECHNICAL UPDATE - TU-2004

SUBJECT: Austenitic Stainless Steel Types

Stainless steel tubing used in heat traced bundles is generally identified by the material type and ASTM specification. This Techincal Update will discuss the material type and how it relates to the ASTM spec. For more detail on the ASTM specifications, see Technical Update titled: "*Stainless Steel Tubing - ASTM A269 or ASTM A213*".

The material type is a number associated to the chemistry of the steel. Each type number indicates a mix of components used in the steel. The mix determines the mechanical, thermal, and corrosion characteristics of the steel.

The most common types of austenitic stainless steel used in Dekoron Unitherm products are: Type 316, Type 316L, Type 304, and Type 304L. A table is attached showing the chemical makeup of these steel types.

Standard Dekoron Unitherm products use Type 316 stainless steel tubing. This material type is readily available in a wide variety of tube sizes and specifications, and provides better corrosion resistance for most applications than Type 304 stainless steel.

Type 316L stainless steel is a low-carbon version of Type 316. The lower carbon content makes this steel less susceptible to corrosion in the area of a weld. This would be better than Type 316 if the customer is using welded fittings. Many customers believe that it is also less susceptible to stress corrosion cracking in high-chloride environments. This makes it preferable in coastal areas.

Type 304 stainless steel is preferred in many food and pharmaceutical applications. Its characteristics give it better corrosion protection against certain chemicals and fluids seen in these applications. It also may carry certifications for this application that are not available to other types of stainless steel.

Type 304L stainless steel is the low-carbon version of Type 304.

These are not, however, the only material types used in Dekoron/Unitherm bundles. Other 300 and 400 series stainless steel types are used if called for in the customer specification. Contact Dekoron Unitherm Engineering for information on other austenitic stainless steels.

Some stainless steel tubing can carry "dual certification". For addition information on this subject, see the Technical Update on dual certified tubing.

Table One: Chemical Composition of Austenitic Stainless Steel

Grade	TP 304	TP 304L	TP 316	TP 316L
UNS Designator	S30400	S30403	S31600	S31613
Carbon	0.08 max	0.035 max	0.08 max	0.035 max
Manganese, max	2.00	2.00	2.00	2.00
Phosphorus, max	0.045	0.045	0.045	0.045
Suflur, max	0.030	0.030	0.030	0.030
Silicon	1.00	1.00	1.00	1.00
Nickel	8.00 – 11.0	8.0 – 12.0	10.0 – 14.0	10.0 – 15.0
Chromium	18.0 – 20.0	18.0 – 20.0	16.0 – 18.0	16.0 – 18.0
Molebdenum	--	--	2.00 – 3.00	2.00 – 3.00
Iron	balance	balance	balance	balance

Note: Some values vary based on the tubing size and construction.