The selection of a sheath material should be made based on the chemical composition of the gas or liquid being heated, the characteristics of the materials entering the solution, and the processes controls. A material selection guide can be found on page 16-12.

**NOTE:** The best source for chemical/sheath compatibility is the supplier of the gas or liquid to be heated.

The following are the most common tubular element sheath materials. For other materials consult Tempco.

**Incoloy® 840:** Nickel 18-20%, Chromium 18-22%, Iron balance. Has about 10% less nickel than Incoloy 800. Used in many air heating applications, where it has exhibited superior oxidation resistance at less cost than Incoloy 800.

**Maximum Sheath Temperature:** 1600°F / 871°C

**Incoloy® 800:** Nickel 30-35%, Chromium 19-23%, Iron balance. The high nickel content of this alloy contributes to its resistance to scaling and corrosion. Used in air heating and immersion heating of potable water and other liquids.

**Maximum Sheath Temperature:** 1600°F / 871°C

**316 Stainless Steel:** Chromium 16-18%, Nickel 11-14%, Iron balance. Modified with the addition of Molybdenum (2-3%) to improve corrosion resistance in certain environments, especially those which would tend to cause pitting due to the presence of chlorides. Applications include deionized water.

**Maximum Sheath Temperature:** 1200°F / 649°C

**304 Stainless Steel:** Chromium 18-20%, Nickel 8-11%, Iron balance. Used in the food industry, medical, and chemical heating.

**Maximum Sheath Temperature:** 1200°F / 649°C

**321 Stainless Steel:** Chromium 17-20%, Nickel 9-13%, Iron balance. Modified with the addition of Titanium to prevent carbide precipitation and resulting intergranular corrosion that can take place in certain mediums when operating in the 800-1200°F (427-649°C) temperature range.

**Maximum Sheath Temperature:** 1200°F / 649°C

**Copper:** Standard Copper Alloy

A low temperature, inexpensive material used mainly for clean water heating.

**Maximum Sheath Temperature:** 350°F / 177°C

**Steel:** Low Carbon

Used for high to low viscosity oils, asphalt, tar, wax, molten salt, heat transfer liquid media and other compatible solutions.

**Maximum Sheath Temperature:** 750°F / 399°C

**Other Sheath Materials:** Available for a limited number of diameters. Consult Tempco for more information.

**Inconel® 600:** Iron 6-10%, Chromium 14-17%, Nickel balance

**Maximum Sheath Temperature:** 1800°F / 982°C

**Incoloy® 825:** Nickel 38-46%, Chromium 19.5-23.5%, Molybdenum 2.5-3.5%, Iron balance

**Maximum Sheath Temperature:** 1100°F / 593°C

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**CAUTION**

**Maximum Sheath Temperature** refers to the maximum temperature of the element sheath material. Consideration must be given to the maximum temperature that can be safely applied to the heated material. See **Watt Density** on the previous page for additional information.