

Pyromation provides a variety of common tubing, MgO sheath, protection tube, and drilled-well materials to protect temperature sensing elements from the environmental conditions typically found in industrial process applications. The following tables are intended as guidelines to aid in the selection of the proper materials for sensors used in different environments. Consult the factory for the availability of other protective materials for specialty applications. NOTE: All chemical compositions and temperature ratings are nominal and are stated as received from suppliers.

### Material Code Index

METALS						CERAMICS and COMPOSITE MATERIALS	
CODE	MATERIAL	CODE	MATERIAL	CODE	MATERIAL	CODE	MATERIAL
2	Molybdenum	25	Tantalum	37	Alloy 800	12	Metal Ceramic LT-1
3	Alloy 600	26	Titanium	38	Alloy 20	13	Vesuvius
4	310 S.S.	27	Alloy 400	41	HR - 160®	14	Cerite® - II
5	446 S.S.	28	Alloy B	50	Zirconium	15	Cerite® - III
6	Carbon Steel	29	Alloy C -276	59	F22-1	16	Mullite
7	Alloy 601	31	Nickel 200	60	F11-2	17	Alumina
8	316 S.S.	32	304 LC S.S.	61	A105	18	Silicon Carbide
9 <sup>[2]</sup>	304 S.S.	33	316 LC S.S.	91	F91	19	Hexoloy® SA
11	Cast Iron	35	321 S.S.			71	Recrystallized Silicon Carbide
22	Brass	36	347 S.S.			79	RA330
23	Copper						
24	Platinum						

### Metals

CATALOG MATERIAL CODE	MATERIAL/COMPOSITION	TYPICAL AREAS OF USE				APPLICATION GUIDELINE INFORMATION
		TUBING	MGO SHEATHS	PROT. TUBES	DRILLED WELLS	
2	<b>MOLYBDENUM</b> 99.9% min. Molybdenum, 0.03% Tungsten	X	X			Up to 1926 °C [3500 °F] in inert atmospheres, to 1871 °C [3400 °F] in vacuum at 10-4 torr. Has poor mechanical shock resistance after heated to 1038 °C [1900 °F]. Oxidizes in air above 427 °C [800 °F].
3	<b>ALLOY 600 (UNS N06600)</b> 72% Nickel, 15% Chromium, 8% Iron	X	X	X	X	Up to 1149 °C [2100 °F] under oxidizing conditions. Reducing conditions reduce maximum temperature to 1038 °C [1900 °F]. Must not be placed in sulfurous atmospheres above 538 °C [1000 °F]. Main areas of application for thermocouple protection are carburizing, annealing and hardening furnaces, Cyanide saltbaths, blast furnace downcomers, open hearth flue stacks, steel soaking pits, waste heat boilers, ore roasters, cement exit flues, incinerators, and glass tank flues. (INCONEL® 600)
4	<b>310 STAINLESS STEEL (UNS S31000)</b> 25% Chromium, 20% Nickel	X	X	X	X	Up to 1038 °C [1900 °F] continuous, 1149 °C [2100 °F] intermittent. Mechanical and corrosion resistance similar to and better than 304 stainless steel.
5	<b>446 STAINLESS STEEL (UNS S44600)</b> 27% Chromium		X	X	X	Up to 1093 °C [2000 °F] under oxidizing conditions. Excellent high temperature corrosion and oxidizing resistance. Main areas of application are hardening, nitriding, and annealing furnaces, salt baths, molten lead, tin and babbitt metal, sulfurous atmospheres. Not for carburizing atmospheres. Other areas of application are steel soaking pits, tinning pots, waste heat boilers, ore roasters, cement exit flues, boiler tubes to 982 °C [1800 °F], incinerators to 1093 °C [2000 °F], glass flue tanks.
6	<b>CARBON STEEL<sup>[1]</sup></b>	X		X	X	Up to 538 °C [1000 °F] in non-oxidizing environments. Main areas of usage are galvanizing pots, tinning pots, molten babbitt metal, molten mangesium, molten zinc, Petroleum refinery applications such as dewaxing and thermal cracking.
7	<b>ALLOY 601 (UNS N06601)</b> 61% Nickel, 23% Chromium, 14% Iron, 1.35% Aluminum		X	X	X	Similar applications to Inconel® 600 but with superior resistance to sulfur, high temperature oxidation resistance to 1260 °C [2300 °F]. (INCONEL® 601)
8	<b>316 STAINLESS STEEL (UNS S31600)</b> 16% Chromium, 12% Nickel 2% Molybdenum	X	X	X	X	Up to 927 °C [1700 °F] under oxidizing conditions. Same areas of applications as 304 stainless steel. Has improved resistance to mild acid and pitting corrosion.
9 <sup>[2]</sup>	<b>304 STAINLESS STEEL (UNS S30400)</b> 18% Chromium, 8% Nickel	X	X	X	X	Up to 899 °C [1650 °F] under oxidizing conditions. Has general good oxidation and corrosion resistance in a wide range of industrial environments. Subject to carbide precipitation, which can reduce corrosion resistance in the (427 to 538) °C [800 to 1000] °F range. Good mechanical properties from (-184 to 788) °C [-300 to 1450] °F. Main areas of usage for thermocouple protection is in chemicals, foods, plastics and petroleum. Generally regarded as standard protection tube material.

[1] Materials available in various alloys - consult factory

[2] Machined fittings may be supplied as 303 Series stainless steel

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