PROTECH MATERIALS LISTING

Wrought Alloys	C	Mn	Si	P	Cb	Mo	N	Cr	Ni	Co	W	Fe	Description
304	0.08	1.70	0.50	0.04	0.00	0.50	0.08	18.00	9.00	0.00	0.00	70.00	*The original "18-8" stainless. Provides useful resistance to corrosion in a wide range of environments. Dual certified material combines low carbon of the L grade with the higher strength of 304.*
309	0.05	1.60	0.80	0.04	0.00	0.50	0.00	23.00	13.00	0.00	0.00	62.00	*Austenitic, oxidation resistant to 1900 F, moderate strength. Useful in reducing sulfidizing atmospheres*
310	0.05	1.60	0.50	0.04	0.00	0.50	0.00	25.00	20.00	0.00	0.00	52.00	*Austenitic heat grade with higher chromium and nickel for oxidation resistance beyond 2000 F. Good sulfidation and hot corrosion resistance.*
316L	0.02	1.60	0.50	0.04	0.00	2.10	0.05	16.40	10.20	0.00	0.00	69.00	*Contains molybdenum for improved chloride pitting and general corrosion resistance. All RA316 is the low carbon L grade, dual certified to meet the higher yield strength of 316.*
330	0.05	1.50	1.20	0.04	0.00	0.50	0.00	19.00	35.00	0.00	0.00	43.00	*The workhorse of the austenitic heat resistant alloys. Good strength, carburization and oxidation resistance up to 2200 F*
333	0.05	1.50	1.00	0.04	0.00	3.00	0.00	25.00	45.00	3.00	3.00	18.00	*A nickel base superalloy with excellent carburization, oxidation, and hot corrosion resistance. It has high creep-rupture strength with exceptional ability to withstand repeated thermal shock. Useful to 2200°F (1200°C).*
253	0.08	0.60	1.70	0.04	0.00	0.50	0.17	21.00	11.00	0.00	0.00	65.00	*An advanced micro-alloyed austenitic heat resistant alloy. High creep-rupture strength and outstanding oxidation resistance through 2000 F.*
230	0.10	0.50	0.40	0.04	0.00	1.50	0.00	22.00	60.00	0.00	14.00	1.00	*excellent high-temperature strength, outstanding resistance to oxidizing environments up to 2100°F (1149°C) for prolonged exposures, premier resistance to nitriding environments, and excellent long-term thermal stability*
120	0.05	0.70	0.60	0.00	0.70	2.50	0.20	25.00	37.00	3.00	2.50	33.00	*High-strength economical alloy, with good resistance to industrial environments. Designed for use in heat treating fixture and industrial heating applications as an upgrade from 330 alloy, 800H alloy and stainless steels. Excellent carburization and sulfidation resistance.*
600	0.08	0.20	0.20	0.04	0.00	0.50	0.00	15.50	76.00	0.00	0.00	8.00	*A nickel-chromium alloy with good carburization and oxidation resistance through 2000°F.*
601	0.05	0.30	0.20	0.04	0.00	0.50	0.00	22.50	61.50	0.00	0.00	14.00	*A nickel base alloy with high chromium and an aluminum addition. Outstanding oxidation resistance to 2200°F, good strength and carburization resistance.*
Cast Alloys	**C**	**Mn**	**Si**	**P**	**Cb**	**Mo**	**N**	**Cr**	**Ni**	**Co**	**W**	**Fe**	**Description**
PTS2005 (HC)	0.30	1.00	0.80	0.04	0.00	0.50	0.00	28.00	2.00	0.00	0.00	67.00	*an iron-chromium allow containing about 28 percent chromium and up to 4 percent nickel. It provides excellent resistance to oxidation and high sulfur-containing flue gases at temperatures as high as 2000°F (1093°C).*
HF	0.17	0.70	0.90	0.04	0.00	0.50	0.10	24.00	8.50	0.00	0.00	65.00	*iron-chromium nickel alloy similar to the well known type CF corrosion resistant composition (19 Cr. 9 Ni), but containing somewhat more chromium and nickel, and substantially more carbon.*
PTS 211 (HH)	0.40	0.50	1.20	0.04	0.00	0.50	0.00	26.00	12.00	0.00	0.00	59.00	*an iron-chromium-nickel alloy containing the minimum quantities of chromium and nickel in proportions to supply a useful combination of properties for elevated temperature service. The chromium range is high enough to ensure good scaling resistance up to 2000°F (1093°C) (and sometimes higher) in air or normal combustion gases*
HK-40	0.40	0.60	1.40	0.04	0.00	0.50	0.00	25.00	20.00	0.00	0.00	52.00	*an iron-chromium-nickel alloy somewhat similar to a wholly austenitic type HH in general characteristics and mechanical properties. Although not quite as resistant to oxidizing gases as types HC, HE, OR HI, the HK alloy has chromium content high enough to ensure good resistance to corrosion by hot gases, in both oxidizing or reducing conditions*
HL-40	0.40	0.60	1.40	0.04	0.00	0.50	0.00	30.00	20.00	0.00	0.00	47.00	*iron-chromium-nickel alloy similar to type HK, but its higher chromium content gives this grade greater resistance to corrosion by hot gases, particularly those containing appreciable amounts of sulfur. Because essentially equivalent high temperature strength can be obtained with either the HK or HL grades, the improved corrosion resistance of the HL alloy makes it especially useful for severe service where excessive scaling must be avoided*
HN	0.40	0.90	1.40	0.04	0.00	0.50	0.00	21.00	25.00	0.00	0.00	51.00	*iron-chromium-nickel alloy containing sufficient chromium for good high temperature corrosion resistance and with a nickel content in excess of the chromium content. The alloy has properties somewhat similar to the much more widely used type HT alloy but with better ductility. It is used for highly stressed components in the 1800-2000°F (982 to 1093°C) temperature range*
PTS233 (HT)	0.50	0.90	1.70	0.04	0.00	0.50	0.00	17.00	35.00	0.00	0.00	44.00	*iron-chromium-nickel alloy containing about equal amounts of iron and alloying elements. The high nickel content makes this grade useful in resisting the thermal shock of rapid heating and cooling. In addition the alloy is resistant at high temperature to oxidation and carburization, and has good strength at heat treating temperatures. Except in high sulfur gases, it performs satisfactorily up to 2100°F (1149°C) in oxidizing atmospheres and up to 2000°F (1093°C) in reducing atmospheres*
HU	0.50	0.90	1.70	0.04	0.00	0.50	0.00	18.00	38.00	0.00	0.00	40.00	*iron-chromium-nickel alloy similar to type HT, but its higher chromium and nickel contents give this grade greater resistance to corrosion by either oxidizing or reducing hot gases, particularly those containing appreciable amounts of sulfur. High temperature strength, resistance to thermal fatigue, and resistance to carburization of the alloy are essentially the same as shown by the HT type; hence, its improved corrosion resistance makes the HU type especially suited for severe service conditions involving high stress and rapid thermal cycling.*
HUCB	0.50	0.90	1.70	0.04	1.50	0.50	0.00	18.00	38.00	0.00	0.00	38.50	*Same as HU Alloy with increased hot strength due to the added Columbium (a.k.a. Niobium)*
HP	0.50	0.60	1.30	0.04	0.00	0.50	0.00	26.00	35.00	0.00	0.00	36.00	*an iron-chromium-nickel alloy that is related to the HN and HT types but is higher in alloy content than either of those grades. It has the same chromium but more nickel than the HN type, and the same nickel but more chromium than the HT alloy. This combination of elements makes the HP composition resistant to both oxidizing and carburizing atmospheres at high temperatures. The alloy has good creep-rupture properties in the 1800 to 2000°F(982 to 1093°C)*
HW	0.50	1.50	1.50	0.04	0.00	0.50	0.00	12.00	60.00	0.00	0.00	24.00	*iron-chromium-nickel alloy in which nickel is the predominant element. The high nickel content contributes toward the excellent resistance of the alloy to carburization and also makes this grade especially useful in applications where wide and rapid temperature fluctuations are encountered. In addition, the alloy is resistant at high temperature to oxidation and, although not as strong as the HT type, has good strength at heat treating temperatures. It performs satisfactorily up to about 2050°F (1121°C) in strongly oxidizing atmospheres and up to 1900°F (1038°C) in oxidizing or reducing products of combustion provided that sulfur is not present in the gas*
HX	0.50	1.40	1.50	0.04	0.00	0.50	0.00	17.00	66.00	0.00	0.00	13.00	*iron-chromium-nickel alloy similar to type HW, but containing more nickel and chromium. The increased chromium content confers substantially improved resistance to hot gas corrosion, even in the presence of some sulfur, which permits this grade to be employed for severe service applications at temperatures up to 2100°F (1149°C). High temperature strength, resistance to thermal fatigue, and resistance to carburization of the alloy are essentially the same as shown by the HW type*
PTS235	0.50	0.20	1.50	0.04	0.00	0.50	0.00	26.00	35.00	15.00	5.00	13.00	*excellent oxidation resistance & high temperature strength to 2200° F (1204° C). PTS 235 is an excellent alloy for use in high temperature press platens or other applications where high temperature strength is critical.*
PTS220	0.50	1.00	5.00	0.04	0.00	0.50	0.00	28.00	48.00	0.00	5.00	16.00	*The alloy is wholly austenitic and is intended for use at elevated temperatures up to 2200° F (1204° C).*
PTS230	0.50	1.00	1.00	0.04	0.00	0.50	0.00	28.00	48.00	3.00	5.00	13.00	*Alloy of choice for extended service service at 1950° to 2250° F (1066° to 1232° C).*
PTS240	0.20	0.00	0.00	0.04	0.00	0.50	0.00	33.00	50.00	0.00	17.00	19.00	*Exceptional strength and oxidation resistance to 2400° F (1315° C).*
PTS249	0.35/0.55	0.5/1.5	0.5/2.0	0.03	0.00	0.05	0.00	27/30	47/50	0.00	4/5.5	Bal	
PTS249 Mod	0.30	0.5/1.5	1.3/1.7	0.03	0.00	0.05	0.00	27/30	47/50	0.00	4/5.5	Bal	
PTS250	0.08	0.00	0.00	0.04	0.00	0.00	0.00	28.00	0.00	50.00	0.00	20.00	*heat- resistant cobalt alloy that has excellent thermal shock resistance and wear resistance. It also shows great strength against sulfur- and vanadium-attacks. Another feature is its higher melting point compared to other cobalt base or nickel base heat- resistant alloys*
PTS300	0.35/0.55	2.00	2.00	0.03	0.00	0.05	0.00	26/30	46/50	2.5/4	10/12.5	Bal	