

MATERIAL LISTING

STANDARD ANALYSES PRODUCED BY AECCO

ACI Grades	Other Material	Nominal Composition (Phosphorus and Sulfur = 0.04 max)										High Temperature Properties Creep Stress PSI 1% 10,000 hrs**			Melting Point °F	Principal Features and Applications
		Ni	Cr	C	Mn*	Si*	Mo*	W	Co	Fe	Other	1600°F	1800°F	2000°F		
HC	Wrought 446	4*	28	0.50*	1.0	2.0	0.50	-	-	Bal	-	750	360	-	2725	Excellent resistance to oxidation and sulfur-containing atmospheres, with good wear resistance. Used for pouring spouts for copper and brass, refinery fittings, and grate bars.
HE	Wrought 312	10	28	0.3	2.0	2.0	0.50	-	-	Bal	-	2400	1400	400	2650	Excellent corrosion and wear characteristics up to 2000°F. Used for rollers, journals, burner nozzles and billet skids where heat and wear resistance are needed.
HF	Wrought 302B	10	20	0.3	2.0	2.0	0.50	-	-	Bal	-	3900	-	-	2550	Excellent resistance to corrosion and heat up to 1200°F. Used for grates, furnace parts, burner tips, and rabble arms.
HH2	Wrought 309	12	26	0.3	2.0	2.0	0.50	-	-	Bal	-	3900	2100	800	2500	Excellent resistance to corrosion and heat up to 1200°F. Also used up to 2000°F in applications where embrittlement from sigma formation is acceptable, and resistance to carburization is not critical. Used for furnace parts, trays, radiant tubes, and fixtures in moderate applications.
HK	Wrought 310	20	26	0.4	2.0	2.0	0.50	-	-	Bal	-	6000	2500	650	2550	Excellent hot gas corrosion and oxidation resistance up to 2100°F, and good high temperature strength up to 1900°F. Used for furnace parts, radiant tubes, reformer tubes, and furnace rolls. Susceptible to embrittlement from sigma formation.
HL	-	20	30	0.4	2.0	2.0	0.50	-	-	Bal	-	4300	2200	-	2600	Similar to HK material, but greater resistance to corrosion by hot gases, particularly those containing sulfur. Used for furnace parts, radiant tubes, and furnace rolls. Susceptible to embrittlement from sigma formation.
HN	-	25	21	0.3	2.0	2.0	0.50	-	-	Bal	-	6300	2400	1040	2500	Similar to HK material, but greater strength at temperatures in excess of 1850°F and greater resistance to thermal shock. Used for furnace parts, trays, and furnace rolls.
HT	Wrought 330	35	17	0.5	2.0	2.5	0.50	-	-	Bal	-	4500	2000	500	2450	Excellent resistance to oxidation and carburization up to 2000°F. Resists thermal shock from heating and cooling. Used for furnace parts, trays, baskets, annealing fixtures, muffles, radiant tubes, enameling fixtures, retorts, belts, and chains.
HP	-	35	26	0.5	2.0	2.5	0.50	-	-	Bal	-	5800	2800	1000	2450	Similar to HT material, with less resistance to thermal shock but greater strength. Not susceptible to embrittlement from sigma formation. Used for furnace parts, trays, radiant tubes, and reformer tubes.
HU	-	39	19	0.5	2.0	2.5	0.50	-	-	Bal	-	5000	2200	600	2450	Similar to HT material, but with greater resistance to rapid thermal shock and greater strength and carburization resistance up to 2000°F. Most useful alloy for carburization applications with an oil quench at 1600-1800°F. Used for trays, baskets, fixtures, radiant tubes, furnace parts, retorts, belts, chains, and muffles.
HW	-	60	12	0.5	2.0	2.5	0.50	-	-	Bal	-	3000	1400	-	2350	Has less strength than HT or HU alloy, but greater resistance to carburization and thermal shock up to 2050°F. Used for trays, fixtures, retorts, and enameling tools where severe thermal shock is present.
HX	-	66	17	0.5	2.0	2.5	0.50	-	-	Bal	-	3200	1600	600	2350	Similar to HW alloy, but has even greater strength and resistance to hot gas corrosion up to 2100°F. This grade is used more commonly than HW alloy for severe applications with water or synthetic quenches. Used for trays, baskets, fixtures, hearth plates, enameling tools, and retorts where thermal shock is present.

COMMON SUPER & SPECIALTY ALLOYS PRODUCED BY AECCO

Proprietary Grades	Other Material	Nominal Composition (Phosphorus and Sulfur = 0.04 max)										High Temperature Properties Creep Stress PSI 1% 10,000 hrs**			Melting Point °F	Principal Features and Applications
		Ni	Cr	C	Mn*	Si*	Mo	W	Co	Fe	Other	1600°F	1800°F	2000°F		
NC24	Alloy 25	10	20	0.5	2	1	-	15	Bal	3*	-	8900 (1000 h)	3000 (1000 h)	-	2425	Excellent high-temperature strength and wear resistance, good oxidation and sulfidation resistance. Used for turbine engine parts, bearings, furnace parts where high-temperature wear resistance is required.
STEL31	Stellite 31	10.5	25.5	0.5	1	1	-	7.5	Bal	2*	-	-	-	-	2540	High-temperature superalloy with high tensile and creep properties and resistance to oxidizing and reducing atmospheres up to 2100°F. Excellent resistance to thermal and mechanical shock. Mainly used in gas turbine engines in areas subject to hot gas erosion.
NC13	MO-RE 1	35	28	0.5	2	2.5	-	1.4	-	Bal	-	-	3600	1200	-	Has additional strength over HP material for 1600-2100°F.
NC17W	T63W	35	22	0.5	2	2.5	-	5	-	Bal	-	-	-	-	2450	Similar to HP alloy, but with the addition of tungsten to provide additional strength at temperatures between 1600-2100°F.
NC14	Supertherm	35	26	0.5	2	2.5	-	5	15	Bal	0.7 Cb	-	4250	2000	-	High strength alloy providing exceptional strength at temperatures up to 2150°F. Used for radiant tubes, furnace rolls, walking beams, and furnace parts where high temperature strength is required.
NC16W	MO-RE 2	35	33	0.5	2	2.5	-	16	-	Bal	-	-	-	1250	-	Excellent high temperature strength and oxidation resistance for applications exceeding 2100°F. Must be preheated for welding.
NC20	HR120	37	25	0.05	1	1	2	2	2	Bal	0.1 Al, 0.4 Ti	5100	1100	-	2375	Similar to wrought 120, high strength alloy up to 2000°F. Offers similar strength characteristics to other super alloys.
NC19	333	45	25	0.08*	2	2	3	3	3	Bal	-	2450	770	-	2400	Similar to wrought 333, excellent carburization resistance.
NC9MO	Hastelloy X	47	22	0.2*	1	1	9	0.6	1.5	Bal	-	5800	1900	-	2400	Exceptional oxidation and high strength characteristics at temperatures up to 2200°F. Used for turbine engines, furnace rolls, retorts, muffles, and trays to provide greater service life in severe applications.
NC11	22H	48	28	0.5	2	2.5	-	5	-	Bal	-	-	2300	1050	-	Popular alloy for high temperature applications (1800-2150°F). Excellent high-temperature strength and oxidation and carburization resistance. Used for radiant tubes, trays, fixtures, retorts, furnace parts, and baskets.
NC11C	S22H	48	28	0.5	2	2	-	5	3	Bal	-	-	3200	1600	-	Similar to NC11 with cobalt added to provide greater strength at elevated temperatures.
NC22W	KHRSA	50	30	0.4	0.5	0.5	-	13	-	Bal	-	-	2650	1550	2400	Excellent oxidation resistance and high temperature strength, suitable for many harsh operating environments. Suitable for long-term service up to 2200°F for radiant tubes, furnace rolls, fixtures.
HXM40	HX (MOD)	69	17	0.4	2	2.5	0.50*	-	-	Bal	-	3200	1600	600	2350	An upgraded version of HX material which exhibits greater resistance to thermal shock.
NC18W	H230	Bal	22	0.1	0.6	0.5	2	14	-	Bal	0.35 Al	4400	1100	-	2400	Similar to wrought 230, with excellent oxidation and carburization resistance up to 2000°F, and high strength up to 1900°F.
INC600	Inconel 600	72 min	16	0.15*	1	0.5	-	-	-	Bal	-	-	-	-	2400	Similar to wrought Inconel 600, with excellent thermal fatigue properties. Suitable for severe water and synthetic quench applications.