

ALLOY DATA SHEET HK50

HEAT RESISTANT ALLOY

REVISION: 04/91

DESCRIPTION

HK 50, is an austenitic Fe-Cr-Ni alloy that has been a standard heat resistant material for over four decades. With moderately high temperature strength, oxidation resistance and carburization resistance the alloy is used in a wide variety of industrial applications.

COMPOSITION

	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>P</u>	<u>S</u>
Min %	0.45	--	--	24	18	-	-
Max %	0.55	2.0	2.0	28	22	0.03	0.03

APPLICATIONS

Ammonia, methanol and hydrogen reformers; ethylene pyrolysis coils and fittings; steam superheater tubes and fittings; tube supports and hangers; tube sheets; heat treatment fixtures and trays; refractory supports; furnace skids; furnace rolls; rabble arms.

PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

PHYSICAL PROPERTIES

Density (lbs/in ³)	0.280
Melting Point(°F)	2540
Thermal Conductivity (Btu/h/ft ² /ft/°F)	7.9 @ 2120°F
	15.7 @ 1600°F
	17.1 @ 1800°F
Thermal Expansion (10 ⁻⁶ in/in °F)	9.8 @ 70-1400°F
	10.0 @ 70-1600°F
	10.2 @ 70-1800°F

CARBURIZATION

RESISTANCE

(Gas-1064 hours @ 1760°F)

ALLOY	WEIGHT GAIN
GRADE	mg/mm ²
H F	0.81
H H	0.58
H K	0.56
H P	0.20

MECHANICAL PROPERTIES (Typical Values)

		Centrifugal Castings					Static Castings
		70	1400	1600	1800	2000 °F	70 °F
U.T.S.	K.S.I.	84	38	24	15	5.6	74
Y.S.	K.S.I.	44	24	16	9	5	45
El.	%	20	13	16	42	55	17

SERVICE TEMPERATURE

The alloy is suitable for service at temperatures up to approximately 2000°F.

COMPARATIVE OXIDATION RATES (mm / year) (500 hour cyclic tests)

GRADE	1832	1922	2012	2102	2204 °F
H H	<0.1	0.22	0.92	3.9	
H K	<0.1	0.22	0.95	3.5	12.7
H T	0.20	0.54	1.4	3.2	7.2

WELDABILITY

HK40 alloy has good weldability by the SMAW, GTAW and GMAW processes using filler metal of matching composition.

CREEP-RUPTURE PROPERTIES

Long term creep-rupture properties were extrapolated from Larson-Miller Parameter versus stress plots.

		<u>RUPTURE-STRESS-KSI</u>						
<u>HOURS</u>		<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	°F
1,000.	AVG.	11.9	8.75	6.18	4.34	3.05	2.09	
	MIN.	9.39	6.97	4.98	3.48	2.35	1.54	
10,000.	AVG.	8.75	6.04	4.10	2.67	1.74	1.05	
	MIN.	6.96	4.84	3.27	2.10	1.34	0.85	
100,000	AVG.	6.11	4.12	2.58	1.59	0.96		
	MIN.	4.84	3.20	2.06	1.28	0.78		
		<u>CREEP-STRESS-KSI</u>						
<u>%/HOUR</u>		<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	°F
0.01	AVG.	-	11.8	9.9	8.0	6.35	4.75	
0.001	AVG.	11.6	9.5	7.4	5.7	3.93	2.68	
0.0001	AVG.	9.0	6.85	5.0	3.35	2.05	1.05	

Note: Creep and rupture stresses are subject to periodic revisions as the results from long term tests become available.

RELATED SPECIFICATIONS

ASTM: A 297 (HK); A 351(HK30 and HK40); A 567 (HK40 and HK50 - specification discontinued in 1987); A608 (HK30 and HK40)

Nearest wrought grade: AISI 310. The composition of the wrought grade differs from that of the cast alloy and has different properties. The cast alloy designation should always be used to identify castings.

HEAD OFFICE, FOUNDRY & INTERNATIONAL SALES**Kubota Metal Corporation, Fahramet Division**

25 Commerce Road, P.O. Box 1700,

Orillia, Ontario, Canada, L3V 6L6.

Phone (705) 325-2781

Fax (705) 325 5887