

ALLOY DATA SHEET HD

HEAT RESISTANT ALLOY

REVISION: 04/91

DESCRIPTION

HD alloy is a two phase ferrite-austenite Fe-Cr-Ni alloy, similar to HC alloy. Somewhat higher strength and ductility result from the higher nickel content in this grade. Oxidation resistance is good up to 2000 °F but resistance to sulphur bearing environments is a little less than that of HC alloy.

COMPOSITION

	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>Mo</u>	<u>P</u>	<u>S</u>
Min %		0.3	0.35	26	4		-	-
Max %	0.5	1.5	2.0	30	7	0.5	0.03	0.03

APPLICATIONS

Grate bars, dampers, recuperators, molten salt pots , furnace skids, rabble blades, tuyeres, slag tapping blocks, burner nozzles.

PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

PHYSICAL PROPERTIES

Density (lbs/in ³)	0.274
Melting Point(°F)	2700
Thermal Conductivity (Btu/h/ft ² /ft/°F)	12.6 @ 212°F 17.9 @ 1000°F 20.3 @ 1500°F 24.2 @ 2000°F
Thermal Expansion (10 ⁻⁶ in/in °F)	7.7 @ 70-1000°F 8.0 @ 70-1200°F 8.3 @ 70-1400°F 8.6 @ 70-1600°F 8.9 @ 70-1800°F 9.2 @ 70-2000°F 10.3 @ 1200-1600°F 10.6 @ 1200-1800°F
Magnetic Permeability	Ferromagnetic

CARBURIZATION

RESISTANCE

(Gas-1064 hours @ 1760°F)

ALLOY	WEIGHT GAIN
GRADE	mg/mm ²
H C	0.69
H D	0.60
H E	0.54
H F	0.81

MECHANICAL PROPERTIES (Typical Values)

		<u>70</u>	<u>1400</u>	<u>1600</u>	<u>1800</u>	°F	<u>ASTM Spec.A297</u>
U.T.S.	K.S.I.	88	36	23	15		75 Min.
Y.S.	K.S.I.	49					35 Min.
Elong.	%	11	14	18	40		8 Min.
Hard.	HB	190					

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	°F
H C	<0.1	0.25	1.05	5.0	
H D	<0.1	0.25	1.3	5.2	
H E	<0.1	0.26	1.05	4.3	

WELDABILITY

Procedures for welding HD alloy are available from Kubota Metal Corporation.

CREEP-RUPTURE PROPERTIES

		<u>RUPTURE-STRESS-KSI</u>						
<u>HOURS</u>		<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>		°F
100.	AVG.	10.0	7.1	5.0	3.5	2.5		
1,000.	AVG.	7.0						
10,000	AVG.							
100,000	AVG.							

		<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>	<u>2000</u>	°F
0.0001	AVG.	3.5	2.6	1.9	1.3	0.9	0.42	0.2	

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

RELATED SPECIFICATIONS

ASTM: A 297 (HD); A608 (HD 50). UNS J93005. SAE 70327

Nearest wrought grade: AISI 327-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