Kubota METAL CORPORATION
25 Commerce Road, Orillia, Ontario, Canada L3V 6L6
Phone (705) 325-2781 Fax (705) 325-5887

ALLOY DATA SHEET
KHR 35CT

HEAT RESISTANT ALLOY

REVISION: 12/96

DESCRIPTION

KHR35CT is a microalloyed modification of KHR35C alloy. The addition of titanium results in the highest creep-rupture strength in the Kubota family of modified HP alloys. It is primarily used in reformer furnaces where it's high strength can be used to reduce wall thickness and tube weight and increase catalyst capacity.

COMPOSITION

	C	Mn	Si	Cr	Ni	Nb	Ti	P	S	Mo
Min %	0.45			24	33	0.4				
Max %	0.55	2.0	1.5	27	37	1.0	Add.	<.03	<.03	0.5

APPLICATIONS

Ammonia, methanol and hydrogen reformers; steam superheaters; tube supports; hangers and tube sheets.

PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

PHYSICAL PROPERTIES

Density (lbs/in^3)	0.287	
Melting Solidus	2381 ^oF	
Thermal Conductivity	7.5	@ 68 ^oF
(Btu ft/ft^2 hr ^oF)	12.6	@ 1112 ^oF
	13.5	@ 1292 ^oF
	14.5	@ 1472 ^oF
	16.0	@ 1652 ^oF
	17.4	@ 1832 ^oF
Thermal Expansion	9.3	@ 70-1112 ^oF
(x 10^{-6} in/in ^oF)	9.6	@ 70-1292 ^oF
	9.9	@ 70-1472 ^oF
	10.3	@ 70-1652 ^oF
	10.6	@ 70-1832 ^oF

CARBURIZATION RESISTANCE

(Gas-100 hours @ 1922 ^oF)

ALLOY GRADE	WEIGHT GAIN mg/mm^2
H K40	0.33
H N	0.31
KHR35CT	**0.23**
KHR48N HiSi	0.18

MECHANICAL PROPERTIES (Typical Values)

			Centrifugal Castings			Min. Values
		70	1400	1600	1800 ^oF	70 ^oF
U.T.S.	K.S.I.	77	46	28	14	64
Y.S.	K.S.I.	37	20	16	9	32.5
El.	%	12	26	41	49	8 (c.c.), 6 (st)

SERVICE TEMPERATURE

The alloy is suitable for long term service at temperatures up to 1975 ^oF, but because of the detrimental effect of niobium on oxidation resistance, it should be used with caution at higher temperatures.

WELDABILITY

Welding procedures for KHR35CT are available from Kubota Metal Corporation.

CREEP-RUPTURE PROPERTIES

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

RUPTURE-STRESS-KSI

HOURS		1500	1600	1700	1800	1900	2000	°F
1,000.	AVG.	11.31	9.06	6.96	5.22	3.48	2.18	
	MIN.	10.08	7.98	6.09	4.57	3.04	1.89	
10,000.	AVG	9.57	7.54	5.51	3.70	2.29	1.29	
	MIN	8.56	6.45	4.79	3.19	2.00	1.16	
100,000	AVG	7.98	5.90	4.01	2.43	1.39	0.77	
	MIN.	6.99	5.17	3.51	2.12	1.22	0.67	

CREEP-STRESS-KSI

%/HOUR		1700	1800	1900	2000	°F
0.0001	AVG.	4.12	2.77	1.76	1.06	

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

MODULUS OF ELASTICITY

R.T.	1112	1202	1292	1382	1472	1562	1652	1742	1832	°F
23.5	18.3	17.5	16.6	16.4	16.2	15.7	15.2	14.7	14.2	(x 10^3 ksi)

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