Kubota METAL CORPORATION
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ALLOY DATA SHEET
F35-50W

HEAT RESISTANT ALLOY

REVISION: 04/96

DESCRIPTION

F35-50W is a nickel-chromium-tungsten alloy exhibiting high surface stability and exceptional resistance to carburization. This alloy is primarily intended for service above 2000 °F. A modified form of the alloy is produced which has a maximum carbon content of 0.15% and is primarily intended for furnace skids where surface temperatues approach 2400 °F.

COMPOSITION

	C	Mn	Si	Cr	Ni	W	P	S	Al
Min %	0.15			32	48	15	-	-	+
Max %	0.30	0.3	0.3	34	52	17	0.03	0.03	

APPLICATIONS

Heat treatment furnace roll coveyors, furnace skids and furnace hardware.

PRODUCT FORMS

Horizontal and vertical centrifugal castings, static castings.

PHYSICAL PROPERTIES

Density (lbs/in^3)	0.33	
Melting Point(°F)	2490	
Thermal Conductivity (Btu/h/ft^2/ft/°F)	15.8 @ 2000 °F	
Thermal Expansion (10^{-6}in/in °F)	7.8	@ 70-1600 °F
	9.3	@ 70-2000 °F
	10.1	@ 70-2200 °F

CARBURIZATION RESISTANCE

(Gas-100 hours @ 1922 °F)

ALLOY GRADE	WEIGHT GAIN mg/mm^2
H K	0.33
H P	0.23
KHR48N	0.21
F35-50W	**0.06**

MECHANICAL PROPERTIES (Typical Values)

		70	1600	1800	2000	2100	2200	2300	2400 °F
U.T.S.	K.S.I.	84	54	38	23	18.5	13.5	9.5	5.5
Y.S.	K.S.I.	47							
El.	%	8.5							

SERVICE TEMPERATURE

The alloy is suitable for long term service at temperatures up 2125 °F. Oxidation rates derived from 100 hour tests in air are shown in the table below.

	OXIDATION RATE							
	1832	1922	2012	2102	2192	2282	2372	°F
F27-37W	0.24	0.42	0.66	0.96	1.25			
F35-50W					0.42	0.81	1.1	mm/yr

WELDABILITY

Procedures for welding F35-50W alloy 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		1600	1700	1800	1900	2000	2100	2200	2300	2400	°F
100	AVG	-	10.88	7.43	5.04	3.39	2.27	1.51	0.99	0.65	
	MIN	-	9.77	6.62	4.46	2.98	1.98	1.30	0.85	0.55	
1,000	AVG	10.54	7.05	4.67	3.08	2.01	1.31	0.84	0.54	0.34	
	MIN	9.46	6.27	4.13	2.70	1.75	1.13	0.72	0.46	0.29	
10,000	AVG	6.96	4.52	2.91	1.86	1.18	0.74	0.46	0.29	-	
	MIN	6.20	3.99	2.55	1.62	1.02	0.63	0.39	0.24	-	
100,000	AVG	4.56	2.88	1.80	1.11	0.68	0.42	0.25	-	-	
	MIN	4.03	2.52	1.56	0.96	0.58	0.35	0.21	-	-	

CREEP-STRESS-KSI

%/HOUR		1600	1700	1800	1900	2000	2100	2200	2300	2400	°F
0.0001	AVG.					1.25	0.95	0.73	0.46	0.29	

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

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