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ALLOY DATA SHEET
KNC-03

HEAT RESISTANT ALLOY

REVISION: 02/2002

DESCRIPTION

KNC-03 is a Ni-Cr-W alloy with excellent high temperature properties. The alloy is primary used at extreme temperatures of up to 1250 C (2282 F). The chemical composition of KNC-03 has been optimized in order to achieve a high melting point, stable microstructure, high temperature hardness and excellent oxidation resistance. The alloy has superior anti-pick up properities to avoid scale build up and adhesion. KNC-03 has the highest melting point in the Kubota family of Ni-Cr-W-Fe alloys which makes it an excellent choice for the most severe applications.
KNC-03 also has increased ductility and toughness as compared to typical cast heat resistant alloys, thus making it more resistant to thermal shocks.

COMPOSITION

The chemical composition of KNC-03 has been engineered to have a high solidus (melting point) and excellent oxidation resistance. It is a Ni-Cr-W base alloy.

APPLICATIONS

Furnace rolls, steel mill skids and rails, heat treatment furnace fixtures, water cooled tire rolls, applications requiring anti-pickup properties to reduce scale adhesion

PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

PHYSICAL PROPERTIES

Density (lb/in^3)	0.314	
Melting Solidus	2460 °F	
Melting Liquidus	2600 °F	
Thermal Conductivity	5.80	@ 70 °F
(Btu ft / ft^2 hr °F)	14.74	@ 1652 °F
	15.71	@ 1832 °F
	16.68	@ 2012 °F
Thermal Expansion	7.78	68-1472 °F
(10^{-6} in/in °F)	9.39	68-1832 °F

COMPARATIVE OXIDATION LOSS

Alloy	100 hr test mass loss (g/m^2·hr)		
	2200 °F	2372 °F	2462 °F
UMCo50	1.95	8.63	11.75
KHR40CM	1.30	7.50	10.50
KNC-03	**1.12**	**6.72**	**---**
KNC-01	1.10	2.20	3.40

MECHANICAL PROPERTIES (Typical Values)

		70 °F	1652	2012	Min Value (CC) 70 °F
U.T.S.	(ksi)	78.0	34.0	11.5	70
Y.S.	(ksi)	43.0	22.0	7.0	35
El.	(%)	25.0	25.0	28.0	15
Modulus	(x10^3 ksi)	26.7	11.9		

ROOM TEMPERTURE MECHANICAL PROPERTIES (Typical Values)
(After aging for 100 hours at indicated temperature)

		70 °F	1472	1652	1832	2012	2192
U.T.S.	(ksi)	78.0	98.0	94.0	95.4	86.0	88.6
Y.S.	(ksi)	43.0	56.0	50.0	48.0	41.0	45.0
El.	(%)	25.0	15.5	16.0	20.5	27.0	33.5

CREEP-RUPTURE PROPERTIES (Tensile)

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°F
100.	AVG.	10.03	7.46	5.38	3.75	2.50	1.58	0.96
	MIN.	8.66	6.45	4.66	3.24	2.16	1.36	0.81
1,000.	AVG.	7.61	5.42	3.71	2.42	1.50	0.88	0.50
	MIN.	6.58	4.32	3.21	2.09	1.28	0.74	0.43
10,000.	AVG	5.62	3.80	2.44	1.48	0.84	0.47	0.25
	MIN	4.87	3.29	2.10	1.26	0.71	0.39	0.20
100,000	AVG.	4.03	2.56	1.52	0.85	0.46	0.23	
	MIN.	3.49	2.21	1.30	0.72	0.39	0.18	

COMPRESSIVE STRENGTH **(** STRESS=0.5 kg/mm2, 10'000 cycles**)**

DEFORMATION VALUES IN %/CYCLE ($x10^{-4}$)

	2202 F	2282 F	2372 F	2462 F
KNC-03	**0.18**	**0.24**	**0.73**	**---**
UMCo50	----	0.55	1.40	4.30
KHR40CM	----	0.58	1.39	4.25
KNC-01	----	---	0.18	0.42

VICKERS HARDNESS AT ELEVATED TEMPERATURE (prior aging 1000 C/24 hrs**)**

	1832 F	1922 F	2012 F
KNC-03	**107**	**101**	**87**
KHR40CM	80	71	62
HK-40	100	90	--

SERVICE TEMPERATURE

The combination of high strength and excellent resistance to oxidation make this alloy suitable for long term service at temperatures up to 2282 °F.

WELDABILITY

Procedures for welding KNC-03 alloy are available from Kubota Metal Corporation.

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