

ALLOY DATA SHEET

KHR 35CTHi Si

HEAT RESISTANT ALLOY

REVISION: 06/97

DESCRIPTION

KHR35CT Hi Si is a microalloyed modification of KHR35C Hi Si alloy which was specifically developed for the outlet sections of ethylene pyrolysis coils. The alloy is suitable for long term service at temperatures up to 2000 °F, but because of the detrimental effect of niobium on oxidation resistance, it should be used with caution at higher temperatures.

COMPOSITION	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>Nb</u>	<u>Ti</u>	<u>P</u>	<u>S</u>
Min %	0.45		1.5	24	33				
Max %	0.55	2.0	2.0	27	37	1.0	Add.	0.03	0.03

APPLICATIONS

Ethylene pyrolysis coils; other cracking tubes.

PHYSICAL PROPERTIES

Density (lbs/in ³)	0.287		
Melting Solidus	2372 °F		
Thermal Conductivity (Btu ft/ft ² hr °F)	6.6	@ 212 °F	
	14.6	@ 1600 °F	
	16.7	@ 1800 °F	
Thermal Expansion (μ in/in °F)	9.9	@ 68 - 1472 °F	
	10.3	@ 68 - 1652 °F	
	10.6	@ 68 - 1832 °F	

CARBURIZATION RESISTANCE

(Standard Pack, 2102 °F, 300 hrs)	
KHR35C	20.8
KHR35C HiSi	13.6
KHR35CW	12.3
KHR35CT HiSi	13.3
(cumulative %C, 0 - 4.5 mm layer)	

MECHANICAL PROPERTIES (Typical Values)

		Centrifugal Castings					Min. Values	
		70	1400	1600	1800	2000 °F	70 °F	
U.T.S.	ksi	73	42	25	16	10	64	
Y.S.	ksi	40	19	13	9	5.5	32.5	
El.	%	12	22	36	44	50	8 (c.c.), 6 (static)	

CREEP-RUPTURE PROPERTIES

RUPTURE STRESS (ksi)

HOURS		<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	<u>2000</u>	<u>2100</u>	°F
100	AVG.	12.15	9.84	7.79	5.99	4.45	3.16	2.13	
	MIN.	10.35	8.39	6.64	5.11	3.80	2.70	1.82	
1000	AVG.	10.08	7.91	6.02	4.41	3.08	2.02	1.25	
	MIN.	8.59	6.75	5.14	3.77	2.63	1.73	1.06	
10000	AVG.	8.21	6.20	4.50	3.10	2.00	1.21	0.72	
	MIN.	7.01	5.30	3.84	2.65	1.71	1.02	0.60	
100000	AVG.	6.55	4.72	3.22	2.06	1.22	0.71		
	MIN.	5.59	4.03	2.76	1.76	1.03	0.59		

LIMITING CREEP STRESS (ksi)

%/HOUR		<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	<u>2000</u>	<u>2100</u>	°F
0.0001	AVG.			3.98	2.57	1.71	1.13		