

# ALLOY DATA SHEET UCX

HEAT RESISTANT ALLOY

REVISION: 07/01

## DESCRIPTION

UCX is a high nickel-chromium austenitic alloy with strengthening elements, developed for ethylene pyrolysis service at temperatures up to 2192 °F. Carburization and coking resistance is significantly higher than the KHR45A alloy while stress rupture strength at high temperatures is excellent. This alloy was designed for operation at temperatures higher than possible for other cracking tube alloys. This makes the alloy suitable for final pass outlet tubes and specific hot regions in a coil. It can be used to combat sulphur and vanadium ash attack. UCX also has much higher oxidation resistance than KHR45A.

COMPOSITION	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>P</u>	<u>S</u>	<u>Other</u>
Min %	0.2	0.0	0.0	40	45	-	-	
Max %	0.5	1.5	2.5	43	50	0.03	0.03	Add.

## APPLICATIONS

Ethylene pyrolysis tubes and fittings, cracking furnace coils, Superheater tube, direct reduction furnace assemblies.

## PRODUCT FORMS

Centrifugal Castings and Static Castings

## PHYSICAL PROPERTIES

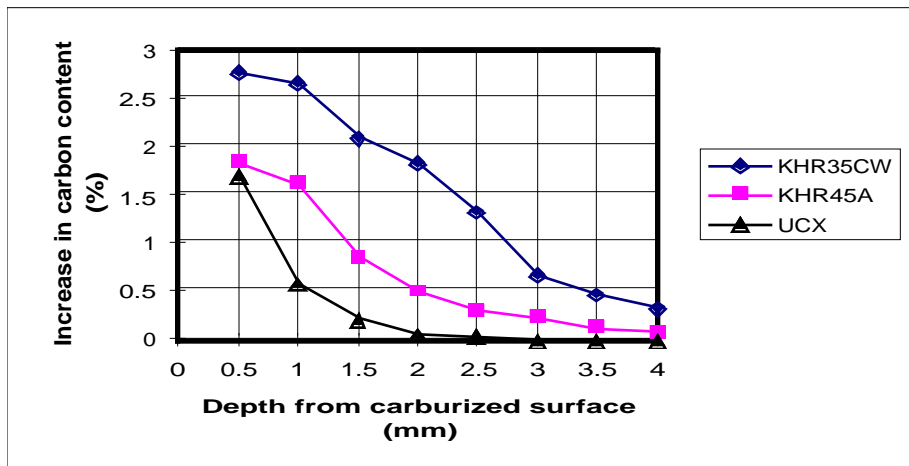
Density (lbs/in <sup>3</sup> )	0.2835
Melting Solidus	2354 °F
Melting Liquidus	2426 °F
Thermal Conductivity (Btu ft/ ft <sup>2</sup> hr °F)	6.05 @ R.T. °F
	13.06 @ 1112 °F
	19.11 @ 2102 °F
Thermal Expansion (μ in/in °F)	8.44 @ 68-932 °F
	8.72 @ 68-1112 °F
	9.27 @ 68-1652 °F
	9.44 @ 68-1832 °F
	10.11 @ 68-2192 °F
Heat Capacity (Cal/g°C)	0.112 @ 68°F
	0.139 @ 1112°F
	0.155 @ 2102°F

## OXIDATION RESISTANCE\*

Metal Loss (relative value)	
KHR35CW	1.0
KHR45A	0.94
<b>UCX</b>	<b>0.40</b>

\*cyclic oxidation at 2100 °F

## CARBURIZATION RESISTANCE\* (Standard Pack 2192 °F, 250 hours)



**MECHANICAL PROPERTIES**

		(Typical Values)								Min. Values
		Centrifugal Castings								
		70	1112	1292	1472	1652	1832	2012	2192°F	68 °F
U.T.S.	ksi	85	70	60	43	26	16	9.3	5.8	68
Y.S.	ksi	45	28	27	25	17	10	5.6	3.2	39
El.	%	11	20	24	22	28	29	35	38	5 c.c., 3.5 static

**ELASTIC MODULUS**

	R.T.	1112	1472	1832°F
X1000 ksi	25.5	18.9	15.4	13.2

**CREEP RUPTURE PROPERTIES**

		RUPTURE STRESS (ksi)							
HOURS		1500	1600	1700	1800	1900	2000	2100	2200°F
100	AVG	12.33	8.53	5.90	4.08	2.83	1.96	1.35	0.94
	MIN	9.86	6.82	4.72	3.27	2.26	1.56	1.08	0.75
1000	AVG	9.24	6.30	4.29	2.93	2.00	1.36	0.93	0.63
	MIN	7.39	5.04	3.44	2.34	1.60	1.09	0.74	0.51
10000	AVG	6.92	4.65	3.12	2.10	1.41	0.95	0.64	0.43
	MIN	5.54	3.72	2.50	1.68	1.13	0.76	0.51	0.34
100000	AVG	5.19	3.43	2.27	1.51	1.00	0.66	0.44	0.29
	MIN	4.15	2.75	1.82	1.20	0.80	0.53	0.35	0.23

**WELDABILITY**

Welding procedures for UCX are available from Kubota Metal Corporation

**SERVICE TEMPERATURE**

UCX can be used at temperatures up to 2192°F.