

# ALLOY DATA SHEET

## HU

HEAT RESISTANT ALLOY

REVISION : 06/95

### DESCRIPTION

HU is an austenitic Ni-Fe-Cr alloy with moderate creep-rupture strength and good ductility. Oxidation and carburization resistance rank highly. These properties combine to give a good resistance to thermal fatigue and shock that is particularly suited for furnace components in long term service at at low stresses, at temperatures up to 2100 °F.

### COMPOSITION

	<b>C</b>	<b>Mn</b>	<b>Si</b>	<b>Cr</b>	<b>Ni</b>	<b>Mo</b>	<b>P</b>	<b>S</b>
Min %	0.35			17	37	-	-	-
Max %	0.75	2.0	2.0	21	41	0.5	0.03	0.03

### APPLICATIONS

Furnace components, trays, hangers, carburizing retorts, heat treatment pots, distillation retorts.

### PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

### PHYSICAL PROPERTIES

Density (lbs/in <sup>3</sup> )	0.290
Melting Point(°F)	2510
Thermal Conductivity (Btu/h/ft <sup>2</sup> /ft/°F)	7.0 @ 212°F
	14.0 @ 1600°F
	15.3 @ 1800°F
Thermal Expansion (10 <sup>-6</sup> in/in °F)	8.8 @ 70-1000°F
	9.0 @ 70-1200°F
	9.2 @ 70-1400°F
	9.4 @ 70-1600°F
	9.6 @ 70-1800°F
	9.7 @ 70-2000°F
	10.5 @ 1200-1600°F
	10.6 @ 1200-1800°F
Magnetic Permeability	1.10-2.0

### CARBURIZATION

#### RESISTANCE

(Gas-1064 hours @ 1760°F)

ALLOY	WEIGHT GAIN
GRADE	mg/mm <sup>2</sup>
H H	0.58
H K	0.56
HT	0.38
<b>H U</b>	<b>0.24</b>

### MECHANICAL PROPERTIES (Typical Values)

		70	1400	1600	1800	2000 °F	ASTM Spec A297
U.T.S.	K.S.I.	71	40	20	10		65 Min.
Y.S.	K.S.I.	40			6		
El.	%	13		20	28		4 Min.

**SERVICE TEMPERATURE**

The alloy is suitable for service at temperatures up to approximately 2100°F.

COMPARATIVE OXIDATION RATES (mm / year)  
(500 hour cyclic tests)

GRADE	1832	1922	2012	2102	2204 °F
HH	<0.1	0.22	0.95	3.9	
HT	0.20	0.54	1.4	3.2	7.2
<b>HU</b>	<b>0.10</b>	<b>0.24</b>	<b>0.54</b>	<b>1.1</b>	<b>2.2</b>

**WELDABILITY**

HU alloy has good weldability by the SMAW, GTAW and GMAW processes.

**CREEP-RUPTURE PROPERTIES**

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

		<b><u>RUPTURE-STRESS-KSI</u></b>									
<u>HOURS</u>		<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	<u>2000</u>	<u>2100</u>	<u>2200</u>	°F
100.	AVG.	-	10.30	8.19	6.34	4.73	3.37	2.26	1.40	0.80	
	MIN	-	9.73	7.66	5.85	4.30	3.00	2.00	1.17	0.64	
1,000.	AVG.	10.40	8.13	6.19	4.53	3.14	2.03	1.20	0.64	-	
	MIN	9.78	7.60	5.71	4.10	2.78	1.74	0.99	0.52	-	
10,000.	AVG.	8.28	6.23	4.48	3.04	1.91	1.08	0.55	-	-	
	MIN	7.64	5.75	4.06	2.69	1.63	0.88	0.45	-	-	
100,000	AVG.	6.45	4.59	3.07	1.88	1.03	0.51	-	-	-	
	MIN	5.96	4.16	2.71	1.60	0.84	0.42	-	-	-	

		<b><u>CREEP-STRESS-KSI</u></b>							
<u>%/HOUR</u>		<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	<u>1900</u>	<u>2000</u>	°F
0.0001	AVG.	8.5	6.5	4.7	3.5	2.35	1.25	0.57	

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

**RELATED SPECIFICATIONS**

ASTM: A 297 (HU); A608 (HU 50)

Nearest wrought grade: None

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