

# ALLOY DATA SHEET F27-37W

HEAT RESISTANT ALLOY

REVISION: 04/96

## DESCRIPTION

F27-37W is an iron-nickel-chromium alloy based on HP with increased strengthening from a 1.5% tungsten addition. Creep strength is outstanding, with higher values than those of HP, KHR35C Hi-Si and KHR35W alloys at temperatures above 1600 °F. Rupture strength is higher than that of KHR35C Hi Si at temperatures above 1700 °F.

## COMPOSITION

	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>W</u>	<u>P</u>	<u>S</u>
Min %	0.40			25	35	1.25	-	-
Max %	0.50	1.25	1.5	28	38	2.0	003	0.03

## APPLICATIONS

Hydrogen reformers; heat treatment furnace roll conveyors and furnace hardware; radiant heater tubes and fittings.

## PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

## PHYSICAL PROPERTIES

Density (lbs/in <sup>3</sup> )	0.290		
Melting Point(°F)	2480		
Thermal Conductivity (Btu/h/ft <sup>2</sup> /ft/°F)	16.4 @ 2000 °F		
Thermal Expansion (10-6in/in °F)	9.6	@ 70-1600 °F	
	9.8	@ 70-1800 °F	
	10.0	@ 70-2000 °F	

## CARBURIZATION

### RESISTANCE

(Gas-100 hours @ 1922°F)

ALLOY	WEIGHT GAIN
GRADE	mg/mm <sup>2</sup>
H H	0.36
H K	0.33
H P	0.23
<b>F27-37W</b>	<b>0.22</b>

## MECHANICAL PROPERTIES (Typical Values -Centrifugal Castings)

		70	1600	1800	2000 °F
U.T.S.	ksi	74	32	19	11
Y.S.	ksi	41			
El.	%	13	19	34	40

## 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	°F
	0.24	0.42	0.66	0.96	1.25	mm/yr

## WELDABILITY

Procedures for welding F27-37W alloy are available from Kubota Metal Corporation.

**CREEP-RUPTURE PROPERTIES**

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

		<u>RUPTURE-STRESS-KSI</u>								
HOURS		1400	1500	1600	1700	1800	1900	2000	2100	°F
100	AVG.	-	-	9.59	7.43	5.46	3.82	2.54	1.60	
	MIN	-	-	9.32	7.16	5.22	3.62	2.38	1.49	
1,000	AVG.	-	9.96	7.69	5.61	3.88	2.54	1.57	0.92	
	MIN	-	9.69	7.41	5.36	3.67	2.38	1.45	0.84	
10,000	AVG.	10.51	8.13	5.92	4.06	2.63	1.60	0.92	0.49	
	MIN	10.24	7.86	5.67	3.85	2.46	1.48	0.84	0.45	
100,000	AVG.	8.77	6.41	4.39	2.82	1.70	0.96	0.51	0.25	
	MIN	8.49	6.15	4.17	2.65	1.57	0.88	0.46	0.22	

		<u>CREEP-STRESS-KSI</u>								
%/HOUR		1400	1500	1600	1700	1800	1900	2000	2100	°F
0.0001	AVG.			6.0	4.8	3.6	2.25	1.2	0.56	

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

**COMPARATIVE 0.0001%/HOUR CREEP-STRESSES-KSI**

ALLOY	1700	1800	1900	2000	°F
HP	3.78	2.45	1.56	0.90	
<b>F27-37W</b>	<b>4.8</b>	<b>3.6</b>	<b>2.25</b>	<b>1.2</b>	

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