

ALLOY DATA SHEET IN 657

HEAT RESISTANT ALLOY

REVISION: 04/91

DESCRIPTION

IN657 is a 50Cr-50Ni-Nb alloy manufactured under licence from Inco Alloy Products. It is specifically used for components in furnaces which are fired by low grade fuel oils containing high levels of vanadium, sodium and sulphur. The addition of niobium increases the creep-rupture strength of the base composition without impairing high temperature corrosion resistance.

COMPOSITION

	<u>C</u>	<u>Mn</u>	<u>Si</u>	<u>Cr</u>	<u>Ni</u>	<u>Nb</u>	<u>P</u>	<u>S</u>	<u>N2+C</u>	<u>Ni+Cr+Nb</u>
Min %				47		1.4	-	-		97.5
Max %	0.1	0.3	0.5	52	Bal.	1.7	0.02	0.02	0.2	

APPLICATIONS

Furnace components, hangers, tube supports; support beams; tube sheets; dampers; baffles; burner nozzles.

PRODUCT FORMS

Horizontal and vertical centrifugal castings; static castings.

PHYSICAL PROPERTIES

Density (lbs/in ³)	0.286
Melting Point(°F)	2425
Thermal Conductivity (Btu/h/ft ² /ft/°F)	7.9 @ 212°F 18.0 @ 2000°F
Thermal Expansion (10 ⁻⁶ in/in °F)	5.6 @ 68-212°F 7.4 @ 68-932°F 8.2 @ 68-1292°F 8.3 @ 68-1652°F 8.2 @ 68-1832°F
Magnetic Permeability	1.02

MECHANICAL PROPERTIES (Typical Values)

		70	1200	1400	1600	1700 °F
U.T.S.	ksi	84	73	64	43	30
Y.S.	ksi	44	40	33	17	11
El.	%	38	15	16	19	21

SERVICE TEMPERATURE

The alloy is suitable for service at temperatures up to approximately 1925°F.

WELDABILITY

IN 657 has limited weldability. Procedures 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>							
<u>HOURS</u>		<u>1200</u>	<u>1300</u>	<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	°F
100.	AVG.		25	20	14	10	7.1	4.8	
1,000.	AVG.	26	19	13.8	8.9	5.7	3.68	2.32	
10,000.	AVG.	20	14.2	9.9	6.3	4.0	2.55	1.6	
100,000	AVG.	15	10.3	7.0	4.3	2.6	1.6	1.0	

		<u>CREEP-STRESS-KSI</u>							
<u>%/HOUR</u>		<u>1200</u>	<u>1300</u>	<u>1400</u>	<u>1500</u>	<u>1600</u>	<u>1700</u>	<u>1800</u>	°F
0.0001	AVG.		15.3	9.4	5.75	3.55	1.84		

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

RELATED SPECIFICATIONS

ASTM: A 560 (Grade 50Cr-50Ni-Cb).

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