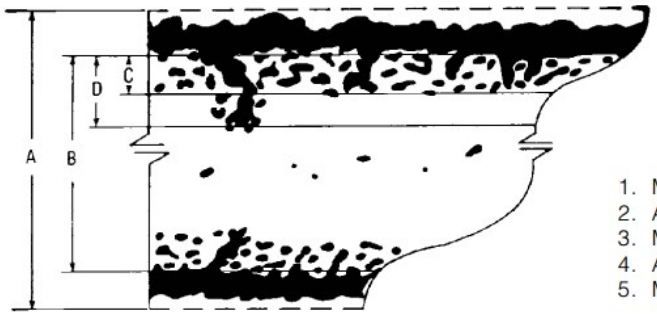
HAYNES® 25 alloy

Oxidation Resistance

HAYNES® 25 alloy exhibits good resistance to both air and combustion gas oxidizing environments, and can be used for long-term continuous exposure at temperatures up to 1800°F (980°C). For exposures of short duration, 25 alloy can be used at higher temperatures. Applications for which oxidation resistance is a serious consideration normally call for newer, more capable materials such as 230® alloy or HAYNES 188 alloy. This is particularly important at temperatures above 1800°F (980°C).



1. Metal Loss = (A-B)/2
2. Average Internal Penetration = C
3. Maximum Internal Penetration = D
4. Average Metal Affected = ((A-B)/2) + C
5. Maximum Metal Affected = ((A-B)/2) + D

Comparative Burner Rig Oxidation Resistance
1000 Hour Exposure at 1800°F (980°C), 30 minute Cycles

Alloy	Metal Loss		Average Metal Affected		Maximum Metal Affected	
	mils	µm	mils	µm	mils	µm
188	1.1	28	3.2	81	3.9	99
230®	2.8	71	5.6	142	6.4	163
617	2.4	61	5.7	145	6.9	175
625	3.7	94	6.0	152	6.6	168
X	4.3	109	7.3	185	8.0	203
25	7.8	198	9.8	249	10.3	262
310SS	16.0	406	18.3	465	19.5	495
800H	22.9	582	Internal oxidation through thickness			

Oxidation Test Parameters

Burner rig oxidation tests were conducted by exposing samples 3/8 in. x 2.5 in. x thickness (9 mm x 64 mm x thickness), in a rotating holder, to products of combustion of No. 2 fuel oil burned at a ratio of air to fuel of about 50:1. (Gas velocity was about 0.3 mach). Samples were automatically removed from the gas stream every 30 minutes and fancooled to near ambient temperature and then reinserted into the flame tunnel.

Comparative Burner Rig Oxidation Resistance at 2000°F (1095°C) for 500 Hours

Alloy	Average Metal Loss per Side		Maximum Metal Affected	
	mils	µm	mils	µm
214	1.2	30.5	1.8	45.7
230®	7.1	180.3	11.8	299.7
188	10.9	276.9	14.1	358.1
X	11.6	294.6	15.1	383.5

25	> 25*	>635*	-	-

> *25 mils (635 µm) in 165 hours

Comparative Oxidation Resistance in Flowing Air*

	1800°F (980°C)				2000°F (1095°C)				2100°F (1150°C)			
	Average Metal Affected		Metal Loss		Average Metal Affected		Metal Loss		Average Metal Affected		Metal Loss	
Alloy	**mils**	**µm**	**mils**	**µm**	**mils**	µm	**mils**	**µm**	**mils**	**µm**	**mils**	**µm**
188	1.1	28	0.1	3	3.7	94	0.5	13	10.7	272	8.6	218
230®	1.5	38	0.2	5	3.3	84	0.5	13	4.4	112	1.2	30
25	2.0	51	0.3	8	10.2	259	9.2	234	10.7	272	8.2	208
X	1.5	38	0.2	5	4.4	112	1.3	33	6.1	115	3.6	91
625	1.9	48	0.4	10	7.8	198	3.5	89	20.2	513	18.3	465
617	2.0	51	0.3	8	3.8	97	0.6	15	5.2	132	1	25
800HT	4.1	104	0.5	13	11.6	295	7.6	193	15.0	381	11	279

*Flowing air at a velocity of 7.0 ft/min (213.4 cm/min) past the samples. Samples cycled to room temperature once per week.

**Average Metal Affected = Metal Loss + Average Internal Penetration

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