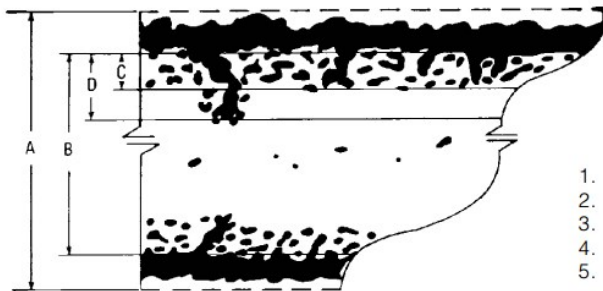


# HAYNES<sup>®</sup> 25 alloy

## Oxidation Resistance

HAYNES<sup>®</sup> 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<sup>®</sup> 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 <sup>®</sup>	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
<b>25</b>	<b>7.8</b>	<b>198</b>	<b>9.8</b>	<b>249</b>	<b>10.3</b>	<b>262</b>
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 <sup>®</sup>	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\***

Alloy	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	
	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm
<b>188</b>	1.1	28	0.1	3	3.7	94	0.5	13	10.7	272	8.6	218
<b>230<sup>®</sup></b>	1.5	38	0.2	5	3.3	84	0.5	13	4.4	112	1.2	30
<b>25</b>	2.0	51	0.3	8	10.2	259	9.2	234	10.7	272	8.2	208
<b>X</b>	1.5	38	0.2	5	4.4	112	1.3	33	6.1	115	3.6	91
<b>625</b>	1.9	48	0.4	10	7.8	198	3.5	89	20.2	513	18.3	465
<b>617</b>	2.0	51	0.3	8	3.8	97	0.6	15	5.2	132	1	25
<b>800HT</b>	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