

# HAYNES<sup>®</sup> R-41 alloy

## Oxidation Resistance

### Static Oxidation Testing

Environment: Flowing Air

Test Duration: 1,008 h

Number of Cycles: 6

Cycle Length: 168 h

Temperatures: 1600, 1700, 1800°F (871, 927, 982°C)

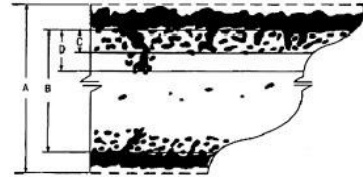
Metal Loss = (A-B)/2

Average Internal Penetration = C

Maximum Internal Penetration = D

Average Metal Affected = Metal Loss + Average Internal Penetration

Maximum Metal Affected = Metal Loss + Maximum Internal Penetration



### Comparative Oxidation Resistance in Flowing Air, 1008 Hours

Alloy	1600°F (871°C)				1700°F (927°C)				1800°F (982°C)			
	Metal Loss		Avg. Met. Aff.		Metal Loss		Avg. Met. Aff.		Metal Loss		Avg. Met. Aff.	
	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm
<b>263</b>	0.1	3	0.4	10	0.2	5	0.7	18	0.9	23	5.0	127
<b>282<sup>®</sup></b>	0.2	5	0.6	15	0.1	3	1.1	28	0.2	5	1.8	46
<b>R-41</b>	0.2	5	0.8	20	0.2	5	1.5	38	0.2	5	2.9	74
<b>Waspaloy</b>	0.3	8	1.4	36	0.3	8	3.4	86	0.7	18	5.0	127

### Dynamic Oxidation Testing (Burner Rig)

Burner rig oxidation tests were conducted by exposing, in a rotating holder, samples 0.375 inch x 2.5 inches x thickness (9.5mm x 64mm x thickness) to the products of combustion of fuel oil (2 parts No. 1 and 1 part No. 2), burned at an air to fuel ratio of about 50:1. The gas velocity was about 0.3 mach. Samples were automatically removed from the gas stream every 30 minutes and fan cooled to less than 500°F (260°C) and then reinserted into the flame tunnel.

Alloy	1600°F (871°C), 1000 hours, 30 minute cycles				1800°F (982°C), 1000 hours, 30 minute cycles			
	Metal Loss,		Avg. Met. Aff.		Metal Loss,		Avg. Met. Aff.	
	mils	µm	mils	µm	mils	µm	mils	µm
<b>263</b>	1.4	36	4.0	102	12.5	318	16.1	409
<b>282<sup>®</sup></b>	1.8	46	4.2	107	8.0	203	13.0	330
<b>Waspaloy</b>	1.9	48	4.3	109	9.5	241	13.6	345
<b>R-41</b>	1.2	30	4.4	112	5.8	147	12.1	307