HAYNES® 242® alloy

Oxidation Resistance

HAYNES® 242® alloy exhibits very good oxidation resistance at temperatures up to 1500°F (815°C), and should not require protective coatings for continuous or intermittent service at these temperatures. The alloy is not specifically designed for use at higher temperatures, but can tolerate short-term exposures.

Comparative Oxidation-Resistance in Flowing Air at 1500°F (815°C) for 1008 Hours*

Alloy	Metal Loss		Average Metal Affected	
-	mils	µm	mils	µm
242®	**0.0**	**0**	**0.5**	**13**
S	0.0	0	0.5	13
X	0.1	3	1.1	28
N	0.4	10	1.2	30
B	7.2	183	8.2	208
909	4.4	112	19.4	493

*Coupons exposed to flowing air at a velocity of 7.0 feet/minute (2.1m/minute) past the samples. Samples cycled to room temperature once-a-day.

Comparative Oxidation Resistance in Flowing Air, 10 Months (7200 h), Cycled Every Two Months**

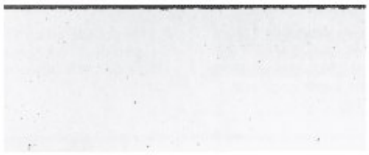
Alloy	800°F (427°C)				1000°F (538°C)				1200°F (649°C)			
	Metal Loss		Average Metal Affected		Metal Loss		Average Metal Affected		Metal Loss		Average Metal Affected	
	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm	mils	µm
718	0	0	0	0	0	0	0.1	3	0	0	0.2	5
242®	**0**	**0**	**0**	**0**	**0**	**0**	**0.1**	**3**	**0**	**0**	**0.3**	**8**
263	0	0	0	0	0	0	0.1	3	0	0	0.3	8

** Coupons exposed to flowing air at a velocity of 7.0 feet/minute (2.1m/minute) past the samples. Samples cycled to room temperature once every two months.

Comparative Burner Rig Oxidation-Resistance at 1400°F (760°C) for 500 Hours***

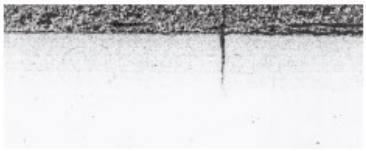
Alloy	Metal Loss		Average Metal Affected	
	mils	µm	mils	µm
N	0.7	18	0.8	20
242®	**1.1**	**28**	**1.2**	**30**
B	1.8	46	2.6	66
909	0.3	8	10.8	275

***Burner rig oxidation tests were conducted by exposing samples 3/8 inch x 2.5 inches x thickness (9mm x 64mm x thickness), in a rotating holder, to the 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 fan-cooled to near ambient temperature and then reinserted into the flame tunnel.



HAYNES® 242™ alloy
Average Metal Affected = 1.2 Mils (30 µm)

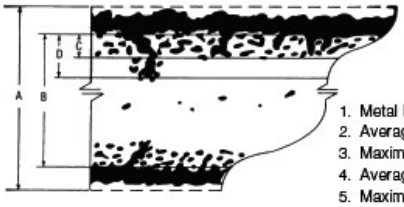
HASTELLOY® B alloy
Average Metal Affected = 2.6 Mils (66 µm)



Alloy 909
Average Metal Affected = 10.8 Mils (275 µm)

Microstructures shown relate to the burner rig oxidation test data shown above for three of the materials evaluated. The black area shown at the top of the pictures for 242® alloy and alloy B represent thickness loss during the test. The alloy 909 apparently exhibited only minor thickness loss. This is believed to be a consequence of the sample actually swelling during the exposure due to oxygen absorption. The sample also developed a very thick, coarse scale and extensive internal oxidation. There was also evidence of significant cracking in the alloy 909 specimen due to the thermal cycling, even though the test samples were not constrained.

Schematic Representation of Metallographic Technique used for Evaluating Oxidation Tests



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