HAYNES® 625 alloy

Oxidation Resistance

Comparative Burner Rig Oxidation Resistance, 1000 Hours

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 a mixture of No. 1 and No. 2 fuel oil. This was burned at a ratio of air to fuel of about 50:1 for 1000 hours. (Gas velocity was about 0.3 mach). Samples were automatically removed from the gas stream every 30 minutes, fan-cooled to near ambient temperature, and then reinserted into the flame tunnel.

Alloy	1800°F (980°C)					
	Metal Loss		Average Metal Affected		Maximum Metal Affected	
-	mils	µm	mils	µm	mils	µm
230®	0.8	20	2.8	71	3.5	89
X	2.7	69	5.6	142	6.4	153
625	4.9	124	7.1	180	7.6	193
25	6.2	157	8.3	211	8.7	221
MULTIMET®	11.8	300	14.4	366	14.8	376
800H®	12.7	312	14.5	368	15.3	389

Oxidation Resistance in Flowing Air (1008 Hours)

The following are static oxidation test rankings for 1008-hour exposures in flowing air. The samples were cycled to room temperature weekly. Average metal affected is the sum of metal loss plus average internal penetration.

Alloy	1600				1800			
	Metal Loss		Avg. Met. Aff. mils, (mm)		Metal Loss		Avg. Met. Aff. mils, (mm)	
	mils	µm	mils	µm	mils	µm	mils	µm
214®	0	0	0.1	3	0.1	3	0.3	8
188	-	-	-	-	0.1	3	1.1	28
230®	0	0	0.6	15	0.2	5	1.5	38
X	0.1	3	0.7	18	0.2	5	1.5	38
625	0.1	3	0.6	15	0.4	10	1.9	48
617	-	-	-	-	0.3	8	2.0	51
25	-	-	-	-	0.3	8	2.0	51
HRâ€120®	0.1	3	0.9	23	0.4	10	2.1	53
556®	-	-	-	-	0.4	10	2.3	58
800HT	0.1	3	1.0	25	0.5	13	4.1	104
HRâ€160®	0.2	5	3.0	79	0.7	18	5.5	140

(Cycled weekly); alloys are arranged in ascending order by the average metal affected.

Amount of metal affected for highâ€temperature sheet (0.060 â€0.125”) alloys exposed for 360 days (8,640â€h) in flowing air at 1600°F (870°C) (Cycled onceâ€aâ€month)

Alloy	Metal Loss		Avg. Met. Aff.	
	mils	µm	mils	µm
214®	0.1	3	0.2	5
625	0.3	8	1.4	36
230®	0.2	5	1.4	36
617	0.3	8	1.6	41
HRâ€120®	0.3	8	1.6	41
25	0.3	8	1.7	43
188	0.2	5	1.8	46
556®	0.3	8	1.9	48
X	0.3	8	2.2	56
800HT	0.4	10	2.9	74

Comparative Dynamic Oxidation

Alloy	1600°F (870°C), 2000 h, 30-min cycles				1800°F (980°C), 1000 h, 30-min cycles			
	Metal Loss		Average Metal Affected		Metal Loss		Average Metal Affected	
	mils	µm	mils	µm	mils	µm	mils	µm
188	1.1	28	2.9	74	1.1	28	3.2	81
230®	0.9	23	3.9	99	2.8	71	5.6	142
617	2.0	51	7.8	198	2.4	61	5.7	145
625	1.2	30	2.2	56	3.7	94	6.0	152
556®	1.5	38	3.9	99	4.1	104	6.7	170
X	1.7	43	5.3	135	4.3	109	7.3	185
HR-120®	-	-	-	-	6.3	160	8.3	211
RA330	2.5	64	5.0	127	8.7	221	10.5	267
HR-160®	-	-	-	-	5.4	137	11.9	302
310SS	6.0	152	7.9	201	16.0	406	18.3	465
800H	3.9	99	9.4	239	22.9	582	Through Thickness	

Amount of metal affected for high-temperature sheet alloys exposed for 1008h (cycled weekly) in air + 10%H_2O

Alloy	1600				1800			
	Metal Loss		Avg. Met. Aff.		Metal Loss		Avg. Met. Aff.	
	mils	µm	mils	µm	mils	µm	mils	µm
214®	0.1	1	0.3	7	0.0	1	0.2	6
188	-	-	-	-	0.1	3	1.4	36
230®	0.1	2	0.5	13	0.2	4	1.5	37
625	0.1	3	0.5	12	0.3	8	1.6	41
X	0.0	1	0.5	13	0.3	7	1.8	45
HR-120®	0.1	2	0.7	17	0.3	9	1.9	49
617	0.1	2	0.9	22	0.3	8	2.0	51