HAYNES® HR-224® alloy

Principle Features

Haynes International, Inc. is pleased to announce the development of HAYNES® HR-224® alloy, a new alloy with excellent oxidation resistance and improved fabricability and weldability compared to HAYNES® 214® alloy. This Ni–27.5Fe–20Cr–3.8Al alloy achieves superior oxidation resistance through the formation of a tightly adherent alumina protective scale. It exhibits excellent ductility and formability characteristics, with weldability on par with nickel-iron-chromium alloys of substantially lower aluminum contents. Potential uses include applications in heat recuperators, automotive catalytic converters and heat shields, strand annealing furnace tubulars, and other severely oxidizing environments.

1,008-Hour Oxidation Resistance Preliminary Test Results

Alloy	1800°F (982°C) Static Air		1400°F (760°C) Air + 5% Water Vapor			
	Average Metal Affected		Average Metal Affected		Maximum Metal Affected	
-	mils	µm	mils	µm	mils	µm
214®	0.2	4	0.05	1.3	0.11	2.8
HR-224®	**0.2**	**4**	**0.11**	**2.8**	**0.23**	**5.8**
230®	0.7	18	0.24	6.1	0.43	10.9

Average Metal Affected = Metal Loss + Average Penetration; Maximum Metal Affected = Metal Loss + Maximum Internal Penetration

Cross Sections after Exposure to 1400°F (760°C) Air + 5% Water Vapor for 1,008 Hours

HAYNES® HR-224® Alloy Preliminary Tensile Results

Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		Elongation
°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	50	342	107	739	45
1400	760	58	401	70	481	27

RT= Room Temperature

HAYNES HR-224 alloy will become available for commercial sale upon completion of key process developments. It is being manufactured in a variety of forms, including sheet, plate, bar, structural and weld wire, and welded tubular products. Material for trial evaluations and fabrications is available.

Please contact Dr. Keith Kruger at (765) 456-6098 or kkruger@haynesintl.com for more information.

Nominal Composition

	Weight %
Nickel:	47 Balance
Cobalt:	2 max.
Iron:	27.5
Chromium:	20
Molybdenum:	0.5 max.
Tungsten:	0.5 max.
Manganese:	0.5 max.
Silicon:	0.3
Columbium:	0.15 max.
Aluminum:	3.8
Titanium:	0.3
Carbon:	0.05
Boron:	0.004 max.
Zirconium:	0.025 max.