HAYNES® 25 alloy

Fabrication

HAYNES® 25 alloy has good forming and welding characteristics. It may be forged or otherwise hot-worked, providing that it is held at 2200°F (1205°C) for a time sufficient to bring the entire piece to temperature. The alloy has good ductility, and thus also may be formed by cold working. The alloy does work-harden very rapidly, however, so frequent intermediate annealing treatments will be needed for complex component forming operations. All hot- or cold-worked parts should be annealed and rapidly cooled in order to restore the best balance of properties. The alloy can be welded by both manual and automatic welding methods, including gas tungsten arc (GTAW), gas metal arc (GMAW), shielded metal arc, electron beam and resistance welding. It exhibits good restraint welding characteristics.

Heat Treatment

HAYNES® 25 alloy is furnished in the solution heat-treated condition, unless otherwise specified. The alloy is normally final solution heat-treated at 2150 to 2250°F (1175 to 1230°C) for a time commensurated with section thickness and rapidly cooled or water-quenched for optimal properties. Because annealing at temperatures less than the solution heat-treating temperature will produce some carbide precipitation in 25 alloy, which may affect the alloy's properties, annealing during fabrication may be performed at lower temperatures, but a final, subsequent solution heat treatment is needed to produce optimum properties and structure.

Machining

For information on Machining, please refer to the machining section of Welding and Fabrication.

Effect of Cold Reduction Upon Room-Temperature Properties*

Cold Reduction	Subsequent Anneal	0.2% Yield Strength		Ultimate Tensile Strength		Elongation	Hardness
%		ksi	MPa	ksi	MPa	%	HRC
0	None	68.4	470	144.0	995	58.5	24
10		123.6	850	181.9	1255	37.1	36
15		148.5	1025	178.2	1230	27.7	40
20		150.9	1040	193.5	1335	18.2	42
25		183.9	1270	232.5	1605	14.6	44
10	1950°F (1065°C) for 5 min.	97.9	675	163.0	1125	39.3	32
15		91.2	630	167.1	1150	43.8	30
20		96.5	665	170.7	1175	40.8	32
25		88.9	615	169.5	1170	44.3	32
10	2050°F (1120°C) for 5 min.	74.0	510	156.6	1080	53.4	27
15		78.6	540	161.2	1110	51.9	28
20		82.0	565	164.8	1135	47.6	31
25		82.9	570	165.6	1140	48.0	30
10	2150°F (1117°C) for 5 min.	66.9	460	148.1	1020	62.6	21
15		73.6	505	156.1	1075	55.4	26
20		72.1	495	154.0	1060	59.3	26

25		68.5	470	149.3	1030	61.7	25

*Based upon cold reductions taken upon 0.110-inch (2.8 mm) thick sheet. Duplicate tests.
HRC = Hardness Rockwell “C”.

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