HAYNES® 230® alloy

Welding

HAYNES® 230® alloy is readily welded by Gas Tungsten Arc Welding (GTAW), Gas Metal Arc Welding (GMAW), Shielded Metal Arc Welding (SMAW), and resistance welding techniques. Its welding characteristics are similar to those for HASTELLOY® X alloy. Submerged Arc Welding (SAW) is not recommended as this process is characterized by high heat input to the base metal and slow cooling of the weld. These factors can increase weld restraint and promote cracking.

Base Metal Preparation

The welding surface and adjacent regions should be thoroughly cleaned with an appropriate solvent prior to any welding operation. All greases, oils, cutting oils, crayon marks, machining solutions, corrosion products, paint, scale, dye penetrant solutions, and other foreign matter should be completely removed. It is preferable, but not necessary, that the alloy be in the solution- annealed condition when welded.

Filler Metal Selection

HAYNES 230-W™ filler wire (AWS A5.14, ERNiCrWMo-1) is recommended for joining 230 alloy by Gas Tungsten Arc or Gas Metal Arc welding. Coated electrodes of 230-W alloy are also available for Shielded Metal Arc welding. For dissimilar metal joining of 230 alloy to nickel-, cobalt-, or iron- base materials, 230-W filler wire, HAYNES 556™ alloy (AWS A5.9 ER3556, AMS 5831), HASTELLOY S alloy (AMS 5838) or HASTELLOY W alloy (AMS 5786, 5787) welding products may all be considered, depending upon the particular case. Please click here or the Haynes Welding SmartGuide for more information.

Preheating, Interpass Temperatures, and Postweld Heat Treatment

Preheat is not required. Preheat is generally specified as room temperature (typical shop conditions). Interpass temperature should be maintained below 200°F (93°C). Auxiliary cooling methods may be used between weld passes, as needed, providing that such methods do not introduce contaminants. Postweld heat treatment is not generally required for 230 alloy. For further information, please click here.

Nominal Welding Parameters

Details for GTAW, GMAW and SMAW welding are given here. Nominal welding parameters are provided as a guide for performing typical operations and are based upon welding conditions used in our laboratories.

Room Temperature Transverse Weld Tensile Results – GTAW of 0.205-in / 5.2 mm Plate

0.2% Yield Strength		Ultimate Tensile Strength		Elongation	Fracture Location
ksi	MPa	ksi	MPa	%	
60.2	415	117.7	812	29.6	Weld Metal
58.4	403	113.4	782	28.2	Weld Metal

Transverse Weld Tensile Results – GTAW of 0.5-in / 12.7 mm Plate

Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		Elongation	Fracture Location
°F	°C	ksi	MPa	ksi	MPa	%	
Room Temperature		65.5	452	126.8	874	37.3	Weld Metal
		63.8	440	120	827	27	Weld Metal
1600	871	38.4	265	60.6	418	44.9	Base Metal
		34.8	240	61.8	426	28.9	Weld Metal

Room Temperature Transverse Weld Tensile Results – GMAW of 2.0-in / 50.8 mm Plate

Ultimate Tensile Strength		Fracture Location
ksi	MPa	
116	800	Weld Metal
117	807	Weld Metal
115	793	Weld Metal
116	800	Weld Metal

Room Temperature Transverse Weld Tensile Results – GTAW of 3.0-in / 76.2 mm Plate

Sample Location	0.2% Yield Strength		Ultimate Tensile Strength		Elongation	Reduction of Area	Fracture Location
	ksi	MPa	ksi	MPa	%	%	
Weld Face	74.1	511	109.5	755	27.2	30.9	Weld Metal
	74.6	514	110.7	763	34.8	44.4	Weld Metal
Weld Center	76.5	527	113.3	781	33.1	37.6	Weld Metal
	76.8	530	111.2	767	26.7	32.9	Weld Metal
Weld Root	74.8	516	109.9	758	19.6	24.1	Weld Metal
	74	510	115	793	31	41.3	Weld Metal

HAYNES® 230-W® All-Weld-Metal Tensile Test Results

Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		Elongation
°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	75.7	520	112.6	775	27.3
1800	980	21.2	145	22.7	155	24.6