

# Wire and Welding products

## HAYNES International



## HASTELLOY® C-276 Welding Data

### Typical Welding Parameters - Flat Position:

S M A W	ELECTRODE	ARC	WELDING
	DIAMETER, in. (mm)	VOLTAGE, volts	CURRENT, amps
	3/32 (2.4)	22-24	55-75
	1/8 (3.2)	22-24	80-100
	5/32 (4.0)	22-25	125-150
	3/16 (4.8)	24-26	150-180

POLARITY: SMAW - DCRP - Electrode Positive

G T A W	JOINT	TUNGSTEN ELECTRODE*	FILLER WIRE	WELDING	ARC
	THICKNESS, in. (mm)	DIAMETER, in. (mm)	DIAMETER	CURRENT, amps	VOLTAGE, volts
	1/32-1/16 (0.8-1.6)	1/16 (1.6)	1/16"	15-60	9-12
	1/16-1/8 (1.6-3.2)	1/16 or 3/32 (1.6 or 2.4)	1/16" or 3/32"	50-95	9-12
	1/8-1/4 (3.2-6.4)	3/32 or 1/8 (2.4 or 3.2)	3/32" or 1/8"	75-150	10-13
	>1/4 (6.4)	3/32 or 1/8 (2.4 or 3.2)	3/32" or 1/8"	95-200	10-13

\*2% Thoriated tungsten

Shielding gas 100% argon, flow rate ~ 25 ft<sup>3</sup>/hr (12 L/min)

POLARITY: GTAW - DCSP - Electrode Negative

G M A W	WIRE	SHIELDING*	WELDING	ARC	TRAVEL SPEED
	DIAMETER, in (mm)	GAS	CURRENT, amps	VOLTAGE, volts	in. / min (mm/s)
W	SHORT ARC	2, 3, 4, 5	70-90	18-20	8-10 (3.4-4.2)
			75-160	19-22	8-10 (3.4-4.2)
	FIXED PULSE	2, 3, 4	120-150 Peak 250-300	18-20	10-15 (4.2-6.3)
	VARIABLE PULSE (synergic)	2, 3, 4	50-125	-	10-15 (4.2-6.3)
			100-175	-	10-15 (4.2-6.3)

SPRAY 0.045 (1.1) 1, 3 190-250 30-32 10-15 (4.2-6.3)

Flow Rate ~ 35 ft<sup>3</sup>/hr (16 L/min)

POLARITY: GMAW - DCRP - Electrode Positive

HASTELLOY and NiCoBRITE are trademarks of Haynes International, Inc. Helistar is a trademark of Praxair Technology, Inc.

#### \*ACCEPTABLE GMAW SHIELDING GASES

#	Composition	Tradename
1	100% argon	
2	75% argon + 25% helium	
3	89% argon + 10.5% helium + 0.5% CO <sub>2</sub>	NiCoBRITE™
4	66.1% argon + 33% helium + 0.9% CO <sub>2</sub>	Helistar™ SS
5	90% helium + 7.5% argon + 2.5% CO <sub>2</sub>	Helistar A-1025

\*Not necessarily in order of preference

# HASTELLOY® C-276 Welding Data

## Typical All Weld Metal Tensile Data\*:

Welding Process	Test Temperature °F (°C)	Ultimate Tensile Strength Ksi (MPa)	Yield Strength at 0.2% Offset, Ksi (MPa)	Elongation %
GTAW	Room	114 (786)	74 (513)	50
GMAW**	Room	110 (758)	68 (466)	57
SMAW	Room	111 (765)	71 (489)	47
GTAW	500 (260)	87 (600)	59 (407)	31
SMAW	500 (260)	89 (614)	56 (386)	44
GTAW	1000 (538)	86 (593)	57 (393)	45
SMAW	1000 (538)	84 (579)	55 (379)	49

\*1/2 in. (12.7 mm) thick, \*\*Short arc mode

## Typical Weld Metal V-Notch Impact Strength (Room Temperature):

Typical Weld Metal V-Notch Impact Strength (Room Temperature)	
GTAW	159 ft-lb (216 joules)
SMAW	73 ft-lb (99 joules)
GMAW	192 ft-lb (260 joules)
Density (Room Temperature)	0.321 lb/in <sup>3</sup> (8.89 gm/cm <sup>3</sup> )
Melting Range	2415-2500°F (1323-1371°C)

## Suggested Practice:

•Establish safe working conditions prior to the start of welding. Areas to consider should include protection of personnel, ventilation, and welding in confined spaces. The recommendations of the American National Standard ANSI/ASC Z49.1, "Safety in Welding and Cutting", should be followed.

•The welding surface and adjacent area on each side of the joint should be thoroughly cleaned and degreased prior to welding.

•Oxy-acetylene welding and cutting are not recommended.

•Covered electrodes used from an unopened can require no further drying. Unused electrodes should be stored in a temperature controlled oven held in the range 250-400°F (121-200°C).

•Backing gas (100% argon) should always be used for the root pass when welding by either GTAW or GMAW. For SMAW, grinding of the back side of the root pass is necessary. •For optimum corrosion resistance of the finished weldment, excessive heat input should be avoided by:

- minimizing weave bead techniques (i.e. use 'stringer' beads with some manipulation).
- avoiding slow travel speeds, especially on thin parts.
- controlling interpass temperatures, generally 200°F (93°C) or less.

•For GTAW, a constant-current power supply equipped with a high frequency start and downslope control is recommended. Torches with gas diffuser lenses provide the optimum gas coverage.

•Postweld stress relieving in the 1200°F (650°C) range is not recommended for HASTELLOY C-276 alloy. If required, solution heat-treatment of this material is accomplished at 2050°F (1121°C) for an appropriate time followed by a water quench or rapid air cool (depending on section thickness)

•If shielding gases containing CO<sub>2</sub> are used during GMAW welding, grinding of the weld bead between each pass is recommended.

•Water cooled torches are recommended for GMAW spray transfer and synergic transfer (above 120 amps) modes.

HW-2031