

Recommended Practice for Welding Weldable Epoxy Powder-Coated Steel Tube

Atlas Tube's epoxy powder-coated tube can be welded without removal of the coating in accordance with the attached Welding Procedure and the following:

Power Supply: 400 amp or larger 100% duty cycle constant voltage DC power supply. Use of pulsed power supply is recommended if welding must be done in the overhead position.

Welding Gun: 400 amp minimum rating, gas cooled.

Electrode extension: The contact tip should be set inside the shielding gas cup 1/4 inch.

Shielding gas: Shielding gas of Argon with between 2 and 18% CO₂ will work. Higher CO₂ content in the shielding gas results in more penetration into the joint, whereas lower CO₂ content reduces the penetration and may be better for use on material that is 3/16 inches thick and thinner where burn-through may be a problem. Do not exceed 18% CO₂.

Fine adjustment of welding parameters: Set the wire feed speed dial at approximately the 10 to 11 o'clock position (for 0.045 inch wire) or 1 to 2 o'clock position (for 0.035 inch wire) and the power supply voltage at 29. While welding and holding the stickout constant, turn the voltage down until the arc begins to spatter, then turn the voltage up slightly. The ideal voltage setting is 1/2 volt above where the arc spatters. The sound should be a sharp, steady crackling. Decreasing stickout increases the arc voltage while increasing stickout reduces it; reduced arc voltage causes spatter, so stickout should be held constant while welding. In no case should the voltage be adjusted so high that the arc gets quiet and the crackling stops; welds made using excessive voltage are prone to formation of cracks under the bead that are particularly hard to find.

Welding positions and progression: Follow the welding procedure for fillet and groove welds that can be welded in the flat, horizontal or vertical positions. In vertical, use downhill progression which is acceptable as the product is tubular. If welding overhead is necessary, 0.035 inch diameter wire should be used; the voltage should be reduced to 17 to 18 and the wire feeder turned to the 10 to 11 o'clock position (110 to 120 amps). Note that these settings change the weld metal transfer mode from spray to short-circuiting, and that requires that the welder and the procedure be separately qualified from the previous settings if welding is being done under the AWS D1.1 Structural Welding Code - Steel

Other Welding Processes: Welding with flux cored electrodes or submerged arc welding is not recommended when welding over the epoxy coating as unacceptable surface conditions (worm tracks) will be

produced. Also, welding with E7018 or similar electrodes that rely on heavy slag formation is not recommended; however, welding with EXXX10 or EXX11 (cellulose type) electrodes using settings recommended by the electrode manufacturer is recommended. GTAW will also make acceptable welds, although it has low productivity.

AWS PREQUALIFIED WELDING PROCEDURE SPECIFICATION

Material Specification	ASTM 500, Grade B*	Preheat Temperature	32°F minimum**
Welding Process	Gas Metal Arc (GMAW)	Interpass Temperature	None
Manual or Machine	Semi-automatic	Postweld Heat Treat	None
Filler Metal Spec.	AWS A5.18	Welding Current Type	DCRP
Filler Metal Classification	ER70S-2, -3 or -6	Transfer mode	Spray
Shielding Gas Flow	Argon, 18% CO2	Welding Position	Flat, Horiz, Vertical
Nozzle size	25 to 30 CFH	Progression in vertical	Downhill
Electrical Stickout	1/2 to 3/4 in. ID	Beening	Not permitted
Single/Multiple Pass	1/2 to 3/4 in. Either	single or Multiple Arc	Single wire brush, grind
		Interpass Cleaning	

* May be welded to any other Group 1 metal listed in AWS D1.1, Table 3.1
 ** Higher preheat is required when thickness exceeds 3/4 inch. See D1.1, Table 3.2

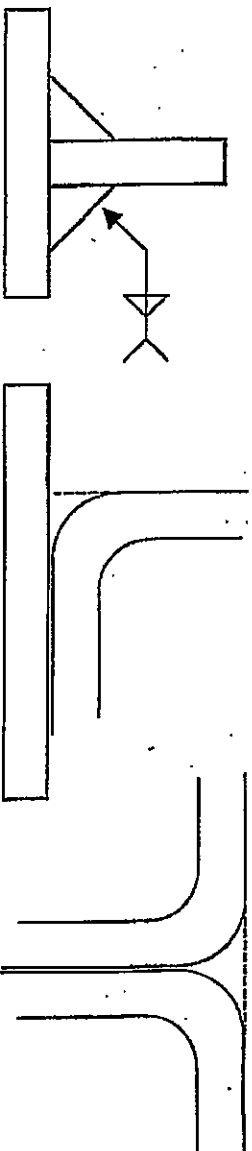
Wire Size, in.	Welding Parameters			Travel Speed (fpm)	
	Volts	Amps	Wire Feed Speed (fpm)	Stringer	Wedge
0.045	26 to 29	230 ± 280	210 to 375	9 to 12	6 to 9
0.035	27 to 30	220 to 265	375 to 490	8 to 11	5 to 8

Joint Designs

Filler (size as shown on Engineering drawings)

Single Flare Bevel

Double Flare Bevel



Fillers over 5/16 size shall be multiple passes.

Single and double flare bevel grooves shall be welded flush (to level of dashed line) unless specified otherwise on engineering drawings.

Other groove designs shown in AWS D1.1, Figures 3.3 and 3.4 may be used when specified on engineering drawings.

Although AWS D1.1 does not require that this welding procedure be qualified when welding directly over Atlas's epoxy powder coating, for critical structures, qualification testing in accordance with D1.1, Section 4 is recommended.

This procedure may vary due to fabrication sequence, fit-up, pass size, etc., within the "Limitation of Variables" given in the applicable section of the American Welding Society D1.1 Structural Welding Code - Steel.