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Praxair and TAFE Arc Spray Silicon Aluminum Wire - 01S

Material Review:

Made exclusively for arc spraying, aluminum silicon alloy wire produces coatings which are slightly less corrosion-resistant than with an aluminum coating. Advantages achieved with the coating are a harder surface, does not gall like aluminum; more dense and finer texture and faster spray adhesion.

Recently successful results have been achieved with the use of silicon aluminum as a mold back-up in the electroform process and repair of cast Kirksite molds.

Arc Spray 01S, Silicon Aluminum Wire, can be sprayed with any Praxair and TAFE Arc Spray gun.

Arc Spray 01S Silicon Aluminum Wire meets Department of Defense Specification MIL-W-6712C, Table II, Silicon Aluminum and Garrett FP5045.

CAUTION: All Praxair and TAFE wires have been optimized for arc spraying. Use of alternate wires usually cause problems such as excessive tip wear, spitting and feeding problems. We only recommend Praxair and TAFE certified wires

Application Review:

Recommended for any aluminum build-up on worn machine parts, for machine element work, for altering the shape of aluminum castings in most model work, or for repairing blow-holes in aluminum patterns.

Praxair and TAFE 01S produces coatings which are harder and slightly denser than coatings produced by Praxair and TAFE 01T pure aluminum. Sprayed coatings of Praxair and TAFE 01S are currently being used for the repair of worn parts of jet engines, and the restoration of dimension to jet engine parts which were mis-machined in manufacture.

Excellent as a filler metal for the brazing of the higher melting aluminum alloys, 2S, 3S and numbers 1 and 2 brazing sheet.

Silicon Aluminum 01S is applicable to the spraying of glass for a heat-reflective or light-reflective surface.

Composition	
Aluminum	95 Percent
Silicon	5 Percent
Coating Physical Properties	
Wire Size	1/16" (1.6 mm)
Deposit Efficiency	69 Percent*
Melting Point	1170°F (632°C) (approx.)
Bond Strength	7,890 psi on low carbon steel (51.0 MPa) 4,250 psi on aluminum (29.3 MPa)
Coating Texture (as sprayed)	Variable *, ** (see next page)
Texture (as machined)	40-80 (microinches aa)*, **
Hardness	95 R _h
Coating Density	2.41 gm/cc (89%)*
Coating Weight	0.013 lbs/ft ² /mil
Shrink	0.0068 in/in (cm/cm)
Porosity	Less than 2 percent

Grit Blasting

Aluminum or magnesium substrates should be blasted with a pressure which does not allow an entrapment of the grit in the substrate. Chilled iron grit is recommended. Do not use aluminum oxide blast pressures over 30 psig. Both these recommendations minimize dust entrapment in the substrate which could reduce coating bond strengths.

Spraying:	
Spray Rate	6 lbs/hr/100 amps (2.75 kg/hr/100 amps)
Coverage (wire consumption)	0.30 oz/ft ² /0.001" (0.37 kg/m ² /100 microns)
Spray Pattern**** (approximate 8" standoff)	Cross Nozzle/Positioner - 1" (2.5 cm) vertical height x 1 3/4" (4.4 cm) width Slot Nozzle/Positioner - 2" (5 cm) vertical height x 1" (2.5 cm) width
Length of wire per lb.	282 ft (1/16"), 176 ft (2 mm)

* Depends on nozzle cap and air pressure and atomizing gas type.

** 6" standoff, 40 psi - 8830, depends on air pressure - fine with high psi, average with medium psi, and rough with low psi

*** Depends on atomizing air pressure

**** Higher air pressures, smaller wire (1/16), and lower amperage with red nozzle cap gives smallest diameter pattern.

Spraying Procedure

These are starting parameters only. Optimum parameters will vary depending on application, utilities, environment, spray rate and equipment.

Coating Type						
	Standard 8830\35	ArcJet 8830\35	Standard 8850	ArcJet 8850	Standard 9000	ArcJet 9000
Atomizing Air Pressure						
Primary	60 ^c	50 ^c	50 ^c	50 ^c	50 ^c	50 ^c
Secondary	--	40	--	50	--	50
Contact Tip	450044	450044	450491	450491	450044	450044
Nozzle Cap	Green	*	Green	451071	Green	Green
Nozzle/Positioner (†=cross)	Long †	**	Long †	Long †	Long †	Long †
Arc Load Volts ^a	28-30	29-31	29-31	29-31	29-31	29-31
Amps ^b	50-300	50-300	50-300	50-300	50-300	50-300
Standoff Inches	4-5	2-4	2-4	2-4	2-4	2-4
Coating Thickness/Pass-mils	3-5	3-5	3-5	3-5	3-5	3-5
Coating Texture-microinches aa	200-350	150-200	200-350	150-200	200-350	150-200

NOTE: Standard air caps and positioners can be used in 8830, 8850, or 9000 systems.

- * P/N 450729 8830/8835 Arc Jet Air Cap
- ** P/N 620074 Arc Jet Modified Short Cross (8830 & 8835)

Using excessive voltage reduces quality of coating. Voltage should be adjusted to give minimum noise and smooth arc operation. Excessive voltage causes larger particles and poor spray pattern. Too low a voltage will cause popping

Be sure not to overheat substrate even if this means stopping to allow cooling, use air jet cooling if greater speed is required. Note that on some applications where preheating is tolerable, preheating work to 300°F can improve bond and deposit efficiency.

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- a When using power lead extensions other than the normal 12 foot furnished, the voltage must be increased by approximately 3.4volts per 50 foot of extension; i.e., add 3.4 volts to the recommended voltage setting for a given wire if the extension is increased to a 50 foot length.
 - b Can vary between 50-300 depending on size of workpiece and traverse speed.
 - c For finer finish, raise air pressure at point of finish.

Finishing

Finish coating by machining. Machining can be done with either high speed or carbide tools. Excellent finishes have been produced without lubricant using a "D" shape tungsten carbide tool bit, with the work rotating at 185 surface feet per minute, a traverse of 0.025" per revolution, and infeed of 0.002". Wet machining, using a lubricant suitable for aluminum, also produces satisfactory results.

Hazards

Observe normal spraying practices, respiratory protection and proper air flow patterns advised. For general spray practices, see AWS Publications AWS C2.1-73, "Recommended Safe Practices for Thermal Spraying," and AWS TSS-85, "Thermal Spraying, Practice, Theory and Application." Thermal spraying is a completely safe process when performed in accordance with proper safety measures. Become familiar with local safety regulations before starting spray operations. **DO NOT** operate your spraying equipment or use the spray material supplied before you have thoroughly read the Praxair and TAFE Instruction Manual.

A Material Safety Data Sheet will be sent with each initial purchase and updated as required.

DISREGARDING THESE INSTRUCTIONS MAY BE DANGEROUS TO YOUR HEALTH.

The Information provided herein is believed to be accurate and reliable; however, results may vary with workpiece preparation and operator technique. Praxair and TAFE warrants only that the wires are free of defects in material and workmanship. No other warranty is expressed or implied.



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