Technical Data
Bulletin

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Praxair and TAFA Arc Spray Aluminum Wire - 01T

Material Review:

Made exclusively for arc spraying. Characteristics are its resistance to atmospheric, chemical, and high temperature corrosion, and its electrical and heat conductivity properties. The bond strength of arc sprayed aluminum is superior to gas sprayed. Arc Spray 01T Aluminum Wire can be sprayed with any Praxair and TAFA Arc Spray gun.

Arc Spray 01T Aluminum Wire meets the following specifications: Dept. of Defense MIL-W-6712C Table II, Aluminum, PWA 1320F and SNECMA DMR33-012, Garrett FP5045, and GE CF6 Overhaul Manual operation number 70-49-40 as a substitute for 70-49-01.

CAUTION: All Praxair and TAFA 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 TAFA certified wires.

Application Review:

Atmospheric Corrosion - The aluminum coating acts as a galvanic corrosion inhibitor and also forms an oxide film producing a protective coating, thus, is recommended under a variety of environmental conditions and is used exclusively on submerged water applications. For long term anti-corrosive applications, aluminum should be covered with a protective 5-8 mil layer of a suitable sealer in all but mild rural applications. Consult Praxair and TAFA for specifications. Typically a phosphate primer is sprayed directly on a freshly sprayed aluminum surface followed by either a vinyl copolymer (colored or aluminum pigmented or a coal tar epoxy the latter for severest environments).

Chemical Corrosion - Useful in protection of chemical processing equipment, oil refining equipment, commercial equipment in contact with marine and similar environmental exposures. For exposure to acid conditions, soft water and hard water, aluminum is the best choice of the arc spray wires.

High Temperature Corrosion - Coatings are applied to increase the service life of steel heat-treating equipment, automotive engine exhaust systems, to protect against thermal shock, and to reline jet engine combustion chambers. (See Bulletin 2.6.1). An aluminum sealer is recommended for coatings used for temperatures up to 1000°F.

Electrical Conductivity - Coatings applied to non-metallic material joints to dissipate static electricity build-up including applications where zinc cannot be used because of weight or chemistry. This includes instrument nuts and missile systems, and applying conducting areas to surfaces requiring electrical conductivity are prime uses.

Heat Conductivity - Commercial and residential kitchen utensils have been sprayed to achieve an even flow and distribution of heat. Through the use of its weight characteristics and heat conductivity properties, aluminum coating has been applied to brake discs to achieve necessary abrasion resistance and good heat flow to aid the cooling of the discs under demanding race conditions.

Repair of blow holes in aluminum, magnesium and their alloy castings to salvage.

Anti-skid - An extremely low atomizing air pressure spray mode gives a coarse anti-skid coating for walkways and shipdecks.

Skin Repair - Praxair and TAFA's Arc Spray has been approved for cosmetic repair of scratches on aircraft surfaces (Bulletin 2.7.2.5.1).

Ceramic Bond Coat - Praxair and TAFA Arc Sprayed aluminum is an extremely good bond coat on ceramic materials such as zinc oxide, carbide, etc.

The high temperature of the droplets and their high velocity result in extremely tenacious bonds (1000 - 3000 psi) on clean surfaces. In most cases, grit blasting or preheating is not required. Merely grind as a finished condition. The high bond strength makes aluminum an ideal coating for varistor or thermistor applications. Consult factory for details since many automated systems and much data is available in this area.

Miscellaneous - Aluminum Alloy 5356 gives an as sprayed hardness of 80 R_h compared with 01T of 60 R_h under the same spray conditions.

Composition	
Aluminum	99.5 Percent (min.)
Coating Physical Properties	
Wire Size	1/16" (1.6 mm), 2.0 mm
Deposit Efficiency	69 Percent*
Melting Point	1215°F (657°C) (approx.)
Bond Strength	1613 psi (11.1 MPa) clean surface ** 4375 psi (30.2 MPa) blasted surface
Coating Texture (as sprayed)	Variable *, *** (see next page)
Hardness	R_{15T} 40-50 (R_B 30-75 converted) 55 $Knoop_{100}$
Coating Density	2.51 gm/cc****
Oxide Content	Less than 2 percent
Porosity	2.1 percent
Coating Weight	0.013 lbs/ft^2/mil
Shrink	0.007 in/in (cm/cm)
Spraying	
Spray Rate	6 lbs/hr/100 amps (2.7 kg/hr/100 amps)
Coverage (wire consumption)	0.3 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)
Power Unit	
	For aluminum only, connect leads to center and left (+) terminal.

* Depends on air pressure, amperage, standoff, nozzle cap and target size

** Depends on surface temperature - consult Praxair and TAFA.

*** 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.

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Spraying Procedures: These are starting parameters only. Optimum parameters will vary depending on applications, utilities, environment, spray rate and equipment

Coating Type			
	Standard 8830/35	Standard 8850	Standard 9000
Atomizing Air Pressure: Primary Secondary	60[c] ---	50[C] ---	50[c] ---
Contact Tip	450044	450491	450044
Nozzle Cap	Green	Green	Green
Nozzle/Positioner (Cross=C; Slot=S)	Long C	Long C	Long C
Arc Load Volts[a]	28-30	29-31	29-31
Amps[b]	50-300	50-300	50-300
Standoff Inches	4-5	2-4	2-4
Coating Thickness/Pass-mils	3-5	3-5	3-5
Coating Texture-Microinches aa	200-350	200-350	200-350

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.

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

a When using power lead extensions other than the normal 12 foot furnished, the voltage must be increased by approximately 3.4 volts 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.

Cautions

1. Use contact tips designed for aluminum. These tips will have a groove on the taper of the tip.

2. Use proper power supply tap - see previous page.

Aluminum is the most difficult of all wires to spray and must be kept very clean, do not allow surface of wire to become dusty, damaged or kinked.

A high quantity of dust is produced and a minimum of 5000 SCFM extraction near gun should be used. In a closed room or booth, a minimum of 10,000 SCFM should be used.

Aluminum or magnesium substrates should be blasted with a pressure which does not allow an entrapment of the grit in the substrate. Use 30 mesh aluminum oxide with a suction blaster or a pressure blast at 55 psi (supply not nozzle pressure) or less.

Finishing:

A variety of finishes can be achieved through machining with either speed or carbide tools, sanding, polishing or burnishing.

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 TAFA 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 TAFA warrants only that the wires are free of defects in material and workmanship. No other warranty is expressed or implied.

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TAFA is constantly improving its products, therefore specifications are subject to change without notice

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