

AI-1893

Description and Applications

AI-1893 is a near pure aluminium wire made exclusively for Thermal 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 aluminium is superior to gas sprayed.

Applications include: Atmospheric Corrosion: A coating of **AI-1893** acts as a galvanic corrosion inhibitor by forming an oxide film producing a protective coating. It is recommended under a variety of environmental conditions and is used extensively on submerged steelwork applications. For long-term anti-corrosive applications **AI-1893** aluminium should be covered with a protective 5-8 mil layer of typically a phosphate primer sprayed directly onto a freshly sprayed aluminium surface followed by either a vinyl copolymer or a coal tar epoxy, the latter for severest environments.

Chemical Corrosion: AI-1893 is useful in the 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, aluminium is the best choice of the 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.

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 **AI-1893** 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 blowholes in aluminium, 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: Arc Spray has recently been approved for cosmetic repair of scratches on aircraft surfaces.



Ceramic Bond Coat: Arc sprayed aluminium 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 of 7.0 - 21.0 MPa or 1,000 - 3,000 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 aluminium an ideal coating for varistor or thermistor applications.

Miscellaneous: Arc Sprayed Aluminium Alloy 5356 gives an as sprayed hardness of 80 RH compared with **Al-1893** of 60 RH under the same spray conditions.

Typical Weldmetal Analysis

Al
99.50

Coating Physical Properties (ARC Sprayed)

Wire Size	:	1.6 mm, 2.0 mm
Deposit Efficiency	:	78 Percent*
Melting Point	:	660°C (Approx)
Bond Strength	:	11.1 MPa Clean Surface** 30.2 MPa Blasted Surface
Tensile Strength	:	134.4 MPa
Coating Texture	:	Variable
Hardness	:	25-60 RH 55 Knoop 100
Oxide Content	:	Less than 2%
Porosity	:	2%
Shrink	:	0.007 cm/cm

Spraying

Spray Rate	:	2.7 kg/hr/100 amps
Coverage (Wire Consumption)	:	0.31 kg/m ² /100 microns
Spray Pattern***	:	Cross Nozzle/Positioner - 2.5 cm
(Approximately 200mm Standoff)	:	Vertical Height x 4.4 cm width : Slot Nozzle/Positioner - 5 cm : Vertical Height x 2.5 cm width

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

** 150mm standoff, 280kPa, 40 psi - BP400, depends on air pressure - fine with high psi, average with medium psi and rough with low psi.

*** High air pressures, smaller wire (1.6mm) and lower amps gives smallest diameter pattern.



Coating Physical Properties – (Flame Sprayed)

Melting Point	:	660°C
Typical Macrohardness	:	RH 60
Shrink	:	0.0068mm
	:	0.173
Coating Tensile Strength	:	135MPa (19,500 psi)
Density, gm/cc	:	2.41g/cm ³
Tensile Bond Strength (on Cold-rolled Steel)	:	
Over Grit Blast	:	7.1MPa (1,030 psi)
Threaded & Grit Blasted	:	14.8MPa (2,140 psi)

Spraying

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.

Aluminium 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 5,000 SCFM extraction near gun should be used. In a closed room or booth, a minimum of 10,000 SCFM should be used.

Aluminium or magnesium substrates should be blasted with a pressure, which does not allow entrapment of the grit in the substrate. Use 30 MESH aluminium oxide with a suction blaster or a pressure blast at 385kPa, 55 psi (supply, not nozzle pressure) or less.

Available Sizes

1.6 mm (1/16"), 3.17mm (1/8") & 4.76 mm (3/16") diameter

Disclaimer

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