



IMC Metalizing Specifications

Pre-qualification of Bidders:

General Contractor shall submit the companies work experience and qualification of his personnel as well as all his subcontractors work experience and qualifications of personnel.

The contractor or subcontractor executing the metalizing work shall have a minimum of 5 years of previous experience in providing surface preparation for metalizing and metalizing application services in the shop and field. A minimum history of three (3) completed similar projects.

Qualification of thermal spray technicians and personnel:

The thermal spray technicians must have a minimum of one year of experience in the operation of thermal spray equipment and hold a certificate of satisfactory completion of training from the equipment manufacturer. A Quality Control Supervisor (SSPC certified QCS) shall be on the thermal spray company's staff and provide a Quality Control Plan to the Engineer in charge of the project prior to the onset of work.

QUALITY CONTROL PLAN:

The contractor will provide a written quality control plan that will be submitted to the engineer or contracting officer for approval. Such a plan shall include a method of adhesion testing, thickness measuring, bend test protocol, and MSDS sheets for material utilized on the projects. A micrograph study, performed by an independent laboratory, shall be supplied with the QC Plan, depicting less than 10% porosity in the thermal spray coating.

MATERIALS:

Certified alloy wire is required. The contractor will obtain written certification from the manufacturer of the alloy and will provide the certifications at the end of the project. The wire certification shall indicate percent composition.

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SURFACE PREPARATION:

Clean to a SSPC SP5, white metal, or SSPC SP10, near white metal, standards. (Engineering firms to determine standard to be used for project) . Steel surface will be free of all oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint, and other foreign matter. Surface finish and cleanliness shall be confirmed according to SSPC-VIS1 standards.

A rough anchor tooth profile of 3 to 5 mils is required. Angular blast media-Mineral and slag abrasives shall be selected & evaluated per SSPC-AB1, (aluminum oxide) recycled ferrous metallic abrasives per SSPC-AB2, steel grit per SSPC-AB3. (One material to be selected for project)

Hardened flame cut edges shall be ground with a disk wheel grinder to a smooth contour prior to abrasive blasting. (If this applies)

Surface Profile measurements shall be made using X-course profile tape and a micrometer, as outlined in ASTM D4417. "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel/NACE Standard RP0287, Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape."

Compressed air shall meet ASTM D4285, method for Indicating Oil or Water in Compressed Air. Utilize a compressed air system capable of delivery at the nozzle of 125 cfm at 120 psi. To minimize any contamination, use an oil/water separator on the airline. 120 psi of compressed air maintains the proper atomization of the molten wire producing the optimum spray pattern.

METAL METALIZING THICKNESS:

The applied **zinc** metalizing thickness should be an average of 10 to 12 mils (dependent on environment – severe marine 15 to 20 mils) and recorded for each coated component using certified coating thickness calibration standards in accordance with SSPC PA2 standards.

The applied **aluminum** metalizing thickness should be an average of 12 to 15 mils minimum, 20 mils maximum and recorded for each coated component using certified coating thickness calibration standards in accordance with SSPC PA2 standards.

The applied **85/15 alloy** metalizing thickness should be an average of 10 to 12 mils and recorded for each coated component using certified coating thickness calibration standards in accordance with SSPC PA2 standards.

If rust bloom, blistering or a degraded coating appears at any time during the application of the Thermal Spray Coating, the following process shall be followed:

1. Stop spraying
2. Mark off the unsatisfactorily sprayed area.
3. Call the Thermal Spray Inspector/Foreman to observe and evaluate the error.
4. Report the deficiency to the purchaser and record the deficiency.
5. Repair the area by removing the Thermal Spray Coating, re-blast to a minimum near-white metal finish (SSPC-10 standard) and as specified anchor tooth profile depth.
6. Recoat the area.
7. Record the actions taken to resume the job.

ADHESION:

Random adhesion testing shall be performed for each coated component, utilizing specified pull/off adhesion testing equipment, in accordance with ASTM D 4541 standards.

Zinc adhesion = 600 psi

Aluminum adhesion = 1000 psi

85/15 adhesion = 800 psi

POROSITY:

Porosity of the metalized coating should be less than 10% with less than 5% air inclusions in the film, and should be fully bonded to the substrate with no air pockets between the coating and substrate. Micrograph analysis to determine compliance is required.

ROUGHNESS OF THE METALIZED COATING:

Surface roughness of the metalized coating should be less than 4 mils in order to avoid unfilled valleys and low areas in the film. As thickness measurement readings are taken from the peaks of the surface, excessive roughness applications will result in less metal being applied and lower protection of the substrate.

METALIZING EQUIPMENT:

Our metalizing equipment consists of a wire feed unit and spray gun, a 1000 amp welding machine, moisture separator, 3/4" air line and 3/4" chicago type fittings, and air compressor capable of delivering 150 CFM, 105 psi minimum of air at the wire feed unit and all necessary cables and at the gun head.

SYSTEM REQUIREMENTS:

Our system uses spooled metalizing wire to apply pure or alloyed metal coatings to large surface areas. We do this by means of an electric arc system. Our unit has two electrical operating modes for primary supply voltage. Mode 1 operates at 230V/200A/3Ph/60Hz. Mode 2 operates at 460V/100A/Ph/60Hz. 3-Phase can be Delta & Wye configurations.

Our air requirements are at least 150 CFM of 105 psi of compressed air. To minimize any contamination, we use an oil/water separator on the airline. 105 psi of compressed air maintains the proper atomization of the molten wire producing the optimum spray pattern.

Only certified spooled metalizing wire, which is properly drawn, spooled and packaged should be used.

The metalizing equipment shall be set up, calibrated, and operated.

- The wire feed method shall be push type system only.
- The system shall be capable of operation at 1000 amps continuous duty cycle.
- The system shall be able to operate remotely from the power supply unit for a distance up to 1,200 feet.
- The wire feed unit and thermal spray gun shall be portable and capable of operating from a reach-all scaffolding, harness, sling, boat, or small barge location.
- Power source must be separate from wire drive to meet containment safety requirements.

Metalizing should occur while substrate still meets specified standards. (Dependent on environmental- 4 hours – 8 hours etc. after surface prep.) Care must be taken to avoid contamination with oils and dirt.

SAFETY PRECAUTIONS:

Eye Protection: Always protect eyes from flying particles and from the injury that can result from excessive ultraviolet, infrared and visible light radiation that occurs during operation of this equipment. Shade nos. 9-12 are appropriate for our system to protect the eyes from the electric arc. Goggles or helmet should be worn to protect the eyes from flying particles. Standard safety glasses are not enough protection.

Respiratory Protection: Always use proper respiratory devices when operating our equipment. Some metals are toxic and others can be damaging to the respiratory system. Different types of metalizing wire produce different types of fumes, gases, and dust. To protect against any of these problems, we recommend a hood type ventilation system, with a continuous flow of filtered air. Minimum air flow to the hood is 6 CFM.

Skin Protection: Always wear protective clothing when operating this equipment. Intense ultraviolet radiation is emitted by the arc and can cause serious burns to exposed skin. Gloves are also recommended as well as long sleeve shirts.

Ear Protection: Always wear ear protection or soft rubber ear plugs to protect against hearing loss when operating this equipment.

Special Health Hazards: Magnetic fields from high electric currents can affect pacemaker operation. Wearer should consult physician before going near this equipment.

GENERAL SAFETY PROCEDURES:

All personnel concerned with metalizing should become familiar with safety procedures for sandblasting and electric arc metalizing. Observe all standard and special safety precautions taken with electrical equipment.

Dust Hazard: Finely divided air-borne material in a confined area should be treated as an explosive. Specifically, aluminum dust and water may generate hydrogen gas.

Electric Shock: Do not touch live electrical parts. Observe all of the safety precautions when using the DC arc power source.

Fire Prevention and Protection: The electric arc creates intense heat and sparks. Do not point the gun head at any person or any thing that will burn.

WEATHER CONSIDERATIONS:

Due to the fact that ours is an electric arc system, safety considerations govern our ability to spray in the rain. It is not a good practice to do so.

METALIZING:

Choice of Coating: In general, a successful coating will depend upon the proper selection of the type of metalizing wire and/or combination of other coatings in view of the material to be protected and the service environment.

Adjusted Spray Patterns: Our system has an adjustable spray head. The gun nozzle can be adjusted to create an elliptical, horizontal or vertical spray pattern.

Masking: Areas of steel that need to be welded can be masked off with duct tape. You can spray right over the duct tape and then peel it off after metalizing the surrounding areas.

Texture: Coating texture is influenced by wire diameter and air pressure. Finer texture results from smaller diameter wire and high air pressure and vice versa.

Bonding and Efficiency: Density and bond strength increase as the gun head is brought closer to the surface to be metalized. The distance of the gun head from the surface to be metalized should not exceed 10 inches.

Coating Uniformity: Coating uniformity is promoted by maintaining a constant spraying distance, maintaining a constant rate of application and maintaining the angle of the gun head at a constant 90 degrees to the surface (unlike spray painting, avoid fanning motion of the wrist.) Making horizontal, then vertical passes will eliminate any holidays or thin spots in the coating.

Metal Thickness: Depending on the application, we can spray a thickness of metal to meet the needs of the job. With Zinc and Aluminum, we can spray almost as thin 1-2 mils, or as thick, 12-14 mils, as you like.

Warping: Proper application of our metalized coating will not cause material distortion or warping.

Speed of Application: Our system is the fastest metalizing system ever produced. With Aluminum and Zinc being the two most popular metalizing wires and now with our combination Al and Zn, we can be extremely competitive in application rates.

TOP COAT - PAINTING:

A seal coat or color paint coat can be applied directly after the metalizing application. Metalizing leaves a surface profile that readily accepts paint coatings with no surface preparation. Directions as to the mixing of the coating material shall be in accordance with the manufacturer's latest instructions.