



ARCOR® Epoxy Coatings

Technical Review – QC: Spark Test

ASTM D5162

A coating is applied to a metallic substrate to prevent corrosion, reduce abrasion or reduce product contamination, or all three. The degree of coating continuity required is dictated by service conditions. Discontinuities in a coating are frequently very minute and not readily visible. This practice provides a procedure for electrical detection of minute discontinuities in nonconductive coating systems.

Electrical testing to determine the presence and number of discontinuities in a coating film is performed on a nonconductive coating applied to an electrically conductive surface. The allowable number of discontinuities should be determined prior to conducting this test since the acceptable quantity of discontinuities will vary depending on coating film thickness, design, and service conditions.

The low voltage wet sponge test equipment is generally used for determining the existence of discontinuities in coating films having a total thickness of 0.5 mm (20 mil) or less. High voltage spark test equipment is generally used for determining the existences of discontinuities in coating films having a total thickness of greater than 0.5 mm (20 mil).

Coatings that are applied at a thickness of less than 0.5 mm (20 mil) may be susceptible to damage if tested with high voltage spark testing equipment. Consult the coating manufacturer for proper test equipment and inspection voltages.

To prevent damage to a coating film when using high voltage test instrumentation, total film thickness and dielectric strength in a coating system shall be considered in selecting the appropriate voltage for detection of discontinuities. Atmospheric conditions shall also be considered since the voltage required for the spark to gap a given distance in air varies with the conductivity of the air at the time the test is conducted. Suggested starting voltages are provided in Table 1.

The coating manufacturer shall be consulted to obtain the following information, which would affect the accuracy of this test to determine discontinuities:

Establish the length of time required to adequately dry or cure the applied coating film prior to testing. Solvents retained in an uncured coating film may form an electrically conductive path through the film to the substrate.

Determine whether the coating contains electrically conductive fillers or pigments that may affect the normal dielectric properties.

This practice is intended for use with new linings applied to metal substrates. Its use on a coating previously exposed to an immersion condition has often resulted in damage to the coating and has produced erroneous detection of discontinuities due to permeation or moisture absorption of the coating. Deposits may also be present on the surface causing telegraphing (current traveling through a moisture path to a discontinuity, giving an erroneous indication) or current leakage across the surface of the coating due to contamination. The use of a high voltage tester on previously exposed coatings has to be carefully considered because of possible spark-through, which will damage an otherwise sound coating. Although a low voltage tester can be used without damaging the coating, it may also produce erroneous results.