TCR Advanced Engineering P. Ltd

Experts in Metallography, Failure Investigation and RLA

Metallurgy for Industries

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Salt Spray testing

Application for corrosion evaluation of coatings.

The salt spray test is a standardized test method used to check corrosion resistance of coated samples. Coatings provide corrosion resistance to metallic parts made of metallic materials. To check the corrosion resistance of the coatings of painting for their intended life, it is required to evaluate through some methodology. Salt spray test is an accelerated corrosion test that produces a corrosive attack to the coated samples in order to predict its suitability in use as a protective finish. In this test the samples or coated components are exposed to salt mist in a controlled environment for a predetermined duration and examined after exposure, The appearance of corrosion products is evaluated after a period of time. Test duration depends on the degree of corrosion resistance of the coating; the more corrosion resistant the coating is, the longer the period in testing without showing signs of corrosion.

Salt spray test can be used to evaluate the quality of galvanizing, Phosphating, anodizing, metallic plantings, paint and other decorative coatings.

Salt spray testing is popular because it is cheap, quick, well standardized, and reasonably repeatable. There is, however, only a weak correlation between the duration in salt spray test and the expected life of a coating (especially on hot dip galvanized steel where drying cycles are important for durability), since corrosion is a very complicated process and can be influenced by many external factors. Nevertheless, salt spray test is widely used in the industrial sector for the evaluation of corrosion resistance of finished surfaces or parts.

Salt spray apparatus:

The apparatus for testing consists of a closed testing chamber, where an aqueous salt solution having 5% sodium chloride concentration is atomized by means of a nozzle. This produces a corrosive environment of dense saline fog in the chamber so that parts exposed in it are subjected to severely corrosive conditions.

The international specification ASTM B117 and ISO 9227 governs the design of salt spray test apparatus. It requires salt spray chamber having minimum volume of 15 cubic feet. TCR advanced is having 2 salt spray apparatus of size 15 and 33 cubic feet for accommodating variety of samples.

TCR News

- Completed RLA of critical Piping at Unchahar Power Plant, NTPC limited. A capable team of TCR Advanced completed the momentous task in record time with utmost customer satisfaction.

- Mr. Paresh Haribhakti, MD delivered a lecture on "Life Management of Power Plants by Knowledge Based Inspection (KBI) on 10th November, 2017 at Power Day Celebration by The Society of Power Engineers (India), Vadodara Chapter.
- Successfully completed NABL audit for Chemical, Mechanical and NDT testing. Eminent auditors from respective fields have audited our facility for requirement of ISO/IEC-17025. The laboratory has received extension for NABL accreditation.
- TCR has proposed Visual testing, ferrite measurement by ferritoscope, surface roughness, Scanning electron microcopy and EDS analysis to its NABL scope during reaccreditation audit. Received a recommendation from Technical assessment team of NABL auditors. Awaiting for final confirmation from NABL.

EVOLVE by TCR

- Conducted one day training of applications of Scanning Electron Microscopy and EDS analysis with hands on practice.

- NDT Level II courses for MT, PT and UT are planned in association with MSME at Evolve for the December month.

Types of Salt spray test

Tests performed with a standardized 5% solution of NaCl are known as NSS (neutral salt spray). Other variations of this test are acetic acid solutions (ASS test) and acetic acid with copper chloride (CASS test). Another variant of this test is Modified SO2 SST which adds sulfur dioxide environment in the salt spray chamber as per ASTM G85. The test duration of salt spray testing can be as short as 12 hours to as long as 2000 Hours depending upon the severity of intended service and degree of corrosion resistance required from the product. The duration of salt spray testing is defined in the product specification or it can be a mutual agreement between purchaser and supplier.

Samples for Salt spray testing

Salt spray is performed on finished products. The salt spray chamber size governs the sample dimensions for testing. To establish the coating of plating process the test panels are prepared for salt spray test. The samples are suspended in the salt spray chamber in such a way that it makes an angle 15 to 30 degrees from vertically and are not in contact with each other. Also, it is ensured that there is no dripping of salt solution from one sample to another sample. The uncoated area or cut edges of the samples are masked with a lacquer or suitable means to avoid initiation of corrosion from unintended locations. Whenever it is desired to determine the development of corrosion from an abraded area in the paint or organic coating, often the samples are scribed or scratched before the exposure.

Evaluation after exposure:

The specimen surface is visually inspected at a predetermined interval after exposure in salt spray chamber. The samples are cleaned with water or suitable solvent and dried before making inspection. Any sign of corrosion is or defect in coating is reported. For ferrous material appearance of red rust signifies that the coating is completely corroded and base is exposed to salt mist. Typically the presence of red rust is considered as end point of test. For galvanized coatings intermediate stage of white rust indicates that sacrificial zinc coating is getting oxidized. Following photographs shows various samples after the salt spray exposure.

Initial

After 120 Hrs.

Initial sample

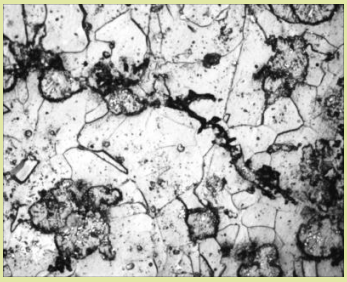
After 24 Hrs.

Applications of salt spray testing: Salt spray testing is carried out routinely in industry segments such as automotive, paints, electroplating, galvanizing, corrosion prevention, aircraft, shipping etc. Some of the important applications of salt spray testing are listed below.

- Evaluation of the performance of coating process.
- Quality control tool for the plating/Coating process
- Improvement is coating process.
- Estimation of life of coating or plating.
- Effectiveness of corrosion resistance.
- Suitability of component in corrosive environment

TCR can perform salt spray testing as per national and international specifications such as ASTM B117, ISO 9227 and IS 9844. The salt spray test facility of TCR advanced is accredited by NABL as per ISO/IEC-17025: 2005.

Microstructure of the Month



Magnification: *200X*
MOC: EN-JS1059
Component: Impeller(Vane)
Etchant : Stationary blade casing
Observation: Microstructures after replication metallography shows nodular cast iron in ferrite and pearlite matrix. The crack is observed to have traversed through graphite nodules forming a branched network..
Cause: The network of cracks observed during inspection of the casing were due to effect of graphitic corrosion at the portion of degraded graphite structure limited to surface at depth of up to 500 µm.

Useful hints: Proper foundry practice needs to be followed to ensure damage free nodular graphite throughout the cross section. This can be ascertained by in-situ metallography on actual casting. The purity of steam quality needs to be ascertained. It is also advised to check the water quality used for makeup / steam condensate circuit. Measure of conductivity at exit of steam condenser would provide early warning on contamination.

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