



Measuring the influence of corrosion and oxidation with a quick test

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Increasing the life span of materials with less impact from weather and environmental conditions is one of the key drivers in today's circular economy to reduce our environmental footprint. It is important to be able to quickly carry out simulations on products and components that show the impact of corrosion and oxidation on components and products.

In order to carry out such accelerated tests, Sirris has acquired a spacious salt spray cabinet (corrosion cabinet). Parts and materials can be placed in a warm (35-60 °C) salt spray (NaCl solutions) for a certain time. The salt acts on the surfaces and thus accelerates the detection of corrosion or oxidation. Also the influence of scratches, damages... on coatings, varnishes, protective layers, etc. can be compared in this way. This makes it possible to evaluate and improve new materials or protective coatings in a short time, without having to expose pieces to certain outdoor conditions for a longer period of time.

Test procedure

The entire spraying period can be programmed in different steps and at different temperatures and humidity levels. Programmed cycles can be repeated several times. The environment in which the components are used is taken into account. For example, a component at sea will react differently

from a component inland. Each environment can be divided into a class, from low-corrosion environment to extreme corrosion environment. After certain predefined time periods and at the end of the test, the samples are evaluated for their corrosion behaviour. The colour and shape of oxidation can also be used to evaluate the coatings and their substrates. By making a cross-cut, the salt spray immediately reaches the base material and the interference layer. The evaluation is usually done in relation to a reference sample. Visible defects, such as blistering, crumbling or discolouration, indicate reduced corrosive resistance.

The most common types of corrosion are:

- Uniform corrosion: the uniform corrosion of surfaces that have not been coated with a protective layer.
- Pitting corrosion: this occurs in metals that form an oxide layer. Particles penetrate the layer.
- Crevice corrosion: corrosive liquid remains in crevices.
- Intergranular corrosion: this occurs along grain boundaries of alloys.



When the salt spray test is combined with a QUV test, which simulates the influence of UV light (e.g. sunlight) in an accelerated manner, and a climatic test, which simulates frost, one gets a realistic idea of how a product will behave over a longer period of time and under normal use. In the context of our salt spray cabinet, we are currently ASTN B117 and ISO 9227 certified. The ISO 12944-9 standard is the most widely used standard for protective coatings on metal. Other standards and applications can be purchased at any time by mutual agreement.

Depending on the base material and the coatings used, it is possible to test for various possible defects according to different standards:

- ISO 4628-2: evaluation of blistering
- ISO 4628-3: Evaluation of rusting
- ISO 4628-4: Evaluation of cracking (micro cracks)
- ISO 4628-5: Evaluation of flaking (peeling or loosening of paint)
- ISO 4628-6 and ISO 4628-7: Evaluation of chalking, important for epoxy coatings
- ISO 4628-8: Degree of delamination around scribe

Test lab possibilities

The salt spray test is just one specific test to analyse the quality of a coating. Other coating properties, such as adhesion and wear resistance, contribute to a quality surface finish and may influence the result of the salt spray test. To test these, Sirris has equipment for layer thickness measurement, adhesion measurements (cross-cut, dolly pull-off), abrasion resistance (linear and circular) and contact angle measurements.

The experts at Sirris can always advise you on possible solutions for or causes of the measurement results obtained.

Some examples of coating applications already tested at Sirris in the past are:

- door handles and grips, for both outdoor and indoor use
- painted car parts, with and without scratch or damage
- roofing, profiles, and sheets (together with QUV simulation)
- bike parts, both the simple city bike and the professional mountain bike
- galvanised and anodised parts and products
- multilayers

Want to know more about our test options? Contact us or visit our test lab webpage!

This cabinet will be used for corrosion management within the Interreg project 'Corrosion & Insulation Practice Laboratory' between Flanders and the Netherlands, which aims to combine existing and new infrastructure for corrosion management.

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