
**Metallic coatings — Corrosion test
method for decorative chrome plating
under a de-icing salt environment**

*Revêtements métalliques — Méthode d'essai de corrosion pour le
chromage décoratif en présence de sels de déverglaçage*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 7, *Corrosion tests*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Decorative, electrodeposited nickel-chromium and copper-nickel-chromium coatings, built up with a multilayer nickel system including micro-discontinuous nickel, are applied to manufactured articles to enhance their appearance and corrosion resistance.

These coating systems are characterized by unique corrosion mechanisms. Once corrosion begins, the nickel layer gets dissolved preferentially (especially in the case of a bright nickel layer): it acts as an anode with respect to chromium (which is intended to act as a cathode). In addition, lots of tiny pores or cracks in the micro-discontinuous layer distribute the corrosion current throughout the whole surface. In this way the amount of current at a given corrosion site is substantially lowered, creating minor pits that remain for a longer time invisible to the naked eye. In addition, the corrosion penetration through the bright nickel layer is reduced, especially when a more noble semi-bright nickel layer shields it from the substrate or the copper underlayer.

An additional different corrosion phenomenon is caused during winter by de-icing salts, especially calcium chloride. This particular corrosion phenomenon is characterized by slightly yellow and less shiny spots on the surface, caused by the complete dissolution of the chromium layer and the partial deterioration of the microporous nickel layer. In this situation, the bright nickel layer remains intact. Such corrosion phenomena are predominantly occurring in areas with cold winter conditions and the use of calcium chloride as de-icing agent in combination with dirt dust deposits.

Unfortunately, this corrosion phenomenon cannot be tested and evaluated using existing corrosion test methods [e.g. salt spray (see ISO 9227) and Corrodkote test].

Metallic coatings — Corrosion test method for decorative chrome plating under a de-icing salt environment

1 Scope

This document specifies the apparatus, reagents, and procedure to assess the corrosion resistance of chromium electroplated parts in the presence of de-icing salts (especially calcium chloride) in the laboratory.

This method is primarily applicable to decorative parts plated with chromium, especially to exterior (automobile) parts electroplated with nickel-chromium or copper-nickel-chromium.

This document simulates a special corrosion in the presence of hygroscopic and corrosive de-icing salt and conductive mud with a high salt concentration on chromium electroplated deposits during winter.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

de-icing salt

chemical sprayed to control ice and snow on the roads

EXAMPLE Sodium chloride (rock salt), calcium chloride, and magnesium chloride.

4 Apparatus

4.1 The apparatus shall consist of a humidity chamber, specimen supports, provision for heating the chamber, and provision for air circulation in the chamber. The humidity chamber shall maintain constant temperature ($60\text{ °C} \pm 3\text{ °C}$) and humidity ($30\% \pm 5\%$).

4.2 The design shall be such that drops of moisture (possibly accumulating on the roof or walls of the chamber, or on the specimen supports) do not fall on the test specimens.

4.3 The construction materials shall not affect the test.