International Standard 4540

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Metallic coatings — Coatings cathodic to the substrate — Rating of electroplated test specimens subjected to corrosion tests

Revêtements métalliques — Dépôts électrolytiques cathodiques par rapport au métal de base — Cotation des éprouvettes ayant reçu un dépôt électrolytique, soumises aux essais de corrosion

First edition — 1980-10-01

UDC 621.357.7 : 620.193 **Ref. No. ISO 4540-1980 (E)**

Descriptors : metal coatings, corrosion tests, classification, defects.

Price based on 16 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4540 was developed by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings*, and was circulated to the member bodies in March 1977.

It has been approved by the member bodies of the following countries :

Australia	India	South Africa, Rep. of
Austria	Ireland	Spain
Bulgaria	Israel	Sweden
Canada	Italy	Switzerland
Czechoslovakia	Japan	Turkey
France	Korea, Rep. of	United Kingdom
Germany, F. R.	Poland	USA
Hungary	Romania	USSR

The member body of the following country expressed disapproval of the document on technical grounds :

Netherlands

Printed in Switzerland

Metallic coatings — Coatings cathodic to the substrate — Rating of electroplated test specimens subjected to corrosion tests

1 Scope and field of application

1.1 This International Standard specifies a method of evaluating the condition of electroplated test specimens that have been exposed to corrosive environments for test purposes.

It is based on experience of the method with standard 10 cm × 15 cm test panels, exposed on racks at outdoor test sites in natural atmospheres. It has also been used for rating similar panels that have been subjected to accelerated tests, such as those specified in ISO 3768, *Metallic coatings — Neutral salt spray test (NSS test)*, ISO 3769, *Metallic coatings — Acetic acid salt spray test (ASS test)*, ISO 3770, *Metallic coatings — Copper-accelerated acetic acid salt spray test (CASS test)* and ISO 4541, *Metallic and other non-organic coatings — Corrodkote corrosion test (CORR test)*. Any modifications needed to adapt the method to rating actual production parts are not considered in this International Standard.

1.2 This method is applicable only to decorative and protective coatings that are cathodic to the substrate, for example nickel plus chromium or copper plus nickel plus chromium on steel or zinc die castings. It is not intended for use with anodic sacrificial coatings such as zinc and cadmium on steel.

2 Principle

2.1 The rating method described in this International Standard recognizes that typical decorative and protective deposits such as nickel plus chromium, with or without a copper undercoat, have two functions :

a) to protect the substrate from corrosion and thus prevent degradation of appearance caused by basis metal corrosion products, such as rust and rust stains;

b) to itself maintain a satisfactory appearance.

Although these functions overlap, they can be evaluated separately and it is frequently desirable to do so. Accordingly, this International Standard assigns separate ratings to

a) the appearance as affected by corrosion of the substrate;

b) the appearance as affected by deterioration of the coating itself.

2.2 The rating number assigned to the ability of the coating to protect the substrate from corrosion is called the "protection" rating.

2.3 The rating number assigned by the inspector's judgment of the overall appearance of the specimen, including all defects caused by exposure (see the note), is called the "appearance" rating.

NOTE — Specimens that are not "perfect" even before being exposed should normally be rejected (see the note to clause 4).

2.4 The result of inspecting a specimen is recorded as two numbers separated by an oblique stroke (/), the protection number being given first.

2.5 In addition to recording the numerical rating of a specimen, the inspector should note the type(s) and severity of defect(s) contributing to the rating. This may be done by the use of agreed symbols for the most common defects (see annex A) and abbreviations for the degree or severity of these defects.

2.6 For the rating of purely protective (not decorative) cathodic coatings, the "appearance number" may be omitted.

3 Types of defect

3.1 "Protection" defects (see annex A) include crater corrosion, pinhole corrosion, corrosion products, blisters (see the note), and any other defects that involve basis metal corrosion.

NOTE — Blisters on electroplated zinc alloy die castings usually signify basis metal corrosion, but the inspector's judgment may be required to decide whether a blister does or does not arise at the substrate-coating interface.

3.2 "Appearance" defects include, in addition to those caused by basis metal corrosion, all defects that detract from the appearance (i.e. the commercial acceptability) of the specimen. Typical defects are surface pits, "crow's feet", cracks, surface stain, tarnish, etc.

3.3 Defects developing on exposure that indicate improper preparation or electroplating shall be noted, but no attempt should be made to rate test specimens showing major amounts of such defects. Peeling of the coating from the substrate, or of one coating from another, is the principal such defect.