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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 5270-2024

**Metallic coatings on metallic substrates - Electrodeposited and
chemically deposited coatings - Review of methods available
for testing adhesion
(English Translation)**

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Foreword

This Document was drafted as per the rules specified in GB/T 1.1-2020 Directives for Standardization - Part 1: Rules for the Structure and Drafting of Standardizing Documents.

This Document replaced GB/T 5270-2005 Metallic Coatings on Metallic Substrates - Electrodeposited and Chemically Deposited Coatings - Review of Methods Available for Testing

Adhesion. Compared with GB/T 5270-2005, the major technical changes of this Document are

as follows besides the structural adjustments and editorial modifications:

- Add quantitative measurement method in tensile test (see 4.11.2 of this Edition);
- Add Rockwell test (see 4.15 of this Edition);
- Add scratch test (see 4.16 of this Edition);
- Add cavitation test (see 4.17 of this Edition).

This Document modified and adopted ISO 2819:2017 Metallic Coatings on Metallic Substrates

-Electrodeposited and Chemically Deposited Coatings - Review of Methods Available for Testing Adhesion.

Compared with ISO 2819:2017, this Document made the following structural adjustments:

- Split Figure A.1 into Figures A.1 and A.2; and add corresponding reference content to comply with China's technical requirements.

The technical differences and causes between this Document and ISO 2819:2017 are as follows:

- Add the scope of application (see Clause 1 of this Document) to meet the technical requirements of China;
- Add the principle of cavitation test (see 4.17 of this Document) to facilitate understanding.

This Document made the following editorial modifications:

- Use national standards to replace the cited international standards to facilitate use.

This Document was proposed by China Machinery Industry Federation.

This Document shall be under the jurisdiction of National Technical Committee on Metallic and Non-Metallic Coatings of Standardization Administration of China (SAC/TC 57).

Drafting organizations of this Document: China Academy of Machinery, Wuhan Research Institute of Materials Protection Co., Ltd.; Zhengzhou Coal Machinery Zhiding Hydraulic Co.,

Ltd.; Guangzhou Sanfu New Materials Technology Co., Ltd.; Zhejiang Dongci Technology Co.,

Ltd.; Hunan Yongsheng New Materials Co., Ltd.; Dongguan Jinluan Hardware Products Co.,

Metallic Coatings on Metallic Substrates - Electrodeposited

and Chemically Deposited Coatings - Review of Methods

Available for Testing Adhesion

Warning: When special methods for adhesion strength tests are specified in national standards for specific coatings, the methods described in this Document should be used first, and the prior agreement of both the supplier and the purchaser should be obtained.

1 Scope

This Document reviews the test methods for checking the adhesion strength of electrodeposited

and chemically deposited coatings, which are limited to qualitative tests.

This Document applies to the selection of test methods for adhesion strength of electrodeposited

and chemically deposited coatings on metallic substrates.

This Document does not describe some quantitative test methods for the adhesion strength of

metallic coatings and substrates developed at different times. Because such tests require special

equipment and considerable skills in operation, they are not suitable as quality control tests for

product parts, but some quantitative test methods can play a role in research and development

work.

2 Normative References

There are no normative references for this Document.

3 Terms and Definitions

For the purposes of this Document, there are no terms and definitions apply.

The websites of the terminology databases used in standardization work maintained by ISO and

IEC are as follows:

--- ISO Online Browsing Platform: <http://www.iso.org/obp>;

--- IEC Electronic Encyclopedia: <http://www.electropedia.org/>.

the structure of the deposit coating. These methods are particularly suitable for deposit coatings

of harder metals, such as nickel or chromium.

In any case, the obtained results shall be carefully analyzed because the ductility of the deposit

coating and the base metal is involved.

4.14 Cathode Test

The coating specimen is placed in the solution as a cathode, and hydrogen is precipitated on the

cathode. As hydrogen diffuses, pressure accumulates at any discontinuity between the coating

and the base metal, causing blistering of the coating.

In a 5% (mass fraction) sodium hydroxide (density 1.054 g/mL) solution, the specimen is treated at a current density of 10A/dm² and a temperature of 90°C for 2 min; and small bubbles

are formed in the parts of the coating with poor adhesion strength. If there is still no blistering

in the coating after 15 min, the adhesion strength of the coating is good. In addition, sulfuric acid (5%, mass fraction) solution can be used; under the conditions of current density of 10A/dm² and temperature of 60°C, after 5min~15min, the coating with poor adhesion strength

shall blister.

The electrolytic test is limited to the coating that can release hydrogen through the cathode. If

the adhesion strength of nickel or nickel-chromium coating is poor, the test is more appropriate.

Metal coatings such as lead, tin, zinc, copper or cadmium are not suitable for this test method.