FINAL
DRAFT

INTERNATIONAL STANDARD

ISO/FDIS 22462

ISO/TC **107**/SC **8**

Secretariat: KATS

Voting begins on:
2020-03-18

Voting terminates on:
2020-05-13

Metallic and other inorganic coatings — Test method for the friction coefficient measurement of chemical conversion coatings

Reference number
ISO/FDIS 22462:2020(E)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 8, *Chemical conversion coatings*.

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

The forming properties of sheet metals are highly dependent on the friction that is generated with the dies during the forming process.

Therefore, there is a need to measure the frictional characteristics of the surface of sheet metals.

The measured friction coefficient can change depending on the test conditions and the apparatus status. Moreover, if the apparatus has been configured properly, it is difficult to ensure reliability and reproducibility. Many traditional methods cause deformation or breakage of the test pieces because of the pressure of the friction block (and its perpendicular pressure to the specimens). In addition, there is no International Standard for metallic coatings, other inorganic coatings and chemical conversion coatings.

This document gives an advanced method that can accurately measure the friction coefficient without deformation of the test pieces during the test.

The test results can vary depending on the test conditions, e.g. surface state, normal force, sliding velocity, temperature. Therefore, it is important that the test conditions are specified.

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Metallic and other inorganic coatings — Test method for the friction coefficient measurement of chemical conversion coatings

1 Scope

This document specifies a test method to measure the friction coefficient of chemical conversion coating sheet products and coiled products.

This document is applicable to measure or compare the friction properties of hot-dip galvanized, lubricated and resin coated steel sheet, when tested under the same conditions.

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 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

ISO 27831-1, *Metallic and other inorganic coatings — Cleaning and preparation of metal surfaces — Part 1: Ferrous metals and alloys*

IEC 60648, *Method of test for coefficients of friction of plastic film and sheeting for use as electrical insulation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 377, IEC 60648 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
friction
resisting force that arises when a surface of one substance slides, or tends to slide, over an adjoining surface of itself or another substance

Note 1 to entry: Between surfaces of solids in contact there may be two kinds of friction.

3.2
sliding coefficient of friction
μ_k
resistance that opposes the force required to move one surface over another at a variable, fixed or predetermined speed

3.3
test piece
part of a sample or rough specimen, with specified dimensions, machined or un-machined, brought to a required condition for submission to a given verification test

4 Apparatus

Use a sled type tester consisting of the following apparatus, as shown in Figure 1.

4.1 Table, located over the sled so that the test piece can be moved in both a horizontal and vertical direction.

4.2 Sled, a device for moving the table in a horizontal direction.

4.3 Clamp, a device for fixing the test piece in a longitudinal direction.

4.4 Stopper, a device for fixing the test piece in a width direction.

4.5 Test piece holder, a place for putting the test piece.

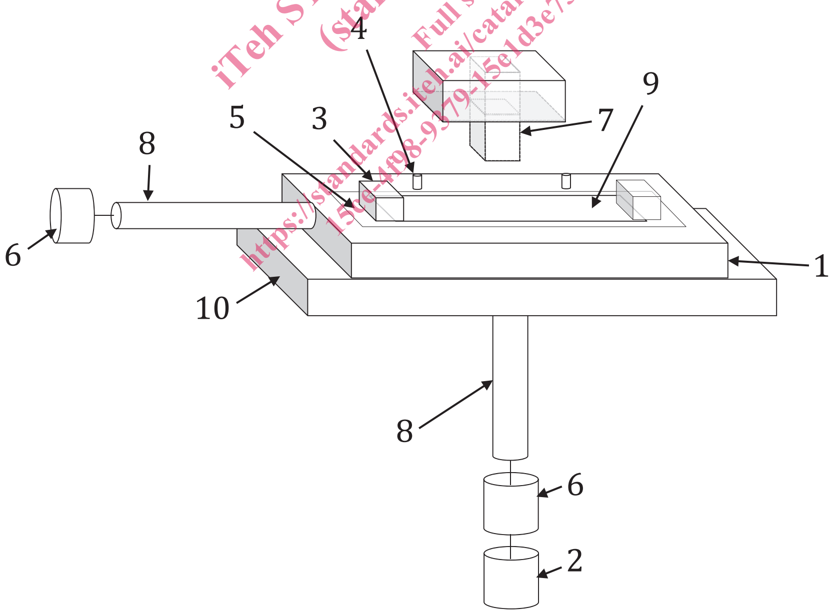
4.6 Friction block, which is perpendicularly positioned for pressing the test piece. Its purpose is to give a curvature to the edge of friction block to prevent it tilting when the test piece moves.

4.7 Load cell.

4.8 Pressure device, a device that gives a load perpendicular to the specimen.

4.9 Horizontal driving device, which controls the sliding speed for the friction test.

4.10 Vertical driving device, which moves the sled delivery system in a vertical direction.



Key

1 table	6 load cell
2 pressure device	7 friction block
3 clamp	8 driving device
4 stopper	9 test piece
5 test piece holder	10 sled

Figure 1 — Apparatus

5 Test piece

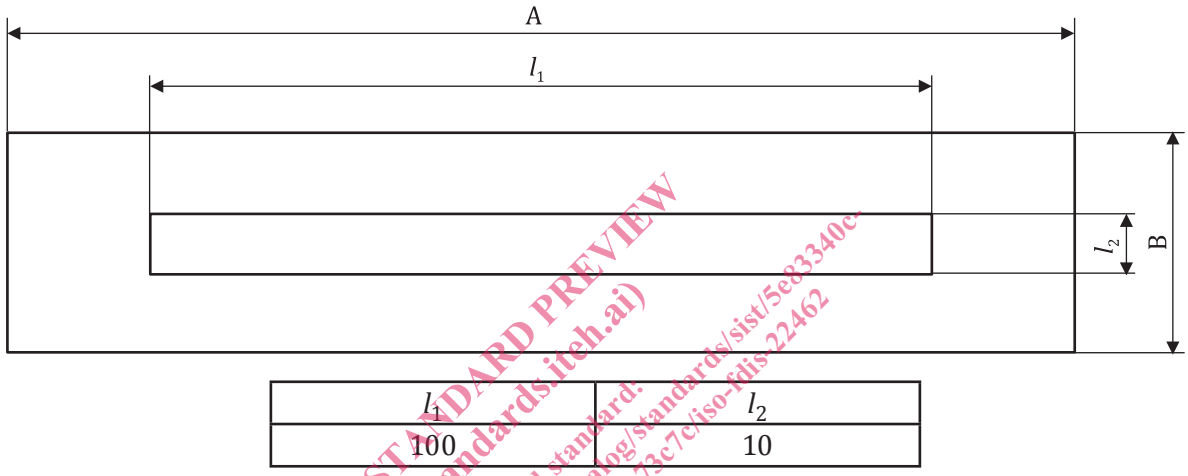
5.1 Dimensions of the test piece

The test piece should be cut from the sample in a transverse or longitudinal direction. In general, the test is carried out in a transverse direction. The test direction information shall be provided.

The shape and dimensions of the test piece shall be in accordance with Figure 2.

If a test piece is short, it cannot have enough travel distance to get a friction coefficient within allowable error limits during the test. A friction coefficient is changed by travel distance. The travel distance has to be specified.

Dimensions in millimetres



Key

A test piece width
B test piece length
l_1 travel distance
l_2 friction block width

Figure 2 — Test piece

5.2 Preparations

Before testing, the test pieces shall be prepared in accordance with ISO 27831-1.

Contaminants on the surface of the test pieces shall be eliminated.

When a load is applied to the test pieces, the load shall be checked with sensitive paper to verify the uniform load. If the load isn't applied to the constant area equally, uncertainty of the test results can be increased.

6 Test conditions

6.1 General

Conduct the tests at (23 ± 10) °C and (50 ± 10) % relative humidity. Follow the temperature and humidity guidelines of the mechanical test.