
**Paints and varnishes — Determination
of stone-chip resistance of coatings —
Part 3:
Single-impact test with a free-flying
impact body**

iTeh STANDARD PREVIEW
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*Peintures et vernis — Détermination de la résistance des revêtements
aux impacts de cailloux —
Partie 3: Essai de choc simple par corps percutant en vol libre*

ISO 20567-3:2012

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 20567-3 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

ISO 20567 consists of the following parts, under the general title *Paints and varnishes — Determination of stone-chip resistance of coatings*:

- Part 1: Multi-impact testing
- Part 2: Single-impact test with a guided impact body
- Part 3: Single-impact test with a free-flying impact body

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Introduction

In the automotive industry, multi-layer paint coatings are applied to car bodies for protection. Grit, road-metal and other materials can damage these coatings in such a way that individual layers come off or the whole coating delaminates from the substrate.

Stone chipping can be simulated by means of single- and/or multi-impact tests. Part 1 of this International Standard describes a multi-impact test, Parts 2 and 3 describe a single-impact test.

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Paints and varnishes — Determination of stone-chip resistance of coatings —

Part 3: Single-impact test with a free-flying impact body

1 Scope

This part of ISO 20567 specifies a method for the evaluation of the resistance of automobile finishes and other coatings to the impact of a single, free-flying body projected onto the surface under test to simulate the impact of stones.

2 Normative references

The following referenced documents are indispensable for the application 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 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 1514, *Paints and varnishes — Standard panels for testing*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 3290-1, *Rolling bearings — Balls — Part 1: Steel balls*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

EN 485-2, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 2: Mechanical properties*

EN 485-4, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 4: Tolerances on shape and dimensions for cold-rolled products*

EN 573-3, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition and form of products*

3 Principle

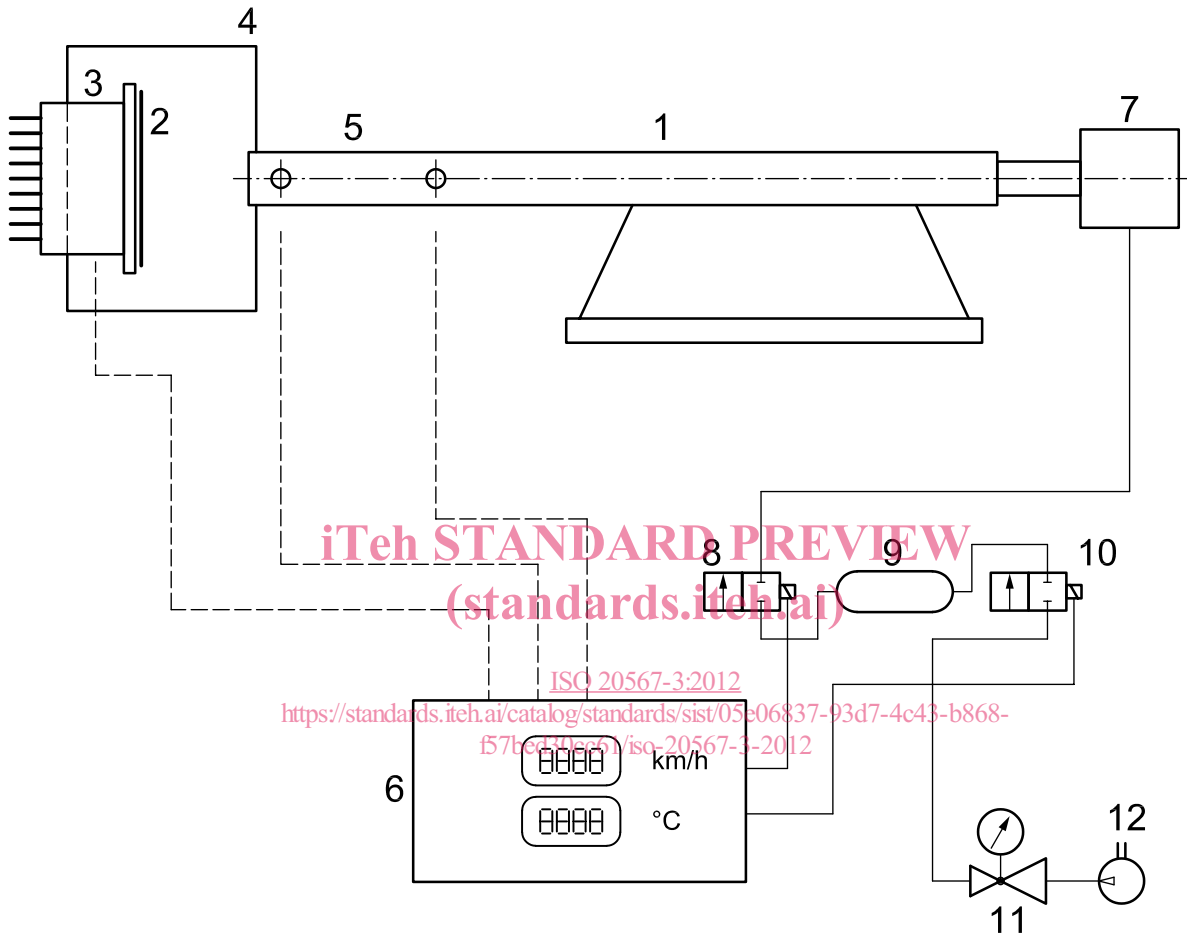
The stone-chip resistance of the coating under test is determined by projecting a single, free-flying body onto it in a test in which those parameters with a significant effect on the damage, i.e. the impact angle, speed, mass and geometry of the impact body, are defined. The temperature can be altered as required.

The test result is expressed in terms of the size of the area that has been damaged, after removal of pieces of the coating which have delaminated from the substrate as a result of the impact, plus, in the case of multi-layer paint systems, details of the damage to each coating layer.

4 Apparatus and materials

4.1 Single-impact tester, as shown in Figure 1.

An impact body is accelerated by compressed air in a defined manner. The speed is determined by measuring the travel time between two light beams and then displayed. The test panel is mounted on a movable holder whose angle can be adjusted and whose temperature can be set in the range from $-20\text{ }^{\circ}\text{C}$ to $+30\text{ }^{\circ}\text{C}$.



Key

| | | | |
|---|--|----|---|
| 1 | impact-body-accelerating tube | 7 | access door (for introducing the impact body) |
| 2 | test panel | 8 | start valve |
| 3 | test-panel holder | 9 | pressure chamber |
| 4 | protective housing | 10 | charge valve |
| 5 | light-beam device for measuring speed of impact body | 11 | pressure regulator |
| 6 | control unit with display for impact-body speed and test-panel temperature | 12 | compressed-air supply |

Figure 1 — Single-impact tester

4.2 Impact body: hardened-steel ball of 2 mm nominal diameter with a mass of 0,033 g (a ball bearing in accordance with ISO 3290-1). Each steel ball shall be used only once.

4.3 Magnifying glass, with $\times 5$ to $\times 10$ magnification.

5 Calibration

A suitable calibration method for the apparatus is specified in Annex A.

6 Sampling

Take a representative sample of the coating material to be tested, as described in ISO 15528.

Examine and prepare each sample for testing, as described in ISO 1513.

7 Test panels

7.1 Substrate

Use 200 mm × 100 mm steel test panels that are between 0,7 mm and 1,0 mm thick.

7.2 Preparation and coating

Prepare each test panel in accordance with ISO 1514 before coating and drying or stoving. Use the application method and drying or stoving conditions specified by the paint manufacturer.

7.3 Thickness of the coating

Determine the thickness, in micrometres, of the dry coating by one of the procedures specified in ISO 2808.

8 Procedure

8.1 Conditioning of the test panels

Condition the test panels, for at least 16 h at (23 ± 2) °C and (50 ± 5) % relative humidity (see ISO 3270) before carrying out the test.

8.2 Test conditions

The impact body shall be shot at the test panel at a speed of (250 ± 10) km/h [$(69,4 \pm 2,8)$ m/s] and at an angle of $(2,0 \pm 0,5)$ ° to the normal.

The preferred test temperatures are:

- a) (23 ± 2) °C;
- b) (0 ± 2) °C;
- c) (-20 ± 2) °C.

8.3 Number of test runs

Carry out at least five test runs on each of two test panels.

8.4 Preparation for the test

Set the test-panel holder to the required temperature. Set the pressure by means of the pressure regulator so that the speed of the impact body is within the range specified in 8.2, i.e. set it to the value determined during calibration of the apparatus (see Clause A.3).