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: Essai de résilience Izod

Luft-und Raumfahrt - Stahl - Prüfverfahren - Teil 2:  
Izod-Kerbschlagbiegeversuch

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## European foreword

This document (EN 2003-002:2023) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.

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

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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## Introduction

This document is part of the series of EN metallic material standards for aerospace applications. The general organization of this series is described in EN 4258.

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## 1 Scope

This document specifies the Izod impact test method for steel products used for aerospace applications. It shall be applied when referred to in the EN technical specification or material standard unless otherwise specified on the drawing, order or inspection schedule.

## 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.

EN 2003-003, *Aerospace series — Steel — Test methods — Part 3: Calibration of pendulum impact machines*<sup>1</sup>

EN 4259, *Aerospace series — Metallic materials — Definitions of general terms*

ISO 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*<sup>2</sup>

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 <https://www.electropedia.org/>

### 3.1 General terms

According to EN 4259.

### 3.2 Other terms

The parameters applicable to this document indicated in Figure A.1 to Figure A.5 of Annex A are defined in Table 1 and Table 2 below.

Table 1 gives the units to be used.

**Table 1 — Units**

Reference in Figure A.1 to Figure A.5	Parameter	Unit
1	Length of test piece	mm
2	Diameter of test piece	mm
3	Depth below notch	mm
4	Angle of notch	Degree

<sup>1</sup> Published as ASD-STAN Standard at the date of publication of this document by AeroSpace and Defence Industries Association of Europe — Standardization (ASD-STAN), <https://www.asd-stan.org/>

<sup>2</sup> Published by: ISO International Organization for Standardization <http://www.iso.ch/>.

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Reference in Figure A.1 to Figure A.5	Parameter	Unit
5	Root radius of notch	mm
6	Distance of plane of symmetry of notch from free end of test piece and from adjacent notch	mm
7	Distance between base of notch (tops of grips) and point of test piece hit by striker	mm
8	Angle between plane of symmetry of notch and longitudinal axis of test piece	Degree
9	Angle between top face of grips and face holding the test piece vertical	Degree
10	Angle at tip of striker	Degree
11	Angle between normal plane to test piece and underside face of striker at striking point	Degree
12	Radius at tip of striker	mm
—	Energy absorbed by breakage	ft.lbf or J as specified

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#### 4 Health and safety

Resources, test pieces, test samples, test materials, test equipment and test procedures shall comply with the current health and safety regulations/laws of the countries where the test is to be carried out.

Where materials and/or reagents which can be hazardous to health are specified, appropriate precautions in conformity with local regulations and/or laws shall be taken.

#### 5 Principle

The test consists of breaking by one blow from a swinging pendulum, under conditions specified hereafter, a notched test piece gripped vertically, with the bottom of the notch in the same plane as the upper face of the grips. The blow is struck on the same face as the notch at a fixed position. The absorbed energy is a measure of the impact strength of the steel.

#### 6 Testing requirements

##### 6.1 Resources

##### 6.1.1 Equipment/plant

##### 6.1.1.1 Testing machine

- shall be constructed and installed rigidly and shall be verified in accordance with EN 2003-003;
- the values of its principal characteristics shall comply with Table 2 (see also Figure A.1);
- the weight of the anvil and its foundations shall be at least 40 times the weight of the pendulum;
- the plane of swing of the pendulum shall be vertical;



- the machine shall be constructed so that the loss of energy (such as from translation, rotation or vibration) in the machine framework during a test is negligible;
- the centre of percussion shall be at the point of impact of the pendulum striker.

**Table 2 — Characteristics of testing machine**

Reference in Figure A.1 to Figure A.5	Parameter	Value
7	Distance between base of notch (tops of grips) and point of test piece hit by striker	22 mm $\pm$ 0,5 mm
9	Angle between top face of grips and face holding the test piece vertical	90° $\pm$ 0,1°
10	Angle at tip of striker	75° $\pm$ 1°
11	Angle between normal plane to test piece and underside face of striker at striking point	100° $\pm$ 1°
12	Radius at tip of striker	0,75 mm $\pm$ 0,25 mm
—	Speed of striker at instant of impact	3,5 m·s <sup>-1</sup> $\pm$ 0,5 m·s <sup>-1</sup>

#### 6.1.1.2 Cooling/Heating equipment

- means of cooling or heating test pieces to the required test temperature.

#### 6.1.1.3 Handling equipment

- means of handling tests pieces at sub-zero or elevated test temperatures.
- shall be designed and usable in such a way that the temperature of the test pieces is maintained within the permitted temperature range.

## 6.2 Test samples/Test pieces

**6.2.1** Sampling, number of test pieces and their location shall be as specified in the relevant material standard or technical specification.

**6.2.2** The standard test piece shall have the dimensions and tolerances given in Table 3 and shall conform to the appropriate Figures as follows:

- Figure A.2: With one notch;
- Figure A.3: With two notches;
- Figure A.4: With three notches.

The notch shall be of V-form (see Figure A.5).

Where more than one notch is cut in a test piece, the notches shall be spaced and positioned as shown in Figure A.3 or Figure A.4.

The plane of symmetry of the notch shall be perpendicular to the longitudinal axis of the test pieces.

Table 3 — Tolerances on specified test piece dimensions

References in Figure A.2 to Figure A.5	Parameter	Nominal value	Machining tolerances	ISO symbol <sup>a</sup>
1	Minimum overall length			
	— 1 notch	71 mm	—	—
	— 2 notches	99 mm	—	—
	— 3 notches	127 mm	—	—
2	Diameter of test piece	11,43 mm	±0,025 mm	js12
3	Depth below notch	8,13 mm	±0,05 mm	js11
4	Angle of notch	45°	±1°	—
5	Root radius of notch	0,25 mm	±0,025 mm	js12
6	Distance of plane of symmetry of notch from free end of test piece and from adjacent notch	28 mm	±0,5 mm	js15
8	Angle between plane of symmetry of notch and longitudinal axis of test piece	90°	±1°	—

<sup>a</sup> In accordance with ISO 286-1.

**6.2.3** The test piece shall be machined all over. Machining shall be carried out in such a way that any alteration of the test piece, for example due to cold working or heating, is minimized. The notch shall be carefully prepared so that no grooves, parallel to the base of the notch, are visible to the naked eye.

The test piece may be marked on an end face.

## 6.3 Test procedure

### 6.3.1 General

When required, a written instruction detailing the technique to be used for the testing of a specific material and, when applicable, testing conditions, shall be prepared.