



# SLOVENSKI STANDARD

## SIST EN 3238:2011

01-november-2011

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**Aeronavtika - Kovinski materiali - Preskusne metode - Strižni preskus za žice in kovice**

Aerospace series - Metallic materials - Test method - Shear test for wires and rivets

Luft- und Raumfahrt - Metallische Werkstoffe - Prüfverfahren - Prüfung der Scherfestigkeit von Drähten und Nieten

Série aérospatiale - Matériaux métalliques - Méthodes d'essais - Essai de cisaillement pour fils et rivets

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Ta slovenski standard je istoveten z: **EN 3238:2010**

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**ICS:**

49.025.05      Železove zlitine na splošno      Ferrous alloys in general

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EUROPEAN STANDARD

EN 3238

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2010

ICS 49.030.99

English Version

## Aerospace series - Metallic materials - Test method - Shear test for wires and rivets

Série aérospatiale - Matériaux métalliques - Méthodes  
d'essais - Essai de cisaillement pour fils et rivets

Luft- und Raumfahrt - Metallische Werkstoffe -  
Prüfverfahren - Prüfung der Scherfestigkeit von Drähten  
und Nieten

This European Standard was approved by CEN on 5 May 2010.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This document (EN 3238:2010) 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 Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, 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of an identical text or by endorsement, at the latest by April 2011, and conflicting national standards shall be withdrawn at the latest by April 2011.

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 3238:2010 (E)

## Introduction

This standard 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 standard specifies the requirements for shear testing rivet wire and rivets in metallic materials 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 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.

EN 4259, *Aerospace series — Metallic materials — Definition of general terms*<sup>1)</sup>

EN ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits*

## 3 Terms, definitions, parameters and symbols

For the purposes of this standard, the terms and definitions given in EN 4259 and the parameters and symbols given in Table 1 apply.

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### 3.1 General terms

See EN 4259.

### 3.2 Other terms

#### 3.2.1 Shear strength

Shear strength ( $R_c$ ) is given by:

$$R_c = \frac{F_m}{2 S_o} \quad \text{or} \quad R_c = 2 \frac{F_m}{\pi d_o^2}$$

where

$d_o$  is the original diameter of the test piece;

$F_m$  is the maximum force;

$S_o$  is the original cross-sectional area of the test piece.

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1) Published as ASD Pre-Standard at the date of publication of this standard.

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## 3.2.2 Parameters and symbols

See Table 1.

Table 1 — Parameters and symbols

Symbol	Unit	Parameter
$d_0$	mm	Original diameter of the test piece
$d_1$	mm	Inside diameter of the inner shearing device
$d_2$	mm	Outside diameter of the inner shearing device
$F_m$	N	The maximum force which the test piece withstands during the test
$h$	mm	Distance between bottom of housing and lower part of inner shearing device
$l_1$	mm	Length of the outer shearing device
$l_2$	mm	Length of the inner shearing device
$L_{min.}$	mm	Minimum length of the test piece
$R_c$	MPa	Shear strength – The maximum force ( $F_m$ ) divided by twice the original cross-sectional area ( $S_0$ ) of the test piece
$S_0$	mm <sup>2</sup>	Original cross-sectional area of the test piece

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#### 4 Health and safety

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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 carried out.

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

#### 5 Principle

The shear test consists in subjecting a wire, rivet or test piece of circular cross-section to shearing in double shear.

#### 6 Testing requirements

##### 6.1 Resources

###### 6.1.1 Equipment/plant

- Tensile or compression testing machines verified in accordance with EN ISO 7500-1;
- shearing device for compression testing machine (see Figures 1 and 3);
- shearing device for tensile testing machine (see Figures 2 and 3);
- shearing devices shall consist of the following components:



- 1) housing (1);
- 2) housing socket (2);
- 3) slide (3);
- 4) slide socket (4).

The dimensions are shown in Table 2.

Shearing device sockets (2) and (4) of Figure 3 shall have a hardness of:

- 5) for aluminium and aluminium alloys, 500 HV minimum;
- 6) for other alloys, 700 HV minimum.

The shearing devices need not conform to the pictorial representation but the dimensions specified and surface roughness shall be maintained.

**Table 2 — Dimensions**

Shearing devices	$d_1$	Tol.	Shearing device corresponding to tolerance zone <sup>a</sup>	$d_2$	$h$ min.	$L_1$	$L_2$	Test piece			
								$d_0$	Tol.	$L$ min.	
1	2	+ 0,100 0	H12 SIST EN 3238:2011 <a href="https://standards.iteh.ai/catalog/standards/sist/0b2264a5-334c-4d68-ae12-e8d2191d972/sist-en-3238-2011">https://standards.iteh.ai/catalog/standards/sist/0b2264a5-334c-4d68-ae12-e8d2191d972/sist-en-3238-2011</a>	30	35	15	20	2	- 0,020 - 0,370	50	
	3										
	4	+ 0,120 0						4	- 0,030 - 0,390		
	5										
	6	+ 0,075 0						H11	6		- 0,030 - 0,345
	8								8		
2	10	+ 0,022 0	H8	45	50	30	50		10	- 0,013 - 0,186	110
	12	+ 0,027 0							12		
	14								- 0,016 - 0,193		
	16										
3	18		+ 0,033 0	H8	45	50	40	50	18	- 0,016 - 0,193	130
	20	- 0,020 - 0,212									
	25										

<sup>a</sup> According to ISO 286-1:1988.

NOTE If the actual size of wire ( $d_0$ ) is different from dimensions given in Table 2, a shearing device with an appropriate inside diameter ( $d_1$ ) consistent with other parameters of Table 2 should be used.