



**SLOVENSKI STANDARD**  
**SIST EN 3475-513:2020**

**01-maj-2020**

**Nadomešča:**

**SIST EN 3475-513:2006**

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**Aeronavtika - Električni kabli za uporabo v zračnih plovilih - Preskusne metode - 513. del: Odpornost proti deformaciji (namestitvev s plastičnimi vezicami)**

Aerospace series - Cables, electrical, aircraft use - Test methods - Part 513: Deformation resistance (Installation with plastic cable ties)

Luft- und Raumfahrt - Elektrische Leitungen für Luftfahrtverwendung - Prüfverfahren - Teil 513: Verformungsbeständigkeit (Installation mit Kunststoff-Kabelbindern)

Série aérospatiale - Câbles électriques à usage aéronautique - Méthodes d'essais - Partie 513 : Déformation mécanique (Installation avec collier de frettage)

**Ta slovenski standard je istoveten z: EN 3475-513:2020**

**ICS:**

29.060.20	Kabli	Cables
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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**en,fr,de**

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EUROPEAN STANDARD

EN 3475-513

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2020

ICS 49.060

Supersedes EN 3475-513:2005

English Version

## Aerospace series - Cables, electrical, aircraft use - Test methods - Part 513: Deformation resistance (Installation with plastic cable ties)

Série aérospatiale - Câbles électriques à usage  
aéronautique - Méthodes d'essais - Partie 513 :  
Résistance à la déformation mécanique (installation  
avec colliers de frettage)

Luft- und Raumfahrt - Elektrische Leitungen für  
Luftfahrtverwendung - Prüfverfahren - Teil 513:  
Verformungsbeständigkeit (Installation mit Kunststoff-  
Kabelbindern)

This European Standard was approved by CEN on 19 August 2019.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## European foreword

This document (EN 3475-513:2020) 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 August 2020, and conflicting national standards shall be withdrawn at the latest by August 2020.

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.

This document supersedes EN 3475-513:2005.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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**EN 3475-513:2020 (E)****1 Scope**

This document defines the test methods to evaluate the performance of coaxial, quadrax and databus cables after the installation of plastic cable ties.

It shall be used together with EN 3475-100.

**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 3475-100, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 100: General*

EN 3475-805, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 805: Characteristic impedance*

EN 3475-806, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 805: Attenuation*

EN 3475-808, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 808: Cross-talk*

EN 3475-812, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 812: Return loss (VSWR)*

EN 4056-003, *Aerospace series — Cable ties for harnesses — Part 003: Plastic cable ties — Operating temperatures – 65 °C to 105 °C and – 65 °C to 150 °C — Product standard*

**3 Terms and definitions**

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

## 4 Coaxial cable — Method A

### 4.1 Preparation of specimens

#### 4.1.1 Required parts/samples

12 plastic cable ties, type EN 4056-003 Type 1, size code S or equivalent.

Cut 8 (eight) pieces of the test cable to a length of  $(2\,000 \pm 20)$  mm.

Test is to be performed on 4 (four) specimens made up of 2 (two) cable pieces.

#### 4.1.2 Initial measurement

Measure the impedance of each specimen (on both pieces of cable) in accordance with EN 3475-805, method B, plot the results.

#### 4.1.3 Preparation of samples

Use 3 (three) plastic cable ties per specimen to bundle 2 (two) cable pieces.

Place the first cable tie approximately 1 000 mm from the end which was connected to the TDR (to measure the initial impedance).

Place the second cable tie at a distance of  $(100 \pm 5)$  mm to the first, the third cable tie in a distance of 100 mm to the second.

The cable tie gun setting must be set and calibrated to a force of  $75^{+5}_0$  N.

### 4.2 Test method

#### 4.2.1 First test

To be performed on 2 (two) out of 4 (four) specimens.

Measure the impedance of each cable again in accordance with EN 3475-805, method B, plot the results.

Compare the impedance before and after the cable ties have been applied to cable bundle.

#### 4.2.2 Second test

To be performed on 2 (two) out of 4 (four) specimens.

Store the cable bundle for 8 (eight) h in an air convection oven at a temperature of  $(130 \pm 5)$  °C.

Cool the cable bundle for 4 (four) h to 6 (six) h to ambient temperature.

Measure the impedance of each cable again in accordance with EN 3475-805, method B, plot the results.

Compare the impedance before and after the cable ties have been applied to cable bundle.

### 4.3 Requirement

The impedance shall not deviate more than 5 % from the originally recorded values.

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## 5 Coaxial cable — Method B

### 5.1 Preparation of specimens

#### 5.1.1 Required parts/samples

14 plastic cable ties, type EN 4056-003 Type 1, size code V (4,4 mm width) or equivalent.

2 (two) pieces of cable each 2 (two) m long.

#### 5.1.2 Preparation of samples

Cut 2 (two) pieces of 2 (two) m long of cable under test.

Mount necessary connectors on each specimen to allow their connection to measurement device, for example with adapted connectors type N or TNC.

### 5.2 Test method

#### 5.2.1 General

Specimens shall be prepared as defined in 5.1.2.

#### 5.2.2 Initial measurement

On each of the 2 (two) samples, measure the VSWR in accordance with EN 3475-812 within the frequency range specified in the cable product standard.

Save the curve for further comparison.

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#### 5.2.3 Sample conditioning

Roll up each sample in order to obtain 4 (four) turns minimum to form a loop with an internal diameter of about 160 mm each.

Place 7 (seven) cable ties all around the loop uniformly. See Figure 1.

The cable tie gun setting must be set and calibrated to a force of  $115^{+5}_0$  N.





**Figure 1 — Coaxial cable with cable ties and specified diameter loop**

#### 5.2.4 Intermediate measurements

Measure the attenuation in accordance with EN 3475-806 and VSWR in accordance with EN 3475-812 in the frequency range of the cable under test.

Compare the curves before and after the cable ties have been applied onto the cable.

#### 5.2.5 Sample conditioning after tying

Store the cable bundle for 8 (eight) h in an air convection oven at a temperature of  $(130 \pm 5) ^\circ\text{C}$ .

Cool the cable bundle for 4 (four) h to 6 (six) h to ambient temperature.

#### 5.2.6 Final measurements

Measure the attenuation in accordance with EN 3475-806 and VSWR in accordance with EN 3475-812 within the frequency range specified in the cable product standard.

Compare the curves before and after sample conditioning.

### 5.3 Requirement

Values for attenuation and VSWR shall be conform to the values specified in the product standard.

The comparison of results before and after tests shall be recorded and joined to the report.

## 6 Quadrax cable

### 6.1 Preparation of specimens

#### 6.1.1 Required parts/samples

90 plastic cable ties, type EN 4056-003 Type 1, size code S or equivalent.

1 (one) piece of cable, length: 20 m.

#### 6.1.2 Preparation of samples

Take the 20 m cable to connect on measurement device with adapted connectors.