



# SLOVENSKI STANDARD SIST EN 6049-003:2009

01-oktober-2009

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Aerospace series - Electrical cables, installation - Protection sleeve in meta-aramid fibres  
- Part 003: Braided, tubular, expandable - Product standard

Luft- und Raumfahrt - Elektrische Leitungen, Installation - Schutzschlauche aus Meta-  
Aramidfasern - Teil 003: Geflecht, rohrenformig, dehnbar - Produkt Norm

Serie aerospatale - Cables electriques, installation - Gaine de protection en fibres meta-  
aramides - Partie 003: Tresse, tubulaire, expansible - Norme de produit

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**Ta slovenski standard je istoveten z: EN 6049-003:2009**

**ICS:**

49.060 Š^æp\ æš Ā^•[ |b\ æ Aerospace electric  
^|\ dā} æ[ ]!^{\ æš Ā ã c^{\ ã equipment and systems

**SIST EN 6049-003:2009**

**en**

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EUROPEAN STANDARD

EN 6049-003

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EUROPÄISCHE NORM

August 2009

ICS 49.060

English Version

**Aerospace series - Electrical cables, installation - Protection sleeve in meta-aramid fibres - Part 003: Braided, tubular, expandable - Product standard**

Série aéronautique - Câbles électriques, installation - Gaine de protection en fibres méta-aramides - Partie 003: Tresse, tubulaire, expansible - Norme de produit

Luft- und Raumfahrt - Elektrische Leitungen, Installation - Schutzschlauche aus Meta-Aramidfasern - Teil 003: Geflecht, rohrenförmig, dehnbar - Produkt Norm

This European Standard was approved by CEN on 20 June 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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 United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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## Foreword

This document (EN 6049-003:2009) 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 February 2010, and conflicting national standards shall be withdrawn at the latest by February 2010.

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, 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 6049-003:2009 (E)****1 Scope**

This standard defines the characteristics of tubular braided expandable mechanical protection sleeves for electrical cable and cable bundles made from Meta-aramid fibres and provided with a water repelled protection.

**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 3475-601, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 601: Smoke density.*

EN 3475-602, *Aerospace series — Cables, electrical, aircraft use — Test methods — Part 602: Toxicity.*

EN 6049-001, *Aerospace series — Electrical cables, installation — Protection sleeve in meta-aramid fibres — Part 001: Technical specification.* <sup>2)</sup>

EN 6059-100 <sup>1)</sup>, *Aerospace series — Electrical cables, installation — Protection sleeves — Test methods — Part 100: General.* <sup>2)</sup>

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**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 6049-001 apply.

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**4 Characteristics****4.1 Composition, dimensions and mass****4.1.1 Composition of the tows**

Each tow shall be built-up of several groups of multifilament fibres made from Meta-aramid. The number of groups which forms a tow and the width of the tow depends on the braiding configuration (braiding Figure 1 and braiding angle) of the sleeve, see 4.1.2. The thickness of the tow shall be so that the finished sleeve meet the mechanical and environmental requirements. One length of sleeve shall be built-up of one type of tow.

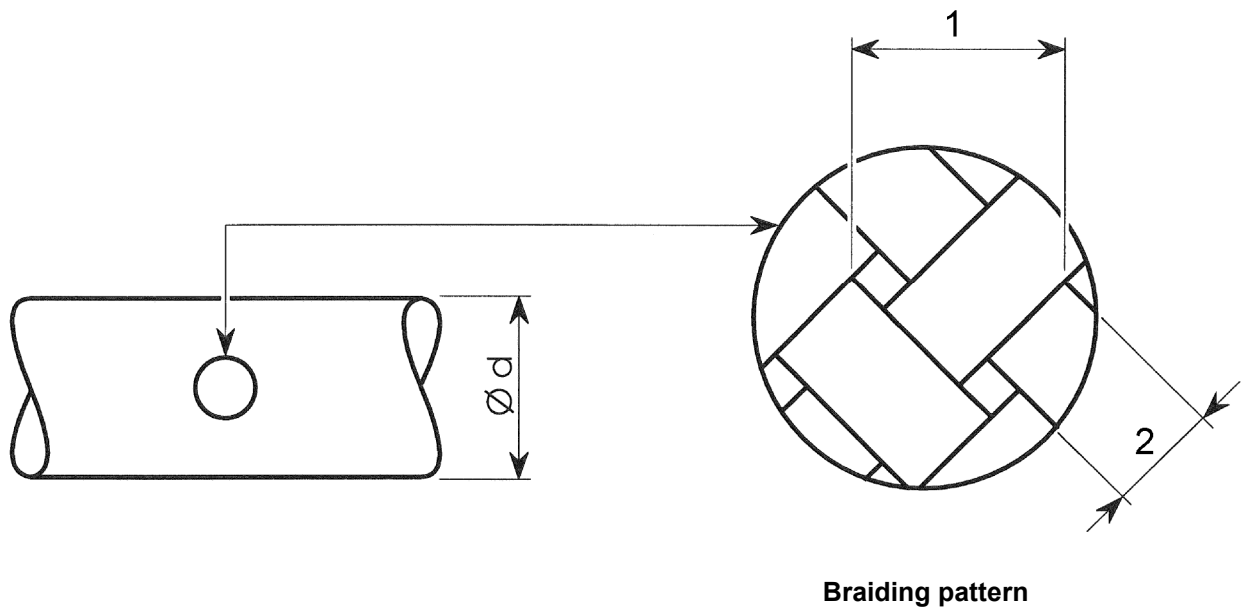
**4.1.2 Composition, dimensions and mass of the sleeve**

The composition of the sleeve (braiding Figure 1, braiding angle and tow width) shall be so that the sleeve meet the requirements for dimensions, coverage, expansion range and mass. The coverage shall be 80 % minimum. The braiding Figure 1 shall consist of two groups of tows in two directions. The braiding angle between the two groups shall be equal over the length of the sleeve. The maximum difference measured on a mandrel with the delivered diameter in accordance with EN 6059-202 is  $\pm 3$  %. Figure 2 and Table 2 give the composition and the dimensions of the sleeve.

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1) All parts quoted in this document.

2) Published as ASD Prestandard at the date of publication of this standard.

**Key**

- 1 Pitch
- 2 One tow

$d$  = Inner diameter

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**Figure 1 — Composition of the sleeve**

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**Table 1 — Dimensions and mass**

Size code	Delivered mm	$d$		Nominal <sup>a</sup> mm	Mass max. <sup>b</sup> g/m
		min. mm	max. mm		
02	1	1	2	2	3
04	2	2	4	4	4
06	4	4	8	6	8,5
08	6	6	12	8	11,5
10	8	8	16	10	14
15	10	10	20	15	17,5
20	12	12	24	20	22
25	15	15	30	25	32,5
30	20	20	40	30	39,5

<sup>a</sup> In practice approximately the maximum diameter of a cable bundle.  
<sup>b</sup> At the delivered diameter.

**EN 6049-003:2009 (E)****4.2 Color and materials****4.2.1 Color**

Color shall be olive green, code 5 (preferential), or ivory, code 9.

**4.2.2 Materials**

The materials shall be multifilament fibres of Meta-aramid and meet the requirements as specified in this standard.

**4.3 Mechanical properties****4.3.1 Sun light exposure**

After testing according to EN 6059-301 for 40 hours, the retention of the tensile strength shall be 45 % minimum with respect to the determined values of non-tested tows.

**4.3.2 Temperature range**

The operation temperature of the protection sleeves shall be:

- a) Maximum: 240 °C;
- b) Minimum: – 55 °C.

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NOTE Above 175 °C: loss of water repellent properties.

**4.3.3 Resistance to fluids range**

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After testing according to EN 6059-303, the retention of the tensile strength shall be 90 % minimum with respect to the determined values of non-tested tows.

**4.3.4 Water absorption**

To fulfil the requirements for water absorption, the sleeve shall repel water as tested in EN 6059-305 for 6 hours. This test shall be executed after a high temperature exposure test according to EN 6059-302 at 175 °C.

**4.3.5 Mould growth**

After testing according to EN 6059-306, there shall no external deterioration which would affect service use and no mould growth visible to the naked eye.

**4.3.6 Tensile strength of tows**

The tensile force to be applied per dTEX shall not be less than 0,03 N. Degradation of the tensile strength after environmental tests shall be within the limits as mentioned in the relevant paragraph. For this test, unbraided tows of the batch which have been used for braiding of the sleeves may be used.

**5 Test methods**

The tests shall be carried out as shown in Table 2. For the number of samples, see EN 6049-001.