
**Aeronavtika - Toplotno skrčljiva cev za utrjevanje, izolacijo in identifikacijo - 301.
del: Z lepilom obložene poliolefinske cevi - Delovna temperatura –55 °C do 105 °C -
Standard za proizvod**

Aerospace series - Sleeving, heat-shrinkable, for binding, insulation and identification -
Part 301: Adhesive lined polyolefin sleeveings - Operating temperature - 55 °C to 105 °C -
Product Standard

Luft- und Raumfahrt - Wärmeschrumpfender Schlauch zur Befestigung, Isolierung und
Identifizierung - Teil 301: Innenbeschichtete Polyolefin-Formteile - Temperaturbereich –
55 °C bis 105 °C - Produktnorm

[SIST EN 4708-301:2018](https://standards.iteh.ai/catalog/standards/sist/5c914383-3800-445f-ab8d-)

Série aérospatiale - Manchons thermorétractables de jonction, isolement et identification
- Partie 301 : Gaine en polyoléfine avec revêtement d'un adhésif - Températures
d'utilisation – 55 °C à 105 °C - Norme de produit

Ta slovenski standard je istoveten z: EN 4708-301:2018

ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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EUROPEAN STANDARD

EN 4708-301

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2018

ICS 49.060

English Version

**Aerospace series - Sleeving, heat-shrinkable, for binding,
insulation and identification - Part 301: Adhesive lined
polyolefin sleeveings - Operating temperature - 55 °C to 105
°C - Product Standard**

Série aérospatiale - Manchons thermorétractables, de
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Luft- und Raumfahrt - Wärmeschrumpfender Schlauch
zur Befestigung, Isolierung und Identifizierung - Teil
301: Innenbeschichtete Polyolefin-Formteile -
Temperaturbereich - 55 °C bis 105 °C - Produktnorm

This European Standard was approved by CEN on 11 September 2017.

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

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 4708-301:2018) 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 November 2018, and conflicting national standards shall be withdrawn at the latest by November 2018.

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 organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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EN 4708-301:2018 (E)**1 Scope**

This document specifies the required characteristics for heat-shrinkable adhesive lined polyolefin sleeveings for use in aircraft electrical systems at operating temperatures between – 55 °C and 105 °C.

The sleeving consists of an outer layer being of a flexible cross-linked polyolefin. The inner wall consists of a hot melt adhesive that flows and fuses during the shrinking process to provide a bond that is suitable where an environmental seal is required.

These sleeveings are normally supplied with internal diameters up to 40 mm for shrink ratios of 3:1 and up to 52 mm for shrink ratios of 4:1.

These sleeveings are normally supplied in colour black.

Sizes or colours other than those specifically listed in this standard may be available as custom items. These items shall be considered to comply with this standard if they comply with the property requirements listed in Table 3 and Table 5 except for dimensions and mass.

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 3909, *Aerospace series — Test fluids for electrical and optical components and sub-assemblies*

EN 4708-001, *Aerospace series — Sleeving, heat-shrinkable, for binding, insulation and identification — Part 001: Technical specification*

EN 6059-304, *Aerospace series — Electrical cables, installation — Protection sleeve — Test methods — Part 304: Flammability*

IEC 60684-1:2011, *Flexible insulating sleeving — Part 1: Definitions and general requirements*¹

IEC 60684-2:2005, *Flexible insulating sleeving — Part 2: Methods of test*¹

IEC 60757:1983, *Code for designation of colours*¹

ISO 846:1997, *Plastics – Evaluation of the action of micro-organisms*

ISO 1817:2005, *Rubber, vulcanized — Determination of the effect of liquids*

MIL-PRF-87937, *Performance specification: cleaning compound, aerospace equipment*²

AMS 1476B:2004, *Deodorant, Aircraft Toilet*³

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60684-1 apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>

¹ Published by: IEC International Commission Electrotechnique Internationale. <http://www.iec.ch/>.

² Published by: Department of Defense (DoD). <http://www.defenselink.mil/>.

³ Published by: SAE National (US) Society of Automotive Engineers. <http://www.sae.org/>.

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

4 Required characteristics

4.1 Dimension and mass

See Table 1 and Table 2.

Table 1 — Dimensional and mass requirements shrink ratio 3:1

Size code	Internal diameter		Recovered total wall thickness mm	Recovered meltable wall thickness mm Nominal	Mass per unit length max. g/m
	Expanded min.	Recovered max.			
3/1	3	1	$1,0 \pm 0,30$	0,5	7,2
4,5/1,5	4,5	1,5	$1,0 \pm 0,30$	0,5	8,3
6/2	6	2	$1,0 \pm 0,30$	0,6	10,9
9/3	9	3	$1,4 \pm 0,30$	0,6	17,7
12/4	12	4	$1,8 \pm 0,40$	0,8	32,7
19/6	19	6	$2,2 \pm 0,60$	0,8	67,3
24/8	24	8	$2,5 \pm 0,60$	1,0	87
40/13	40	13	$2,5 \pm 0,60$	1,0	130,4

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Table 2 — Dimensional and mass requirements shrink ratio 4:1

Size code	Internal diameter		Recovered total wall thickness mm	Recovered meltable wall thickness mm Nominal	Mass per unit length max. g/m
	Expanded min.	Recovered max.			
4/1	4	1	$1,0 \pm 0,30$	0,5	7,2
8/2	8	2	$1,0 \pm 0,30$	0,5	10,9
12/3	12	3	$1,4 \pm 0,30$	0,6	17,7
16/4	16	4	$1,8 \pm 0,40$	0,8	32,7
24/6	24	6	$2,2 \pm 0,60$	0,8	67,3
32/8	32	8	$2,5 \pm 0,60$	1,0	87
52/13	52	13	$2,5 \pm 0,60$	1,0	130,4

EN 4708-301:2018 (E)**4.2 Conditions of test**

Unless otherwise specified, the sleeving shall be shrunk in a forced air circulation oven for (5 ± 1) min. at $200 \text{ °C} \pm 5 \text{ °C}$ prior to testing.

4.3 Tests

See Table 3.

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Table 3 — Tests (1 of 3)

Designation of the test	IEC 60684-2 Clause or subclause	Requirements	Remarks
Dimensions	3		
— internal diameter	3.1.2	Table 1 and Table 2	
— wall thickness	3.3.2	Table 1 and Table 2	
— concentricity	3.3.3		—
• expanded		Shrink ratio 3:1 60 % min. Shrink ratio 4:1 50 % min.	
• recovered		All types 85 % min.	
Density	4	Not applicable	See Clause 38.
Heat shock	6		Heat at 200 °C ± 5 °C
Tensile strength	19.1 and 19.2	7 MPa min.	
Elongation at break	19.1 and 19.2	150 % min.	
Longitudinal change	9	Shrink ratio 3:1 between +1 % and - 15 % Shrink ratio 4:1 between +1 % and - 20 %	Heat the expanded sleeving at 200 °C ± 5 °C for (5 ± 1) min.
Bending after heating	13	Not applicable	See Clauses 6, 39 and 50.
Bending at low temperature	14	No cracks shall be visible	Condition at - 55 °C ± 3 K. For strips, the mandrel shall be between 15 and 17 times the wall thickness. Full section sleeving is tested unfilled and the mandrel shall be between 20 and 22 times the outer diameter.
Dimensional stability during storage	16	The dimensions shall be as specified in Table 1 and Table 2	—
Tensile strength	19.1 and 19.2	9 MPa min.	Use a jaw separation rate of 100 mm/min. Below 6,5 mm diameter test as sleeving, at 6,5 mm diameter and above test as dumb-bells.
Elongation at break	19.1 and 19.2	200 % min.	
Secant modulus at 2 % elongation	19.4	40 MPa min. 175 MPa max.	—
Breakdown voltage	21	Table 5	—
Volume resistivity	23	—	
— at ambient temperature	23.4.2	10 ¹¹ Ω m min.	—
— after damp heat	23.4.4	10 ¹⁰ Ω m min.	
Flammability	—	EN 6059-304 Method 2 Clause 6.2	Method in accordance EN 6059-304 Test size 10/8 on 10 mm diameter tube
Oxygen index	27	Not applicable	—