
Aeronavtika - Toplotno skrčljive cevke za povezovanje, izolacijo in prepoznavanje - 203. del: Polivinilidensko kloridne identifikacijske cevke iz (PVDF) – Obratovalno temperaturno območje med –55 °C in 225 °C - Standard za proizvod

Aerospace series - Sleeving, heat-shrinkable, for binding, insulation and identification - Part 203: polyvinylidene fluoride (PVDF) Identification sleeves - Operating Temperature range -55°C to 225°C - Product Standard

Luft- und Raumfahrt - Wärmeschrumpfender Schlauch zur Befestigung, Isolierung und Identifizierung - Teil 203: Kennzeichnungsschlauch aus Polyvinylidenfluorid (PVDF), Betriebstemperaturbereich -55 °C bis 225 °C - Produktnorm

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Série aérospatiale - Manchons thermorétractables, de jonction, isolement et identification - Partie 203 : Manchons d'identification en polyfluorure de vinylidène (PVDF) - Températures d'utilisation -55 °C à 225 °C - Norme de produit

Ta slovenski standard je istoveten z: EN 4708-203:2022

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49.025.40	Guma in polimerni materiali	Rubber and plastics
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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Aerospace series - Sleeving, heat-shrinkable, for binding, insulation and identification - Part 203: polyvinylidene fluoride (PVDF) Identification sleeves - Operating Temperature range -55°C to 225°C - Product Standard

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This European Standard was approved by CEN on 24 July 2022.

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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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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STANDARD PREVIEW
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European Foreword

This document (EN 4708-203:2022) 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 June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

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.

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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EN 4708-203:2022 (E)**1 Scope**

This document specifies the required characteristics for heat-shrinkable semi rigid polyvinylidene identification sleeves for use in aircraft electrical systems at operating temperatures between -55 °C and 225 °C.

This specification is for the characterisation of Identification sleeves only.

This sleeving is a semi rigid tough product and is suitable for use where high temperatures and extreme fluid resistance properties are required.

It is available with a shrink ratio of 2 : 1.

The product is normally supplied with internal diameters up to 38 mm.

The standard colours are white, black or yellow.

For use at temperatures above 200 °C black with white or silver ink is recommended.

Sizes or colours other than those specifically listed in this standard may be available. These items are considered to comply with this document if they comply with the property requirements listed in tables 2 and 3 except for dimensions and mass.

As the sleeving to be tested is a printed article the complete system is to be recorded as part of the evaluation. The sleeve will only be considered as meeting the requirements of this document if printed with the printer, ribbon/inks and settings referenced within the test report.

Mark adherence and print permanence are determined in this document using method EN 6059-407.

2 Normative references (standards.iteh.ai)

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 3909:2016, *Aerospace series — Test fluids and test methods for electrical and optical components and sub-assemblies*

EN 4708-001:2019, *Aerospace series — Sleeving, heat-shrinkable, for binding, insulation and identification — Part 001: Technical specification*

IEC 60684-1, *Specification for flexible insulating sleeving — Part 1: Definitions and general requirements*

IEC 60684-2:2011, *Flexible insulating sleeving — Part 2: Methods of test*

IEC 60757, *Code for designation of colours*

ISO 846:2019, *Plastics — Evaluation of the action of microorganisms*

ISO 1817:2022, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 11075, *Aircraft — De-icing/anti-icing fluids — ISO type I*

ISO 11078, *Aircraft — De-icing/anti-icing fluids — ISO types II, III and IV*

AMS1428, *Fluid, Aircraft Deicing/Anti-Icing, Non-Newtonian (Pseudoplastic), SAE Types II, III, and IV¹*

¹ Published by SAE International (US) Society of Automotive Engineers (www.sae.org).

ASTM D740-11, *Standard Specification for Methyl Ethyl Ketone*²

MIL-PRF-87937, *CLEANING COMPOUND, AEROSPACE EQUIPMENT*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:

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

4 Required characteristics

4.1 Dimensions and mass

Table 1 — Dimensional and mass requirements

Size code	Internal diameter		Recovered wall thickness	Mass per unit length
	Expanded min.	Recovered max.		
2,4/0,8 ^a	2,4	0,8	0,38 ± 0,08	3,6
3,2/1,6	3,2	1,6	0,38 ± 0,08	5,9
4,8/2,4	4,8	2,4	0,38 ± 0,08	8,2
6,4/3,2	6,4	3,2	0,38 ± 0,08	10,5
9,5/4,8	9,5	4,8	0,38 ± 0,08	15,1
12,7/6,4	12,7	6,4	0,38 ± 0,08	19,7
19,0/9,5	19,0	9,5	0,38 ± 0,08	28,8
24,4/12,7	25,4	12,7	0,43 ± 0,08	42,2
38,1/19,0	38,1	19,0	0,43 ± 0,08	62,0

^a 2,4/0,8 3 : 1 recovery ratio to allow printing on supplied product.

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 °C ± 5 °C prior to testing.

² Published by ASTM International American Society for Testing and Materials (www.astm.org).

³ Published by DoD National (US) Mil. Department of Defense (<http://www.defenselink.mil/>).

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The sleeving shall be tested as a printed article the complete system is to be recorded as part of the evaluation. The sleeve will only be considered as meeting the requirements of this specification if printed with the printer, ribbon, inks and settings referenced within the test report and recorded upon the approval certificate. All test specimens shall have a series of alphanumeric characters along 75% of the test specimen on one surface as listed in Table 2.

Table 2 — Test characters

Tube Size Supplied Inside Diameter	Text Size Printed	Typical Printed Text	Text Size Fully Recovered
mm (inches)	mm (inches)		mm (inches)
3,20 (0,126)	14pt ≈ 3,55 (0,140)	ABC	≈ 2,50 (0,100)
4,80 (0,189)	14pt ≈ 4,00 (0,160)	ABC	≈ 2,50 (0,100)
6,40 (0,252)	24pt ≈ 6,00 (0,240)	ABC	≈ 3,80 (0,150)
7,90 (0,312)	28pt ≈ 7,10 (0,280)	ABC	≈ 4,00 (0,160)
9,50 (0,375)	36pt ≈ 9,10 (0,360)	ABC	≈ 5,60 (0,220)
12,70 (0,500)	48pt ≈ 12,20 (0,480)	ABC	≈ 6,10 (0,240)
19,10 (0,750)	72pt ≈ 18,47 (0,720)	ABC	≈ 8,12 (0,320)
25,40 (1,000)	72pt ≈ 18,47 (0,720)	ABC	≈ 8,12 (0,320)

4.3 Tests

Table 3 — Tests

IEC 60684-2:2011 Clause or subclause	Designation of the test	Requirements	Remarks
3 3.1.2 3.3.2 3.3.3	Dimensions – internal diameter – wall thickness – concentricity – expanded – recovered	Table 1 Table 1 65 % min. 85 % min.	—
—	Initial Mark adherence	Mark adherence 20 rubs, 1 kg, method A	EN 6059-407:2019, method A
6 13	Heat shock	Bend test Print permanence 20 rubs, 1kg, method B	Heat at 200 °C ± 5 °C for 4 h EN 6059-407:2019, method B
9	Longitudinal change	± 20 % max.	Heat the expanded sleeving at 225 °C ± 5 °C for (5 ± 1) min
14	Bending at low temperature	No cracks shall be visible	Condition at -55 °C ± 3 °C For strips, the mandrel shall be between 20 and 22 times the wall thickness. Full section sleeving is tested unfilled, and the mandrel shall be between 20 and 22 times the outer diameter.
16 19.2 and 19.3 19.2 and 19.3	Dimensional stability during storage Tensile strength Elongation at break	The dimensions shall be as specified in Table 1. 10 MPa min. 150 %	2 weeks at 40 °C 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.
26 Method C	Flame propagation Time of burning Length burned	 15 s max. 75 mm max.	—
27	Oxygen Index		—
27.1	At ambient temperature	NA	
27.2	At elevated temperature	NA	
33	Copper corrosion	N/A	N/A

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IEC 60684-2:2011 Clause or subclause	Designation of the test	Requirements	Remarks
34	Colour fastness to light	The colour contrast between the exposed and unexposed parts of the specimens shall be equal to or less than that of the fastness standard. Print permanence 20 rubs, 1 kg, method B	Fastness standard No. 5 EN 6059-407:2019, method B
36	Resistance to selected fluids	—	Use the fluids and test temperatures specified in Table 4.
13		Bending Print permanence 20 rubs, 1kg, method B	Immersion time (24 ± 1) h EN 6059-407 method B
38	Mass per unit length	Table 1	—
39	Heat ageing		Heat at 175 °C ± 3 °C for 168 hrs
13		Bend test	
40	Water absorption	1,0 % max.	—
41	Restricted shrinkage	No cracking or splitting	Heat at 225 °C
	Visual		Perform the visual determination only
43	Smoke Index	NA	—
44	Toxicity	NA	—
45	Halogen content	NA	—
46	Acid gas generation	NA	—
50	Long term ageing		Ageing temperature shall be Black 225 °C ± 3 °C White/yellow 200°C ± 3 °C
13		Bend test Print permanence 20 rubs, 1 kg, method B	EN 6059-407:2019, method B