



SLOVENSKI STANDARD
oSIST prEN 4840-103:2021
01-september-2021

Aeronavtika - Toplotno skrčljive ulite forme - 103. del: Fluoroelastomerne, temperaturno območje od -55 °C do 200 °C - Standard za proizvod

Aerospace series - Heat shrinkable moulded shapes - Part 103: Fluoroelastomeric, temperature range -55 °C to 200 °C - Product Standard

Luft- und Raumfahrt - Wärmeschrumpfende Bauteile - Teil 103: Fluoroelastomeric, Temperaturbereich -55 °C bis 200 °C - Produktnorm

Série aérospatiale - Manchons thermorétractables - Partie 103 : Fluoroelastomeric, plage de température de -55 °C à 200 °C - Norme de produit

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ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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EUROPEAN STANDARD
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Aerospace series - Heat shrinkable moulded shapes - Part 103: Fluoroelastomeric, temperature range -55 °C to 200 °C - Product Standard

Série aérospatiale - Manchons thermorétractables -
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bis 200 °C - Produktnorm

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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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 (prEN 4840-103:2021) 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 document is currently submitted to the CEN Enquiry.

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prEN 4840-103:2021 (E)**1 Scope**

This document specifies the required characteristics for heat-shrinkable fluoroelastomeric, heat-shrinkable boots for use in aircraft electrical systems at operating temperatures between $-55\text{ }^{\circ}\text{C}$ and $200\text{ }^{\circ}\text{C}$.

The moulded shapes can be supplied with a pre-coated adhesive. Refer to the manufacturers/suppliers for options. A guide to adhesive compatibility is given in Appendix A.

These moulded shapes are normally supplied in the styles and dimensions given in EN 4840-002. The colour is normally black.

Styles and dimensions other than those specifically listed in EN 4840-002 can be available as custom items. These items are considered to comply with this standard if they comply with the property requirements listed in Table 1 with the exception of dimensions.

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 and test methods for electrical and optical components and sub-assemblies*

EN 4840-001:2019, *Aerospace series — Heat shrinkable moulded shapes — Part 001: Technical specification*

EN 4840-002, *Aerospace series — Heat shrinkable moulded shapes — Part 002: Index of product standards and product dimensions*

ISO 846, *Plastics — Evaluation of the action of micro-organisms*

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

IEC 62329-1, *Heat shrinkable moulded shapes — Part 1: Definitions and general requirements*

IEC 62329-2:2011, *Heat shrinkable moulded shapes — Part 2: Methods of test*

IEC 60757, *Code for designation of colours*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62329-1 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**

See EN 4840-002.

4.2 Conditions of test

4.2.1 Conditions of test for the moulded shapes

The moulded shapes shall be shrunk in a forced air circulation oven for (10 ± 1) min at the temperature specified in Table 1, Clause 5.

4.2.2 Moulded shapes material conformance

Conformance with the requirements of this specification shall be based on the results from test sheets, $(2 \pm 0,15)$ mm thick, unless otherwise specified*, which shall be prepared from the same cross-linked heat shrinkable material that is used to manufacture the heat shrinkable moulded shapes.

*A suitable size has been found to be 150 mm x 150 mm.

4.2.3 Moulded shapes compatibility

Conformance with the compatibility requirements of this specification shall be based on the results from the assembly configuration as shown in Figure 3 of IEC 62329-2:2011.

The tubing used for qualification should be a qualified grade and the declared adhesive shall be Type X.

See Table 3 for compatibility test fluids.

4.3 Tests

See Table 1.

iTeh STANDARD PREVIEW Table 1 – Tests (standards.iteh.ai)

IEC 62329-2:2011 Clause or subclause	Designation of the test	Requirements	Remarks
5	Dimensions	EN 4840-002 Dimension tables	Condition at $200^{\circ}\text{C} \pm 3^{\circ}\text{C}$
6	Density	$\pm 0,03$	Max permitted deviation from manufacturers qualification values
7 10 10	Heat shock Tensile strength Elongation at break	10 MPa min 250 % min	Heat at $300^{\circ}\text{C} \pm 3^{\circ}\text{C}$
8	Bending at low temperature	No cracks shall be visible	Condition at $-55^{\circ}\text{C} \pm 2^{\circ}\text{C}$. The mandrel diameter shall be between 20mm +1/-0 mm
9	Dimensional stability during storage	The dimensions shall be as specified in EN 4840-002 dimension tables	
10	Tensile strength	12 MPa min	Use a jaw separation rate of 100 mm/min.
10	Elongation at break	300 % min	
11	Secant modulus at 2 % elongation	70 MPa max	
12	Electric Strength	8 KV/mm	

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IEC 62329-2:2011 Clause or subclause	Designation of the test	Requirements	Remarks
13	Volume resistivity	109 Ω m min	
16	Flammability	30 s max.	Test in accordance with method A of IEC 60695-11-10
17	Oxygen Index	Not applicable	
18	Copper corrosion	None above the allowable 8	Heat for (16 \pm 0,5) h at 200 $^{\circ}$ C \pm 3 $^{\circ}$ C
19	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.	Fastness standard No. 5
20	Resistance to selected fluids		Use the fluids and test temperatures specified in table 2
10	Tensile strength	8 MPa min	Immersion time (24 \pm 1) h
10	Elongation at break	200 % min	
21	Long Term Ageing (3000hr)		Heat at 200 $^{\circ}$ C \pm 3 $^{\circ}$ C
10	Elongation at break	100 % min	
22	Mass	EN 4840-002	
23	Heat ageing	Dimension tables	Heat at 250 $^{\circ}$ C \pm 3 $^{\circ}$ C
10	Tensile strength	10 MPa min	
10	Elongation at break	250 % min	
24	Water absorption	0,5	
25	Colour stability to heat	Not applicable	
26	Smoke Index	Not applicable	
27	Toxicity	Not applicable	
28	Halogen content	Not applicable	
29	Acid gas generation	Not applicable	
30	Resistance to mould growth		Method B
10	Tensile Strength		56 days exposure
10	Elongation	12 MPa min. 300% min.	
31.1	Dynamic shear	300 N min.	Test at 23 $^{\circ}$ C \pm 3 $^{\circ}$ C
		25 N min.	Test at 200 $^{\circ}$ C \pm 3 $^{\circ}$ C
31.2	Static load	20 kgs, 300 N minimum	Test at 23 $^{\circ}$ C \pm 3 $^{\circ}$ C
		1 kgs 300 N minimum	Test at 200 $^{\circ}$ C \pm 3 $^{\circ}$ C

IEC 62329-2:2011 Clause or subclause	Designation of the test	Requirements	Remarks
31.3	Fluid resistance Tensile Strength Elongation	8 MPa min. 200 % min.	Use the fluids and test temperatures specified in table 3 Immersion time (24 ± 1) h
31.4	Thermal Ageing	300 N min.	Heat for (168 ± 1) h at 200 °C ± 3 °C
31.5	Peel Adhesion	60 N/25mm	
31.6	Altitude immersion	109 Ω	
EN 4840-001:2019 Clause 4.6	Shelf life*	The dimensions shall be as specified in EN4840-002	Condition the boots for 60 months at ambient temperature prior to testing; interim measurements shall be made every 12 months
EN 4840-001:2019 Table 2 10 10	Artificial weathering Tensile strength Elongation at break	5 MPa min 100 % min	
<p>¹ Due to the duration of this test, lack of completion of this test shall not preclude certification of this material. Additional evidence of compliance with this requirement in the interim shall be as agreed between the supplier and/or the approval authority and/or the customer.</p> <p>² These system performance requirements are based on using Type X adhesive. When using other adhesives the performance may be different. Refer to the supplier/manufacturer.</p>			

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4.4 Fluid Resistance Tests

See Tables 2 and Table 3.

Table 2 — Resistance to selected fluids

EN 3909 No	Fluids	Type	Standard or symbol	Immersion temperature °C ± 2 °C
1a	Fuels	Gasoline	ISO 1817 Liquid B	40
1b		Kerosene	ISO 1817 Liquid F	40
2a	Hydraulic fluids	Phosphate base	ISO 1817 Liquid 103	Not Tested
2b		Silicone base	S-1714	50
2c		Mineral base	H-520	Not Tested
3a	Oils	Mineral base	O-1176	50
3b		Mineral base	O-142	50
3c		Synthetic base	ISO 1817 Liquid 101	70
3d		Synthetic Oil	NATO-160 OX-26	70
4a	Cleaning fluids	Solvent	Isopropyl alcohol	23
4c			Propanol 25 % White spirit 75 %	23
4d			Methylethylketone	23
5a	De-icing fluids	Runway de-icers	Inhibited potassium acetate in water, 50 %	23
5b		Aircraft de-icers	Ethylene glycol 80 % Water 20 %	23
Other fluids and/or temperatures may be specified with specific needs. These additional fluids and/or temperatures shall be applicable when incorporated into agreements between the supplier and customer but do not form part of the requirements of this standard.				

Table 3 — Resistance to selected fluids for the compatibility test

EN 3909 No	Fluid type	Standard or symbol	Immersion Temperature °C ± 3 °C
1b	Kerosene fuel	ISO 1817 Liquid F	40
3d	Oil	NATO—160 OX-26	70