
Aeronavtika - Toplotno skrčljive ulite forme - 102. del: Elastomerne, poltoge, temperaturno območje -75 do 150 °C - Standard za proizvod

Aerospace series - Heat shrinkable moulded shapes - Part 102: Elastomeric, semi-rigid, temperature range -75 to 150 °C - Product Standard

Luft- und Raumfahrt - Wärmeschrumpfende Formteile - Teil 102: Elastomer, halbsteif, Temperaturbereich -75 °C bis 120 °C - Produktnorm

Série aérospatiale - Manchons thermorétractables - Partie 102 : Semi-rigides en élastomère, plage de température de -75 à 150 °C - Norme de produit

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EUROPEAN STANDARD

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Aerospace series - Heat shrinkable moulded shapes - Part 102: Elastomeric, semi-rigid, temperature range -75 to 150 °C - Product Standard

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- Teil 102: Elastomer, halbsteif, Temperaturbereich -75
°C bis 120 °C - Produktnorm

This European Standard was approved by CEN on 13 October 2019.

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

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European foreword

This document (EN 4840-102:2019) 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 document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.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.

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, 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 4840-102:2019 (E)**1 Scope**

This document specifies the required characteristics for heat-shrinkable elastomeric semi-rigid, boots for use in aircraft electrical systems at operating temperatures between -75 °C and 150 °C.

The moulded shapes may be supplied with a pre-coated adhesive. Refer to the manufacturers/suppliers for options. A guide to adhesive compatibility is given in Annex A (informative).

These moulded shapes are normally supplied in the styles and dimensions given in EN 4840-002 Table 1 to Table 22. The colour is normally black.

Styles and dimensions other than those specifically listed in EN 4840-002 Table 1 to Table 22 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 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, *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 1817:2005, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

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

IEC 62329-1, *Heat shrinkable moulded shapes — Part 001: Definitions and general requirements*

IEC 62329-2, *Heat shrinkable moulded shapes — Part 002: Methods of test*

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:

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

4 Required characteristics**4.1 Dimensions and mass**

According to 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 (150 ± 3) °C.

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 ¹⁾ which shall be prepared from the same cross-linked heat shrinkable material that is used to manufacture the heat shrinkable moulded shapes.

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.

The tubing used for qualification should be a qualified grade and the adhesive should be specified.

See Table 3 for compatibility test fluids.

4.3 Tests

See Table 1.

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

Table 1 — Tests (1 of 2)

IEC 62329-2 Clause or subclause	Designation of the test	Requirements	Remarks
5	Dimensions	EN 4840-002 Dimension tables	Condition at 150 °C ± 3 °C
6	Density	± 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 215 °C ± 3 °C
8	Bending at low temperature	No cracks shall be visible	Condition at - 75 °C ± 2 °C. The mandrel diameter shall be between 20 ⁺¹ ₀ mm.
9	Dimensional stability during storage	The dimensions shall be as specified in EN 4840-002 dimension tables.	—
10 10	Tensile strength Elongation at break	12 MPa min. 350 % min.	Use a jaw separation rate of 100 mm/min.
11	Secant modulus at 2 % elongation	80 MPa min. 160 MPa max.	—
12	Electric Strength	8 kV/mm	—
13	Volume resistivity	1 011 Ωm 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 ± 0,5) h at 150 °C ± 3 °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 N°5
20 10 10	Resistance to selected fluids Tensile strength Elongation at break	8 MPa min. 250 % min.	Use the fluids and test temperatures specified in Table 2. Immersion time (24 ± 1) h
21 10	Long Term Ageing 3 000 h Elongation at break	100 % min.	Heat at 150 °C ± 3 °C
22	Mass	EN 4840-002 Dimension tables	—
23 10 10	Heat ageing Tensile strength Elongation at break	10 MPa min. 250 % min.	Heat at 160 °C ± 3 °C
24	Water absorption	0,5	—
25	Colour stability to heat	Not applicable	—
26	Smoke Index	Not applicable	—

Table 1 — Tests (2 of 2)

IEC 62329-2 Clause or subclause	Designation of the test	Requirements	Remarks
27	Toxicity	Not applicable	—
28	Halogen content	Not applicable	—
29	Acid gas generation	Not applicable	—
30 10 10	Resistance to mould growth Tensile Strength Elongation	12 MPa min. 350 % min.	Method B 56 days exposure
31	Compatibility ^a	—	Boot: EN 4840-102-B/5-BK-R-N or EN 4840-102-B/5-BK-N-N with adhesive Type U Tubing: EN 4708-102-12,7/6,4-BK
31.1	Dynamic shear	300 N min.	Test at 23 °C ± 3 °C
		110 N min.	Test at 100 °C ± 3 °C
31.2	Static load	20 kg, 300 N min.	Test at 23 °C ± 3 °C
		5 kg, 110 N min.	Test at 100 °C ± 3 °C
31.3	Fluid resistance	150 N 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 100 °C ± 3 °C
31.5	Peel Adhesion	60 N/25 mm	—
31.6	Altitude immersion	109 Ω	—
EN 4840-001 subclause 4.6	Shelf life ^b	The dimensions shall be as specified in EN 4840-002.	Condition the boots for 60 months at ambient temperature prior to testing; interim measurements shall be made every 12 months.
EN 4840-001 Table 2 10 10	Artificial weathering Tensile strength Elongation at break	5 MPa min. 100 % min.	—
<p>^a These system performance requirements are based on using R and U adhesives. When using other adhesives the performance may be different. Refer to the supplier/manufacturer.</p> <p>^b 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>			