

INTERNATIONAL STANDARD



**Flexible insulating sleeving –
Part 3: Specifications for individual types of sleeving – Sheets 116 and 117:
Extruded polychloroprene, general purpose**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FLEXIBLE INSULATING SLEEVING –

Part 3: Specifications for individual types of sleeving – Sheets 116 and 117: Extruded polychloroprene, general purpose

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60684-3-116:2010. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60684-3-116 has been prepared by IEC technical committee 15: Solid electrical insulating materials. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2010 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) update of clause references in Table 2;
- b) addition of resistance to fluids test.

The text of this International Standard is based on the following documents:

Draft	Report on voting
15/1005/CDV	15/1020/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all the parts in the IEC 60684 series, published under the general title *Flexible insulating sleeving*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document is one of a series of standards which deals with flexible insulating sleeving for electrical purposes.

The series consists of three parts:

Part 1: Definitions and general requirements (IEC 60684-1);

Part 2: Methods of test (IEC 60684-2);

Part 3: Specification requirements for individual types of sleeving (IEC 60684-3).

This document comprises two of the sheets of Part 3, as follows:

Sheet 116: Extruded polychloroprene, general purpose: thin wall;

Sheet 117: Extruded polychloroprene, general purpose: thick wall.

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FLEXIBLE INSULATING SLEEVING –

Part 3: Specifications for individual types of sleeving – Sheets 116 and 117: Extruded polychloroprene, general purpose

1 Scope

This part of IEC 60684 gives the requirements for non-heat-shrinkable sleeving, extruded from compounds based on polychloroprene elastomer. This sleeving has been found suitable for temperatures up to 95 °C.

Sleeving of this type is normally available with internal diameters up to 25 mm, and in the following opaque colours: black, brown, red, orange, yellow, green, blue, violet, grey, white and pink. Sizes or colours other than those specifically listed in this document ~~may~~ can possibly be available as custom items. These items ~~shall be~~ are considered to comply with this document if they comply with the other property requirements listed in Table 2.

Materials which conform to this specification meet established levels of performance. However, the selection of a material by a user for a specific application ~~should~~ will be based on the actual requirements necessary for adequate performance in the application and not based on the specification alone.

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.

IEC 60684-1:~~2003~~, *Flexible insulating sleeving – Part 1: Definitions and general requirements*

~~IEC 60684-2:—, Flexible insulating sleeving – Part 2: Methods of test¹~~

IEC 60684-2:~~1997~~2011, *Flexible insulating sleeving – Part 2: Methods of test*
~~Amendment 1 (2003)~~
~~Amendment 2 (2005)~~

IEC 60068-2-74²:1999, *Environmental testing – Part 2-74: Tests – Test Xc: Fluid contamination*
IEC 60068-2-74:1999/AMD1:2018

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

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

¹ ~~Third edition to be published~~

² There exists a consolidated version 1.1:2018 that includes IEC 60068-2-74:1999 and its Amendment 1:2018.

3 Terms and definitions

There are no terms and definitions in this document.

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 Designation

The sleeving shall be identified by the following designation:

Description	IEC publication number	IEC Part number	IEC Sheet number	Size internal diameter, in millimetres	Colour
↓	↓	↓	↓	↓	↓
Sleeving	IEC 60684	3	116	2,5	GN

Any abbreviation for colour shall comply with IEC 60757 where applicable. Non-standard colours shall be written out in full.

5 Requirements

In addition to the general requirements given in IEC 60684-1, the sleeving shall comply with the requirements of Table 1 and Table 2, Table 3 and Table 4.

6 Sleeving conformance

Product qualification shall normally be based on results from 10 mm internal diameter sleeving. Colour and colour fastness to light shall be qualified for all colours.

Table 1 – Dimensional requirements^a

Internal diameter ^b mm			Wall thickness mm			
Nominal			Sheet 116: Thin wall		Sheet 117: Thick wall	
	Min.	Max.	Min.	Max.	Min.	Max.
0,5	0,4	0,7	0,4	0,6	0,6	0,8
0,8	0,6	0,9	0,4	0,6	0,6	0,8
1,0	0,9	1,2	0,4	0,6	0,6	0,8
1,2	1,0	1,4	0,4	0,6	0,6	0,8
1,5	1,3	1,8	0,5	0,7	0,7	0,9
2,0	1,7	2,3	0,5	0,7	0,7	0,9
2,5	2,1	2,9	0,5	0,7	0,7	0,9
3,0	2,5	3,5	0,5	0,7	0,7	0,9
4,0	3,3	4,6	0,5	0,9	0,9	1,2
5,0	4,2	5,8	0,5	0,9	0,9	1,2
8,0	6,8	9,2	0,5	1,1	1,1	1,5
10,0	8,6	11,4	0,5	1,2	1,2	1,8
12,0	10,4	13,6	0,5	1,2	1,2	1,8
16,0	14,0	18,0	0,5	1,4	1,4	2,0
20,0	17,5	22,5	0,7	1,5	1,5	2,4
25,0	21,5	28,5	0,7	1,5	1,5	2,4

^a Measurements shall be made to the nearest 0,05 mm.

^b Sleeving with a non-standard nominal internal diameter shall have a wall thickness at least as large as the next larger standard size. Sleeving with a non-standard internal diameter greater than 25,0 mm shall have a wall thickness that meets the requirements of the 25,0 mm internal diameter sleeving.

Table 2 – Property requirements

Property	IEC 60684-2:2011, clause or subclause	Units	Max. or min.	Requirements	Remarks
Dimensions	3	mm		Table 1	
Bending after heating	13	–	–	There shall be no sign of cracking and the original colour shall be clearly recognizable.	Oven temperature $95\text{ °C} \pm 2\text{ K}$. For nominal internal diameters of 8 mm or less, the mandrel diameters shall be between four and five times the nominal internal diameter of the sleeving. Above 8 mm nominal internal diameter, strips 6 mm wide cut from the sleeving shall be bent around a mandrel $6\text{ mm} \pm 1\text{ mm}$ in diameter.
Bending at low temperature	14	–	–	There shall be no sign of cracking.	Test temperature $-35\text{ °C} \pm 2\text{ K}$ Sleeving shall be tested unfilled and the mandrel diameter shall be between 15 and 20 times the specified maximum wall thickness. For strips cut from sleeving the mandrel diameter shall be between eight and ten times the specified maximum wall thickness.
Elongation at break	19.42 and 19.3	%	Min.	400	Dumbbell specimens shall be cut from sleeving of 8 mm or greater diameter.
Breakdown voltage	21	kV	Min.	Sheet 116: 2,0 Sheet 117: 4,0	The voltage shall be applied at a rate of 500 V/s or such that the required breakdown value is reached between 10 s and 20 s.
Volume resistivity – at room temperature – after damp heat	23 23.4.2 23.4.4	$\Omega\cdot\text{m}$	Min.	5×10^9 4×10^8	
Flame propagation	26 Method A	s	Max.	30	In addition, the indicator flag shall not be burned, nor shall flaming or glowing particles or drops ignite the cotton in any of the three tests.
Silver staining	30	–	–	Any stain shall not be darker than the standard shade.	
Colour fastness	34	–	–	The colour contrast between the exposed parts of the specimens shall be equal to or less than that of the fastness standard.	Light fastness standard 3 shall be used.
Ozone resistance	35	–	–	There shall be no sign of cracking.	The ozone concentration shall be $(1 \pm 0,2)\text{ ml/m}^3$ and the temperature shall be 30 °C to 40 °C . The mandrel shall be twice the nominal diameter of the sleeving. The duration of the exposure shall be $(20 \pm 0,5)\text{ h}$.
Tension test	48	%	Max.	25	The test shall be carried out at a temperature of $23\text{ °C} \pm 2\text{ K}$.
Tear propagation	5049.3 ³	–	–	There shall be no splitting.	Oven temperature $95\text{ °C} \pm 2\text{ K}$. The mandrel diameter shall be $3D$, where D is the nominal bore of the sleeves. Test time: 6 h

³—This subclause refers to the 3rd edition of IEC 60684-2, which is to be published.

Property	IEC 60684-2:2011, clause or subclause	Units	Max. or min.	Requirements	Remarks
					NOTE —Test not applicable to sleeves with less than 2 mm internal diameter.
Circumferential extension	59 ⁴ 58	–	–	There shall be no splitting	Oven temperature 70 °C ± 2 K. The mandrel diameter shall be 3,5D, where D is the nominal bore of the sleeves. NOTE —Test not applicable to sleeves with less than 2 mm internal diameter.
Voltage proof	60 ⁵ 59	kV	Min.	There shall be no breakdown.	Applied test voltage: up to and including 0,5 mm wall shall be 2 kV, over 0,5 mm wall shall be 4 kV.
Thermal shock	61.4.1 ⁶ 60	–	–	The sleeves shall show no signs of cracking, splitting or change of colour. The sleeves shall not slip off the mandrel under their own weight. Any printing shall remain legible.	Oven temperature 95 °C ± 2 K
Resistance to selected fluids	36			Sleeves shall not slip down the mandrel under their own weight and shall not split or become gelatinous or tacky either on removal from the fluid or after conditioning.	Three test pieces shall be fitted to a smooth non-ferrous mandrel, the diameter of which is twice the nominal internal diameter of the sleeve. Use the fluids and test temperatures specified in Table 3. Use the sample length listed in Table 4. Immersion time: (24 ± 1) h Dry time: 2 hours at 70 °C ± 2 K

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⁴—This subclause refers to the 3rd-edition of IEC 60684-2, which is to be published.

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