

INTERNATIONAL STANDARD



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

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IECNORM.COM : Click to view the full PDF of IEC 60049-1:2024 RLV

INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.035.20

ISBN 978-2-8322-8673-9

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	2
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Designation	7
5 Requirements	7
6 Sleeving conformance	7
Bibliography.....	11
Table 1 – Dimensional requirements	8
Table 2 – Property requirements	9
Table 3 – Resistance to selected fluids	11
Table 4 – Sample dimensions for resistance to fluids test	11

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

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.

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

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.

^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	19.12 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

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

⁵—This subclause refers to the 3rd-edition of IEC 60684-2, which is to be published.

⁶—This subclause refers to the 3rd-edition of IEC 60684-2, which is to be published.

Table 3 – Resistance to selected fluids

Fluids	Type	Standard or symbol	Immersion temperature °C ± 2 K
IEC 60068-2-74:1999/AMD1:2018 Fluid (b)	Gasoline (piston engine)	ISO 1817 Test Liquid B	40
IEC 60068-2-74:1999/AMD1:2018 Fluid (h)	Cleaning Fluid	Propan-2-ol CAS 67-63-0	50
IEC 60068-2-74:1999/AMD1:2018 Fluid (l)	De-icing Fluid	Ethylene Glycol CAS 107-21-1 with a volume fraction of 50 % in water	23
IEC 60068-2-74:1999/AMD1:2018 Fluid (c)	Mineral based Hydraulic Fluid	NATO H-520 (ON-18) (or as an alternative NATO H-545)	70
IEC 60068-2-74:1999/AMD1:2018 Fluid (e)	Silicone based Hydraulic Fluid	NATO S-1714 (ZX-42)	80

Table 4 – Sample dimensions for resistance to fluids test

Nominal internal diameter mm	Length of sleeve mm
0,5 to 1,5	4 ± 1
1,6 to 9,0	7 ± 2
10,0 to 25	12 ± 3

Bibliography

IEC 60684-3 (all parts), *Flexible insulating sleeving – Part 3: Specifications for individual types of sleeving*

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Flexible insulating sleeving –

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

Gaines isolantes souples –

**Partie 3: Spécifications pour types particuliers de gaines – Feuilles 116 et 117:
Polychloroprène extrudé, utilisation générale**

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Designation	7
5 Requirements	7
6 Sleeving conformance	7
Bibliography.....	12
Table 1 – Dimensional requirements	8
Table 2 – Property requirements	9
Table 3 – Resistance to selected fluids	10
Table 4 – Sample dimensions for resistance to fluids test	11

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 PLV

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

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.

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024-PL-V

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.

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

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 can possibly be available as custom items. These items 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 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, *Flexible insulating sleeving – Part 1: Definitions and general requirements*

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

IEC 60068-2-74¹:1999, *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 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 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	19.2 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	
Tear propagation	49.3	–	–	There shall be no splitting.	Oven temperature $95\text{ °C} \pm 2\text{ K}$. Test time: 6 h Test not applicable to sleeves with less than 2 mm internal diameter.

Property	IEC 60684-2:2011, clause or subclause	Units	Max. or min.	Requirements	Remarks
Circumferential extension	58	–	–	There shall be no splitting	Oven temperature $70\text{ °C} \pm 2\text{ K}$. The mandrel diameter shall be $3,5D$, where D is the nominal bore of the sleeves. Test not applicable to sleeves with less than 2 mm internal diameter.
Voltage proof	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	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 $95\text{ °C} \pm 2\text{ K}$
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: $(24 \pm 1)\text{ h}$ Dry time: 2 hours at $70\text{ °C} \pm 2\text{ K}$

Table 3 – Resistance to selected fluids

Fluids	Type	Standard or symbol	Immersion temperature $\text{°C} \pm 2\text{ K}$
IEC 60068-2-74:1999/AMD1:2018 Fluid (b)	Gasoline (piston engine)	ISO 1817 Test Liquid B	40
IEC 60068-2-74:1999/AMD1:2018 Fluid (h)	Cleaning Fluid	Propan-2-ol CAS 67-63-0	50
IEC 60068-2-74:1999/AMD1:2018 Fluid (l)	De-icing Fluid	Ethylene Glycol CAS 107-21-1 with a volume fraction of 50 % in water	23
IEC 60068-2-74:1999/AMD1:2018 Fluid (c)	Mineral based Hydraulic Fluid	NATO H-520 (ON-18) (or as an alternative NATO H-515)	70
IEC 60068-2-74:1999/AMD1:2018 Fluid (e)	Silicone based Hydraulic Fluid	NATO S-1714 (ZX-42)	80

Table 4 – Sample dimensions for resistance to fluids test

Nominal internal diameter mm	Length of sleeve mm
0,5 to 1,5	4 ± 1
1,6 to 9,0	7 ± 2
10,0 to 25	12 ± 3

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

Bibliography

IEC 60684-3 (all parts), *Flexible insulating sleeving – Part 3: Specifications for individual types of sleeving*

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

SOMMAIRE

AVANT-PROPOS	15
INTRODUCTION.....	17
1 Domaine d'application	18
2 Références normatives	18
3 Termes et définitions	19
4 Désignation	19
5 Exigences.....	19
6 Conformité des gaines	19
Bibliographie.....	24
Tableau 1 – Exigences dimensionnelles.....	20
Tableau 2 – Exigences relatives aux propriétés	21
Tableau 3 – Résistance aux fluides choisis	23
Tableau 4 – Dimensions de l'échantillon pour l'essai de résistance aux fluides	23

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 PLV

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

GAINES ISOLANTES SOUPLES –

**Partie 3: Spécifications pour types particuliers de gaines –
Feuilles 116 et 117: Polychloroprène extrudé, utilisation générale**

AVANT-PROPOS

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'IEC attire l'attention sur le fait que la mise en application du présent document peut entraîner l'utilisation d'un ou de plusieurs brevets. L'IEC ne prend pas position quant à la preuve, à la validité et à l'applicabilité de tout droit de brevet revendiqué à cet égard. À la date de publication du présent document, l'IEC n'a pas reçu notification qu'un ou plusieurs brevets pouvaient être nécessaires à sa mise en application. Toutefois, il y a lieu d'avertir les responsables de la mise en application du présent document que des informations plus récentes sont susceptibles de figurer dans la base de données de brevets, disponible à l'adresse <https://patents.iec.ch>. L'IEC ne saurait être tenue pour responsable de l'identification de ces droits de propriété en tout ou partie.

L'IEC 60684-3-116 a été établie par le comité d'études 15 de l'IEC: Matériaux isolants électriques solides. Il s'agit d'une Norme internationale.

Cette quatrième édition annule et remplace la troisième édition parue en 2010, dont elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) mise à jour des références aux articles dans le Tableau 2;
- b) ajout de l'essai de résistance aux fluides.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
15/1005/CDV	15/1020/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 60684, publiées sous le titre général *Gaines isolantes souples*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

INTRODUCTION

Le présent document fait partie d'une série de normes qui traitent des gaines isolantes souples à usages électriques.

Cette série est composée de trois parties:

Partie 1: Définitions et exigences générales (IEC 60684-1);

Partie 2: Méthodes d'essai (IEC 60684-2);

Partie 3: Spécifications pour types particuliers de gaines (IEC 60684-3).

Le présent document comprend deux des feuilles qui composent la Partie 3, à savoir:

Feuille 116: Polychloroprène extrudé, utilisation générale: paroi mince;

Feuille 117: Polychloroprène extrudé, utilisation générale: paroi épaisse.

IECNORM.COM : Click to view the full PDF of IEC 60684-3-116:2024 RLV

GAINES ISOLANTES SOUPLES –

Partie 3: Spécifications pour types particuliers de gaines – Feuilles 116 et 117: Polychloroprène extrudé, utilisation générale

1 Domaine d'application

La présente partie de l'IEC 60684 fournit les exigences relatives aux gaines non thermorétractables, extrudées à partir de composés à base d'élastomère polychloroprène. Ces gaines se sont révélées être adaptées à des températures jusqu'à 95 °C.

Les gaines de ce type sont généralement proposées avec des diamètres intérieurs jusqu'à 25 mm et dans les couleurs opaques suivantes: noir, brun, rouge, orange, jaune, vert, bleu, violet, gris, blanc et rose. D'autres dimensions et d'autres couleurs que celles spécifiquement indiquées dans le présent document peuvent être proposées comme articles spéciaux. Ces articles sont considérés comme conformes au présent document s'ils sont conformes aux autres exigences relatives aux propriétés indiquées dans le Tableau 2.

Les matériaux conformes à la présente spécification satisfont à des niveaux établis de performance. Toutefois, l'utilisateur choisit le matériau destiné à une application spécifique en se fondant sur les exigences réelles nécessaires pour assurer des performances adéquates dans le cadre de l'application considérée et non sur la spécification seule.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60684-1, *Gaines isolantes souples – Partie 1: Définitions et exigences générales*

IEC 60684-2:2011, *Gaines isolantes souples – Partie 2: Méthodes d'essai*

IEC 60068-2-74¹:1999, *Essais d'environnement – Partie 2-74: Essais – Essai Xc: Contamination par des fluides*

IEC 60068-2-74:1999/AMD1:2018

IEC 60757:1983, *Code de désignation de couleurs*

ISO 1817, *Caoutchouc vulcanisé ou thermoplastique – Détermination de l'action des liquides*

¹ Il existe une version consolidée 1.1:2018 qui inclut l'IEC 60068-2-74:1999 et son Amendement 1:2018.