

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Flexible insulating sleeving –
Part 3: Specifications for individual types of sleeving – Sheet 248: General
purpose, heat-shrinkable, dual wall polyolefin sleeving, flame retarded, shrink
ratios 2:1, 3:1, 4:1**

[IEC 60684-3-248:2007](#)

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Gaines isolantes souples –

**Partie 3: Spécifications pour types particuliers de gaines – Feuille 248: Gaines à
usage général, thermorétractables, en polyoléfine, à double paroi, retardées à la
flamme, avec des rapports de rétreint de 2:1, 3:1 et 4:1**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FLEXIBLE INSULATING SLEEVING –

**Part 3: Specifications for individual types of sleeving –
Sheet 248: General purpose, heat-shrinkable, dual wall polyolefin
sleeving, flame retarded, shrink ratios 2:1, 3:1, 4:1**

FOREWORD

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International Standard IEC 60684-3-248 has been prepared by IEC technical committee 15: Solid electrical insulating materials.

This bilingual version, published in 2009-06, corresponds to the English version.

The text of this standard is based on the following documents:

FDIS	Report on voting
15/359/FDIS	15/372/RVD

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

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of 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 publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

This international Standard is one of a series 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: Specifications for individual types of sleeving (IEC 60684-3)

This standard comprises one of the sheets of Part 3 as follows:

Sheet 248: General purpose, heat-shrinkable, dual wall polyolefin sleeving, flame retarded, shrink ratios 2:1, 3:1, 4:1

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FLEXIBLE INSULATING SLEEVING –

Part 3: Specifications for individual types of sleeving – Sheet 248: General purpose, heat-shrinkable, dual wall polyolefin sleeving, flame retarded, shrink ratios 2:1, 3:1, 4:1

1 Scope

This part of IEC 60684 gives the requirements for six types of general purpose, heat shrinkable dual wall polyolefin sleeveings, flame retarded with nominal shrink ratios of 2:1, 3:1 or 4:1 and available in low and high temperature adhesive inner walls.

The low temperature adhesive sleeving has been found suitable for temperatures up to 105 °C and the high temperature adhesive sleeving has been found suitable for temperatures up to 125 °C.

- Type AL:
2:1 shrink ratio, internal diameter up to 51 mm, low temperature adhesive inner wall.
- Type AH:
2:1 shrink ratio, internal diameter up to 51 mm, high temperature adhesive inner wall.
- Type BL:
3:1 shrink ratio, internal diameter up to 40 mm, low temperature adhesive inner wall.
- Type BH:
3:1 shrink ratio, internal diameter up to 40 mm, high temperature adhesive inner wall.
- Type CL:
4:1 shrink ratio, internal diameter up to 52 mm, low temperature adhesive inner wall.
- Type CH:
4:1 shrink ratio, internal diameter up to 52 mm, high temperature adhesive inner wall.

The sleeving consists of an outer layer being of a flexible cross-linked polyolefin. The inner wall consists of a hot melt adhesive that flows and fuses during the shrinking process to provide a bond.

These sleeveings are normally supplied in colour black.

Sizes or colours other than those listed in this standard may be available as custom items. These items are considered to comply with this standard if they comply with the property requirements listed in Tables, 5 and 6 and Table 8 where applicable, with the exception of dimensions.

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 be based on the actual requirements necessary for adequate performance in that application and not based on this specification alone.

2 Normative references

The following referenced documents are indispensable for the application 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 60684-2:1997, *Flexible insulating sleeving – Part 2: Methods of test*¹⁾
 Amendment 1 (2003)
 Amendment 2 (2005)

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

ISO 1817:2005, *Rubber, vulcanized – Determination of the effect of liquids*

3 Designation

This sleeving shall be identified by the following designation:

Description	IEC publication number	IEC part number	IEC sheet number	Type	Size (expanded/recovered internal diameter, in millimetres)	Colour	Table 8 Code
	↓	↓	↓	↓	↓	↓	↓
Sleeving	IEC 60684	– 3	– 248	– AL	– 12,7/6,4	– BK	– X

NOTE The addition of “X” at the end of the designation indicates that the properties contained in Table 8 have been agreed upon and are included in the purchase contract.

Any abbreviation of colour shall comply with IEC 60757. Where no abbreviation is given, the colour shall be written in full.

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4 Conditions of test

Unless otherwise specified, the sleeving shall be shrunk in a forced air circulation oven for (5 ± 1) min at $200 \text{ °C} \pm 5 \text{ K}$ prior to testing.

5 Requirements

In addition to the general requirements given in IEC 60684-1, the sleeving shall comply with the requirements in Tables 2, 3, 4 and 5, 6 and 8 where applicable.

6 Sleeving conformance

Conformance to the requirements of this specification shall normally be based on the results obtained for black sleeving of the following sizes:

- Type AL and AH: 12,7 mm / 6,4 mm;
- Type BL and BH: 24 mm / 8 mm;
- Type CL and CH: 32 mm / 8 mm.

The colour fastness to light shall be determined for all colours.

¹⁾ A consolidated edition 2.1 exists, including IEC 60684-2:1997 and its Amendment 1 (2003).

7 Elevated temperature performance test

Three specimens for each size as detailed in Table 1 shall be tested.

(100 ± 2) mm lengths of expanded sleeving shall be cut and recovered, according to the manufacturer’s or supplier’s recommendations, onto the appropriate size of stepped mandrel, as detailed in Figure 1.

After recovery onto the stepped mandrel, the assembly shall be allowed to cool to room temperature and the lengths of sleeving over the masking tape shall be removed.

The assembly shall then been conditioned for (24 ± 0,5) h in an oven at the temperature specified in Table 8.

On removal from the oven the assembly shall be allowed to cool to room temperature and any movement of the sleeving away from the masking tape on the Y diameter shall be measured as specified in Table 8 to an accuracy of ±1 mm.

All measurements shall be recorded and the result is the mean of the three measurements.

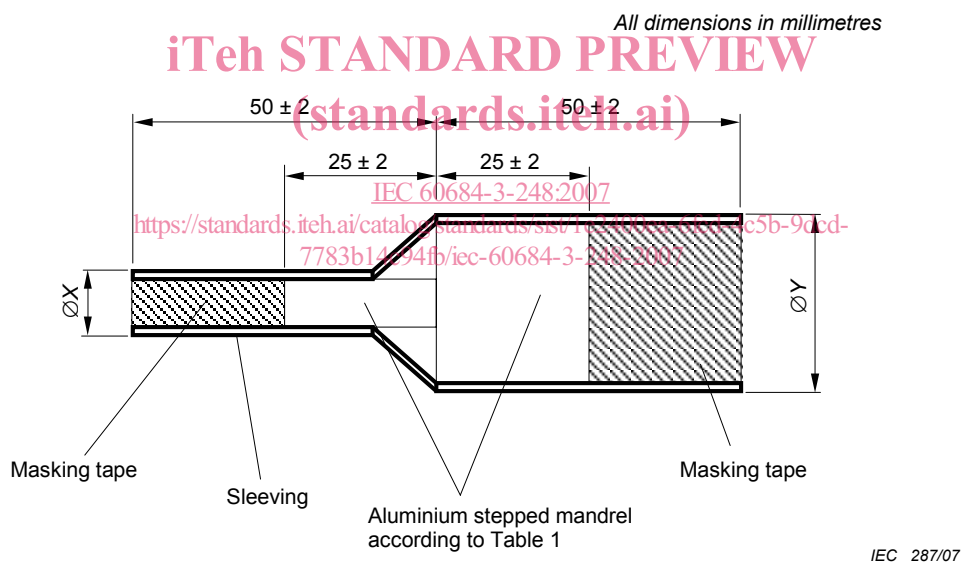


Figure 1 – Test assembly for elevated temperature performance

Table 1 – Size of stepped mandrel for elevated temperature performance test.

Type	Size	Diameters mm	
		X	Y
AL and AH	12,7/6,4	6,4 ± 0,1	10 ± 1
BL and BH	24/8	8,0 ± 0,1	20 ± 1
CL and CH	32/8	8,0 ± 0,1	26 ± 1

Table 2 – Dimensional requirements – Type AL and AH

Size code	Internal diameter		Recovered total wall thickness	Recovered meltable wall thickness
	mm			
	Expanded min.	Recovered max.		Nominal ^a
3,2/1,6	3,2	1,6	0,70 ± 0,10	0,10
4,8/2,4	4,8	2,4	0,70 ± 0,10	0,10
6,4/3,2	6,4	3,2	0,75 ± 0,15	0,13
9,5/4,8	9,5	4,8	0,75 ± 0,15	0,13
12,7/6,4	12,7	6,4	0,80 ± 0,15	0,15
19,0/9,5	19,0	9,5	0,90 ± 0,15	0,15
25,4/12,7	25,4	12,7	1,10 ± 0,20	0,20
38,0/19,0	38,0	19,0	1,20 ± 0,20	0,20
51,0/25,4	51,0	25,4	1,50 ± 0,25	0,40

^a For customer information only.

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In those cases where the inner wall distorts or flows during recovery, it may not be possible to determine the recovered inside diameter accurately. In these cases, the sleeving may be recovered over a mandrel or plug gauge of the specified diameter after recovery for the size being measured.

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Following recovery, the specimen shall be examined for complete contact with the mandrel or plug gauge to establish compliance with the requirements for recovered diameter.

Table 3 – Dimensional requirements – Type BL and BH

Size code	Internal diameter		Recovered total wall thickness	Recovered meltable wall thickness
	mm			
	Expanded min.	Recovered max.		Nominal ^a
3/1	3	1	1,0 ± 0,30	0,5
4,5/1,5	4,5	1,5	1,0 ± 0,30	0,5
6/2	6	2	1,0 ± 0,30	0,6
9/3	9	3	1,4 ± 0,30	0,6
12/4	12	4	1,8 ± 0,40	0,8
19/6	19	6	2,2 ± 0,60	0,8
24/8	24	8	2,5 ± 0,60	1,0
40/13	40	13	2,5 ± 0,60	1,0

^a For customer information only.

In those cases where the inner wall distorts or flows during recovery, it may not be possible to determine the recovered inside diameter accurately. In these cases, the sleeving may be recovered over a mandrel or plug gauge of the specified diameter after recovery for the size being measured.

Following recovery, the specimen shall be examined for complete contact with the mandrel or plug gauge to establish compliance with the requirements for recovered diameter.

Table 4 – Dimensional requirements – Type CL and CH

Size code	Internal diameter		Recovered total wall thickness	Recovered melttable wall thickness
	mm		mm	mm
	Expanded min.	Recovered max.		Nominal ^a
4/1	4	1	1,0 ± 0,30	0,5
8/2	8	2	1,0 ± 0,30	0,5
12/3	12	3	1,4 ± 0,30	0,6
16/4	16	4	1,8 ± 0,40	0,8
24/6	24	6	2,2 ± 0,60	0,8
32/8	32	8	2,5 ± 0,60	1,0
52/13	52	13	2,5 ± 0,60	1,0

^a For customer information only.

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In those cases where the inner wall distorts or flows during recovery, it may not be possible to determine the recovered inside diameter accurately. In these cases, the sleeving may be recovered over a mandrel or plug gauge of the specified diameter after recovery for the size being measured.

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Following recovery, the specimen shall be examined for complete contact with the mandrel or plug gauge to establish compliance with the requirements for recovered diameter.