

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Flexible insulating sleeving –  
Part 3: Specifications for individual types of sleeving – Sheet 247: Heat-  
shrinkable, polyolefin sleeving, dual wall, not flame retarded, thick and medium  
wall**

**Gaines isolantes souples –  
Partie 3: Spécifications pour types particuliers de gaines – Feuille 247: Gaines  
thermorétractables en polyoléfine, à double paroi (épaisse et moyenne), non  
retardées à la flamme**



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IEC Central Office  
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CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
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Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tél.: +41 22 919 02 11  
Fax: +41 22 919 03 00

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FLEXIBLE INSULATING SLEEVING –

**Part 3: Specifications for individual types of sleeving –  
Sheet 247: Heat-shrinkable, polyolefin sleeving, dual wall,  
not flame retarded, thick and medium wall**

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International Standard IEC 60684-3-247 has been prepared by IEC technical committee 15: Solid electrical insulating materials.

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

FDIS	Report on voting
15/625/FDIS	15/637/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.

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

A list of all the parts in the IEC 60684 series, 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 stability 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

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- withdrawn,
- replaced by a revised edition, or
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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 gives one of the sheets comprising part 3 as follows:

Sheet 247: Heat-shrinkable, polyolefin sleeving, dual wall, not flame retarded, thick and medium wall

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## FLEXIBLE INSULATING SLEEVING –

### Part 3: Specifications for individual types of sleeving – Sheet 247: Heat-shrinkable, polyolefin sleeving, dual wall, not flame retarded, thick and medium wall

#### 1 Scope

This part of IEC 60684 gives the requirements for two types of heat-shrinkable, polyolefin sleeving, dual wall, not flame retarded with a nominal shrink ratio of 3:1.

This sleeving has been found suitable for use at temperatures of up to 100 °C.

Type A : Medium wall, internal diameter up to 200,0 mm typically

Type B : Thick wall, internal diameter up to 200,0 mm typically

These sleeveings are normally supplied in colour black.

Since these types of sleeveings cover a significantly large range of sizes and wall thicknesses, Tables A.1 and A.2 provide a guide to the range of sizes available. The actual size shall be agreed between the user and supplier.

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 60296:2003, *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

IEC 60502-1:2004, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m = 1,2$  kV) up to 30 kV ( $U_m = 36$  kV) – Part 1: Cables for rated voltages of 1 kV ( $U_m = 1,2$  kV) and 3 kV ( $U_m = 3,6$  kV)*

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*  
Amendment 2 (2005)

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

ISO 846:1997, *Plastics – Evaluation of the action of micro-organisms*

ISO 868: 2003, *Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)*



ISO 11357-3:1999, *Plastics – Differential scanning calorimetry (DSC) – Part 3: Determination of temperature and enthalpy of melting and crystallization*

ISO 11358:1997, *Plastics – Thermogravimetry (TG) of polymers – General principles*

### 3 Designation

The sleeving shall be identified by the following designation:

Description	IEC publication number	IEC part number	IEC sheet number	Type	Size (expanded and recovered internal diameter in mm)	Colour	Table 4* code
↓ Sleeving	↓ IEC 60684	↓ - 3	↓ - 247	↓ - B	↓ - 85,0/25,0	↓ - BK	↓ X

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

NOTE This information is for package labelling only, in accordance with IEC 60684-1.

\* The addition of "X" at the end of the designation indicates that the properties contained in Table 4 have been agreed upon between the user and supplier.

### 4 Conditions of test

Unless otherwise specified, the sleeving shall be shrunk in a forced air circulation oven for  $(10 \pm 1)$  min at  $200 \text{ }^\circ\text{C} \pm 3 \text{ K}$  prior to testing.

### 5 Requirements

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

### 6 Sleeving conformance

Conformance to the requirements of this specification shall normally be based on the results from typical sizes:

Type A : Recovered ID 25 mm – 30 mm

Type B : Recovered ID 25 mm – 30 mm

**Table 1 – Property requirements**

Property	IEC 60684-2 clause or subclause	Units	Max. or Min.	Requirements	Remarks
Dimensions	3				
Internal diameter	3.1.2	mm		To be agreed between purchaser and supplier	
Wall thickness	3.3.2	mm			
Concentricity expanded	3.3.3	%	Min.		
recovered			Min.	85	
Heat shock	6	-	-		Heat at 200 °C ± 5 K
Tensile strength	19.1 and 19.2	MPa	Min.	10	Jacket only, ignore flowing adhesive
Elongation at break	19.1 and 19.2	%	Min.	200	
Longitudinal change	9	%	Max.	-10 + 5	
Bending at low temperature	14	-	-	No cracking shall be visible	Test at - 40 °C. For strips, the mandrel shall be between 20 and 22 times the wall thickness. Full section sleeving is tested unfilled and the mandrel shall be between 20 and 22 times the outer diameter.
Dimensional stability on storage	16	-	-	The dimensions shall remain as agreed.	See Clause 1 Scope.
Tensile strength	19.1 and 19.2	MPa	Min.	13	Jacket only.
Elongation at break	19.1 and 19.2	%	Min.	350	Use a jaw separation rate of 100 mm/min. Below 6,5mm Ø as sleeving. At 6,5 mm Ø and above as dumbbells.
Secant modulus at 2% elongation	19.4	MPa MPa	Min. Max.	80 160	Calculate cross- section area without adhesive.
Breakdown voltage	21	kV	Min.	Table 2	
Volume resistivity at room temperature after damp heat	23 23.4.2 23.4.4	Ω·m Ω·m	Min. Min.	10 <sup>12</sup> 10 <sup>11</sup>	