IEC 60684-3-283

Edition 1.0 2010-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Flexible insulating sleeving –
Part 3: Specifications for individual types of sleeving – Sheet 283: Heat-shrinkable, polyolefin sleeving for bus-bar insulation

Gaines isolantes souples –
Partie 3: Spécifications pour types particuliers de gaines – Feuille 283: Gaines thermorétractables en polyoléfine pour isolation de barre omnibus

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FLEXIBLE INSULATING SLEEVING –

Part 3: Specifications for individual types of sleeving – Sheet 283: Heat-shrinkable, polyolefin sleeving for bus-bar insulation

FOREWORD

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International Standard IEC 60684-3-283 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
15/597/FDIS	15/605/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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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:

Sheet 283: Heat-shrinkable, polyolefin sleeving for bus-bar insulation.

FLEXIBLE INSULATING SLEEVING –

Part 3: Specifications for individual types of sleeving – Sheet 283: Heat-shrinkable, polyolefin sleeving for bus-bar insulation

1 Scope

This part of IEC 60684 gives the requirements for two types of heat-shrinkable, polyolefin sleeving for bus-bar insulation, with a nominal shrink ratio of 2,5:1.

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

– Type A : Medium wall Internal diameter up to 170,0 mm typically
– Type B : Thick wall Internal diameter up to 165,0 mm typically

These sleevings are normally supplied in colour, red or brown.

Since these types of sleevings cover a significantly large range of sizes and wall thicknesses, Tables A.1 and A.2 provide guidance to the range of sizes available. The actual size and wall thickness shall be agreed between the user and supplier depending on the electric strength of the installed tubing offered and the requirements of the user.

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 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 1 (2003)
Amendment 2 (2005)

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

ISO 846:1997, *Plastics – Evaluation of the action of microorganisms*

ISO 4892-3:2006, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps*

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 millimetres)	Colour	Table 4 [a] code
↓	↓	↓	↓	↓	↓	↓	↓
Sleeving	IEC 60684	- 3	-283	A	- 75,0/30,0	-Red	X

[a] 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 the supplier.

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

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

4 Conditions of test

Unless otherwise specified, the sleeving shall be shrunk in a forced air circulation oven for (10 ± 1) min at 200 °C ± 3 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 - 40 mm

Table 1 – Property requirements

Property	IEC 60684-2 clause or subclause	Units	Max. or min.	Requirements	Remarks
Dimensions – Internal diameter – Wall thickness – Concentricity – expanded – recovered	3 3.1.2 3.3.2 3.3.3	 mm mm %	 Min. Min.	To be agreed between the purchaser and the supplier 60 85	
Heat shock Tensile strength Elongation at break	6 19.1 and 19.2 19.1 and 19.2	 MPa %	 Min. Min.	 5 200	Heat at 150 °C ± 5 K
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 Scope.
Tensile strength Elongation at break	19.1 and 19.2 19.1 and 19.2	MPa %	Min. Min.	8 400	Use a jaw separation rate of 100 mm/min.
Secant modulus at 2 % elongation	19.4	MPa	Max.	160	
Dielectric strength	21	kV/mm	Min.	See Table 2.	
Volume resistivity at room temperature	23 23.4.2	Ω·m	Min.	10^{11}	
Flame propagation	26 Method C	s mm	Max. Max.	60 100	Burning includes flaming and glowing
Corrosion resistance Elongation	32 19.1 and 19.2	%	Min.	No chemical interaction	Heat at 150 °C ± 3 K
Resistance to selected fluids Tensile strength Elongation at break	36 19.1 and 19.2 19.1 and 19.2	MPa %	Min. Min.	5 200	Use the fluids and test temperatures specified in Table 3. Immersion (24 ± 1)h
Heat ageing Tensile strength Elongation at break	39 19.1 and 19.2 19.1 and 19.2	MPa %	Min. Min.	5 200	Heat at 150 °C ± 3 K
Long term ageing Elongation at break	50 19.2	%	Min.	150	The ageing temperature shall be 100 °C ± 3 K.

Table 2 – Requirements for dielectric strength

Expanded wall thickness mm	Dielectric strength [a] Min.	
All dimensions	Expanded ID Types A+B All sizes	Dielectric strength kV/mm 12
[a] Measure the expanded wall thickness and calculate the electric strength by dividing the breakdown voltage by this value.		
NOTE Care should be taken on selection of sizes based on these values. Refer to the manufacturer for actual values on installed conditions.		

The breakdown voltage shall be determined by the method described in 21 of IEC 60684-2. All values shall comply with the minimum value in this table.

The sleeving shall be tested in the expanded condition.

The rate of application of the voltage shall be 500 V/s.

Table 3 – Resistance to selected fluids

Test fluid No.	Fluids	Type	Standard or symbol	Immersion temperature °C ± 2 K
1	Insulating oil	Mineral based	IEC 60296	23
2	Cleaning fluid	Solvent	Isopropyl alcohol	23
3	-	Water	De-ionized	85

Other fluids and/or temperatures may be specified for customers with specific needs. These additional fluids and/or temperatures shall be applicable when incorporated into agreements between the supplier and the customer.