

FINAL VERSION

VERSION FINALE

**Plastic films for electrical purposes –
Part 3: Specifications for individual materials – Sheet 8: Balanced biaxially
oriented polyethylene naphthalate (PEN) films used for electrical insulation**

**Films plastiques à usages électriques –
Partie 3: Spécifications pour matériaux particuliers – Feuille 8: Films de
polynaphtalate d'éthylène (PEN), à orientation bi-axiale équilibrée, utilisés dans
l'isolation électrique**



CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Classification.....	6
4 Designation	6
5 General requirements.....	7
6 Dimensions	7
6.1 Thickness.....	7
6.2 Width	7
7 Properties.....	8
7.1 Properties not dependent on thickness.....	8
7.2 Properties dependent on thickness.....	9
7.3 Other properties	10
7.3.1 Thermal endurance.....	10
7.3.2 Burning characteristics	11
8 Roll characteristics for all types.....	11
8.1 Roll diameter/film length.....	11
8.2 Windability/sag.....	11
8.2.1 General	11
8.2.2 For films of width less than 150 mm.....	11
8.2.3 For films of width 150 mm and above	11
8.3 Joins	11
8.4 Roll width	12
8.5 Cores	12
Table 1 – Properties not dependent on thickness.....	8
Table 2 – Properties dependent on thickness.....	9
Table 3 – Electric strength (a.c. test) for all types	10
Table 4 – Electric strength (d.c. test) type 2 only	10
Table 5 – Windability	11
Table 6 – Maximum permissible number of joins or breaks per roll.....	12
Table 7 – Film width.....	12

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PLASTIC FILMS FOR ELECTRICAL PURPOSES –

Part 3: Specifications for individual materials – Sheet 8: Balanced biaxially oriented polyethylene naphthalate (PEN) films used for electrical insulation

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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 60674-3-8 bears the edition number 1.1. It consists of the first edition (2011-07) [documents 15/631/FDIS and 15/643/RVD] and its amendment 1 (2016-11) [documents 15/738/CDV and 15/761/RVC]. The technical content is identical to the base edition and its amendment.

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60674-3-8 has been prepared by IEC technical committee 15: Solid electrical insulating materials.

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

A list of all the parts in the IEC 60674 series, under the general title *Plastic films for electrical purposes*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment 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 plastic films for electrical purposes.

The series consists of three parts:

Part 1: Definitions and general requirements (IEC 60674-1).

Part 2: Methods of test (IEC 60674-2).

Part 3: Specifications for individual materials (IEC 60674-3).

This standard contains one of the sheets comprising part 3, as follows:

Sheet 8: Balanced biaxially oriented polyethylene naphthalate (PEN) films used for electrical insulation.

PLASTIC FILMS FOR ELECTRICAL PURPOSES –

Part 3: Specifications for individual materials – Sheet 8: Balanced biaxially oriented polyethylene naphthalate (PEN) films used for electrical insulation

1 Scope

This International Standard gives the requirements for balanced biaxially oriented polyethylene naphthalate (PEN) films for use as electrical insulation.

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.

Safety warning: it is the responsibility of the user of the methods contained or referred to in this document to ensure that they are used in a safe manner.

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 60674-1:1980, *Specification for plastic films for electrical purposes – Part 1: Definitions and general requirements*

IEC 60674-2:1988, *Specification for plastic films for electrical purposes – Part 2: Methods of test*

IEC60068-2-66:1994, *Environmental testing – Part 2: Test methods – Test Cx: Damp heat, steady state (unsaturated pressurized vapour)*

IEC 60216-5:2008, *Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative thermal endurance index (RTE) of an insulating material*

ISO11357-3:1999, *Plastics – Differential scanning calorimetry (DSC) – Part 3: Determination of temperature and enthalpy of melting and crystallization*

3 Classification

The PEN film shall be of the following types:

- Type 1a: General purpose, high hydrolytic stability grade.
- Type 1b: General purpose, standard grade.
- Type 2: Capacitor grade.

4 Designation

The plastic film shall be identified by the following designation: