

INTERNATIONAL STANDARD

REDLINE VERSION

**Plastic films for electrical purposes -
Part 3: Specifications for individual materials - Sheet 1: Biaxially oriented
polypropylene (PP) films for capacitors**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Plastic films for electrical purposes -
Part 3: Specifications for individual materials - Sheet 1: Biaxially oriented
polypropylene (PP) films for capacitors**

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60674-3-1:2021. 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 60674-3-1 has been prepared by IEC technical committee 15: Solid electrical insulating materials. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) this document has been completely revised editorially and technically;
- b) the ranges of film thickness have been expanded;
- c) the requirements of characteristics with the films of expanded thickness have been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
15/1097/FDIS	15/1106/RVD

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 http://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at <http://www.iec.ch/standardsdev/publications>.

A list of all parts in the IEC 60674 series, published under the general title *Plastic films for electrical purposes*, 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 <http://webstore.iec.ch> in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

This document is one of a series which deals with plastic films for electrical purposes. The series will consist of three parts:

Part 1: Definitions and general requirements ([IEC 60674-1 \[1\]](#));

Part 2: Methods of test ([IEC 60674-2 \[2\]](#));

Part 3: Specifications for individual materials ([IEC 60674-3 \(all sheets\) \[3\]](#)).

This document contains one of the sheets comprising Part 3, as follows:

Sheet 1: Biaxially oriented (PP) polypropylene films for capacitors.

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1 Scope

This sheet of IEC 60674-3 (all sheets) [3] gives the requirements for biaxially oriented polypropylene film having a smooth or rough surface, corona treated when required for vacuum metallization. The films are for use as dielectric in capacitors.

Materials which conform to this specification meet established levels of performance. However, the selection of a material by a user for a specific application is 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 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 60674-1:1980, *Specification for plastic films for electrical purposes. Part 1: Definitions and general requirements*

IEC 60674-2:2016, *Specification for plastic films for electrical purposes - Part 2: Methods of test*

IEC 60674-1, *Specification for plastic film for electrical purposes - Part 1: Definitions and general requirements*

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

3 Terms and definitions

No terms and definitions are listed 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 Classification

The polypropylene film shall be of the following types:

Type 1: having smooth surfaces (space factor < 5 %, see 8.9);

Type 1a: not corona treated;

Type 1b: one side pre-treated to facilitate the vacuum deposition of metal;

Type 1c: both sides pre-treated.

Type 2: having at least one rough surface (space factor $\geq 5\%$, see 8.9);

Type 2a: not corona treated;

Type 2b: one side pre-treated to facilitate the vacuum deposition of metal;

Type 2c: both sides pre-treated.

Type 3: having high electric strength for thin film (film thickness $\leq 3,5\ \mu\text{m}$);

Type 3a: not corona treated;

Type 3b: one side pre-treated to facilitate the vacuum deposition of metal;

Type 3c: both sides pre-treated.

5 Designation

The plastic film shall be identified by the following designation:

Designation of the film – IEC 60674-3-1 – PP – type – thickness in micrometres – width in millimetres – length in metres.

EXAMPLE Polypropylene film – IEC 60674-3-1 – PP – 1a – 6 – 100 – 3000.

6 General requirements

The materials shall be made essentially from isotactic type polypropylene homopolymer and shall conform to the requirements laid down in IEC 60674-1.

7 Dimensions

7.1 Thickness

The film thickness shall be measured in accordance with the requirements of 4.3.2 of IEC 60674-2:2016. This is in general the gravimetric thickness, but for type 2 distinction shall be made between thickness determined by weighing (t_g = gravimetric thickness) and thickness measured by micrometer method (t_b = bulking thickness).

Gravimetric thickness shall be measured in accordance with the requirements of 4.3.2 of IEC 60674-2:2016.

Bulking (micrometric) thickness shall be measured according to 4.2.3 of IEC 60674-2:2016.

There are no requirements for thickness in this document, but preferred gravimetric thicknesses are as follows:

- Type 1: 4,0 μm ; 5,0 μm ; 6,0 μm ; 7,0 μm ; 8,0 μm ; 10,0 μm ; 12,0 μm ; 15,0 μm ; 18,0 μm ; 20,0 μm and 25,0 μm .
- Type 2: 7,4 μm ; 9,0 μm ; 10,1; 11,0 μm ; 12,0 μm ; 12,7 μm ; 13,6 μm ; 14,4 μm ; 15,2 μm ; 16,2 μm ; 17,8 μm ; 20 μm ; 22,7 μm and 27,3 μm .
- Type 3: 2,0 μm ; 2,3 μm ; 2,5 μm ; 2,8 μm ; 3,0 μm and 3,5 μm .

The thickness tolerance shall comply with the requirements of 4.1 of IEC 60674-1:1980 unless otherwise specified.

7.2 Width

The film width shall be measured in accordance with the requirements of ~~Clause 6 of~~ IEC 60674-2:2016.

Preferred widths cannot be given on account of the great variety of applications and different requirements throughout the capacitor industry.

The tolerance on the width up to 750 mm shall comply with the requirements of 4.2 of IEC 60674-1:1980 . For the width over 750 mm, the tolerance shall be $\pm 4,0$ mm.

7.3 Length/diameter

There are no requirements in this document for length or diameters of rolls. These should be subject to purchase contract.

8 Properties

8.1 Physical properties

~~See Table 1.~~

Physical properties shall satisfy the requirements in Table 1.

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