

INTERNATIONAL STANDARD

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**Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes –
Part 3-5: Specifications for individual materials – Requirements for rigid laminated sheets based on polyester resins**

Matériaux isolants – Stratifiés industriels rigides en planches à base de résines thermodurcissables à usages électriques – 2003

Partie 3-5: Spécifications pour matériaux particuliers – Prescriptions pour stratifiés rigides en planches à base de résine polyester



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATING MATERIALS –
INDUSTRIAL RIGID LAMINATED SHEETS
BASED ON THERMOSETTING RESINS FOR ELECTRICAL PURPOSES –****Part 3-5: Specifications for individual materials –
Requirements for rigid laminated sheets based on polyester resins**

FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60893-3-5 edition 2.1 contains the second edition (2003) [documents 15C/1525/FDIS and 15C/1539/RVD] and its amendment 1 (2009) [documents 15/491/CDV and 15/531/RVC].

A vertical line in the margin shows where the base publication has been modified by amendment 1.

International standard IEC 60893-3-5 has been prepared by subcommittee 15C: Specifications, of IEC technical committee 15: Insulating materials.

In this revision of the IEC 60893 series of specifications, new material types have been included, changes have been made to the property requirements of some existing types, a new method for testing permittivity and dissipation factor has been added, and all non-specification data for each type has been moved to a new Part 4 document – IEC 60893-4: Typical values.

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

The committee has decided that the contents of the base publication and its amendments 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

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- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

This part of IEC 60893 is one of a series, which deals with industrial rigid laminated sheets based on thermosetting resins for electrical purposes.

This series consists of four parts:

Part 1: Definitions, designations and general requirements (IEC 60893-1)

Part 2: Methods of test (IEC 60893-2)

Part 3: Specifications for individual materials (IEC 60893-3)

Part 4: Typical values (IEC 60893-4)

IEC 60893-3-5 contains one of the specification sheets comprising Part 3, as follows:

Sheet 5: Requirements for rigid laminated sheets based on polyester resins

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INSULATING MATERIALS – INDUSTRIAL RIGID LAMINATED SHEETS BASED ON THERMOSETTING RESINS FOR ELECTRICAL PURPOSES –

Part 3-5: Specifications for individual materials – Requirements for rigid laminated sheets based on polyester resins

1 Scope

This part of IEC 60893 gives the requirements for industrial rigid laminated sheets for electrical purposes based on polyester resins and different reinforcements.

Applications and distinguishing properties are given in Table 1.

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 60893-1, *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 1: Definitions, designations and general requirements*¹

IEC 60893-2:2003, *Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 2: Methods of test*

IEC 60587, *Test methods for evaluating resistance to tracking and erosion of electrical insulating materials used under severe ambient conditions*

3 Designation

The sheets covered by this specification are classified into types which differ in reinforcement employed and in their distinguishing properties. The sheets are designated by

- the IEC standard number;
- a two-letter abbreviation denoting the resin;
- a second two-letter abbreviation, denoting the reinforcement;
- a serial number;
- nominal thickness x width x length in mm.

¹ To be published.

Example of designation: Industrial rigid laminated sheet of type UP GM 201 with a nominal thickness of 10 mm, 500 mm wide, 1 000 mm long.

Sheet IEC 60893-3-5 – UP GM 201 – 10 x 500 x 1 000.

The following abbreviations are used in this Part 3 sheet:

<i>Type of resin</i>		<i>Type of reinforcement</i>	
UP	Unsaturated polyester	GM	Glass mat

4 Requirements

In addition to the general requirements given in IEC 60893-1, the laminated sheets shall also comply with the dimensional requirements given in Tables 2, 3 and 4 and with the other requirements given in Tables 5, 6 and 7.

Table 1 – Types of industrial rigid laminated sheets based on unsaturated polyester resins

Laminate type			Applications and distinguishing characteristics ^a
Resin	Reinforcement	Serial number	
UP	GM	201	Mechanical and electrical applications. Good stability of electrical properties under high humidity. Good mechanical properties at moderate temperature
		202	Mechanical and electrical applications. Similar to type UP GM 201. Low flammability
		203	Mechanical and electrical applications. Similar to type UP GM 202, but with improved resistance to arcing and tracking
		204	Mechanical and electrical applications. Very good mechanical properties at ambient temperature. Good mechanical properties at elevated temperature
		205	Mechanical and electrical applications. Similar to type UP GM 204. Low flammability

^a It should not be inferred from the contents of Table 1 that laminates of any particular type are necessarily unsuitable for applications other than those listed for them, or that specific laminates will be suitable for all applications within the wide description given.

Table 2 – Tolerances on thickness
(Test method: see 4.1 of IEC 60893-2)

Where the nominal thickness is not one of the preferred thicknesses listed, then the tolerance for the next highest preferred nominal thickness shall apply.

Nominal thickness mm	Tolerance (all types) ±mm
0,8	0,23
1,0	0,23
1,2	0,23
1,5	0,25
2,0	0,25
2,5	0,30
3,0	0,35
4,0	0,40
5,0	0,55
6,0	0,60
8,0	0,70
10,0	0,80
12,0	0,90
14,0	1,00
16,0	1,10
20,0	1,30
25,0	1,40
30,0	1,45
35,0	1,50
40,0	1,55
45,0	1,65
50,0	1,75
60,0	1,90
70,0	2,00
80,0	2,20
90,0	2,35
100,0	2,50

NOTE Other tolerances may be agreed between the supplier and the purchaser.

Table 3 – Flatness

(Test method: see 4.2 of IEC 60893-2)

Thickness <i>d</i> mm	Length of straight edge mm	
	1 000	500
$3 < d \leq 6$	10	2,5
$6 < d \leq 8$	8	2,0
$8 < d$	6	1,5