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**Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes –
Part 3-6: Specifications for individual materials – Requirements for rigid laminated sheets based on silicone resins**

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

Partie 3-6: Spécifications pour matériaux particuliers – Prescriptions pour stratifiés rigides en planches à base de résine silicone



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 3-6: Specifications for individual materials – Requirements for rigid laminated sheets based on silicone resins

FOREWORD

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

IEC 60893-3-6 edition 2.2 contains the second edition (2003-11) [documents 15C/1526/FDIS and 15C/1540/RVD], its amendment 1 (2009-09) [documents 15/492/CDV and 15/532/RVC] and its amendment 2 (2017-09) [documents 15/786/CDV and 15/802/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International standard IEC 60893-3-6 has been prepared by subcommittee 15C: Specifications, of IEC technical committee 15: Insulating materials.

This second edition constitutes a technical revision.

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 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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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 60893-3-6 contains one of the specification sheets comprising Part 3, as follows:

Sheet 6: Requirements for rigid laminated sheets based on silicone resins

INTRODUCTION to the Amendment 1

This amendment introduces revised limits for CHARPY and IZOD impact strengths for the requirements of all types of rigid laminated sheets based on silicone resins. These revised limits are based on the results of round-robin testing.

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1 Scope

This part of IEC 60893 gives the requirements for industrial rigid laminated sheets for electrical purposes based on silicone 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, *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*

3 Designation

The sheets covered by this specification are classified into types, which differ in the 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.

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

Sheet IEC 60893-3-6 – SI GC 201 – 10 x 500 x 1 000

¹ To be published.

The following abbreviations are used in this Part 3 sheet:

<i>Type of resin</i>		<i>Type of reinforcement</i>	
SI	Silicone	GC	Woven glass cloth

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 silicone resins

Laminate type			Applications and distinguishing characteristics ^a
Resin	Reinforcement	Serial number	
SI	GC	201	Electrical and electronic applications. Extremely good electrical properties under dry conditions. Good electrical properties under humid conditions.
		202	Mechanical and electrical applications at elevated temperature. Good heat resistance.

^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.

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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
0,4	0,10
0,5	0,12
0,6	0,13
0,8	0,16
1,0	0,18
1,2	0,21
1,5	0,24
2,0	0,28
2,5	0,33
3,0	0,37
4,0	0,45
5,0	0,52
6,0	0,60
8,0	0,72
10,0	0,82
12,0	0,94
14,0	1,02
16,0	1,12
20,0	1,30
25,0	1,50
30,0	1,70
35,0	1,95
40,0	2,10
45,0	2,30
50,0	2,45

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
$3 < d \leq 6$	15	4,0
$6 < d \leq 8$	12	3,0
$8 < d$	10	2,5

**Table 4 – Tolerances for width of cut strips
(minus tolerances only)**

Nominal thickness <i>d</i> mm	Nominal width, all types mm					
	$3 < b \leq 50$	$50 < b \leq 100$	$100 < b \leq 160$	$160 < b \leq 300$	$300 < b \leq 500$	$500 < b \leq 600$
0,4	0,5	0,5	0,5	0,6	1,0	1,5
0,5	0,5	0,5	0,5	0,6	1,0	1,5
0,6	0,5	0,5	0,5	0,6	1,0	1,5
0,8	0,5	0,5	0,5	0,6	1,0	1,0
1,0	0,5	0,5	0,5	0,6	1,0	1,0
1,2	0,5	0,5	0,5	1,0	1,2	1,2
1,5	0,5	0,5	0,5	1,0	1,2	1,2
2,0	0,5	0,5	0,5	1,0	1,2	1,5
2,5	0,5	1,0	1,0	1,5	2,0	2,5
3,0	0,5	1,0	1,0	1,5	2,0	2,5
4,0	0,5	2,0	2,0	3,0	4,0	5,0
5,0	0,5	2,0	2,0	3,0	4,0	5,0

NOTE Unilateral, all-negative tolerances are normally applied to the width of cut strips, and are given in the above table. Other tolerances may be agreed upon between purchaser and supplier.

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Table 5 – Property requirements

Property	Test method in IEC 60893-2 Subclause	Unit	Minimum or Maximum	Nominal thickness of sheet to which test is applicable mm	Type		Remarks
					SI GC 201	SI GC 202	
Flexural strength	5.1	MPa	Minimum	≥1,5	90	120	
Charpy impact strength or Izod impact strength parallel to laminations	5.4.2 or 5.4.3	kJ/m ²	Minimum	≥5	20 35	25 35	Conformance with the requirements for either the Charpy or Izod test constitutes, in this respect, conformance with the this specification.
			Minimum	≥5	24	26	
Electric strength at 90 °C in oil perpendicular to laminations	6.1	kV/mm	Minimum	≤3	See Table 6		
Breakdown voltage at 90 °C in oil parallel to laminations	6.1	kV	Minimum	>3	30	25	
Permittivity at 48 Hz – 62 Hz	6.2		Maximum	≤3	4,5	6,0 -	Conformance with the requirements for either test constitutes, in this respect, conformance with the specification.
Permittivity at 1 MHz	6.2		Maximum	≤3	4,5	6,0 -	
Dissipation factor at 48 Hz-62 Hz	6.2		Maximum	≤3	0,02	0,07 -	Conformance with the requirements for either test constitutes, in this respect, conformance with the specification.
Dissipation factor at 1 MHz	6.2		Maximum	≤3	0,02	0,07 -	
Insulation resistance after immersion in water	6.3	MΩ	Minimum	All	1×10 ⁴	1×10 ³	