

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 3-7: Specifications for individual materials – Requirements for rigid laminated sheets based on polyimide resins

[IEC 60893-3-7:2003+AMD1:2009 CSV](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-1e60893-3-7/2003+AMD1:2009 CSV)

[https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-1e60893-3-7/2003+AMD1:2009 CSV)

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

Partie 3-7: Spécifications pour matériaux particuliers – Prescriptions pour stratifiés rigides en planches à base de résine polyimide



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes –
Part 3-7: Specifications for individual materials – Requirements for rigid laminated sheets based on polyimide resins**

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-11e5561b2370/iec-60893-3-7-2009-11-2009>

**Matériaux isolants – Stratifiés industriels rigides en planches à base de résines thermodurcissables à usages électriques –
Partie 3-7: Spécifications pour matériaux particuliers – Prescriptions pour stratifiés rigides en planches à base de résine polyimide**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
INTRODUCTION (to amendment 1).....	5
1 Scope.....	6
2 Normative references.....	6
3 Designation	6
4 Requirements	7
Bibliography.....	12
Table 1 – Type of industrial rigid laminated sheets based on polyimide resins.....	7
Table 2 – Tolerances on thickness (Test method: see 4.1 of IEC 60893-2)	8
Table 3 – Flatness (Test method: see 4.2 of IEC 60893-2).....	8
Table 4 – Tolerances on width of cut strips (minus tolerances only)	9
Table 5 – Property requirements	10
Table 6 – Electric strength at 90 °C in oil, perpendicular to laminations (1 min proof test or 20 s step-by-step test) (kV/mm).....	11

[IEC 60893-3-7:2003+AMD1:2009 CSV](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv)
<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATING MATERIALS –
INDUSTRIAL RIGID LAMINATED SHEETS
BASED ON THERMOSETTING RESINS FOR ELECTRICAL PURPOSES –****Part 3-7: Specifications for individual materials –
Requirements for rigid laminated sheets based on polyimide resins**

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.

International Standard IEC 60893-3-7 has been prepared by subcommittee 15C: Specifications, of IEC technical committee 15: Insulating materials.

This consolidated version of IEC 60893-3-7 consists of the second edition (2003) [documents 15C/1527/FDIS and 15C/1541/RVD] and its amendment 1 (2009) [documents 15/493/CDV and 15/533/RVC].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

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

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

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC 60893-3-7:2003+AMD1:2009 CSV](#)

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>

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 60893-3-7 contains one of the specification sheets comprising Part 3, as follows:

Sheet 7: Requirements for rigid laminated sheets based on polyimide resins

INTRODUCTION (to amendment 1)

iTeh STANDARD PREVIEW

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

[IEC 60893-3-7:2003+AMD1:2009 CSV](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv)

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>

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

Part 3-7: Specifications for individual materials – Requirements for rigid laminated sheets based on polyimide resins

1 Scope

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

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 PI GC 301 with a nominal thickness of 10 mm, 500 mm wide, 1 000 mm long.

Sheet IEC 60893-3-7 – PI GC 301 – 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>
PI Polyimide	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 – Type of industrial rigid laminated sheets based on polyimide resins

Type designation	Applications and distinguishing characteristics ^a
PI GC 301	Electrical and mechanical applications. Very good mechanical and electrical properties at high temperature
^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.	

(standards.iteh.ai)

[IEC 60893-3-7:2003+AMD1:2009 CSV](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv)

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>

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 ±mm
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

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

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>

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

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

Nominal thickness d mm	Nominal width, all types mm					
	$3 < b \leq 50$	$50 < b \leq 100$	$100 < b \leq 160$	$160 < b \leq 300$	$300 < b \leq 500$	$500 < b \leq 600$
0,8	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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 60893-3-7:2003+AMD1:2009 CSV](https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv)

<https://standards.iteh.ai/catalog/standards/sist/5392e4c2-1836-4a1b-925e-2ec459e9660b/iec-60893-3-7-2003amd1-2009-csv>