
Specification for industrial rigid laminated sheets based on thermosetting resins for electrical purposes - Part 3: Specifications for individual materials - Sheet 2: Requirements for rigid laminated sheets based on epoxide resins - Amendment A1 (IEC 60893-3-2:1993/A1:1998)

Specification for industrial rigid laminated sheets based on thermosetting resins for electrical purposes -- Part 3: Specifications for individual materials -- Sheet 2: Requirements for rigid laminated sheets based on epoxide resins

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Bestimmung für Tafeln aus technischen Schichtpressstoffen auf der Basis wärmehärtbarer Harze für elektrotechnische Zwecke -- Teil 3: Bestimmungen für einzelne Werkstoffe -- Blatt 2: Anforderungen für Schichtpressstofftafeltypen auf der Basis von Epoxidharz

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Spécification pour les stratifiés industriels rigides en planches à base de résines thermodurcissables à usages électriques -- Partie 3: Spécifications pour matériaux particuliers -- Feuille 2: Prescriptions pour les stratifiés rigides en planches à base de résine époxyde

Ta slovenski standard je istoveten z: EN 60893-3-2:1995/A1:1999

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60893-3-2/A1

October 1999

ICS 29.035.20

English version

**Specification for industrial rigid laminated sheets based on
thermosetting resins for electrical purposes
Part 3: Specifications for individual materials
Sheet 2: Requirements for rigid laminated sheets based on epoxide resins
(IEC 60893-3-2:1993/A1:1998)**

Spécification pour les stratifiés
industriels rigides en planches à base
de résines thermodurcissables à usages
électriques

Partie 3: Spécifications pour matériaux
particuliers

Feuille 2: Prescriptions pour les stratifiés
rigides en planches à base de résine
époxyde

(CEI 60893-3-2:1993/A1:1998)

Bestimmung für Tafeln aus technischen
Schichtpreßstoffen auf der Basis
wärmehärtbarer Harze für
elektrotechnische Zwecke

Teil 3: Bestimmungen für einzelne
Werkstoffe

Blatt 2: Anforderungen für
Schichtpreßstoffafeltypen auf der
Basis von Epoxidharz

(IEC 60893-3-2:1993/A1:1998)

This amendment A1 modifies the European Standard EN 60893-3-2:1995; it was approved by CENELEC on 1999-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 15C/861/FDIS, future amendment 1 to IEC 60893-3-2, prepared by SC 15C, Specifications, of IEC TC 15, Insulating materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60893-3-2:1995 on 1999-10-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-07-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2002-10-01

Endorsement notice

The text of amendment 1:1998 to the International Standard IEC 60893-3-2:1993 was approved by CENELEC as an amendment to the European Standard without any modification.

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NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

60893-3-2

1993

AMENDEMENT 1
AMENDMENT 1

1998-04

Amendement 1

**Spécification pour les stratifiés industriels rigides
en planches à base de résines thermodurcissables
à usages électriques –**

Partie 3:

**Spécifications pour matériaux particuliers –
Feuille 2: Prescriptions pour les stratifiés rigides
en planches à base de résine époxyde**

[SIST EN 60893-3-2:1998/A1:2002](https://standards.itec.ai/catalog/standards/sist/03ba3c91-73bb-44f8-afac-5510c66b8340/sist-en-60893-3-2-1998-a1-2002)

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Amendment 1

**Specification for industrial rigid laminated sheets
based on thermosetting resins
for electrical purposes –**

Part 3:

**Specifications for individual materials –
Sheet 2 : Requirements for rigid laminated sheets
based on epoxyde resin**

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International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembé Geneva, Switzerland
e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



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CODE PRIX
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*Pour prix, voir catalogue en vigueur
For price, see current catalogue*

FOREWORD

This amendment has been prepared by subcommittee 15C: Specifications, of IEC technical committee 15: Insulating materials.

The text of this amendment is based on the following documents:

FDIS	Report on voting
15C/861/FDIS	15C/951/RVD

Full information on the voting for the approval of this amendment can be found in the report indicated in the above table.

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

Below type designation EP GC 205 add the following:

EP GC 306	Similar to type EP GC 203, but with improved tracking indices
EP GC 307	Similar to type EP GC 205, but with improved tracking indices
EP GC 308	Similar to type EP GC 203, but with improved thermal endurance properties
EP CC 301	Mechanical and electrical applications. Fine weave, with good resistance to tracking, wear and chemicals

Below type designation EP GM 204 add the following:

EP GM 305	Similar to type EP GM 203, but with improved thermal endurance properties
EP GM 306	Similar to type EP GM 305, but with improved tracking indices
EP PC 301	Electrical and mechanical applications (Coarse weave). Good resistance to SF ₆

Add, in the list of abbreviations below table 1, CC = cotton cloth.

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Table 2 – Tolerances on thickness (\pm mm)

In the heading of the third column, add 306, 308.

In the heading of the fourth column, add 307.

In the heading of the fifth column, add 305, 306.

Add the following additional column, EP CC 301 (for tolerances) after EP PC 301:

Nominal thickness mm	EP CC 301	Nominal thickness mm	EP CC 301	Nominal thickness mm	EP CC 301
0,4	–	4,0	0,34	30,0	1,22
0,5	–	5,0	0,39	35,0	1,34
0,6	–	6,0	0,44	40,0	1,47
0,8	0,16	8,0	0,52	45,0	1,60
1,0	0,18	10,0	0,60	50,0	1,74
1,2	0,19	12,0	0,68	60,0	2,02
1,6	0,22	14,0	0,74	70,0	2,32
2,0	0,24	16,0	0,80	80,0	2,62
2,5	0,27	20,0	0,93	90,0	2,92
3,0	0,30	25,0	1,08	100,0	3,22

Delete "Under consideration" and complete the column EP PC 301 with the following values for tolerances:

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Nominal thickness mm	EP PC 301	Nominal thickness mm	EP PC 301	Nominal thickness mm	EP PC 301
0,4	–	4,0	0,45	30,0	1,70
0,5	–	5,0	0,52	35,0	1,95
0,6	–	6,0	0,60	40,0	2,10
0,8	–	8,0	0,72	45,0	2,30
1,0	–	10,0	0,82	50,0	2,45
1,2	0,21	12,0	0,94	60,0	–
1,6	0,24	14,0	1,02	70,0	–
2,0	0,28	16,0	1,12	80,0	–
2,5	0,33	20,0	1,30	90,0	–
3,0	0,37	25,0	1,50	100,0	–

Replace table 5b by the following new tables 5b and 5c.

Table 5b – Property requirements of industrial rigid laminated sheets

Item	Property	Test method in subclause IEC 60893-2	Unit	Maximum or minimum	Nominal thickness of sheet to which test is applicable mm	EP GM 201	EP GM 202	EP GM 203	EP GM 204	EP GM 305	EP GM 306	Remarks
1	Flexural stress at rupture, perpendicular to laminations	5.1	MPa	Min.	≥ 1,6	320 (15 000)	320 (15 000)	320 ¹⁾	320 ¹⁾	320 ¹⁾	320 ¹⁾	1) Flexural stress measured at (150 ±5) °C, not to be less than 50 % of the specified value
2	Apparent modulus of elasticity in flexure	5.2	MPa	Min.	≥ 1,6	(15 000)	(15 000)	(15 000)	(15 000)	(15 000)	(15 000)	
3	Compressive strength perpendicular to laminations	5.3	MPa	Min.	≥ 5	(350)	(350)	(350)	(350)	(350)	(350)	
4	Impact strength (Charpy) parallel to laminations	5.5.2	kJ/m ²	Min.	≥ 5	50	50	50	50	50	50	Conformance with the requirement for either test constitutes conformance with the specification in this respect
5	Impact strength (Izod) parallel to laminations	5.5.3	kJ/m ²	Min.	≥ 5	55	55	55	55	55	55	
6	Shearing strength parallel to laminations	5.6	MPa	Min.	≥ 5	(20)	(20)	(20)	(20)	(20)	(20)	
7	Tensile strength	5.7	MPa	Min.	≥ 1,6	(250)	(250)	(250)	(250)	(250)	(250)	
8	Electric strength at 90 °C in oil perpendicular to laminations	6.1.2	kV/mm	Min.	≤ 3							
9	Breakdown voltage at 90 °C in oil parallel to laminations	6.1.3	kV	Min.	> 3	35	35	35	35	35	35	

See table 6

NOTE 1 – Values in parentheses () are typical values intended to give only general guidance and are not to be considered as requirements of this standard.
NOTE 2 – A dash (–) signifies that there is no requirement.

Table 5b (concluded)

Item	Property	Test method in subclause IEC 60893-2	Unit	Maximum or minimum	Nominal thickness of sheet to which test is applicable mm	EP GM 201	EP GM 202	EP GM 203	EP GM 204	EP GM 305	EP GM 306	Remarks
10a	Permittivity at 48 Hz – 62 Hz	6.2	–	Max.	≤ 3	(5,5)	(5,5)	(5,5)	(5,5)	(5,5)	(5,5)	Conformance with the requirement to either test frequency constitutes conformance to the other frequency
10b	Permittivity at 1 MHz	6.2	–	Max.	≤ 3	(5,5)	(5,5)	(5,5)	(5,5)	(5,5)	(5,5)	Conformance with the requirement to either test frequency constitutes conformance to the other frequency
11a	Dissipation factor at 48 Hz – 62 Hz	6.2	–	Max.	≤ 3	(0,05)	(0,05)	(0,05)	(0,05)	(0,05)	(0,05)	Conformance with the requirement to either test frequency constitutes conformance to the other frequency
11b	Dissipation factor at 1 MHz	6.2	–	Max.	≤ 3	(0,05)	(0,05)	(0,05)	(0,05)	(0,05)	(0,05)	Conformance with the requirement to either test frequency constitutes conformance to the other frequency
12	Insulation resistance after immersion in water	6.3	MΩ	Min.	All	5 × 10 ³	5 × 10 ³	5 × 10 ³	5 × 10 ³	5 × 10 ³	5 × 10 ³	
13	Proof tracking index	6.4	–	–	–	–	–	–	–	–	500	
14	Comparative tracking index	6.4	–	Min.	≥ 3	(200)	(200)	(180)	(180)	(180)	(600)	
15	Tracking and erosion resistance	6.5	Class	Min.	–	–	–	–	–	–	–	
16	Thermal endurance	7.1	TI		≥ 3	(130)	(130)	(155)	(155)	180 ²⁾	180 ²⁾	2) This test is only used to characterize the type of material and should only be regarded as a type test
17	Flammability	7.2	Category		3	–	–	–	–	–	–	
18	Temperature of deflection under load	7.3	°C	Min.	≥ 3	–	–	–	–	–	–	
19	Density	8.1	g/cm ³	Range	All	(1,7–1,9)	(1,7–1,9)	(1,7–1,9)	(1,7–1,9)	(1,7–1,9)	(1,7–1,9)	
20	Water absorption	8.2	mg	Max.	All	–	–	–	–	–	–	

NOTE 1 – Values in parentheses () are typical values intended to give only general guidance and are not to be considered as requirements of this standard.

NOTE 2 – A dash (–) signifies that there is no requirement.