IEC 61061-1

Edition 3.0 2006-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Non-impregnated densified laminated wood for electrical purposes – Part 1: Definitions, designation and general requirements

Stratifiés de bois densifié, non imprégnés, à usages électriques – Partie 1: Définitions, désignation et exigences générales

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

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX

G

ICS 17.220.99; 29.035.01

ISBN 978-2-88910-403-1

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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NON-IMPREGNATED DENSIFIED LAMINATED WOOD FOR ELECTRICAL PURPOSES –

Part 1: Definitions, designation and general requirements

FOREWORD

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International Standard IEC 61061-1 has been prepared by IEC technical committee 15: Solid electrical insulating materials.

This third edition cancels and replaces the second edition published in 1998, and constitutes a technical revision. The main changes from the previous edition are as follows:

– addition of application use and safety statements;
– redefinition of ring and sheet;
– appropriate additions to the subclauses;
– reformatting of text to bring it in line with current IEC document format.

This bilingual version, published in 2009-09, corresponds to the English version.

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

FDIS	Report on voting
15/343/FDIS	15/350/RVD

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

The French version of this standard has not been voted upon.

A list of all parts of the IEC 61061 series, under the general title *Non-impregnated densified laminated wood for electrical purposes*, can be found on the IEC website.

The committee has decided that the contents of this publication 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- withdrawn;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.

NON-IMPREGNATED DENSIFIED LAMINATED WOOD FOR ELECTRICAL PURPOSES –

Part 1: Definitions, designation and general requirements

1 Scope

This part of IEC 61061 includes the definitions required for the understanding of all three parts of the standard, the designation of the material types and the general requirements applicable to non-impregnated densified laminated wood for electrical purposes.

This specification is intended to cover only sheets and rings of nominal thicknesses between 6 mm and 100 mm, inclusive.

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.

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 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 60296, *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

IEC 61061-2, *Non-impregnated, densified laminated wood for electrical purposes – Part 2: Methods of test*

IEC 61061-3 (all sheets), *Non-impregnated, densified laminated wood for electrical purposes – Part 3: Specifications for individual materials*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1
veneer
single non-laminated ply with a thickness of not more than 2,5 mm in the non-pressed condition, for example produced from beech *(fagus silvatica)*, North-American maple *(acer saccherem)* or birch *(betula pendula)*

3.2
non-impregnated densified laminated wood
laminated wood made from layers of wood veneer bonded together under controlled conditions of heat and pressure using a thermosetting synthetic resin adhesive

3.3
sheet
material with parallel or crosswise arrangement of veneers

3.4
direction A and direction B
two directions in the plane of laminations, mutually at right angles, one of which is parallel with an edge of the sheet

3.5
ring
ring form manufactured either by

a) cutting out the ring from a sheet made with crosswise arrangement of veneers (positioned at 90° to one another);

b) pressing substantially tangentially arranged veneers laid up in a circular form; or

c) pressing veneers assembled in a circular form, with each layer arranged at 45° to the layer preceding it

NOTE Because of the different methods of manufacture which may be used, the three types clearly differ in their properties and therefore the required type of ring should be specified in the purchase contract.

4 Designation

4.1 General

The types of material covered by this specification shall be designated by:

– the shape of the material: sheet or ring;
– the number of the IEC standard: IEC 61061;
– a letter to denote the arrangement of the veneers according to 4.2;
– a digit to denote the range of densities according to 4.3;
– a letter to denote the kind of wood according to 4.4;
– the dimensions of the
  - sheet: thickness in millimetres × width in millimetres × length in millimetres;
  - ring: thickness in millimetres × radial ring width in millimetres × outer diameter in millimetres.

4.2 Arrangements of veneers

The arrangement of veneers shall be denoted by the following letters:

P: parallel arrangement;

C: crosswise arrangement;

T: tangential arrangement;

A: veneers arranged at 45° to the preceding layer.

NOTE In arrangements P and T, for manufacturing reasons, up to 20 % of the veneers may be arranged in such a manner that the fibres are perpendicular to the fibres of the rest of the veneers. When arranging the layers crosswise, it is permissible to have two veneers on top of each other in the same direction, in order to compensate for the variation in mass of each ply of veneer.

4.3 Apparent density in grams per cubic centimetre (g/cm^3)

The apparent density shall be denoted by the following digits:

1: apparent density ≥ 0,7 < 0,9 g/cm^3;

2: apparent density ≥ 0,9 < 1,1 g/cm^3;

3: apparent density ≥ 1,1 < 1,2 g/cm^3;

4: apparent density ≥ 1,2 < 1,3 g/cm^3.

4.4 Kind of wood

The kind of wood shall be denoted by the following letters:

B: birch;

M: maple;

R: beech.

4.5 Examples of complete IEC designations

Sheet of non-impregnated, densified, laminated wood with crosswise arrangement of veneers of beech, with an apparent density greater than or equal to 1,1 g/cm^3 but less than 1,2 g/cm^3, with a thickness of 10 mm, a width of 1 000 mm and a length of 2 000 mm:

Sheet IEC 61061 – C3R – 10 × 1 000 × 2 000

Ring of non-impregnated, densified, laminated wood with tangential arrangement of veneers of beech, with an apparent density greater than or equal to 0,9 g/cm^3 but less than 1,1 g/cm^3, with a thickness of 80 mm, a radial ring width of 100 mm and an outer diameter of 1 500 mm:

Ring IEC 61061 – T2R – 80 × 100 × 1 500

5 General requirements

5.1 Composition

The material shall be produced from wood veneer layers and thermosetting resin. All materials, i.e. the wood veneers and the resin, shall be resistant to transformer oils according to IEC 60296 and shall not have any detrimental effect on them, according to the test method in IEC 61061-2.

5.2 Defects – all types

No diseased areas or electrically conducting inclusions are permitted, but natural staining due to causes other than fungus attack may be accepted. For sheets, the direction of the fibres shall not deviate by more than 5° ± 1° from being parallel to the edge of the sheet.

5.3 Finish

5.3.1 Sheets

Sheets shall be plane, smooth and free from local deformations. All joints between veneers shall be reasonably close-butted and substantially free from gaps and overlaps. Sheets shall be supplied with trimmed edges, unless otherwise agreed upon between the customer and the manufacturer.

NOTE With some veneers, it is not possible to be totally free of voids, gaps and overlaps.

5.3.2 Rings

Rings shall have all joints reasonably close-butted or overlapped, and be substantially free from gaps.

NOTE Depending upon the application, open spaces in the laminate are not detrimental to the use of the ring, for example in oil filled transformers.

5.4 Thickness

The nominal thickness should be one of the preferred thicknesses given in Table 1, unless otherwise agreed between purchaser and supplier. The deviation from the nominal thickness of a sheet measured according to IEC 61061-2, shall not exceed the appropriate value specified in IEC 61061-3.

5.5 Machinability

When sawn, turned, planed or milled in accordance with the recommendations of the manufacturer, the sheet or ring shall not show undue chipping or any sign of splitting or cracking.

5.6 Flatness

Tests for flatness are given in IEC 61061-2, and requirements for flatness are given in the relevant sheet of IEC 61061-3.

6 Conditions of supply

The sheets and rings shall be supplied in packing which ensures adequate protection during transport, handling and storage.

The IEC designation of the material and the number of sheets or rings and the mass shall be clearly marked on the outside of each package.

Where different types of sheets or rings are contained in the same package, the required information may be on a note accompanying the package.

Any marking on individual sheets or rings shall be as specified in the purchase contract.

Where marking is carried out with a stamp, the stamping ink used shall not impair the electrical properties of the material or the insulating oil.

Table 1 – Preferred nominal thickness

Type of laminated sheet or ring	Preferred nominal thickness mm
All types	6,0; 8,0; 10,0; 14,0; 16,0; 20,0; 30,0; 40,0; 50,0; 60,0; 70,0; 80,0; 90,0; 100,0.

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