

Physical and mechanical properties of wood - Test methods for small clear wood specimens - Changes in the new standard ISO 13061-2014

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Abstract

During 2017, the International Standardization Organization (ISO) Technical Committee has developed and approved 14 standards for testing the physical-mechanical properties of wood according to the ISO 13061 standard series. 6 Standards are updates of standard 2014, while 8 are new standards. The ISO 13061 standard series repeals the ISO 3130 series of 1974 and provides test methods for small parts of clear wood and general requirements for determining the physical-mechanical properties of wood. The standard ISO 13061 standard has 16 standards. Changes technically revised with regards to the sizes of test pieces, precision of measurements and adjustment for moisture content.

Keywords: physical-mechanical properties; ISO; moisture content.

1. Introduction

In general, ISO/TC 218 Timber has a big number of standards dating back to the 70es or 80es: they all need (or needed) revision to reflect changes in technology, accuracy of test methods, etc. The committee responsible for this document is ISO/TC 218, Timber. ISO 3131:1975 has been withdrawn and replaced by ISO 13061-2:2016. The foreword of ISO 13061-2 indicates the changes compared to ISO 3131: This first edition of ISO 13061-2 cancels and replaces ISO 3131:1975, which has been technically revised with regards to the sizes of test pieces, precision of measurements and adjustment for moisture content. The standard ISO 13061 standard has 16 standards. Physical and mechanical properties of wood -- Test methods for small clear wood specimens

ISO 13061-1 Determination of moisture content for physical and mechanical tests

ISO 13061-2 Determination of density for physical and mechanical tests

ISO 13061-3 Determination of ultimate strength in static bending.

ISO 13061-4 specifies the method of determining the modulus of elasticity in static bending

ISO 13061-6- Determination of ultimate tensile stress parallel to grain.

ISO 13061-7 Determination of ultimate tensile stress perpendicular to grain.

ISO 13061-10 Determination of impact bending strength

ISO 13061-11 Determination of resistance to impact indentation.

ISO 13061-12 Determination of static hardness

ISO 13061-13 specifies how to determine radial and tangential shrinkage

ISO 13061-14 Determination of volumetric shrinkage

ISO 13061-15 Determination of radial and tangential swelling

ISO 13061-16 Determination of volumetric swelling

ISO 13061-17 Determination of ultimate stress in compression parallel to grain

This first edition of ISO 13061-2 cancels and replaces ISO 3131:1975, which has been technically revised with regards to the sizes of test pieces, precision of measurements and adjustment for moisture content. The main purpose of ISO 13061 is to establish test methods for small clear wood specimens, and general requirements for determining physical and mechanical properties of wood.

Changes revised in precision of apparatus:

- 1) Measuring instrument, capable of measuring the dimensions (thickness, length and width) of the test pieces to the nearest 0,1 mm or to a precision of $\pm 0,3$ %, whichever is greater.
- 2) Balance, capable of weighing to a precision of $\pm 0,2$ % or less.
- 3) Equipment for the determination of moisture content, in accordance with ISO 13061-1.

Changes in measures of test pieces:

ISO-3131 Test pieces shall be prepared in the form of right prisms having a Square Cross-section of side 20 mm and length along the grain of 25 ± 5 mm.

2. Material and Methods

ISO 13061- 6.2 Test pieces shall have a cross-section of at least 20 mm by 20 mm and minimum length along the grain of 20 mm and be made preferably in the form of rectangular prism. If the growth rings are more than 4 mm wide, the dimensions of the cross section of the test piece shall be increased to include not less than five growth rings. The sampling and preparation of test pieces shall be in accordance with ISO 3129: This International Standard specifies methods for the extensive and limited sampling of wood, conditioning and preparation of test pieces. It also specifies the general requirements for physical and mechanical testing of small clear wood specimens. The sampling guidance provided in this International Standard can be applied for timber taken from either trees, logs, or pieces of ungraded/graded/presorted sawn timber for non-structural applications, such as furniture, windows, doors, etc., only.

This International Standard covers procedures of sampling for obtaining small clear specimens which, when tested in accordance with methods prescribed under relevant International Standards, may provide information on the influence on mechanical properties of such factors as moisture content, density, position in cross section,height in the tree and locality of growth. The material intended for physical and mechanical tests shall be selected taking into account the purpose of the test, as well as the requirements to ensure that the properties obtained from the test pieces represent the sample population. Trees or logs shall be selected to represent the population. For each species to be tested, at least five trees or logs representative of that species or species group shall be selected. A heart plank shall be cut from a log of acceptable diameter. For a log having an eccentric structure, the heart plank shall cover the geometrical centre (Figure 1). In the case of a log having a diameter of 180 mm or less, the heart plank shall be cut in the direction of two mutually perpendicular diameters (Figure 2).

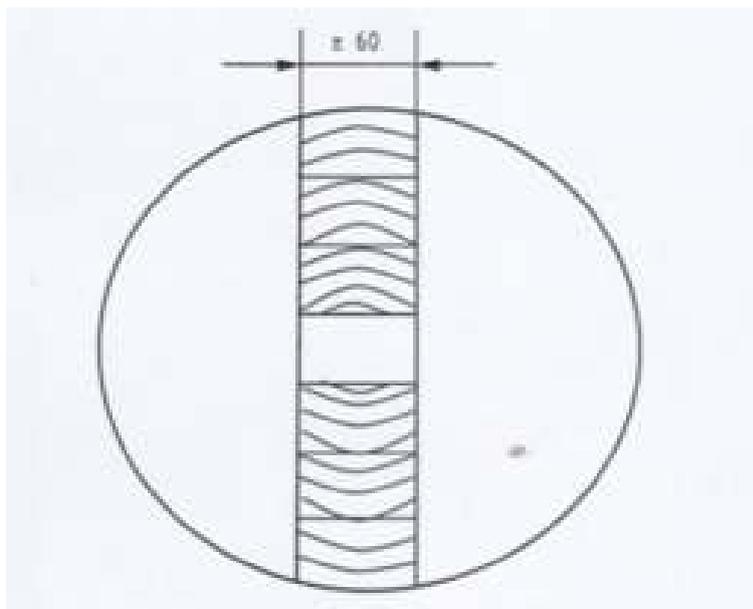


Figure 1. General cutting pattern of heart plank from a log of diameter > 180mm

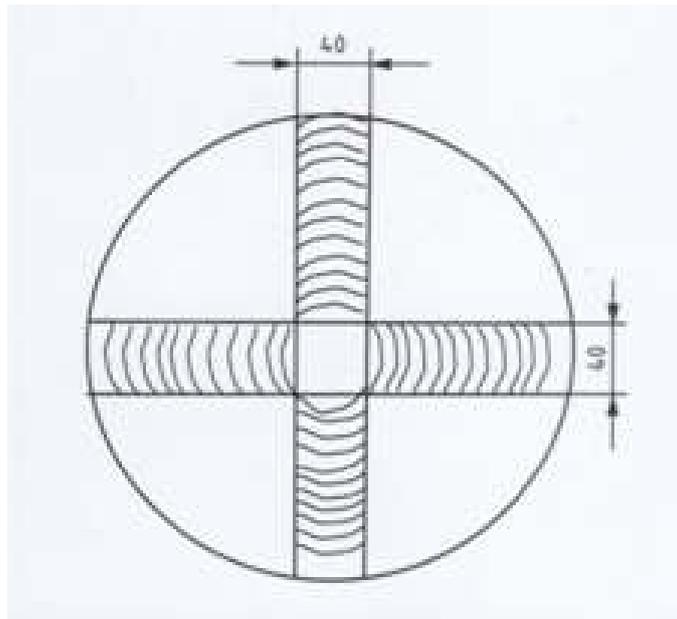


Figure 2. General cutting pattern of heart plank from a log of diameter ≤ 180 mm

In the case of an eccentric structure, the plank shall include the pith and not the geometrical centre. The thickness of the heart plank shall be at least 60 mm, except for logs with a diameter of 180 mm or less, where the thickness shall be 40 mm. In this case, to obtain test pieces with a cross-sectional dimension greater than 30 mm, a disc that is at least 100 mm thick shall be cut from one end of the log prior to sawing out heart planks. This disc may be used for the hardness test.

Changes in calculation: In the new standard is changed a formula and the range of moisture content for the cases: When required, the density, ρ_w , shall be adjusted to a 12 % moisture content using nationally or internationally recognized method.

NOTE The following formula can be used for adjustments of density if moisture content W is below the fibre saturation point:

$$\rho_{12} = \rho_w \frac{1 + 0.001(12 - W)}{1 + 0.01(12 - W) \frac{\rho_w}{\rho_{H_2O}}}$$

Where

W – is the moisture content at the time of test, in percent;

ρ_{H_2O} - is the density of water, 1000 kg/m³ (or 1.000 g/cm³)

In standard ISO :3131 the range of moisture content was from 7 to 17 %

Test report changes:

IN the test report is added :

The point e) the date of the test and f) the name of organization performing the test.

3. Conclusions

ISO 13061-2 cancels and replaces ISO 3131:1975, which has been technically revised with regards to the:

1. sizes of test pieces ,regarding standard ISO 3129-2012 which is revised regarding ISO 3129-1975;
2. Precision of measurements. The level of precision of the apparatus now is higher but again the precision required is higher ,that determine high precision results;
3. Adjustment for moisture content. Knowing that the wood has different behaviours in different humidity, this will lead to more accurate results;

The main purpose of ISO 13061 is to establish test methods for small clear wood specimens, and general requirements for determining physical and mechanical properties of wood.

4. References

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12. ISO 3349, Wood — Determination of modulus of elasticity in static bending
13. ISO 3350, Wood — Determination of static hardness
14. ISO 3351, Wood — Determination of resistance to impact indentation
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