



Wood — Sampling sample trees and logs for determination of physical and mechanical properties of wood in homogeneous stands

Bois — Prélèvement d'arbres échantillons et de billes pour la détermination des propriétés physiques et mécaniques du bois des peuplements homogènes

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4471 was developed by Technical Committee ISO/TC 55, *Sawn timber and sawlogs*, and was circulated to the member bodies in May 1980.

It has been approved by the member bodies of the following countries :

Australia	Ghana	Romania
Austria	Hungary	South Africa, Rep. of
Belgium	India	Sweden
Bulgaria	Italy	Turkey
Canada	Korea, Dem. P. Rep.	USSR
Czechoslovakia	Mexico	Yugoslavia
Finland	Norway	
France	Poland	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Ireland
New Zealand

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1 Scope and field of application

This International Standard specifies the method of selecting sample trees and logs in test areas of homogeneous stands for determination of physical and mechanical properties of wood.

2 Reference

ISO 3129, *Wood — Sampling methods and general requirements for physical and mechanical tests*.

3 Definitions

3.1 homogeneous stand : A plot of forest which is homogeneous by its woody and bushy vegetation and by its live overground cover and which differs from the neighbouring plots in these characteristics.

3.2 homogeneous forest : A total combination of trees, growing in the same portion of forest, distinguished by their thickness and height, the values of which do not exceed $\pm 30\%$ and $\pm 10\%$, respectively, of the mean values.

3.3 generation age : An interval of time measured in classes of age.

For coniferous species and broad-leaved species of seed origin, the class of age is equal to 20 years. For broad-leaved species of shoot origin, the class of age is equal to 10 years. For rapid growing species and for bushes, the class of age is 5 years.

3.4 stand of the same age : Standing forest, whose trees have an age difference not exceeding the duration of one class of age.

3.5 method of selecting the test area : The method used in studying the forest and managing the farm in it.

3.6 root collar : The portion where the root passes into the stem.

3.7 crown base : The place where the first living branch starts.

3.8 form ratio : The relation between the diameter at a height of 1,3 m from the root collar and the diameters in the root collar, at a height of $1/4$, $1/2$, and $3/4$ of the total height of the stem.

4 Selection of test area

4.1 The test area shall be selected according to national forest regulation instructions and normative documents. It shall be carried out on a forest plot with most typical taxation characteristics for the stand under study.

4.2 The test area shall contain not fewer than 100 trees of each generation of the species to be examined, the diameter of the trees at a height of 1,3 m from the root collar being at least 14 cm.

4.3 The description of the test area shall be made in accordance with the form shown in annex A. Its characteristics shall be determined in compliance with national forest regulation instructions.

4.4 The trees in the test area shall be inventoried separately by species and age generations in accordance with national forest regulation instructions. The results of the inventory shall be recorded in the report shown in annex B.

While drawing up the inventory, the diameter and height of the trees of the species being examined shall be determined in accordance with national forest regulation instructions and normative documents.

The serial number, diameter and height of the trees as well as the description of the defects occurring shall be recorded in the inventory report shown in annex C.

5 Selection of sample trees in test areas

5.1 When the studied species is 22 cm and over in average diameter, sample trees shall be selected from among trees of not less than 18 cm diameter. When the average diameter is less than 22 cm, sample trees shall be selected from among trees of not less than 14 cm diameter. The inventoried trees shall not contain any visible defects (with the exception of knots) hampering the selection of logs from a sample tree.

5.2 The inventoried trees shall be recorded, beginning with the smallest diameter, in the inventory report shown in annex D. These trees shall be numbered in ascending order and divided into at least six groups.

5.3 The average tree, following the order in which the trees are recorded in the inventory report, shall be taken out of each group as a sample tree. In the case of groups having an even number of trees, the even-numbered average tree shall be selected as a sample tree.

The sample trees shall be given respective group numbers.

NOTE — If a selected sample tree has some inner defects which prevent sample logs from being sawn out, then the tree following the average tree in the inventory report shall be taken as a sample tree.

5.4 Each sample tree shall be provided with a card as shown in annex E. The characteristics of sample trees shall be determined according to national forest regulation instructions.

6 Conversion of sample trees into logs

6.1 Not more than three logs shall be sawn from sample trees from the butt to the top : the first log shall be sawn at a

distance of 1,3 m from the root collar, the second at a distance of one-third of the trunk length down from the crown base, and the third at a distance of 1 m down from the crown base.

Not more than two logs shall be sawn from species with low crowns : the first log shall be sawn at a distance of 1,3 m from the root collar, and the second at a distance of 1 m down from the crown base.

The length of the log should be such as to ensure that a set of test pieces can be made according to ISO 3129.

6.2 The logs should have no defects preventing the taking of samples according to ISO 3129.

6.3 To prevent the ends of the logs from biodamage and cracking, proper means of protection should be used.

6.4 Each of the logs, from butt to crown, shall be given serial numbers. In addition, each log shall carry the number of the test area and sample tree.

Annex A

Description of test area No

- 1 Administrative units
- 2 Enterprise or organization
- 3 Block, plot
- 4 Test area

Taxation characteristics

of the whole stand

of the species to be examined

- | | |
|--|----------------------|
| 1 Type of forest | Species |
| 2 Composition of stand ..... | ..... |
| 3 Quality class ..... | ..... |
| 4 Average age ..... | ..... |
| 5 Average diameter at a height of 1,3 m
from the root collar | cm |
| 6 Average height | m |
| 7 Section area per 1 hectare | m ² |
| 8 Reserve per 1 hectare | m ³ |
| 9 Density ..... | ..... |
| 10 Kind of growth (delayed or undelayed) ..... | ..... |
| 11 Underwood ..... | ..... |
| 12 Undergrowth ..... | ..... |
| 13 Vegetation ..... | ..... |
| 14 Relief ..... | ..... |
| 15 Soil ..... | ..... |
| 16 Specific features of the stand and the method
of selecting the test area | |

Date :

Signature :

Annex B

Overall inventory report on trees growing in test area No

- 1 Administrative units
- 2 Enterprise or organization
- 3 Block, plot

Steps of thickness cm	Generations	Species			
		Number of trees			
		not containing visible defects (except knots)	containing visible defects (except knots)	not containing visible defects (except knots)	containing visible defects (except knots)
8					
10					
12					
14					
16					
etc.					

Date :

Signature :

Annex C

Inventory report on trees of species to be examined in test area No.....

- 1 Administrative units
- 2 Enterprise or organization
- 3 Block, plot
- 4 Species
- 5 Generation

[illegible]

Date :

Signature :.....

Annex D

Inventory report on selection of sample trees in test area

- 1 Administrative units.
- 2 Enterprise or organization.
- 3 Block, plot.
- 4 Species.
- 5 Generation.

Diameter cm	Numbers of trees according to the inventory report not containing visible defects (except knots)	Serial numbers of trees not containing visible defects (except knots)	Group No.	Serial number of tree groups	Sample trees No.	Notes

Date :

Signature :

Annex E

Card of sample tree No.

- 1 Administrative units
- 2 Enterprise or organization
- 3 Block, plot
- 4 Test area No.
- 5 Species
- 6 Age
- 7 Diameters of trunk with bark at a height of 1,3 m taken at right angles cm
- 8 Height m
- 9 Distance to the first open dead knot m
- 10 Distance to the first living knot m
- 11 Trunk diameter with bark at half-height cm
- 12 Form ratio
- 13 Overall trunk volume m³
- 14 Top diameter of trunk :
- with bark cm
- without bark cm
- 15 Characteristics of logs sawn from sample tree used to test physical and mechanical properties

Characteristics	Log		
	1	2	3
Length, m			
Top diameter, cm			
Cutting height, m			

Date :

Signature :