

Rules for the type-approval of marine plywood

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GENERAL CONDITIONS

Definitions:

“Administration” means the Government of the State whose flag the Ship is entitled to fly or under whose authority the Ship is authorised to operate in the specific case.

“IACS” means the International Association of Classification Societies.

“Interested Party” means the party, other than the Society, having an interest in or responsibility for the Ship, product, plant or system subject to classification or certification (such as the owner of the Ship and his representatives, the ship builder, the engine builder or the supplier of parts to be tested) who requests the Services or on whose behalf the Services are requested.

“Owner” means the registered owner, the ship owner, the manager or any other party with the responsibility, legally or contractually, to keep the ship seaworthy or in service, having particular regard to the provisions relating to the maintenance of class laid down in Part A, Chapter 2 of the Rules for the Classification of Ships or in the corresponding rules indicated in the specific Rules.

“Rules” in these General Conditions means the documents below issued by the Society:

- (i) Rules for the Classification of Ships or other special units;
- (ii) Complementary Rules containing the requirements for product, plant, system and other certification or containing the requirements for the assignment of additional class notations;
- (iii) Rules for the application of statutory rules, containing the rules to perform the duties delegated by Administrations;
- (iv) Guides to carry out particular activities connected with Services;
- (v) Any other technical document, as for example rule variations or interpretations.

“Services” means the activities described in Article 1 below, rendered by the Society upon request made by or on behalf of the Interested Party.

“Ship” means ships, boats, craft and other special units, as for example offshore structures, floating units and underwater craft.

“Society” or “TASNEEF” means Tasneef and/or all the companies in the Tasneef Group which provide the Services.

“Surveyor” means technical staff acting on behalf of the Society in performing the Services.

Article 1

1.1. The purpose of the Society is, among others, the classification and certification of ships and the certification of their parts and components. In particular, the Society:

- (i) sets forth and develops Rules;
- (ii) publishes the Register of Ships;
- (iii) issues certificates, statements and reports based on its survey activities.

1.2. The Society also takes part in the implementation of national and international rules and standards as delegated by various Governments.

1.3. The Society carries out technical assistance activities on request and provides special services outside the scope of classification, which are regulated by these general conditions, unless expressly excluded in the particular contract.

Article 2

2.1. The Rules developed by the Society reflect the level of its technical knowledge at the time they are published. Therefore, the Society, although committed also through its research and development services to continuous updating of the Rules, does not guarantee the Rules meet state-of-the-art science and technology at the time of publication or that they meet the Society's or others' subsequent technical developments.

2.2. The Interested Party is required to know the Rules on the basis of which the Services are provided. With particular reference to Classification Services, special attention is to be given to the Rules concerning class suspension, withdrawal and reinstatement. In case of doubt or inaccuracy, the Interested Party is to promptly contact the Society for clarification.

The Rules for Classification of Ships are published on the Society's website: www.tasneef.ae.

2.3. The Society exercises due care and skill:

- (i) in the selection of its Surveyors
- (ii) in the performance of its Services, taking into account the level of its technical knowledge at the time the Services are performed.

2.4. Surveys conducted by the Society include, but are not limited to, visual inspection and non-destructive testing. Unless otherwise required, surveys are conducted through sampling techniques and do not consist of comprehensive verification or monitoring of the Ship or of the items subject to certification. The surveys and checks made by the Society on board ship do not necessarily require the constant and continuous presence of the Surveyor. The Society may also commission laboratory testing, underwater inspection and other checks carried out by and under the responsibility of qualified service suppliers. Survey practices and procedures are selected by the Society based on its experience and knowledge and according to generally accepted technical standards in the sector.

Article 3

3.1. The class assigned to a Ship, like the reports, statements, certificates or any other document or information issued by the Society, reflects the opinion of the Society concerning compliance, at the time the Service is provided, of the Ship or product subject to certification, with the applicable Rules (given the intended use and within the relevant time frame).

The Society is under no obligation to make statements or provide information about elements or facts which are not part of the specific scope of the Service requested by the Interested Party or on its behalf.

3.2. No report, statement, notation on a plan, review, Certificate of Classification, document or information issued or given as part of the Services provided by the Society shall have any legal effect or implication other than a representation that, on the basis of the checks made by the Society, the Ship, structure, materials, equipment, machinery or any other item covered by such document or information meet the Rules. Any such document is issued solely for the use of the Society, its committees and clients or other duly authorised bodies and for no other purpose. Therefore, the Society cannot be held liable for any act made or document issued by other parties on the basis of the statements or information given by the Society. The validity, application, meaning and interpretation of a Certificate of Classification, or any other document or information issued by the Society in connection with its Services, is governed by the Rules of the Society, which is the sole subject entitled to make such interpretation. Any disagreement on technical matters between the Interested Party and the Surveyor in the carrying out of his functions shall be raised in writing as soon as possible with the Society, which will settle any divergence of opinion or dispute.

3.3. The classification of a Ship, or the issuance of a certificate or other document connected with classification or certification and in general with the performance of Services by the Society shall have the validity conferred upon it by the Rules of the Society at the time of the assignment of class or issuance of the certificate; in no case shall it amount to a statement or warranty of seaworthiness,

structural integrity, quality or fitness for a particular purpose or service of any Ship, structure, material, equipment or machinery inspected or tested by the Society.

3.4. Any document issued by the Society in relation to its activities reflects the condition of the Ship or the subject of certification or other activity at the time of the check.

3.5. The Rules, surveys and activities performed by the Society, reports, certificates and other documents issued by the Society are in no way intended to replace the duties and responsibilities of other parties such as Governments, designers, ship builders, manufacturers, repairers, suppliers, contractors or sub-contractors, Owners, operators, charterers, underwriters, sellers or intended buyers of a Ship or other product or system surveyed.

These documents and activities do not relieve such parties from any fulfilment, warranty, responsibility, duty or obligation (also of a contractual nature) expressed or implied or in any case incumbent on them, nor do they confer on such parties any right, claim or cause of action against the Society. With particular regard to the duties of the ship Owner, the Services undertaken by the Society do not relieve the Owner of his duty to ensure proper maintenance of the Ship and ensure seaworthiness at all times. Likewise, the Rules, surveys performed, reports, certificates and other documents issued by the Society are intended neither to guarantee the buyers of the Ship, its components or any other surveyed or certified item, nor to relieve the seller of the duties arising out of the law or the contract, regarding the quality, commercial value or characteristics of the item which is the subject of transaction.

In no case, therefore, shall the Society assume the obligations incumbent upon the above-mentioned parties, even when it is consulted in connection with matters not covered by its Rules or other documents.

In consideration of the above, the Interested Party undertakes to relieve and hold harmless the Society from any third party claim, as well as from any liability in relation to the latter concerning the Services rendered.

Insofar as they are not expressly provided for in these General Conditions, the duties and responsibilities of the Owner and Interested Parties with respect to the services rendered by the Society are described in the Rules applicable to the specific Service rendered.

Article 4

4.1. Any request for the Society's Services shall be submitted in writing and signed by or on behalf of the Interested Party. Such a request will be considered irrevocable as soon as received by the Society and shall entail acceptance by the applicant of all relevant requirements of the Rules, including these General Conditions. Upon acceptance of the written request by the Society, a contract between the Society and the Interested Party is entered into, which is regulated by the present General Conditions.

4.2. In consideration of the Services rendered by the Society, the Interested Party and the person requesting the service shall be jointly liable for the payment of the relevant fees, even if the service is not concluded for any cause not pertaining to the Society. In the latter case, the Society shall not be held liable for non-fulfilment or partial fulfilment of the Services requested. In the event of late payment, interest at the legal current rate increased by 1.5% may be demanded.

4.3. The contract for the classification of a Ship or for other Services may be terminated and any certificates revoked at the request of one of the parties, subject to at least 30 days' notice to be given in writing. Failure to pay, even in part, the fees due for Services carried out by the Society will entitle the Society to immediately terminate the contract and suspend the Services.

For every termination of the contract, the fees for the activities performed until the time of the termination shall be owed to the Society as well as the expenses incurred in view of activities already programmed; this is without prejudice to the right to compensation due to the Society as a consequence of the termination.

With particular reference to Ship classification and certification, unless decided otherwise by the Society, termination of the contract implies that the assignment of class to a Ship is withheld or, if already assigned, that it is suspended or withdrawn; any statutory certificates issued by the Society will be withdrawn in those cases where provided for by agreements between the Society and the flag State.

Article 5

5.1. In providing the Services, as well as other correlated information or advice, the Society, its Surveyors, servants or agents operate with due diligence for the proper execution of the activity. However, considering the nature of the activities performed (see art. 2.4), it is not possible to guarantee absolute accuracy, correctness and completeness of any information or advice supplied. Express and implied warranties are specifically disclaimed.

Therefore, except as provided for in paragraph 5.2 below, and also in the case of activities carried out by delegation of Governments, neither the Society nor any of its Surveyors will be liable for any loss, damage or expense of whatever nature sustained by any person, in tort or in contract, derived from carrying out the Services.

5.2. Notwithstanding the provisions in paragraph 5.1 above, should any user of the Society's Services prove that he has suffered a loss or damage due to any negligent act or omission of the Society, its Surveyors, servants or agents, then the Society will pay compensation to such person for his proved loss, up to, but not exceeding, five times the amount of the fees charged for the specific services, information or opinions from which the loss or damage derives or, if no fee has been charged, a maximum of AED5,000 (Arab Emirates Dirhams Five Thousand only). Where the fees charged are related to a number of Services, the amount of the fees will be apportioned for the purpose of the calculation of the maximum compensation, by reference to the estimated time involved in the performance of the Service from which the damage or loss derives. Any liability for indirect or consequential loss, damage or expense is specifically excluded. In any case, irrespective of the amount of the fees charged, the maximum damages payable by the Society will not be more than AED5,000,000 (Arab Emirates Dirhams Five Millions only). Payment of compensation under this paragraph will not entail any admission of responsibility and/or liability by the Society and will be made without prejudice to the disclaimer clause contained in paragraph 5.1 above.

5.3. Any claim for loss or damage of whatever nature by virtue of the provisions set forth herein shall be made to the Society in writing, within the shorter of the following periods: (i) THREE (3) MONTHS from the date on which the Services were performed, or (ii) THREE (3) MONTHS from the date on which the damage was discovered. Failure to comply with the above deadline will constitute an absolute bar to the pursuit of such a claim against the Society.

Article 6

6.1. These General Conditions shall be governed by and construed in accordance with United Arab Emirates (UAE) law, and any dispute arising from or in connection with the Rules or with the Services of the Society, including any issues concerning responsibility, liability or limitations of liability of the Society, shall be determined in accordance with UAE law. The courts of the Dubai International Financial Centre (DIFC) shall have exclusive jurisdiction in relation to any claim or dispute which may arise out of or in connection with the Rules or with the Services of the Society.

6.2. However,

- (i) In cases where neither the claim nor any counterclaim exceeds the sum of AED300,000 (Arab Emirates Dirhams Three Hundred Thousand) the dispute shall be referred to the jurisdiction of the DIFC Small Claims Tribunal; and
- (ii) for disputes concerning non-payment of the fees and/or expenses due to the Society for services, the Society shall have the

right to submit any claim to the jurisdiction of the Courts of the place where the registered or operating office of the Interested Party or of the applicant who requested the Service is located.

In the case of actions taken against the Society by a third party before a public Court, the Society shall also have the right to summon the Interested Party or the subject who requested the Service before that Court, in order to be relieved and held harmless according to art. 3.5 above.

Article 7

7.1. All plans, specifications, documents and information provided by, issued by, or made known to the Society, in connection with the performance of its Services, will be treated as confidential and will not be made available to any other party other than the Owner without authorisation of the Interested Party, except as provided for or required by any applicable international, European or domestic legislation, Charter or other IACS resolutions, or order from a competent authority. Information about the status and validity of class and statutory certificates, including transfers, changes, suspensions, withdrawals of class, recommendations/conditions of class, operating conditions or restrictions issued against classed ships and other related information, as may be required, may be published on the website or released by other means, without the prior consent of the Interested Party.

Information about the status and validity of other certificates and statements may also be published on the website or released by other means, without the prior consent of the Interested Party.

7.2. Notwithstanding the general duty of confidentiality owed by the Society to its clients in clause 7.1 above, the Society's clients hereby accept that the Society may participate in the IACS Early Warning System which requires each Classification Society to provide other involved Classification Societies with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and used to facilitate the proper working of the IACS Early Warning System. The Society will provide its clients with written details of such information sent to the involved Classification Societies.

7.3. In the event of transfer of class, addition of a second class or withdrawal from a double/dual class, the Interested Party undertakes to provide or to permit the Society to provide the other Classification Society with all building plans and drawings, certificates, documents and information relevant to the classed unit, including its history file, as the other Classification Society may require for the purpose of classification in compliance with the applicable legislation and relative IACS Procedure. It is the Owner's duty to ensure that, whenever required, the consent of the builder is obtained with regard to the provision of plans and drawings to the new Society, either by way of appropriate stipulation in the building contract or by other agreement.

In the event that the ownership of the ship, product or system subject to certification is transferred to a new subject, the latter shall have the right to access all pertinent drawings, specifications, documents or information issued by the Society or which has come to the knowledge of the Society while carrying out its Services, even if related to a period prior to transfer of ownership.

Article 8

8.1. Should any part of these General Conditions be declared invalid, this will not affect the validity of the remaining provisions.

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1 - FIELD OF APPLICATION

These Rules apply for the purposes of issue and renewal of the "Type-Approval Certificate" for panels in plywood of marine type (hereafter referred to as "marine plywood").

2 - DEFINITIONS

Apart from the definitions given in UNI Standard 6467-69, the following apply:

- **marine plywood:** panels obtained by gluing layers of stripped or sheared wood with heatsetting glues. The layers are to be arranged with the grain suitably criss-crossing for the purpose of obtaining a certain level of isotropy ("compensation") of the physical-mechanical characteristics;
- **length (or longitudinal dimension) of a panel:** conventionally, the surface parallel to the direction of the grain on the external layers;
- **width (or transverse dimension) of a panel:** conventionally, the surface perpendicular to the direction of the grain on the external layers;
- **type of panel:** range of products having different dimensions but identical composition. Identical composition is intended as: same species of timber and number of layers given the same panel thickness.
Example: Comp. Khaya mm 15/9 layers, Comp. Okoumé mm 15/9 layers and Comp. Khaya mm 15/15 layers belong to three different panel types.

NOTE : The type of glue may be different, but is, however, to provide the same results in the type-approval tests.

3 - GENERAL REQUIREMENTS FOR MARINE PLYWOOD

3.1.1

The plywood covered by these Rules is to be fabricated with timber species of sufficient hardness, insusceptible to rotting and/or suitably treated and resistant to all atmospheric agents, including those in tropical climates, and to prolonged immersion in both fresh and sea water.

Table 1 lists the species of timber considered suitable for the fabrication of marine plywood; other species may be considered by RINA and accepted subject, where necessary, to further specific tests.

The timber species permitted for the various structures are given in Part II of the Rules for the Construction and Classification of Pleasure Vessels.

The following general rules are to be observed in the fabrication of marine plywood, such as to preserve its durability and stability in severe operating conditions:

- the thickness of the single layers is to be reduced in direct proportion to the natural durability of the species adopted (the maximum recommended thicknesses are shown in Table 1);
- the layers are to be free from rot, loose knots, spongy wood, areas of reaction and sapwood;
- the external layers are to be arranged such that the "open" side (with more cracks) is on the inside and the exposed surface is compact;
- the surfaces are to be free from joints or open slits. Repairs are permitted provided that the gluing guarantees efficiency equal to that of the rest of the panel;
- each edge may have a maximum of one witness mark (open joint) not wider than 1 mm for a number of layers

≤ 7 and two witness marks not wider than 1 mm for a number of layers > 7;

- for scarf joints, the width of the scarf is to be greater than 10 times the thickness of the panel for thicknesses ≤ 15 mm and 8 times for greater thicknesses.

3.1.2

The gluing of the various layers and any scarfs is to be effected by means of suitable glues (generally of phenolic or resorcinic type), and capable of passing the tests of Standard EN 314 for "Outside" use.

3.1.3

The minimum number of plywood layers is three for thicknesses up to and including 6 mm, and five for greater thicknesses.

For special applications which will be specified in the certificate, other compositions may be accepted.

3.1.4

At the time of supply, the moisture content of the plywood, determined according to UNI Standard 6475-69, is to be not greater than 15%.

4 - REQUEST FOR TYPE-APPROVAL

The manufacturer is to submit to RINA a request for type-approval together with the following information and associated documentation:

- location and description of the workshop;
- list of the compositions (timber species, thickness and number of layers) for each type of panel to be type-approved;
- for each panel type and composition to be type-approved, the following mechanical reference characteristics:
 - (a) resistance to longitudinal and transverse tensile stresses, in N/mm²
 - (b) resistance to longitudinal and transverse bending stresses, in N/mm²
 - (c) mass density, in kg/m³, relative to tests of the type shown in 6.3 under the conditions described in 6.4;
- technical report with a description of the production cycle;
- technical detailed list and chemical-physical characteristics of the types of glues used;
- measurement and testing equipment available in the workshop;
- type of internal controls carried out during production.

NOTE :

- Plywood may be obtained using layers of stripped or sheared wood of two different timber species. In such case the plywood will be identified by the denominations of the two species adopted.
- The thickness does not include any non-structural covering (for example veneering in timber species other than those in Table 1) which the manufacturer may apply.

5 - WORKSHOP SURVEY

Subject to the satisfactory outcome of the examination of the documentation cited in item 4 above, RINA will perform a survey at the manufacturer's works in order to verify that:

- the workshop is provided with systems and equipment appropriate for the fabrication of plywood
- adequate production controls are implemented such as to ensure the consistency and level of quality
- the plywood possesses the general requirements listed in item 3 above.

On the occasion of the workshop survey RINA also draws the sample for the type-approval tests, as indicated in item 6 below.

6 - SAMPLING PROCEDURE

6.1

The selecting of material from which to draw samples for type-approval testing will be performed following the directions of the RINA Surveyor at the manufacturer's warehouse or directly at the workshop.

6.2

For each type of panel for which type-approval is requested, two sample panels are selected in the range of thicknesses foreseen by the manufacturer, one couple near the minimum thickness, one couple near the average thickness and one couple near the maximum thickness (making a total of 6 panels); where the range is wider than 20 mm, two intermediate thicknesses will be selected instead of one (making a total of 8 panels).

Where, for a timber species, more than one composition is foreseen, further samples are to be drawn as specified in the previous sentence.

6.3

The following specimens will be taken from each sample panel for the tests stipulated in item 7 below:

- 3 longitudinal for tensile tests,
- 3 transverse for tensile tests,
- 3 longitudinal for bending tests,
- 3 transverse for bending tests.

The 12 specimens above will be taken near the edge of the sample panel, in the direction of the grain of the external layers (longitudinal specimens) and at an angle of 90° to such direction (transverse specimens).

Specimens for the determination of the quality of gluing according to Standard EN 314 (10 specimens for each pair of gluing lines) will also be taken near the edge.

The dimensions of the specimens, measured in accordance with UNI Standard 9342, will be those indicated in the Standards for the carrying out of the individual tests.

6.4

Before being subjected to testing, the specimens are to be left in an atmosphere with a temperature $25 \pm 2^\circ$ and humidity $85 \pm 5\%$ such as to obtain virtually constant weight.

7 - TESTS

The specimens taken and left according to the provisions of item 6 above will be subjected to the following tests, in accordance with the procedures stipulated in the individual Standards also shown:

- (a) determination of mass density (UNI 9343)
- (b) tensile test (UNI 6480/69)

- (c) static bending test and determination of the modulus of elasticity (EN 310)
- (d) determination of the gluing quality (EN 314 for "Outside").

Standards other than those above may be considered by RINA in special individual cases.

8 - REQUIREMENTS

As well as possessing the general requirements indicated in item 3 above, marine plywood is to satisfy (a) to (d) below.

(a) Mass density

The determination of mass density is only for guidance purposes.

(b) Tensile test

The average of the results for every three specimens is to be not less than the value declared by the manufacturer and each individual specimen is to have a tensile strength not less than 86% of that declared.

(c) Bending test

1 - Ultimate flexural strength

The average of the results for every three specimens is to be not less than the value declared by the manufacturer.

Moreover, each individual specimen is to have an ultimate flexural strength not less than 73% of that declared by the manufacturer.

2 - Modulus of elasticity

The determination of the modulus of elasticity is only for guidance purposes.

(c) Determination of the gluing quality

The requirements concerned are those stipulated in Standard EN 314 for "Outside".

9 - EVALUATION OF TEST RESULTS - RE-TESTS

Where, due to the poor results of more than one sample panel, the average of a group of tests of the same type is less than the value shown in the detailed list of the product concerned, the test is considered unsatisfactory.

Similarly, the outcome of the test is considered unsatisfactory where more than one sample panel gives limit values of the physical-mechanical characteristics which are not within the permissible values indicated in the detailed list of the product concerned.

Where, on the other hand, the average of a group of tests of the same type is less than the value shown in the detailed list solely due to the poor results of one sample panel only, two further sample panels are randomly drawn and the tests are repeated: the results are acceptable if the average for both panels is not less than the value specified in the detailed list; failing this, the test is considered unsatisfactory.

Similarly, where only one sample panel gives limit values of the physical-mechanical characteristics which are not within the permissible limits shown in the detailed list, the test is repeated on two further sample panels drawn at random and considered satisfactory only if all the new results are within the permissible limits.

10 - CERTIFICATION

Subject to the satisfactory outcome of the tests and checks in the preceding items, RINA will issue a Type-approval Certificate showing, inter alia, the composition, thicknesses and mechanical characteristics (tensile and bending strengths).

11 - PERIOD OF VALIDITY OF TYPE-APPROVAL

The type-approval has three-year validity and may be renewed on expiry according to the procedure stipulated in item 13.

12 - LOSS OF TYPE-APPROVAL

The type-approval issued by RINA lapses automatically if the manufacturer modifies the composition and/or the fabrication process of the marine plywood such that the characteristics of the latter are altered, without notifying RINA.

The type-approval may also lapse in the event of variation in the provisions according to which the Type-approval Certificate was issued.

13 - PROCEDURES AND TESTS FOR RENEWAL OF TYPE-APPROVAL

Prior to the expiry of the type-approval, generally three months in advance, the Interested Party may request renewal of the type-approval.

Where the fabrication process and materials used are unchanged with respect to the previous type-approval, such renewal will be issued subject to the satisfactory outcome of a new workshop survey and the repetition of the tests provided for in item 7 (d).

In the event of alterations to the fabrication process and/or the use of materials other than those indicated at the previous type-approval, all the tests in item 7 may be required to be repeated.

Subject to the satisfactory outcome of the checks above, a new Type-approval Certificate will be issued.

TABLE 1
BASIC PHYSICAL/MECHANICAL CHARACTERISTICS OF TIMBERS FOR CONSTRUCTION

Commercial name	Origin [1]	Botanical name [2]	Mass density (kg/m ³)	Natural durability [3]	Ease of impregnation [3]	Mechanical characteristics [4]			
						R _f (N/mm ²)	E _t (N/mm ²)	R _c (N/mm ²)	R _s (N/mm ²)
DOUSSIE'	Africa	Afzelia spp	800	A	4	114	16000	62	14,0
IROKO	Africa	Chlorophora excelsa	650	A/B	4	85	10000	52	12,0
KHAYA	Africa	Khaya spp	520	C	4	74	9600	44	10,0
MAKORE'	Africa	Tieghemella spp	660	A	4	86	9300	50	11,0
MOGANO	America	Swietenia spp	550	B	4	79	10300	46	8,5
OKOUME'	Africa	Aucoumea Kleineana	440	D	3	51	7800	27	6,7
OLMO	Europa	Ulmus spp	650	D	2/3	89	10200	43	11,0
QUERCIA	Europa	Quercus robur e Q. petraea	710	B	4	125	15600	68	13,0
SAPALI	Africa	Entandrophragma cylindricum	650	C	3	105	12500	56	15,7
SIPO	Africa	Entandrophragma utile	640	B/C	3/4	100	12000	53	15,0
TECK	Asia	Tectona grandis	680	A	4	100	10600	58	13,0
WHITE OAK	America	Quercus spp	730	B/C	4	120	15000	65	12,6
CASTAGNO	Europa	Castanea spp	600	B	4	59	8500	37	7,4
CEDAR	America	Thuja plicata	380	B/C	3	51	7600	31	6,8
(Western Red) DOUGLAS FIR	America	Pseudotsuga menziesil	500	C/D	3/4	85	13400	50	7,8
LARICE	Europa	Larix decidua	550	C/D	3/4	89	12800	52	9,4

ABBREVIATIONS AND NOTES

Abbreviations:

Natural durability

A = very durable

B = durable (maximum permissible thickness for the fabrication of marine plywood 5 mm)

C = not very durable (maximum permissible thickness for the fabrication of marine plywood 2,5 mm)

D = not durable (maximum permissible thickness for the fabrication of marine plywood 2 mm)

Ease of treatment for impregnation

1 = permeable

2 = not very resistant

3 = resistant

4 = very resistant

NOTES :

[1] Area of natural growth

[2] Unified botanical name (spp = different species)

[3] Level of natural durability and ease of treatment for impregnation according to Standard EN 350/2

[4] Mechanical characteristics with 12% moisture content, source: Wood Handbook: wood as an engineering material - 1987, USDA

- Ultimate flexural strength, R_f (strength concentrated amidships)
- Bending modulus of elasticity, E_t (strength concentrated amidships)
- Ultimate compression strength, R_c (parallel to the grain)
- Ultimate shear strength, R_s (parallel to the grain)