



RULES FOR THE CLASSIFICATION OF FAST PATROL VESSELS

Effective from 1 January 2016

Part D

Material and Welding

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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 authorized 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 certificate on 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 authorization 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.

EXPLANATORY NOTE TO PART D

1. Reference edition

The reference edition for Part D is this edition effective from 1 January 2016.

2. New editions after the reference edition

Except in particular cases, a new edition of the Rules is published annually.

3. Effective date of the requirements

3.1 All requirements in which new or amended provisions with respect to those contained in the reference edition have been introduced are followed by a date shown in brackets.

3.2 The date shown in brackets is the effective date of entry into force of the requirements as amended by the last updating. The effective date of all those requirements not followed by any date shown in brackets is that of the reference edition.

4. Rule Variations and Corrigenda

Until the next edition of the Rules is published, Rule Variations and/or corrigenda, as necessary, will be published on the TASNEEF web site (www.tasneef.ae). Except in particular cases, paper copies of Rule Variations or corrigenda are not issued.

5. Rule subdivision and cross-references

5.1 Rule subdivision

The Rules are subdivided into six parts, from A to F.

Part A: Classification and Surveys

Part B: Hull and Stability

Part C: Machinery, Systems and Fire Protection

Part D: Materials and Welding

Part E: Service Notations

Part F: Additional Class Notations

Each Part consists of:

- Chapters
- Sections and possible Appendices
- Articles
- Sub-articles
- Requirements

Figures (abbr. Fig) and Tables (abbr. Tab) are numbered in ascending order within each Section or Appendix.

5.2 Cross-references

Examples: Pt A, Ch 1, Sec 1, [3.2.1] or Pt A, Ch 1, App 1, [3.2.1]

- Pt A means Part A

The part is indicated when it is different from the part in which the cross-reference appears. Otherwise, it is not indicated.

- Ch 1 means Chapter 1

The Chapter is indicated when it is different from the chapter in which the cross-reference appears. Otherwise, it is not indicated.

- Sec 1 means Section 1 (or App 1 means Appendix 1)

The Section (or Appendix) is indicated when it is different from the Section (or Appendix) in which the cross-reference appears. Otherwise, it is not indicated.

- [3.2.1] refers to requirement 1, within sub-article 2 of article 3.

Cross-references to an entire Part or Chapter are not abbreviated as indicated in the following examples:

- Part A for a cross-reference to Part A
- Part A, Chapter 1 for a cross-reference to Chapter 1 of Part A.

6. Summary of amendments introduced in the edition effective from 1st January 2016.

This edition of the Rules for the classification of Fast Patrol Vessels is considered as a reference edition for future amendments.

RULES FOR THE CLASSIFICATION OF FAST PATROL VESSELS

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Part D
Materials and Welding

Chapter 1
GENERAL REQUIREMENTS

SECTION 1 MANUFACTURE, INSPECTION, CERTIFICATION

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SECTION 1

MANUFACTURE, INSPECTION, CERTIFICATION

1 General

1.1 Application

1.1.1 Part D specifies in Chapter 2 to Chapter 4 the requirements for the manufacture, inspection and certification of steel and iron products, non-ferrous metals, various finished products and equipment such as propellers, pressure bottles, anchors, chain cables, ropes and sidescuttles, entering in the construction or repair of ships which are surveyed for Tasneef classification purposes.

The general requirements relevant to the manufacture, inspection and certification of the above-mentioned materials and products, hereafter generally referred to as "products", are given in this Chapter 1 and are to be complied with as applicable.

The requirements of Chapter 1 are also applicable, as appropriate, to products covered by other parts of the Rules.

Part D specifies in Chapter 5 the requirements for approval of welding consumables and qualification of welding procedures.

1.1.2 In addition to Part D, the requirements given for certain materials, procedures and products in the other Parts of the Rules or specified on the approved plans, are also applicable, where appropriate.

1.1.3 Products subject to the requirements of Part D and the relevant testing operations are those laid down in the relevant Rules of Tasneef dealing with the design, inspection at works and testing of products, unless otherwise specified.

1.1.4 Products with properties departing appreciably from those covered by the Rules may be used with the approval of Tasneef.

1.2 Other specifications

1.2.1 Products complying with international, national or proprietary specifications may be accepted by Tasneef, provided such specifications give reasonable equivalence to the requirements of these Rules or are approved for a specific application.

Such products, when accepted, are designated by their standard identification mark or as agreed at the time of the approval.

Unless otherwise agreed, inspection and certification of products complying with other specifications are to be carried out in accordance with the requirements of the Rules.

1.3 Information to be supplied by the purchaser

1.3.1 The purchaser is to provide the Manufacturer with the information necessary to ensure that products are tested in accordance with these Rules; optional or additional conditions are also to be clearly indicated.

2 Manufacture and quality

2.1 General

2.1.1 Manufacture

Manufacturers and their individual works are to be recognised by Tasneef for the type of products fabricated

To this end plants, production and treatment procedures, testing machines, laboratories for analyses, internal control systems and personnel qualification are to be suitable in the opinion of Tasneef.

Manufacturing procedures and techniques are to be such as to reasonably ensure constant compliance of the product with the requirements.

Where tests and analyses are performed by external laboratories or third parties, these are to be recognised by Tasneef.

2.1.2 Approval

Depending on the type and importance of the products being supplied, the relevant manufacturing process may be required to be approved and approval tests performed for the purpose.

When approval of the manufacturing process is required, such condition is specified in the rule requirements relevant to the various products.

The provisions for the approval of Manufacturers are given in the "Rules for the approval of Manufacturers of materials".

2.1.3 Responsibility

Irrespective of the interventions of Tasneef, the Manufacturer is entirely and solely responsible for compliance of the supplied products with the stipulated requirements.

Tasneef assumes no liability by its testing interventions in respect of the compliance of a tested product with the stipulated regulations and requirements.

Where, in the course of manufacture or after supply, a product is found not to be in compliance with the requirements or to present unacceptable defects, it will be rejected, irrespective of any previous satisfactory test results.

2.2 Chemical composition

2.2.1 The chemical composition is to be determined and certified, as a rule, by the Manufacturer using ladle sampling analysis. The laboratory is to be adequately equipped and the analyses are to be performed by qualified personnel .

2.2.2 The analyses of the Manufacturer are generally accepted subject to occasional checks, if required by Surveyor. When checks on the product are required, they are to be performed and the results evaluated in accordance with recognised standards.

2.3 Condition of supply

2.3.1 Unless otherwise agreed, the products are to be supplied in the finished condition as per rules, including heat treatment if required.

Heat treatment is to be carried out in suitable and efficient furnaces, fitted with appropriate means for temperature control and recording.

The furnaces employed are to have a size sufficient to allow a uniform increase in temperature up to the required value of the whole furnace charge to be heat treated. In the case of very large parts, alternative systems proposed are to be agreed by Tasneef.

Sufficient thermocouples are to be connected to the furnace charge to measure and record its temperature and check that it is adequately uniform, unless the temperature uniformity of the furnace is verified at regular intervals.

2.4 Identification of products

2.4.1 In the course of manufacturing, inspection and testing, the identification of the various products in respect of their origin is to be ensured as required.

To this end the Tasneef Surveyor is to be given all facilities for tracing the products when required.

3 Inspection and testing

3.1 General conditions

3.1.1 As a rule, the inspections and tests are to be carried out at the Manufacturer's works before delivery.

If the necessary facilities are not available at the Manufacturer's works, the testing is to be carried out at a recognised testing laboratory.

3.1.2 Where the testing is allowed to be carried out or completed at works other than the Manufacturer's it is in any case to be possible to trace back with certainty to the documentation of the origin.

3.1.3 Interested parties are to apply for inspection in adequate time.

Prior to the inspection and testing, the Manufacturer is to provide the Surveyor with details of the orders, technical specifications and any special condition additional to the rule requirements.

3.1.4 The Surveyors are to have free access to all departments involved in production, collection of test samples, internal control and, in general, all operations concerning the inspection .

They are to be supplied with the information necessary to assess whether production and tests are performed according to the rule requirements .

3.1.5 All tests and checks required by the Rules are to be carried out in the presence of the Surveyors or, when expressly agreed with Tasneef, in the presence of the person responsible for internal control, specially delegated for this purpose .

The inspection and testing activities may be delegated to the Manufacturer under the conditions given in [3.2].

3.1.6 The tests required are to be performed by qualified personnel in accordance with the procedures stated by the Society or, failing this, with recognised national or international standards .

The testing and measuring equipment is to be adequate, maintained in proper condition and regularly calibrated, as required; the record of such checks is to be kept up-to-date and made available to the Surveyor .

3.2 Alternative inspection scheme

3.2.1 Alternative procedures to the systematic intervention of the Surveyor for testing may be adopted by Manufacturers specially recognised by Tasneef for the purpose.

Such alternative inspection schemes, which are determined by taking into account the type of product, its mass production and the effectiveness of the certified Quality System implemented in the workshop, allow the testing operations indicated in these Rules to be totally or partially delegated to the Manufacturer.

Indications on the field of application of such schemes, along with conditions and procedures for their recognition, are given by Tasneef in a separate document

3.3 Sampling for mechanical tests

3.3.1 The test samples are to be selected by the Surveyor or by a responsible person from the Manufacturer's staff, specially delegated, and are to be suitably marked for identification purposes.

3.3.2 The test samples are to be representative of the unit or lot of material which they are relevant to and are therefore also to have been subjected to the same heat treatment as the products except when a different procedure is agreed with Tasneef .

3.3.3 For the purpose of test sampling the following definitions apply:

- a) unit: single forging, casting, plate, tube or other single product,
- b) rolled unit: product rolled from the same slab or billet or, when rolling proceeds directly from ingots, from the same ingot,
- c) batch: number of similar units or rolled units presented as a group for acceptance testing, on the basis of the tests to be carried out on the test sample,
- d) sample: a sufficient quantity of material taken from the unit, rolled unit or batch, for the purpose of producing one or more test specimens ,
- e) test specimens: part of sample with specified dimensions and conditions for submission to a given test.

3.4 Mechanical tests

3.4.1 The mechanical tests are to be carried out in the presence of the Surveyor unless otherwise agreed; see [3.2].

3.4.2 For the check of the mechanical properties of the material, test methods and specimens in compliance with the requirements of Sec 2 are to be used .

3.4.3 The type of tests, the number and direction of the test specimens and the results of the tests are to comply with the requirements relevant to the type of product, as indicated in the various Articles.

3.5 Re-test procedures

3.5.1 General

Where the unsuccessful outcome of any test is attributable to defective machining of the test specimen and/or to improper test procedure, the negative result is disregarded and the test repeated, in correct conditions, on a substitute test specimen .

Where a test, other than an impact test, gives a result which is not in compliance with the requirements, two additional tests may be allowed to be performed on specimens of the same type taken from the same samples. For the purpose of acceptance, both tests are to comply with the requirements.

For the impact test, performed on a set of three test specimens, where the average value of the set does not comply with the required value, provided that not more than two test results are less than such value, with not more than one less than 70% of it, a second test may be allowed to be performed on three test specimens of the same type taken from the same samples .

For acceptance, the new average, calculated on the basis of the six results of the first and second sets of three test specimens taken together, is to comply with the required value, not more than two individual values are to be lower than the required average and, of these, not more than one is to be less than 70% of it .

3.5.2 Rejection or reconsideration

Where unsatisfactory results are obtained from re-tests representative of one lot of material, the unit from which the test specimens are taken is rejected

The remainder of the lot may, at the discretion of the Surveyor, be reconsidered by performing the required tests on at least two different units; for acceptance, both the results of the new tests are to satisfy the requirements

Otherwise, upon agreement with the Surveyor, the individual units composing the lot may be tested individually and those found satisfactory may be accepted.

The Manufacturer may resubmit for testing previously rejected material, after a suitable heat treatment or reheat treatment, or resubmit it under a different grade .

The Surveyor is to be notified of such circumstances

Unless otherwise agreed by the Surveyor, only one new heat treatment is permitted for material which has already been heat treated .

3.6 Visual, dimensional and non-destructive examinations

3.6.1 General

The products are to be subjected to:

- a) visual examination,
- b) dimensional check,
- c) non-destructive examination, when applicable.

The above operations, to be effected on products in appropriate conditions, are carried out under the responsibility of the Manufacturer and are to be witnessed or repeated in the presence of the Surveyor when required by the Rules or, in any case, when it is deemed necessary by the Surveyor .

When, following examinations and tests, there are grounds for thinking a product may be defective, the Manufacturer is obliged, for the purpose of acceptance, to demonstrate its suitability using procedures deemed necessary .

3.6.2 Visual examination

Visual examination, unless otherwise specified, is performed by the Surveyor on each unit, for products tested on individual units and, randomly or on the units submitted to mechanical tests, for products tested by lot.

3.6.3 Dimensional check

The dimensional checks and verification of compliance with approved plans are carried out by the Surveyor, as deemed necessary, solely for those parts subject to approval, or where expressly required in Part D or other parts of the Rules .

3.6.4 Non-destructive examination

Non-destructive examination is to be performed by skilled and qualified personnel, using calibrated equipment of suitable type and according to approved procedures, recognised standards and the requirements of Tasneef

The Manufacturer's laboratory or other organisation responsible for the non-destructive examination is required to issue, on its own responsibility, a certificate illustrating the results and, where requested, an opinion concerning the acceptability of the product; in the latter case, the certificate is to be countersigned by the Manufacturer.

For the radiographic test suitable means are to be provided in order to identify the zones examined and the relevant radiographic films .

The various steps of the examinations are to be witnessed by the Surveyor when required. In such case the certificates are generally to be countersigned by the witnessing Surveyor .

3.7 Repairs of defects

3.7.1 Small surface defects may be suitably removed by grinding or other appropriate means, provided that the dimensional tolerances, prescribed for the various products in the relevant Articles, are complied with .

The repaired zone is to be found free from defects and to be acceptable in the opinion of the Surveyor.

3.7.2 Repairs by welding may be accepted only where this is not in contrast with the requirements applicable to the product, and provided that they are deemed suitable in connection with the material, extent of defects and welding procedure.

The repair procedure is to be previously agreed upon with the Surveyor.

4 Identification and certification

4.1 Identification and marking

4.1.1 General

During the inspection, a detailed record of the products to be tested is to be submitted to the Surveyor with indication of the necessary data, as applicable:

- a) name of purchaser and order number ,
- b) hull number or destination ,
- c) number, size and mass of parts or batches,
- d) cast number and chemical composition ,
- e) part reference number, detail of manufacturing process and heat treatment,
- f) condition of supply.

4.1.2 Manufacturer's marking

Products, which have satisfactorily undergone the required inspection and tests are to be appropriately marked by the Manufacturer in at least one easily accessible location.

The marking is to contain all necessary indications, as specified in the Articles relevant to the various products, and is to correspond to the content of the inspection documentation.

The marks are to be stamped, as a rule, by means of brands, except when products could be impaired by such a system. When paints or other reliable alternatives are adopted, adequate duration of marking is to be ensured.

For small pieces contained in effective containers, as well as bars and sections of modest weight, adequately bound in bundles, the marks are transferred to the container, label or top item of each bundle to the Surveyor's satisfaction.

4.1.3 Marking with Tasneef brand

The products satisfactorily inspected in accordance with the Rules are to be marked with Tasneef brand in the presence of the Surveyor unless otherwise agreed between Manufacturer and Surveyor.

All other additional marks required are specified in the applicable Articles depending on the products (e.g. name or initials of Manufacturer, material, grade and cast number, code for calendar year, running file number and code of the local office inspection, Surveyor's personal brand, TP as statement of hydrostatic test.

4.1.4 Society marking for incomplete inspection

Whenever a product is despatched for delivery or is to be marked without undergoing all the inspections and tests required (whether by the provisions of Part D or those of other parts of the Rules), Tasneef brand will be replaced by Tasneef's mark for incomplete inspection.

The testing documents are to contain clear indications of all outstanding inspections and tests and specify the reason why they have not been performed.

Upon satisfactory completion of all required tests, the product is to be stamped with Tasneef brand.

4.1.5 Invalidation of Tasneef brand

When a product already marked with one of Tasneef stamps is found during or subsequent to the testing not to be in compliance with the requirements and is therefore rejected, the previously stamped marks are to be invalidated by punching them .

The Surveyors may request to check the invalidation effected.

Any repairs after the product is tested are subject to the prior consent of Tasneef; failing this, the validity of the original testing will automatically expire and the original testing marks are to be invalidated by the interested parties.

4.1.6 Tasneef brand for alternative inspection scheme

In the case of admission to an alternative inspection scheme, the marking with Tasneef brand may be delegated to the Manufacturer, who will be supplied with the special brand to be used for this purpose.

4.2 Documentation and certification

4.2.1 Tasneef inspection certificate

For products tested with satisfactory results, Tasneef issues an inspection certificate signed by the Surveyor stating that the products have been tested in accordance with Tasneef Rules.

This certificate is identified by the letter C for ease of reference in the various parts of the Rules.

An inspection certificate issued by the Manufacturer is to be attached to Tasneef certificate and is to include, as applicable, the following particulars:

- a) Manufacturer's name,
- b) purchaser's name, order number and hull number,
- c) description of the product, dimensions and weight,
- d) results of all specified inspections and tests, including non - destructive tests where applicable,
- e) identification and testing marks stamped on the products

In the case of testing of materials, the following particulars are also to be included

- identification of specification or grade of material,

- identification of the heat and relevant chemical analysis,
- identification of the heat and relevant chemical analysis
- working and manufacturing procedure (for rolled products intended for hull, boilers and pressure vessels only,
- declaration that the material has been made by an approved process, as applicable, and that it has been subjected with satisfactory results to the tests required by the Rules .

By agreement with Tasneef, the inspection certificate issued by the Manufacturer may be directly confirmed by endorsement with Tasneef brand and the signature of the Surveyor.

For products manufactured in large quantities and tested by heats or by lot, the Manufacturer is to further state, for the individual supplies, that the products have been produced according to Tasneef Rules.

4.2.2 Tasneef inspection certificate for alternative inspection scheme

For products covered by the alternative inspection scheme, unless otherwise stated in the admission to the alternative inspection scheme, the Manufacturer is to issue a Certificate of Conformity on the appropriate Tasneef form.

This certificate is identified by the letter CA (certificate for alternative survey) for ease of reference in the various parts of the Rules.

The inspection certificate issued by the Manufacturer and including all the information required in [4.2.1] is to be attached to the (CA) certificate .

The certificate is to be submitted to Tasneef for endorsement according to the procedures stated in the agreement for the alternative survey scheme.

4.2.3 Works' certificates

For products which in accordance with the relevant rules may be accepted only on the basis of a certificate of conformity issued by the Manufacturer, stating the results of the tests performed, such certificate is to contain the information required under [4.2.1], as applicable.

This certificate of conformity is identified by the letter W (works' certificate) for ease of reference in the various parts of the Rules.

For particular products it may be accepted that the tests or inspections are carried out by the Manufacturer not on the product supplied, but on the current production

In this case the certificate of conformity is identified by the letter R (report) for ease of reference in the various parts of the Rules.

SECTION 2

TESTING PROCEDURES FOR MATERIALS

1 General

1.1.1 The testing procedures, testing machines and the preparation of test specimens are to be as requested in Part D, Ch 1, Sec 2 of TASNEEFMIL.

1.1.2 Different procedures can be accepted by Tasneef, at its discretion, if submitted and agreed in advance with Tasneef.

Part D
Material and welding

Chapter 2
STEEL AND IRON PRODUCTS

- SECTION 1 ROLLED STEEL PLATES, SECTIONS AND BARS**
- SECTION 2 STEEL PIPES AND FITTINGS**
- SECTION 3 STEEL FORGINGS**
- SECTION 4 STEEL CASTINGS**
- SECTION 5 IRON CASTINGS**

SECTION 1

ROLLED STEEL PLATES, SECTIONS AND BARS

1 General

1.1.1 The hot rolled plates, strips, sections and bars intended for hull, structural application, pressure vessels and parts of machinery are to meet the requirements of Part D, Ch 2, Sec 1 of TASNEEFMIL.

SECTION 2

STEEL PIPES, TUBES AND FITTINGS

1 General

1.1.1 The seamless and welded pipes, tubes and fittings for pressure vessels and systems operating at ambient, high or low temperature, are to have the characteristics and to be tested according the requirements in Part D, Ch 2, Sec 2 of TASNEEFMIL.

SECTION 3

STEEL FORGINGS

1 General

1.1.1 The steel forgings intended for hull, structural application, machinery, pressure vessels and piping systems are to have the characteristics and to be tested according the requirements in Part D, Ch 2, Sec 3 of TASNEEFMIL.

SECTION 4

STEEL CASTING

1 General

1.1.1 The steel castings intended for hull, structural applications, machinery, pressure vessels and piping system are to have the characteristics and to be tested according the requirements in Part D, Ch 2, Sec 4 of TASNEEFMIL.

SECTION 5 IRON CASTINGS

1 General

1.1.1 The iron castings intended for structural applications, machinery, pressure vessels and piping system are to have the characteristics and to be tested according the requirements in Part D, Ch 2, Sec 5 of TASNEEFMIL.

Two types of iron castings are considered: grey lamellar graphite (GG) and the spheroidal graphite (SG)

The use of cast iron components and the type of cast iron permitted are either regulated by the sections of the Rules relevant to the construction of the above mentioned components, or stipulated in each case.

Part D
Materials and Welding

Chapter 3
NON FERROUS METAL

SECTION 1 COPPER AND COPPER ALLOY

SECTION 2 ALUMINIUM ALLOY

SECTION 1

COPPER AND COPPER ALLOY

1 General

1.1.1 The requirements of this Section apply in addition to those of Chapter 1 and Chapter 2 to copper and copper alloy tubes and castings..

The requirement for propeller and propeller blade castings are given in Ch 4, Sec 2.

1.1.2 Copper alloy and products other than those indicated in this Section complying with national or international standards or proprietary specifications deemed equivalent to these requirements may be accepted subject to the approval of Tasneef.

1.1.3 Where welding is envisaged, procedures and preparations for the welded joints are to be submitted for approval.

2 Copper alloy

2.1.1 The characteristics and tests of the copper alloy intended for different application, except for propeller blade castings or propeller, The iron castings intended for structural applications, machinery, pressure vessels and piping system are to have the characteristics and to be tested according the requirements in Part D, Ch 2, Sec 5 of TASNEEFMIL are to met the requirements of Part D, Ch 3, Sec 1 of TASNEEFMIL.

SECTION 2

ALUMINIUM ALLOYS

1 General

1.1 Application

1.1.1 General

The requirements of this Section apply to wrought aluminium alloys, rivets, transition joints (bimetal and cast aluminium alloys).

1.1.2 Other standards

Alloys and tempers other than those defined in Articles [2], [3], [4] and [5] in Part D, Ch 3, Sec 2 of TASNEEFMIL and which comply with national or international standards or proprietary specifications deemed equivalent to these requirements, may be accepted with the agreement of Tasneef.

1.1.3 Weldability Saldabilità

Except for rivets, aluminium products in accordance with these Rules are weldable using suitable welding processes and, where appropriate, subject to any conditions stated at the time of approval.

1.2 Manufacture

1.2.1 Manufacturing process

Manufacturing processes and heat treatments suitable to obtain products having the specified quality and properties are, in principle, left to the discretion of the Manufacturer.

1.2.2 Approval

The manufacturing and treatment processes and the control systems are to be approved by Tasneef for individual Manufacturers. To this end, detailed information is to be submitted to Tasneef and, as a rule, checks and tests are required depending on the importance of the product and its intended use.

1.2.3 Quality of material

All products are to have a workmanlike finish and be free from defects, surface or internal imperfections, segregation and non-metallic inclusions which may impair their proper workability and use .

2 Wrought aluminium alloy products (plates, bars, sections and tubes)- Castings -

2.1 Application

The characteristics and tests of the wrought and castings aluminium alloy intended for the construction of hulls and other marine structures are to meet the requirements of Part D, Ch 3, Sec 2 of TASNEEFMIL.

3 Rivets

3.1 General

3.1.1 The characteristics and tests of the aluminium alloy rivets intended for use in the construction of marine structures are to meet the requirements of Part D, Ch 3, Sec 2 of TASNEEFMIL.

4 Transition joints

4.1 General

4.1.1 The characteristics and tests of the transition joints, explosion bonded composite aluminium/steel transition joints, used for the connection of aluminium alloy structures to steel structures are to meet the requirement of Part D, Ch 3, Sec 2 of TASNEEFMIL.

Part D
Materials and Welding

Chapter 4
MISCELLANEOUS EQUIPMENT

SECTION 1 EQUIPMENT

SECTION 2 VARIOUS FINISHED PRODUCTS

SECTION 1 EQUIPMENT

1 Anchors

1.1 General

1.1.1 The anchors and associated components (heads, shanks and shackles) made of cast or forged steel, or fabricated by welding from rolled steel, are to be designed, manufactured and tested according to requirements of Part D, Ch 4, Sec 1 of TASNEEFMIL.

2 Stud link chain cables, studless chain cables and accessories

2.1 General

2.1.1 The design, manufacture and test of stud and studless chain cables and relevant accessories intended for naval use are to meet the requirements of Part D, Ch 4, Sec 1 of TASNEEFMIL.

3 Steel wire ropes and fibre ropes

3.1 General

3.1.1 Fibre ropes and unalloyed steel wire ropes, round stranded, intended for warping, towing, rigging and similar applications, are to be manufactured and tested according to the requirement in Part D, Ch 4, Sec 1 of TASNEEFMIL.

4 Side scuttles, windows and their glass panes

4.1 General

4.1.1 The fixed frames, window frames, dead covers and glass panes are to be manufactured and tested according to the requirement in Part D, Ch 4, Sec 1 of TASNEEFMIL.

4.1.2 The side scuttles and windows are to be manufactured in conformity to drawings approved by Tasneef or in conformity to national or international standard recognized by Tasneef.

SECTION 2

VARIOUS FINISHED PRODUCTS

1 Cast copper alloy propellers and propeller blades

1.1 General

1.1.1 The moulding, casting, inspection, testing and repair procedures of new cast copper alloy propeller, blades and bosses are to meet the requirements of Part D, Ch 4, Sec 2 of TASNEEFMIL.

1.1.2 These requirements may also be applied for the repair and inspection of propellers which become damaged during service.

2 Pressure bottles

2.1 General

2.1.1 The seamless pressure bottles in carbon, carbon manganese and alloy steels, and the are to be manufactured and tested according the requirements in Part D, Ch 4, Sec 2 of TASNEEFMIL.

Seamless bottles are mainly used for carbon dioxide systems and welded bottles for portable fire extinguishers..

Steel grades to be used for the manufacture are to comply with those specified in Part D, Ch 2 of TASNEEFMIL as applicable or with recognised standards.

3 Cast steel propellers and propeller blades

3.1 General

3.1.1 Moulding ,casting, inspection and repair procedure of cast steel propellers, blades and bosses are to be according to requirements of Part D, Ch 4, Sec 2 of TASNEEFMIL.

3.1.2 Where the use of alternative alloy is proposed, particulars of chemical composition, mechanical properties and heat treatment are to be submitted for approval.

3.1.3 These requirements may also be used for the repair and inspection of propellers which become damaged during service, subject to prior agreement with Tasneef. The characteristics and tests of.

Part D
Materials and Welding

Chapter 5
WELDING

- SECTION 1 GENERAL REQUIREMENTS**
- SECTION 2 APPROVAL OF WELDING CONSUMABLE**
- SECTION 3 APPROVAL OF OVER WELDABLE SHOP PRIMERS**
- SECTION 4 APPROVAL OF WELDING PROCEDURES**
- SECTION 5 APPROVAL OF CO₂ LASER WELDING PROCEDURES**

SECTION 1

GENERAL REQUIREMENTS

1 Application

1.1 General

1.1.1 This Chapter specifies the general requirements for fabrication by welding, in Sec 1, Sec 2 concerns the requirements for approval of welding consumables, Sec 3, specifies the requirements for approval of over weldable shop primers while Sec 4 and Sec 5 specify the requirements for the welding procedures.

1.1.2 The requirements are essentially intended for the welding of weldable steels and aluminium alloy grades covered by the applicable Articles of Part D of the Rules.

1.1.3 Different materials, applications and procedures, as well as other standards and specifications, may be considered by Tasneef On a case-by case basis.

2 Fabrication by welding

2.1 General

2.1.1 Fabrication by welding is to be carried out in compliance with the applicable Tasneef Rules and according to normal good practice, general or specific to the individual process, to the Survey's satisfaction; in particular the condition stated at the time of approval and authorisation for the use of individual processes are to be complied with.

The welded structures, the relevant details and the size of welds are to comply with the requirements indicated on the approval plans or specified during survey of construction.

2.2 Approval

2.2.1 Welding procedures, consumables and tests are to meet the requirements of Part D, Ch 5, Sec 1 of TASNEEFMIL.

SECTION 2

APPROVAL OF WELDING CONSUMABLES

1 General

1.1.1 The requirements for the approval and periodical control tests of consumables for welding carbon and carbon manganese steels, high strength quenched and tempered steels, chromium and chromium-molybdenum steels, austenitic and austenitic-ferritic stainless steels and aluminium alloy are indicated in Part D, Ch 5, Sec 2 of TASNEEFMIL.

SECTION 3

APPROVAL OF OVER WELDABLE SHOP PRIMERS

1 General

1.1.1 Shop primers applied to plates and sections to be welded are to be submitted to tests to verify their suitability for welding in respect of their tendency towards porosity in fillet welds.

2 Procedure for approval

2.1.1 The procedure for approval and periodical control tests of weldable shop primers are quoted in Part D, Ch 5, Sec 3 of TASNEEFMIL.

SECTION 4

APPROVAL OF WELDING PROCEDURES

1 Application

1.1.1 General

The requirements for the approval of welding procedures for steel materials and for aluminium alloy are in Part D, Ch 5, Sec 4 of TASNEEFMIL.

The requirements relevant to materials not covered herein, are defined on case-by-case basis following, as far as applicable, the criteria specified in Part D, Ch 5, Sec 4 of TASNEEFMIL.

Provisions for approval of laser welding procedures of hull structural steels are given in Part D, Ch 5, Sec 4 of TASNEEFMIL.

1.1.2 Other standars and specifications Procedures considered equivalent by Tasneef may be accepted.

SECTION 5

APPROVAL OF CO₂ LASER WELDING PROCEDURES

1 General

1.1.1 The requirements for the approval of CO₂ laser welding procedure for butt and T-joints in hull construction are detailed in Part D, Ch 5, Sec 5 of TASNEEFMIL.

Part D
Materials and Welding

Chapter 6
PLASTIC MATERIALS

- SECTION 1 GENERAL REQUIREMENTS**
- SECTION 2 TESTS ON RESINS, REINFORCEMENTS AND COMPONENT**
- SECTION 3 TESTING PROCEDURES**
- SECTION 4 PLASTIC PIPES AND FITTINGS**

SECTION 1

GENERAL REQUIREMENTS

1 Application

1.1 General

1.1.1 Provision is made in this Chapter for the approval requirements for base materials used in the construction or repair of composite vessels, which are intended for classification purpose.

1.1.2 For such materials, the manufacturer's works do not require approval by Tasneef, provided that they have a Quality Control procedures certified by Tasneef or other recognized Society.

1.1.3 Where in the other Parts of this Rule a requirement exists for the material to be approved, the test requirements and information to be submitted for polymers, resins, reinforcements and associated materials are defined in Sec 2 and 3. As alternative requested indicated in "Rules for the type-approval of components of composite materials intended for hull construction" can be applied".

1.1.4 For Builders constructing composite vessels, Part B - Ch 4 -Sec 2 provides the minimum material control requirements acceptance of the works by Tasneef.

1.1.5 For "plastics material" it is mean an organic substance which may be thermosetting or thermoplastic and which, in its finished state, may contain reinforcements and/or additives.

1.2 Information on material quality and application

1.2.1 The manufacturer is to provide the shipyard with such information as is essential to ensure that the base materials are used with correct procedure according the product specification. Information about the check carried out at the shipyard are to be given.

1.3 Manufacture

1.3.1 Plastics products are to be made at works which have been recognized for the type of product being supplied using base materials that have been approved.

1.3.2 Base materials are to be approved in accordance with the requirements of Sections 2 and 3.

1.3.3 In order that a works can be approved the manufacturer is required to demonstrate to the satisfaction of Tasneef that the necessary manufacturing and testing facilities are available and are supervised by qualified personnel. A specified programme of tests is to be carried out under the supervision of the Tasneef Surveyors, and the results are to be to the satisfaction of Tasneef. When a manufacturer has more than one works, the approval is only valid for the individual works which carried out the test programme

1.4 Inspection and testing

1.4.1 Before final acceptance, all test materials are to be confirmed as typical of the manufactured product and be submitted to the specified tests and examinations to Surveyor' satisfaction. The results are to comply with the specification and any Rule requirements and are to be to the satisfaction of the Surveyors.

1.4.2 These specified tests and examinations are to be carried out prior to the dispatch of finished products from the manufacturer's works.

1.5 Alternative inspection and testing

1.5.1 Where materials are manufactured in quantity by semi-continuous or continuous processes, as foreseen at Chapter 1, Section 1, an alternative system for testing and inspection may be adopted, subject to the Tasneef agreement

1.5.2 The manufacturers are to comply with the requirements Chapter 1, Section 1.

1.6 Post-cure heating

1.6.1 Post-cure heating is to be carried out in properly ovens whose temperature is efficiently maintained and have adequate means for control and recording of temperature. The oven is to be such as to allow the whole "product" to be uniformly heated to the necessary temperature.

In the case of very large components which require post-cure heating, alternative methods will be specially considered

1.7 Test material

1.7.1 Sufficient material is to be provided for the preparation of the test specimens detailed in the specific requirements. It is, however, in the interests of manufacturers to foresee additional material for any re-tests which may be necessary, in case some specimens do not overcome the tests and consequently material rejection.

1.7.2 The samples for testing are to be prepared under conditions that are as close as possible to those under which the product will be used. Where this is not possible, a suitable procedure is to be agreed with Tasneef.

1.7.3 During production, check test samples are to be provided as requested by the Surveyor.

1.7.4 In case the taking of these samples is not possible, model samples are to be prepared concurrently with production. The procedure for the preparation of these samples is to be agreed with the Surveyor.

1.7.5 The dimensions, number and orientation of test specimens are to be in accordance with the requirements of a National or International Standard acceptable to Tasneef.

1.8 Repairs of defects

1.8.1 Small surface blemishes may be removed by mechanical means (grinding) provided that, after such treatment, the dimensions are acceptable, the area is proved free from defects and is considered acceptable by Surveyor.

1.8.2 Repair procedures for larger defects are to be agreed with Tasneef in advance.

1.9 Identification of products and base materials

1.9.1 The manufacturer of plastics products is to adopt a system of identification which will enable all finished products to be traced to the original batches of base materials

SECTION 2

TESTS ON RESINS, REINFORCEMENTS AND COMPONENT

1 Scope

1.1.1 This Section gives the tests and data required by Tasneef for approval of the following materials:

- a) Thermoplastic polymers.
- b) Thermosetting resins.
- c) Reinforcements.
- d) Reinforced thermoplastic polymers.
- e) Reinforced thermosetting resins.
- f) Core materials (balsa wood, rigid foams).
- g) Plywoods..
- h) Adhesive and sealant materials.
- i) Repair compounds.

2 Thermoplastic polymers

2.1.1 The following data is to be provided by the manufacturer for each thermoplastic polymer:

- a) Melting point.
- b) Melt flow index.
- c) Density.
- d) Filler content, if foreseen.
- e) Pigment content, if foreseen.
- f) Colour.

2.1.2 Samples for testing are to be prepared by moulding or extrusion under the polymer manufacturer's recommended conditions.

2.1.3 The following tests are to be carried out on these samples

- a) Tensile stress at yield and break.
- b) Modulus of elasticity in tension.
- c) Tensile strain at yield and break.
- d) Compressive stress at yield and break.
- e) Compressive modulus.
- f) Temperature of deflection under load.
- g) Water absorption.

3 Thermosetting resins

3.1.1 The data listed in Table 1 is to be provided, in general, by the manufacturer for each thermosetting resin.

3.1.2 Cast samples are to be prepared in accordance with the manufacturer's recommendations and are to be cured and post-cured in a manner consistent with the intended use. The curing system used and the ratio of catalyst to resin are to be recorded.

3.1.3 The following values are to be determined using these samples:

- a) Ultimate tensile strength.
- b) Tensile strain at maximum load.
- c) Temperature of deflection under load.
- d) Temperature of deflection under load.
- e) Temperature of deflection under load.
- f) Volume shrinkage after cure.
- g) Density of cast resin.

3.1.4 In addition, for gel coat resins, the stress at break and modulus of elasticity in flexure are to be determined.

4 Reinforcements

4.1.1 The following data is to be provided, where applicable, according to the type of reinforcement, for each type of reinforcement:

- a) Reinforcement type.
- b) Diameter and length of fibres.
- c) Type of dressing and bonding for fibre treatment.
- d) Linear mass or mass per area.
- e) Moisture content.
- f) Solubility in styrene.
- g) Content of combustible materials
- h) Compatibility (e.g. suitable for polyesters, epoxides, etc.)
- i) Tensile strength
- j) Resistance to temperature.
- k) Surface treatment, in particular against oxidation.

4.1.2 Tests of the mechanical properties are to be made on laminate samples containing the reinforcement and prepared as follows:

- a) An approved resin of suitable type is to be used;
- b) A minimum of three layers of the reinforcement is to be laid with parallel ply to give a laminate having a thickness between 3 and 4 mm;
- c) For glass reinforcements, the glass/resin ratios, by weight, as shown in Table 2 are to be used
- d) For reinforcement type other than glass, a fibre volume fraction, as shown in Table 3, is to be used.

4.1.3 The following tests as defined in Section 3 are to be made on the samples::

- a) Tensile strength (for carbon-graphite fibres, tensile tests are to be performed also on specimens after immersion in fresh water at a temperature of 50°C +/-2 for 25 days.
- b) Tensile strain at break.
- c) Compressive strength.
- d) Compressive modulus.
- e) Flexural strength.
- f) Modulus of elasticity in flexure.
- g) Interlaminar shear.
- h) Fibre content.
- i) Water absorption.

4.1.4 The laminate is to be tested in the directions indicated by Table 4.

5 Reinforced thermoplastic polymers

5.1.1 Thermoplastic polymers intended for use with reinforcements are to be tested in accordance with [2.1.1], [2.1.2] and [2.1.3].

5.1.2 A laminate is to be prepared using the polymer and an approved reinforcement in accordance with manufacturing information. The laminate is to be tested in accordance with the appropriate requirements of 4.1.3 Testing may be confined to one direction only.

6 Reinforced thermosetting plastic

6.1.1 Thermosetting resins intended for use with reinforcements are to be tested in accordance with [3.1.1], [3.1.2] and [3.1.3].

6.1.2 For laminating resins, a laminate is to be prepared using the resin and an approved reinforcement as follows:

- a) For polyester resins, chopped strand mat
- b) For epoxide or phenolic resins, a balanced woven roving.

6.1.3 The laminate is to be tested in accordance with [4.1.3] a), e) in one fibre direction only.

7 Core materials

7.1.1 The following data is to be provided for each type of core material:

- a) Type of material.
- b) Density.
- c) Description (block, scrim mounted, etc.).
- d) Thickness.
- e) Block/sheet dimensions.
- f) Surface treatment.

7.1.2 Manufacturers are required to provide a full application procedure for use of the product.

8 Specific requirements for balsa wood

8.1.1 The supplier is to provide a statement that the balsa (*Ochroma lozopus*) is of good quality, is chemically treated against attacks from moulds and insects, is oven dried immediately after being cut, is sterilized and homogenized and has an average humidity of 12%.

Where manufactured in formable sheets of small blocks, the support material (open scrim) and adhesive are to be compatible with the laminate resins:

8.1.2 The following tests are to be carried out on the material, both parallel to and perpendicular to the grain:

- a) Ultimate compressive strength and modulus of elasticity.
- b) Ultimate tensile strength and modulus of elasticity.
- c) Ultimate shear strength and modulus of elasticity
- d) Density.

9 Specific requirements for rigid expanded foams

9.1.1 For rigid expanded foam plastics it is intended to mean "Expanded Polyurethanes" (PUR) and "Polyvinylchloride" (PVC).).

9.1.2 The foam is to be of the closed cell type and compatible with the proposed resin system (e.g. polyester, epoxide, etc.).

9.1.3 Foams are to be of uniform cell structure and maintain a satisfactory level of resistance to temperature up to 60°C, and to have a low water absorption.

9.1.4 They are to be resistant to environmental agents (water, oil fuels, lube oils) and information is to be provided on the dimensional stability of the foam by measurement of the shrinkage.

9.1.5 The following test data is to be submitted for each type of foam:

- a. Density.
- b. Tensile strength.
- c. Tensile modulus of elasticity.
- d. Compressive strength.
- e. Compressive modulus of elasticity.

9.1.6 Core shear properties are to be determined according to the requirements of Section 3, [7].

10 Plywoods

10.1.1 All plywoods utilized for construction or repair of pleasure boats Intended for classification purpose are to be approved in accordance with Tasneef procedure showed in "Rules for the type-approval of marine plywood".

11 Adhesive and sealant materials

11.1.1 Materials of these types are to be accepted by Tasneef before use.

11.1.2 The requirements for acceptance are dependent on the nature and the application.

11.1.3 The manufacturer is to submit full details of the product, procedure for method of use, including surface preparation and the intended application.

11.1.4 Any acceptance will be limited to specific applications according to the instructions.

12 Repair compounds

12.1 Application

12.1.1 Materials used for repairs are to be accepted by Tasneef before use.

12.1.2 For acceptance purposes the manufacturer is to submit full product details, and user instructions, listing the types of repair for which the system is to be used.

12.1.3 Dependent on the proposed uses, Tasneef shall require some tests.

Table 1 : Data requirements for thermosetting resins

Data	Polyester/Vinylester	Epoxide	Phenolic
Specific gravity of liquid resin	YES	YES	YES
Viscosity	YES	YES	YES
Gel time	YES	YES	N.A.
Appearance	YES	YES	YES
Mineral content (1)	YES	YES	N.A. (2)
Volatile content	YES	N.A.	N.A.
Acid value	YES	N.A.	N.A.
Epoxide content	N.A.	YES	N.A.
Free phenol	N.A.	N.A.	YES
Free formaldehyde	N.A.	N.A.	YES
(1) This is the total filler in the system			
(2) If the resin is pre-filled, the mineral content is required			

Table 2 : Glass content by weight for different reinforcement types

Reinforcement type	Glass content
Unidirectional	0,60
Chopped strand mat	0,30
Woven roving, cloth	0,50
Continuous fibre with chopped strand mat	0,45
+,- 45°/Triaxial/quadriaxial stitched parallel plied roving	0,50

Table 3 : Content by volume for reinforcement different from glass

Reinforcement type	Content by volume (1)
Unidirectional	0,41
Chopped strand mat	0,17
Woven roving, cloth	0,32
+,- 45°/Triaxial/quadriaxial stitched parallel plied roving	0,32

(1) The weight fraction can be calculated by the formula:

$$W_f = V_f \cdot D_f / (D_f \cdot V_f + D_r \cdot V_r)$$
where:
 W_f fibre fraction by weight
 D_f density of fibre
 D_r density of resin
 V_f fibre fraction by volume
 V_r resin fraction by volume.

Table 4 : Fibre orientations in reinforced test Specimens

Reinforcement type	Text orientation
Unidirectional	0°
Chopped strand mat	Any direction
Woven roving, cloth, continuous fiber with chopped strand mat	0°/90°
+,- 45°/Triaxial/quadriaxial stitched parallel plied roving	0°/45°/90°/-45°

SECTION 3

TESTING PROCEDURES

1 General

1.1.1 This Section gives details of the test methods to be used for components of composite materials and for finished plastics products and any testing required in the construction of composite vessels information about this matter can be find also in "Rules for the type-approval of components of composite materials intended for hull construction

1.1.2 In general, testing is to be carried out by a competent independent laboratory recognized by Tasneef which, at its discretion, may or may not require witnessing by the Surveyor.

1.1.3 Alternatively, testing may be carried out by the manufacturer but in this case at the presence of Tasneef Surveyor.

1.1.4 Unless specified otherwise, testing is to be carried out in accordance with a recognized National or International Standards (ASTM, EN, ISO etc.) following a written procedures.

1.1.5 Mechanical properties are to be established using suitable testing machines of approved types..

The machines and other test equipment are to be maintained in a satisfactory and accurate condition and are to be calibrated, nearly yearly, by Tasneef or a Nationally recognized authority according recognized standards. A record of all calibrations is to be kept available and showed to Surveyor at his request.

2 Preparation of test samples

2.1.1 Thermoplastic samples are to be prepared in accordance with the manufacturer's recommendations for moulding.

For finished products, samples are to be taken from the product during production, but where this is impossible separate test samples are to be prepared in a manner identical to that of the product.

2.1.2 Samples of thermosetting resins are to be prepared using the curing system recommended by the manufacturer and identical with that used for the finished product.

2.1.3 The post curing conditions for samples of thermosetting resins are to be as indicated by the manufacturer and identical with those used for the finished product. Where the samples are made for the approval of a resin, the post curing conditions are to be those in which the resin is intended to be used (see also "Rules for the type approval of components of composite materials intended for hull construction")

2.1.4 Where curing of the product is intended to take place at room temperature, the sample is to be kept to cure at room temperature (>18°C) for 24 hours followed by a post-cure at 40°C for 16 hours.

2.1.5 Where a reinforcement is to be used, the ratio of reinforcement is to be nominally the same as that of the finished product or in accordance with Tables 2 or 3.

2.1.6 Where laminates are prepared specifically for approval test purposes, the reinforcement is to be laid as indicated in the Rules referred to [2.1.3].

3 Preparation of test specimens

3.1.1 The test specimen is to be prepared in accordance with the appropriate National or International Standards (ASTM, EN, ISO etc.) and the requirements of this Section.

4 Testing

4.1.1 Strain measurement are to be made by the use of a suitable device.

4.1.2 The rate of strain is to be in accordance with the appropriate standard.

4.1.3 The number of test specimens from each sample to be tested is to be in accordance with the standard used or, if not indicated, in accordance with the Rules referred in 2.1.3.

In general 10 (5 longitudinal + 5 transversal).

5 Reporting of results and discarding of test specimens

5.1.1 The results of tests are to be reported according to what indicated in Chapter 1, Sec.1, also as for discarding of test specimens..

5.1.2 Additionally, full details of the sample and specimen preparation are to be provided including (where applicable).

- a) Catalyst/accelerator or curing agent types and mix ratio.
- b) Weights of resins, and/or reinforcements used
- c) Casting/laminate dimensions.
- d) Number of layers of reinforcement used.
- e) Curing/post-curing conditions.

6 Tests for specific materials

6.1.1 The data requirements in Section 2, Art. 2 and 3 for thermoplastic or thermosetting resins or polymers are to be determined in accordance with suitable National or International Standards.

6.1.2 Some of recognized Standards to which specimens of unreinforced thermoplastic resins can be tested are listed in Table 1.

6.1.3 Test standards for unreinforced cast thermosetting resins are the same indicated in Table.

6.1.4 The Standards to which laminate specimens of any type are to be tested are listed in Table 2.

7 Structural core materials

7.1.1 The tests are to be carried out on specimens not-conditioned and after immersion in fresh water at 50 °C +/- 5 °C for 25 days..

The following conditions are to be complied with::

- a) Each skin is to be identical and have a thickness between 3 and 4 mm and in general not greater than 21 per cent of the nominal core thickness. For hand laid constructions, each skin is have a glass content between 0,45 and 0,50.
- b) The method of construction of the sandwich laminate is to reflect the core material manufacturer's instructions for use, i.e. application of bonding paste, surface preparation or any other recommended system.
- c) Where vacuum bagging techniques or equivalent systems are used these will be subject to special consideration.
- d) All resins and reinforcements are to be of Tasneef type approval.

- e) Curing conditions are to be in accordance with 2.1.3 and 2.1.4
- f) The dimensions of the test samples are to be according to Appendix 5 of "Rules for the type-approval of components of composite materials intended for hull construction " or be based on the requirements of ASTM C393 Paragraph 5.1, and the ratio parameters as indicated in ASTM C393 Paragraph 5.2, using a proportional limit stress (F) for the woven roving skins of 130 N/mm² and a span (a₂) of not less than 400 mm.

7.1.2 For each type of test sample the following data are to be reported, together with the submission of a representative test sample showing the mode of failure for each density of core material.

- a) Skin and core thickness, and core type and density.
- b) Resin/catalyst/accelerator ratio.
- c) Skin construction, including types and weight of reinforcements, resin, etc.
- d) Details of production method and curing conditions (temperature and times).
- e) Where additional preparation of the foam is involved, for example the use of primers or bonding pastes, full details are to be provided
- f) Actual span between base supports for each type of test sample.

7.1.3 The following requirements apply to balsa wood:

- a) The data requirements in Section 2, Art. 7 are to be provided, where applicable according to suitable International Standards.
- b) The balsa is to be tested according to the requirements of Art..
- c) The test methods for balsa are given in Table 3.

7.1.4 The following requirements apply to rigid foams:

- a) The data requirements in Section 2, Art. 7 are to be provided, where applicable according to suitable International Standards.
- b) The foam is to be tested according to the requirements of Art. 7
- c) The test methods for rigid foams are the same of Table 3..

Table 1 : Standards for Tests of unreinforcement thermoplastic resins and cast thermoset resin

Test	Standard
Tensile strength	ISO 527-2 (speed = 5 mm/1',specimen 1A or 1B)
Flexural strength	ISO 178 (speed= t/2 mm/1')
Water absorption	ISO 62 - Method 1, or ASTM D 570
High temperature deflection	ISO 75-2 Method A
Compressive properties	ISO 604

Table 2 : Standards for Tests on laminate specimens

Test	Standard
Tensile strength (1)	<ul style="list-style-type: none"> ISO 527-4 (speed= 2 mm/1' specimens Type II or III) ASTM D 638
Flexural strength	<ul style="list-style-type: none"> ISO 14125 (speed = t/2 mm/1') Method A ASTM D 790
Compressive strength	<ul style="list-style-type: none"> ISO 604 (speed= 1 mm/1') ASTM D 695
Interlaminar shear	<ul style="list-style-type: none"> ISO 14130 ASTM D 3846
Water absorption	ASTM D 570 + ISO 62 Method 1
Glass content	ISO1172
(1) Tensile tests are to be performed on unconditioned specimens and after immersion in fresh water at temperature of 50°C +/- 5°C for 25 days. .	

Table 3 : Tests on balsa-wood

Test	Standard
Density	ISO 845-1977
Tensile strength	ASTM C297- 61 (speed = t/10 mm/1')
Compressive strength	ISO 844 - 1978 (speed = t/10 mm/1')
Shear strength	ISO 1922 -1981 (speed = 1 mm/1')

Table 4 : Mechanical properties of balsa wood

Density (kg/m ³)	Ultimate strength (N/mm ²)				Shear	Compressive modulus		Shear modulus of elasticity (N/mm ²)
	Compressive		Tensile			Stress direction		
	Stress direction							
	Parallel to fibres	Perpendicular to fibres	Parallel to fibres	Perpendicular to fibres		Parallel to fibres	Perpendicular to fibres	
96	5,00	0,35	9,00	0,44	1,10	22,75	35,20	105
144	10,6	0,57	14,6	0,70	1,64	39,00	67,8	129
175	12,80	0,65	20,60	0,80	2,10	52,90	98,60	145

Table 5 : Minimum property values of Gel coat resins

Properties	Standard
Tensile strength	40 N/mm ²
Tensile strain	>3,0%
Flexural strength	80 N/mm ²
Water absorption	<60 mg
High temperature deflection	>60 °C

Table 6 : Minimum property values of laminating resins

Properties	Standard
Tensile strength	40 N/mm ²
Tensile strain	>2,5%
Flexural strength	70 N/mm ²
Water absorption	<60 mg
High temperature deflection	>60 °C

Table 7 : Minimum property values for laminates

R_m = ultimate tensile strength	$= 1278 G_c^2 - 510 G_c + 123$	85
E = tensile modulus of elasticity	$= (37 G_c - 4,75) \cdot 10^3$	6350
R_{mc} = ultimate compressive strength	$= 1507 G_c + 72$	117
E_c = compressive modulus of elasticity	$= (40 G_c - 6) \cdot 10^3$	6000
R_{mf} = ultimate flexural strength	$= (502 G_c^2 + 107)$	152
E_r = flexural modulus of elasticity	$= (33,4 G_c^2 + 2,2) \cdot 10^3$	5200
R_{mt} = ultimate shear strength	$= 80 G_c + 38$	62
G = shear modulus of elasticity	$= (1,7 G_c + 2,24) \cdot 10^3$	2750
R_{mti} = ultimate interlaminar shear strength	$= 22,5 - 17,5 G_c$	17

7.1.5 The mechanical properties: tensile, compressive, and shear strength and corresponding module of elasticity are, in general, to be not less than the value given in Figures 1 to 4, for expanded foam plastics (PVC or PUR) and in table 4 for balsa wood.

The tables 5 and 6 give the minimum properties for the cast resin, while the table 7 give the minimum mechanical properties of laminates made with reinforcements in "E" type glass fibre as a function of G_c (glass fraction by weight).

Figure 1 : Properties of PVC type expanded foam plastics

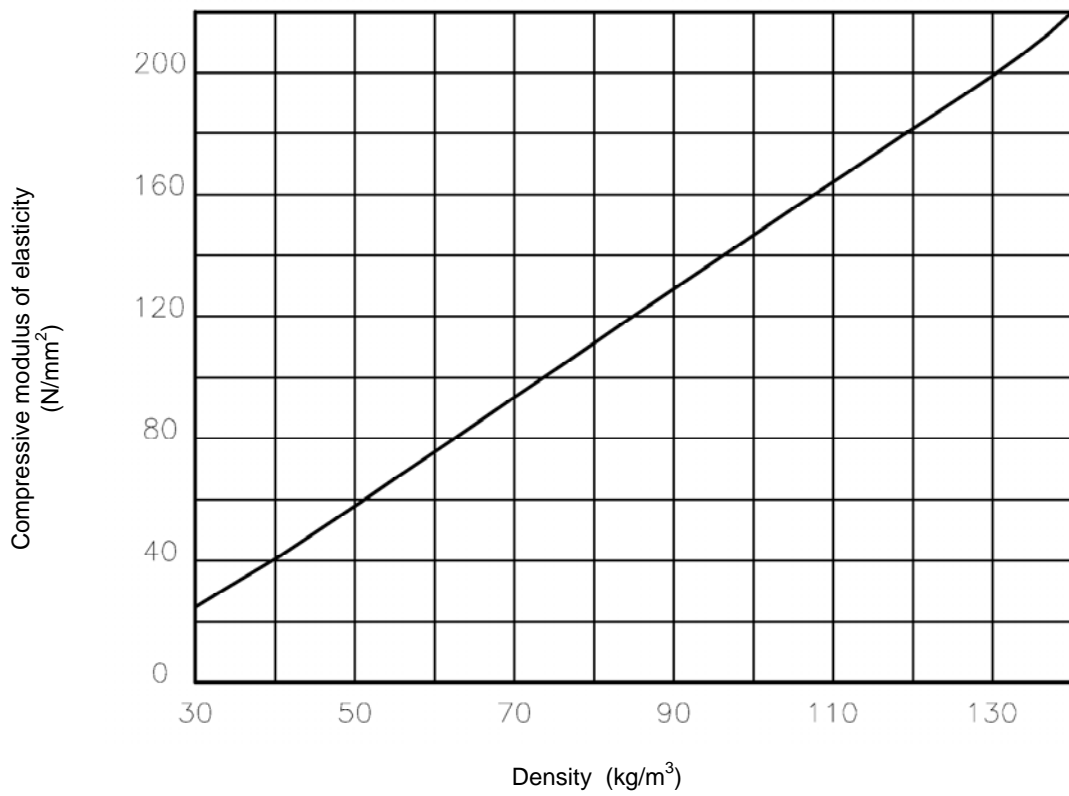
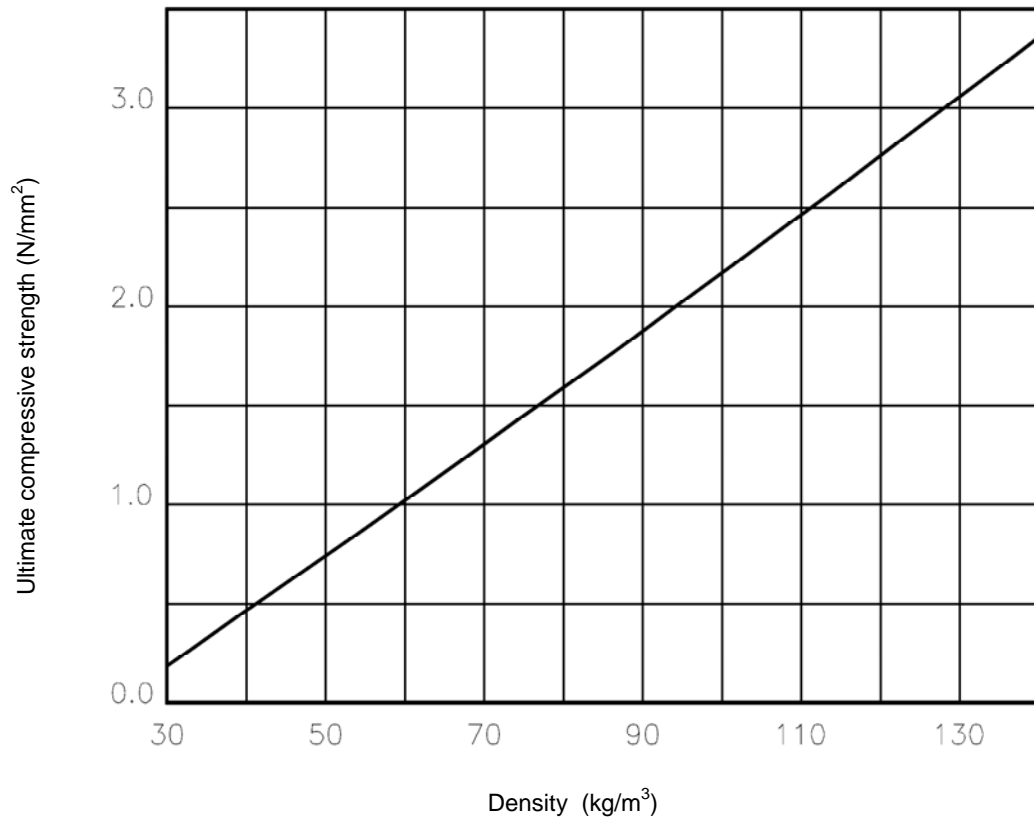


Figure 2 : Properties of PVC type expanded foam plastics

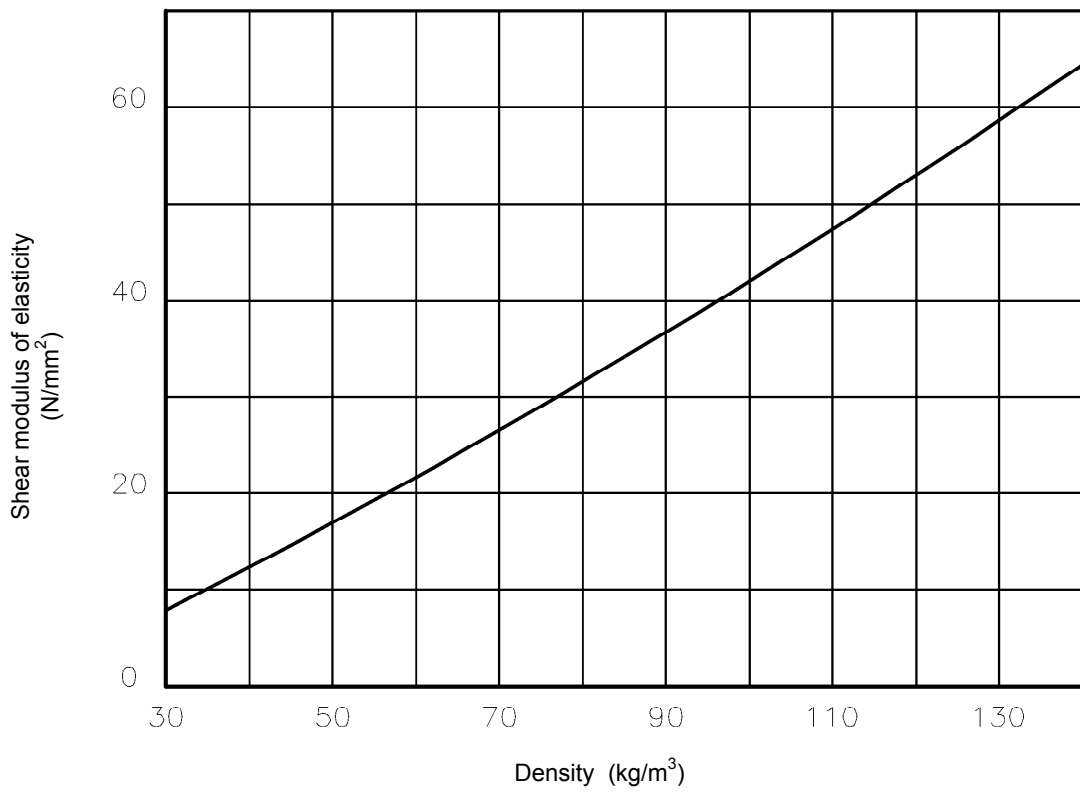
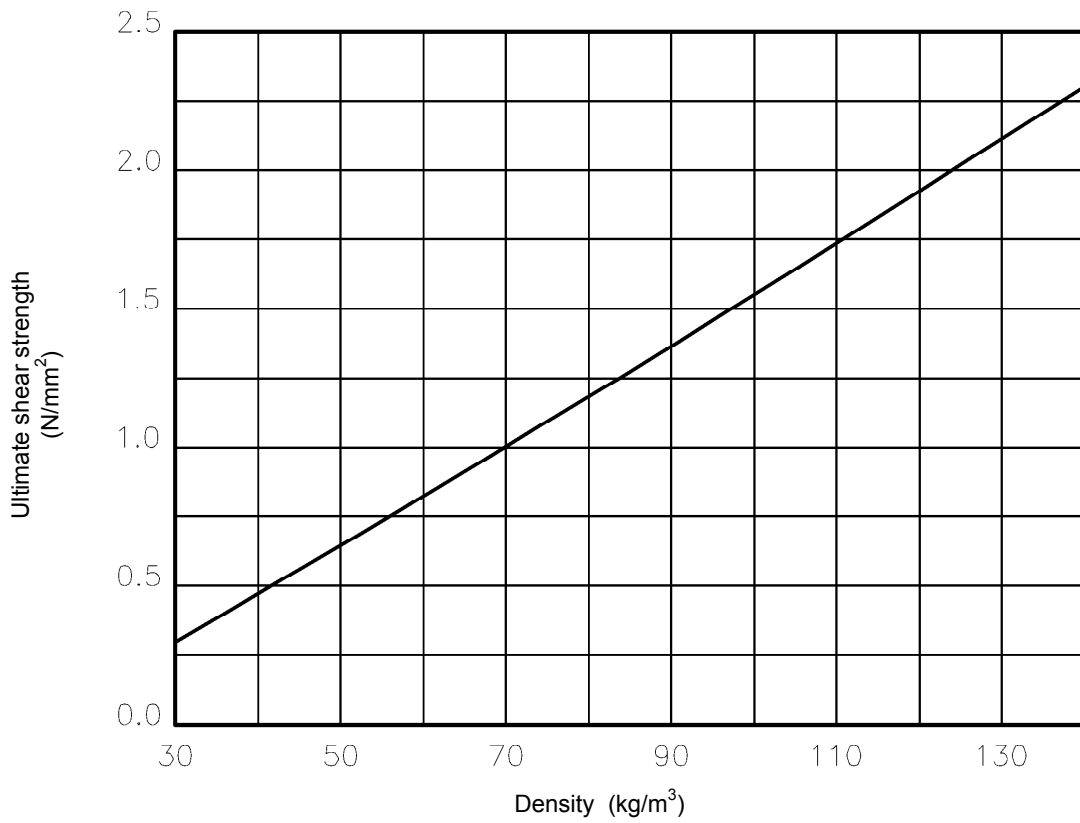


Figure 3 : Properties of PUR type expanded foam plastics

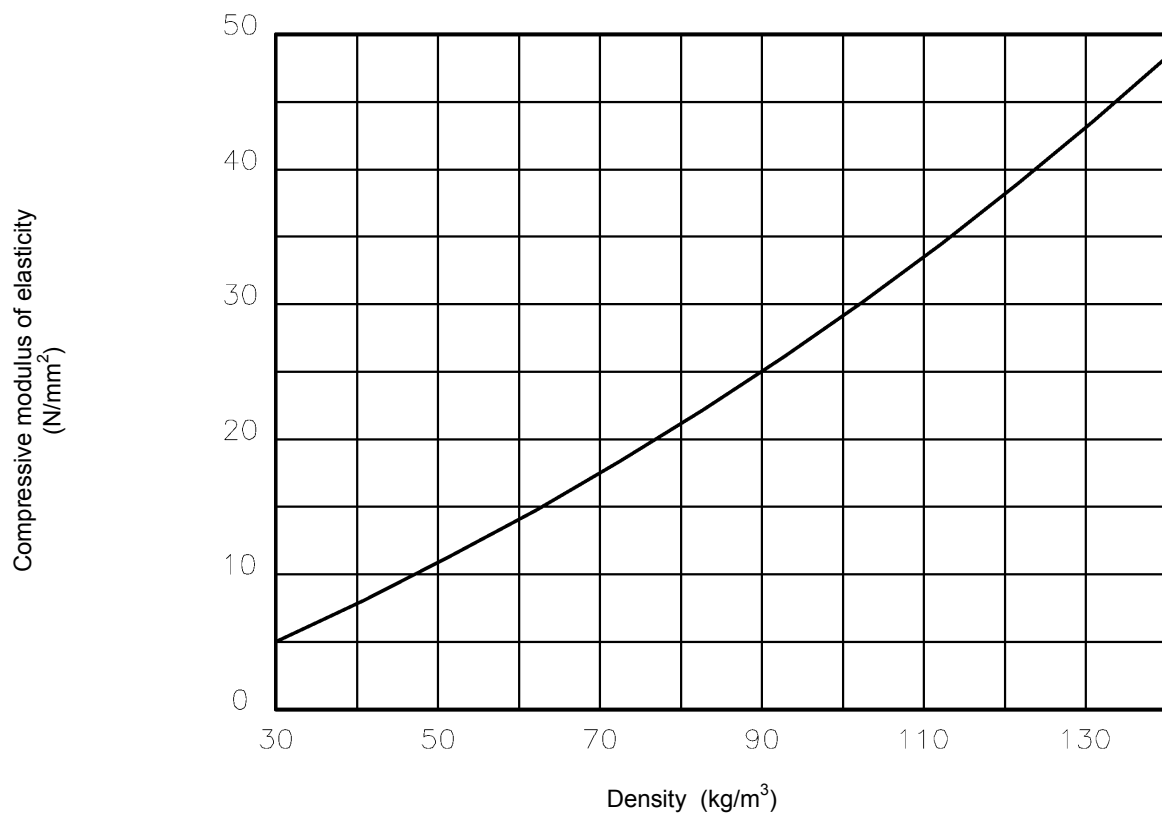
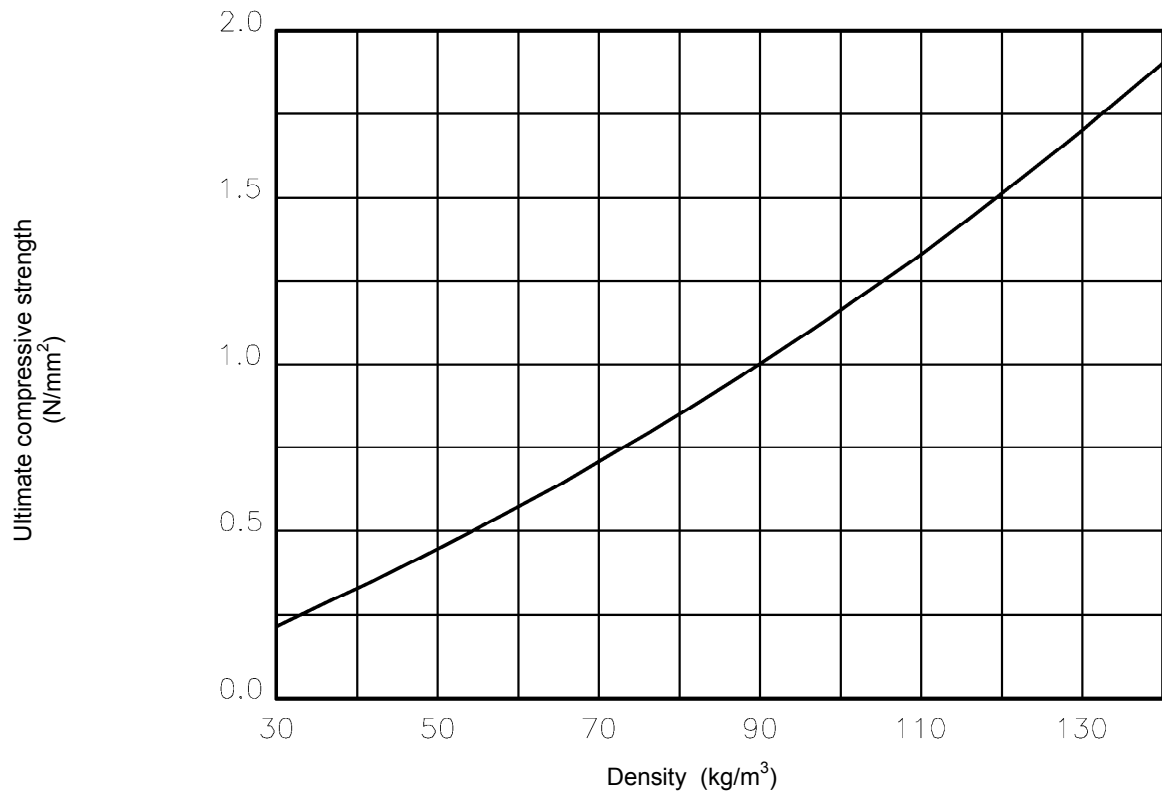
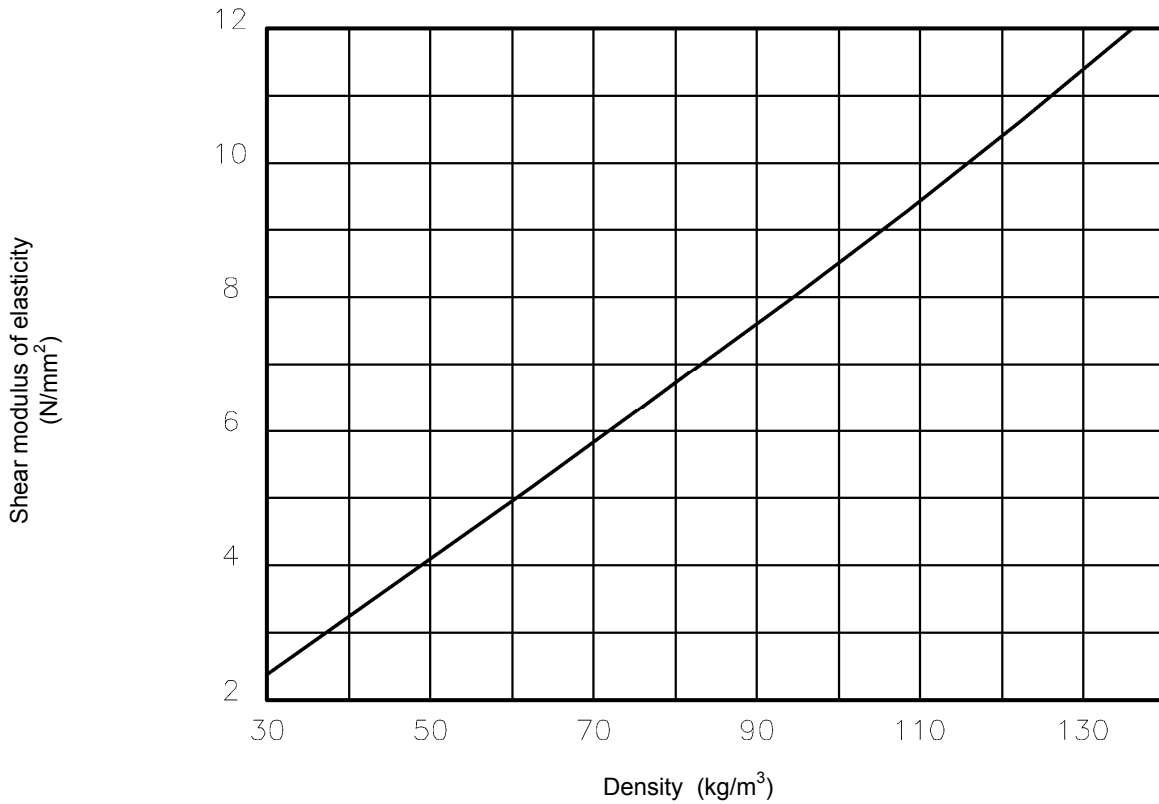
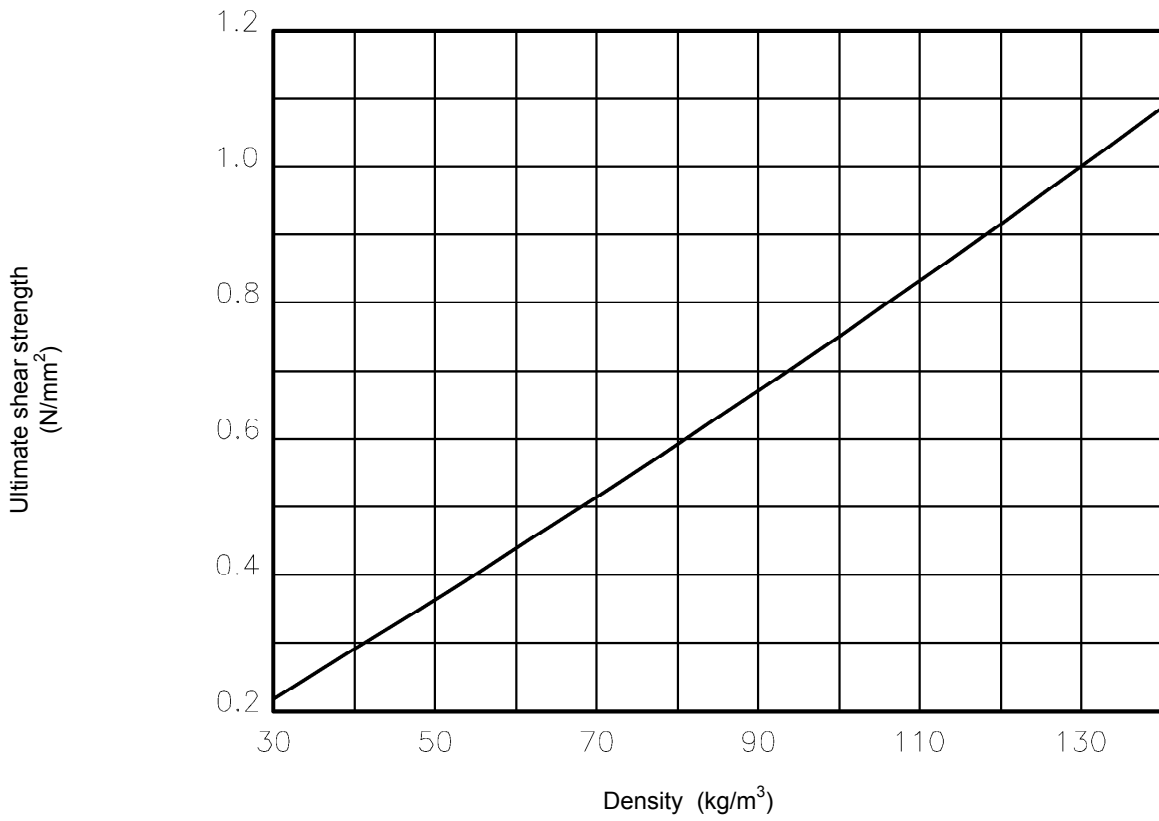


Figure 4 : Properties of PUR type expanded foam plastics



SECTION 4

PLASTIC PIPES AND FITTINGS

1 General

1.1.1 The general requirements for plastics pipes and fittings which can be used in piping systems in accordance with the relevant rules, are indicated in Part C, Ch 1, App 2 of TASNEEFMIL.