

RULES FOR THE CLASSIFICATION OF FISH FARMS

NR387 - OCTOBER 2023



RULE NOTE



**BUREAU
VERITAS**

BUREAU VERITAS RULES FOR THE CLASSIFICATION OF FISH FARMS

NR387 - OCTOBER 2023

This version of the document takes precedence over previous revision. Unless otherwise specified, these rules apply to fish farms for which contracts are signed on or after October 1st, 2023. The Society may refer to the contents hereof before October 1st, 2023, as and when deemed necessary or appropriate.

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These rules are provided within the scope of the Bureau Veritas Marine & Offshore General Conditions, enclosed at the end of Part A of NR467, Rules for the Classification of Steel Ships. The current version of these General Conditions is available at the Bureau Veritas Marine & Offshore website.

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**PART A
CLASSIFICATION AND
SURVEYS**

**PART B
STRUCTURAL SAFETY**

**PART C
MACHINERY AND SYSTEMS**

REFERENCE DOCUMENT
NR387 DT R01 OCTOBER 2023

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NR387

RULES FOR THE CLASSIFICATION OF FISH FARMS

Part A	Classification and Surveys
Part B	Structural Safety
Part C	Machinery and Systems

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RULES FOR THE CLASSIFICATION OF FISH FARMS

Part A **Classification and Surveys**

Chapter 1	Classification
Chapter 2	Maintenance of Class

Part A

Classification and Surveys

CHAPTER 1

CLASSIFICATION

- Section 1 General Principles of Classification
- Section 2 Classification Notations
- Section 3 Assignment of Class
- Section 4 Required Documentation

Section 1 General Principles of Classification

1 Principles of classification

1.1 Purpose of the Rules

1.1.1 The present Rules give the requirements for the assignment and the maintenance of classification for fish farms

Note 1: The general conditions of classification are laid down in the Marine & Offshore Division General Conditions.

1.1.2 The application criteria of the different parts of the present Rules are the following:

- Part A - Classification and Surveys, which applies to all fish farms
- Part B - Structural Safety, Part C - Facilities and Safety Equipment, which apply to fish farms of welded steel construction. Where necessary, the extent of application is more precisely defined in each chapter of these parts.

The classification of fish farms other than those dealt with in the above-mentioned Part B and Part C is to be agreed with the Society in a case-by-case basis.

1.2 General definitions

1.2.1 The following general definitions are used in these Rules:

- Society means the Classification Society with which the fish farm is classed.
- Rules means the present Rules for the Classification of Fish Farms and documents issued by the Society serving the same purpose.
- Offshore Rules means the NR445, Rules for the Classification of Offshore Units.
- Ship Rules means the NR467, Rules for the Classification of Steel Ships.
- Surveyor means the technical staff acting on behalf of the Society to perform tasks in relation to classification and survey duties.
- Survey means an intervention by the Surveyor for assignment or maintenance of class, or interventions by the Surveyor within the limits of the tasks delegated by the Administrations.
- Administration means the Government of the State whose flag the fish farm is entitled to fly or the State under whose authority the fish farm is operating in the specific case.
- Interested Party means a party, other than the Society, having responsibility for the classification of the fish farm, such as the Owners of a fish farm and his representatives, or the Shipbuilder, or the Engine Builder, or the Supplier of parts to be tested.
- Owner means the Registered Owner or the Disponent Owner or the Manager or any other party having the responsibility to keep the fish farm seaworthy, having particular regard to the provisions relating to the maintenance of class laid down in Part A, Chapter 2.
- Approval means the review by the Society of documents, procedures or other items related to classification, verifying solely their compliance with the relevant Rules requirements, or other referentials where requested.
- Type approval means an approval process for verifying compliance with the Rules of a product, a group of products or a system, and considered by the Society as representative of continuous production.

1.2.2 Date of “contract for construction”

The date of “contract for construction” of a fish farm is the date on which the contract to build the fish farm is signed between the Owner and the Shipbuilder. This date is normally to be declared to the Society by the Interested Party applying for the assignment of class to a new fish farm.

1.3 Meaning of classification, scope and limits

1.3.1 Classification process

The classification process consists of:

- the development of Rules, Guidance Notes and other documents relevant to the structure, material, equipment, machinery and other items covered by such documents
- the review of plans and calculations and the surveys, checks and tests intended to demonstrate that the fish farm meets the Rules (refer to Ch 1, Sec 3)
- the assignment of class (see Ch 1, Sec 2) and issue of a Certificate of Classification, where compliance with the above Rules is found
- the periodical, occasional and class renewal surveys performed to record that the fish farm in service meets the conditions for maintenance of class (see Part A, Chapter 2).

1.3.2 Other parties

The Rules, surveys performed, reports, certificates and other documents issued by the Society, are in no way intended to replace or alleviate the duties and responsibilities of other parties such as Administrations, Designers, Shipbuilders, Manufacturers, Repairers, Suppliers, Contractors or Sub-contractors, actual or prospective Owners or Operators, Charterers, Brokers, Cargo-owners and Underwriters.

The activities of such parties which fall outside the scope of the classification as set out in the Rules, such as design, engineering, manufacturing, operating alternatives, choice of type and power of machinery and equipment, number and qualification of crew or operating personnel, lines of the fish farm in case of a surface unit type fish farm, trim, hull vibrations, spare parts including their number, location and fastening arrangements, life-saving appliances (except if **LSA** additional class notation, as defined in Ch 1, Sec 2, [8.2.3], is assigned), and maintenance equipment, remain therefore the responsibility of those parties, even if these matters may be given consideration for classification according to the type of fish farm or additional class notation assigned.

1.3.3 Certificate of classification

The class assigned to a fish farm by the Society following its interventions is embodied in a Certificate of Classification and noted in the appropriate Register.

At a certain date the class of a fish farm is maintained or regular when no surveys are overdue, when the conditions for suspension of class are not met and when the class is not withdrawn nor suspended. Otherwise the class is irregular. Attention is drawn on the fact that a fish farm holding a valid Certificate of Classification may be in an irregular class position.

1.3.4 Site conditions and related operating procedures

- It is incumbent to the Owners/Operators to perform the necessary investigations, including environmental and geotechnical surveys, prior to operating the fish farm at a given site.
- For permanent fish farms, Owner/Operator is to provide supporting information to give evidence to the Society that the proposed design criteria are an adequate representations of the actual conditions on site, including both environmental and soil conditions.
- For other fish farms, these investigations are to be conducted in order to ascertain that the actual conditions met at the contemplated operating site remain on the safe side when compared to design data and assumptions, particularly those listed in the Design Criteria Statement.

Such site assessment is however not part of classification, which also does not cover the assessment of sea bottom conditions and geotechnical investigations or the assessment of possible sea floor movement.

- The procedures to be used for the fish farm's positioning, anchors setting and retrieving, legs lowering and jacking, preloading, jetting and other related operations are not part of classification. It is the responsibility of the Owner, or of the Operator if distinct from the Owner, to ascertain that the said procedures and their implementation satisfy the design criteria of the fish farm and the design of the related equipment.

For permanent fish farms, above procedures are only considered in so far as they could affect the safety or integrity of completed installation on site.

- For other classification limits applicable to operating procedures, refer to Part B, Chapter 2.

1.3.5 Classification restrictions

When the design data and assumptions specified by the party applying for classification do not comply with the applicable Rule requirements, restrictions may be placed upon the fish farm's class.

When deemed necessary, restrictions may be placed on the duration of the operating life of the fish farm.

Class restrictions, if any, are to be endorsed as a Memorandum and are to be incorporated in the Operating Manual prescribed in [3.4].

1.4 Request for services

1.4.1 Requests for interventions by the Society, such as surveys during construction, surveys of fish farms in service, tests, etc., are in principle to be submitted in writing and signed by the Interested Party. Such request implies that the applicant will abide by all the relevant requirements of the Rules, including the Marine Division General Conditions.

The Society reserves the right to refuse or withdraw the class of any fish farm for which any applicable requirement of the Rules is not complied with.

1.5 Register

1.5.1 A Register is published periodically by the Society. This publication, which is updated by the Society, contains the names of fish farms which have received the certificate of classification, as well as particulars of the class assigned and information concerning each fish farm.

1.6 Design Criteria Statement

1.6.1 General

Classification is based upon the design data or assumptions specified by the party applying for classification.

A Design Criteria Statement is to list the service(s) performed by the fish farm and the design conditions and other assumptions on the basis of which class is assigned to the fish farm.

The Design Criteria Statement is issued by the Society, based on information provided by the party applying for classification.

The Design Criteria Statement is to be referred to in a Memorandum.

The Design Criteria Statement is to be incorporated in the Operating Manual as prescribed in [3.4].

1.6.2 Fish farm's activities

The Design Criteria Statement is to list the main services for which the fish farm is designed, the service notation and other notations assigned to the fish farm.

The nature of the fish farm's activity is to be duly accounted for in the application of the present Rules, as far as classification is concerned.

The Design Criteria Statement is to mention when the fish farm is, or is part of, a permanent fish farm, and will make reference to the applicable site data.

1.6.3 Structural design criteria

The Design Criteria Statement is to list the necessary data pertaining to the structural design of the fish farm for the different conditions of operation of the fish farm, according to provisions of Part B, Chapter 2.

Note 1: Transit of non self-propelled fish farms is covered by classification as regards only the fish farm's structural overall and local strength as well as stability. All other aspects relating to towing are reviewed only on special request for a towage survey.

Note 2: As regards design of the foundations of equipment, classification is based upon the data submitted by the party applying for classification, under the format called for by the Rules.

1.6.4 Machinery, electrical and other system design conditions

The party applying for classification is to submit the necessary description, diagrammatic plans, design data of all systems, including those used solely for fishfarming and, where applicable, their cross connections with other systems. The submitted data are to incorporate all information necessary to the assessment of the fish farm for the purpose of the assignment of class or for the assignment of additional class notations.

In accordance with [1.6.1] the party applying for classification is to give an estimation of electric balance for the different conditions of operation of the fish farm. The specifications are to list all important equipment and apparatus, their rating and the power factors as applicable.

1.7 Design life

1.7.1 Definition

For classification, a "design life" for structural strength and integrity assessment of fish farm structure and mooring is to be specified by the Party applying for classification at the time of design and construction. The default and minimum value usually considered is 20 years.

In particular, the "design life" should be taken into account in the predictions of corrosion protection and fatigue strength, in conjunction with appropriate safety factors.

1.7.2 Fish farm modification

Fish farm modification may be required during the fish farm life. In such a case, the Owner and/or the operator are/is to carry out an assessment of the impact of modifications on the existing fish farm. The assessment is to be submitted to the Society.

The review of the assessment may result in requirement for a more comprehensive re-assessment due to the extent and impact of the modification and taking into account the fish farm age and condition.

1.7.3 Fish farm re-assessment

A complete re-assessment of the fish farm condition may be required in the following cases:

- if operating life is expected beyond "design life"
- deficiencies revealed during operation
- major modification.

The re-assessment is to address the actual situation (condition, modifications) of the fish farm and the current knowledge in site environmental conditions.

Classification requirements as result of the re-assessment, given in terms of required repair/renewal work, surveys, plan approval, possible limited class period, etc., will be evaluated on a case by case basis.

1.8 Non-permanently installed equipment

1.8.1 General

Non-permanent equipment means equipment not remaining on board during the operation of the fish farm but installed periodically for the purpose of specific works.

1.8.2 Classed equipment

The Owner is to inform the Society about any classed equipment or part of classed equipment which is returned onshore for storage, modifications, repair or maintenance.

As a rule, the classed equipment is to be tested onshore after modifications, repair or maintenance, in accordance with the rules applicable for the classification of the equipment.

A release statement (attestation) is to be issued upon satisfactory completion of tests and visual examination.

The release statement is to be maintained on board the fish farm for verification during classification surveys.

1.8.3 Non-classed equipment

Unless otherwise specified, non-classed equipment which is not permanently installed and is used solely for operational activities is not covered by the rules.

1.9 Attachments of appurtenances

1.9.1 The attachments of appurtenances to the hull are within the scope of classification if the supported equipment is either within the scope of classification or essential for the safety of the fish farm.

Otherwise, the interface between classed and non-classed parts is to be defined on a case-by-case basis.

2 Rules

2.1 Rule application

2.1.1 The requirements of the present Rules are applicable to all fish farms, as defined in [4], unless a specific statement to the contrary is made.

The designer is to contact the Society for information about any amendments to these Rules.

The present Rules are not applicable to bottom founded fixed fish farms.

2.2 Effective date

2.2.1 The effective date of entry into force of any amendments to the Rules is indicated on the inside front page of the Rules or in the relevant Section.

2.2.2 In principle, the applicable Rules for assignment of class to a new fish farm are those in force at the date of contract for construction.

2.2.3 Special consideration may be given to applying new or modified rule requirements which entered into force subsequent to the date of contract for construction, at the discretion of the Society and in the following cases:

- when a justified written request is received from the party applying for classification
- when the keel is not yet laid and more than one year has elapsed since the contract for construction was signed
- where it is intended to use existing previously approved plans for a new contract.

2.2.4 The above procedures for application of the Rules are, in principle, also applicable to existing fish farms in the case of major conversions and, in the case of alterations, to the altered parts of the fish farm.

2.2.5 The rule requirements related to assignment, maintenance and withdrawal of the class of fish farms already in operation are applicable from the date of their entry into force.

2.3 Equivalence

2.3.1 The Society may consider the acceptance of alternatives to these Rules, provided that they are deemed to be equivalent to the Rules to the satisfaction to the Society.

The Society may accept surveys and approval done by Administration or by a recognised organisation, concerning fire prevention, ventilation systems, means of escape in accommodation and service spaces. In such a case, supporting documents are to be transmitted to the Society.

2.3.2 Risk Based Inspection (RBI) may be considered as an element in application of [2.3.1].

2.3.3 On a case by case basis and upon request from the Owner, a specific in-service inspection programme may be approved by the Society, as an alternative to these Rules.

2.4 Novel features

2.4.1 The Society may consider the classification of fish farms based on or applying novel design principles or features, to which the Rules are not directly applicable, on the basis of experiments, calculations or other supporting information provided to the Society. Specific limitations may then be indicated on a memorandum.

2.5 Disagreement and appeal

2.5.1 Any technical disagreement with the Surveyor in connection with the performance of his duties should be raised by the Interested Party as soon as possible.

The Interested Party may appeal in writing to the Society, which will subsequently consider the matter and announce its decision according to its established procedure.

2.6 Risk assessment and Rule application

2.6.1 As an alternative to the full application of the present prescriptive rules, a hazard analysis approach may be used to justify deviations or modifications from Rule requirements.

2.6.2 This alternative approach is authorised and encouraged as far as the class is concerned, under reserve of the agreement of the Owner when it leads to deviation from the Rules. Regarding the application to statutory requirements, attention is drawn upon the necessary agreement of the flag and/or coastal Authorities.

2.6.3 The risk levels obtained by the arrangement resulting from the analysis are to be as low as reasonably practicable.

2.6.4 It is to be noted that the use of prescriptive rules is not contradictory with the use in parallel of analytical methods, the rules deriving from collection and analysis of past experience.

2.6.5 The analysis is to be documented and a complete file is to be submitted to the Society for agreement.

3 Duties of the Interested Parties

3.1 International and national regulations

3.1.1 The classification of a fish farm does not relieve the Interested Party from compliance with any requirements issued by Administrations.

3.1.2 When authorised by the Administration concerned, the Society will act on its behalf within the limits of such authorisation. In this respect, the Society will take into account the relevant national requirements, survey the fish farm, report and issue or contribute to the issue of the corresponding certificates.

The above surveys do not fall within the scope of the classification of fish farms, even though they may overlap in part and may be carried out concurrently with surveys for assignment or maintenance of class.

3.1.3 In the case of a discrepancy between the provisions of the applicable international and national regulations and those of the Rules, normally, the former take precedence. However, the Society reserves the right to call for the necessary adaptation to preserve the intention of the Rules or to apply the provisions of [1.4.1].

3.2 Surveyor's intervention

3.2.1 Surveyors are to be given free access at all times to fish farms which are classed or being classed, shipyards and works, to carry out their interventions within the scope of assignment or maintenance of class, or within the scope of interventions carried out on behalf of Administrations, when so delegated.

Free access is also to be given to auditors accompanying the Surveyors of the Society within the scope of the audits as required in pursuance of the Society's internal Quality System or as required by external organizations.

3.2.2 Interested Parties are to take the necessary measures for the Surveyors' inspections and testing to be carried out safely. Interested Parties - irrespective of the nature of the service provided by the Surveyors of the Society or others acting on its behalf - assume with respect to such Surveyors all the responsibility of an employer for his workforce such as to meet the provisions of applicable legislation. As a rule, the Surveyor is to be constantly accompanied during surveys by personnel of the Interested Party. Interested Parties are to inform promptly the Surveyor of defects or problems in relation to class.

Refer also to the Ship Rules, Pt A, Ch 2, Sec 2, [2.5] to Pt A, Ch 2, Sec 2, [2.8].

3.2.3 The Certificate of Classification and/or other documents issued by the Society remain the property of the Society. All certificates and documents necessary to the Surveyor's interventions are to be made available by the Interested Party to the Surveyor on request.

3.2.4 During the phases of fish farm design and construction, due consideration should be given to rule requirements in respect of all necessary arrangements for access to spaces and structures with a view to carrying out class surveys. Arrangements of a special nature are to be brought to the attention of the Society.

3.3 Operation and maintenance of fish farms

3.3.1 The classification of a fish farm is based on the understanding that the fish farm is operated in a proper manner by competent and qualified crew or operating personnel according to the environmental, loading, operating and other criteria on which classification is based.

In particular, it will be assumed that the draught of the fish farm in operating conditions will not exceed that corresponding to the freeboard assigned or the maximum approved for the classification, that the fish farm will be properly loaded taking into account both its stability and the stresses imposed on its structures and that cargoes will be properly stowed and suitably secured and that the speed and course of the fish farm are adapted to the prevailing sea and weather conditions, according to the normal prudent seamanship.

In the same way, it will be assumed that the draught of the fish farm in operating conditions will not be lower than the minimum draught approved for the classification.

3.3.2 Fish farms are to be maintained at all times, at the diligence of the Owners, in proper condition complying with international safety and pollution prevention regulations.

3.3.3 Any document issued by the Society in relation to its interventions reflects the condition of the fish farm as found at the time and within the scope of the survey. It is the Interested Party's responsibility to ensure proper maintenance of the fish farm until the next survey required by the Rules. It is the duty of the Interested Party to inform the Surveyor when he boards the fish farm of any events or circumstances affecting the class.

3.4 Operating Manual

3.4.1 An Operating Manual, which includes instructions regarding the safe operation of the fish farm and of the systems and equipment fitted on the fish farm, together with necessary emergency procedures, is to be placed onboard the fish farm.

The Operating Manual is to incorporate a dedicated section containing all information relating to classification, particularly environmental, loading and other design criteria as well as classification restrictions. The Operating Manual is to be, at all times, placed on board the fish farm and made available to all concerned. A copy of the Operating Manual is to be retained ashore by the Owners of the fish farm or their representatives.

It is the responsibility of the Interested Party to prepare the contents of the Operating Manual.

3.4.2 The Operating Manual is to be submitted for review to the Society, this review being limited to checking that the classification related material contained in the dedicated section mentioned in [3.4.1] is consistent with data given in the Design Criteria Statement (see [1.6] and Part B, Chapter 2).

3.4.3 When a construction portfolio is not required according to Ch 1, Sec 3, [2.4], the Operating Manual is to contain all reviewed drawings relative to structural strength, stability, fire and explosion safety.

3.5 Flag and Port State Control inspections

3.5.1 Where defects are found further to an inspection by an Administration in pursuance of Port State Control or similar programmes, Owners are to:

- immediately report the outcome of this inspection to the Society, and
- ask the Society to perform an occasional survey in order to verify that the deficiencies, when related to the class of the fish farm or to the statutory certificates issued by the Society on behalf of the flag Administration, are rectified and/or the necessary repair work is carried out within the due time.

3.6 Use of measuring equipment and of service suppliers

3.6.1 General

Firms providing services on behalf of the Interested Party, such as measurements, tests and servicing of safety systems and equipment, the results of which may form the basis for the Surveyor's decisions, are subject to the acceptance of the Society, as deemed necessary.

The equipment used during tests and inspections in workshops, shipyards and on board fish farms, the results of which may form the basis for the Surveyor's decisions, is to be customary for the checks to be performed. Firms are to individually identify and calibrate to a national or international standard each piece of such equipment.

3.6.2 Simple measuring equipment

The Surveyor may accept simple measuring equipment (e.g. rulers, tape measures, weld gauges, micrometers) without individual identification or confirmation of calibration, provided it is of standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces.

3.6.3 Onboard measuring equipment

The Surveyor may accept measuring equipment fitted on board a fish farm (e.g. pressure, temperature or rpm gauges and meters) and used in examination of onboard machinery and/or equipment based either on calibration records or comparison of readings with multiple instruments.

3.7 Spare parts

3.7.1 It is the Owner's responsibility to decide whether and which spare parts are to be carried on board.

3.7.2 As spare parts are outside the scope of classification, the Surveyor will not check that they are kept on board, maintained in a satisfactory condition, or suitably protected and lashed.

However, in the case of repairs or replacement, the spare parts used are to meet the requirements of the Rules as far as practicable.

4 Definitions

4.1 Fish farms

4.1.1 For the purpose of the application of the present Rules, a fish farm is defined as a unit fulfilling simultaneously the following conditions:

- to be designed for breeding fishes
- to be of a normally floating type, or to be so designed as to be capable of being moved from one operating site to another in a floating mode.

The present Rules are not applicable to bottom founded fixed structures.

4.2 Propulsion

4.2.1 Self-propelled fish farms

A self-propelled fish farm is a fish farm capable of unassisted transit between different geographic locations.

Note 1: Fish farms capable of short moves from one operating location to another close one are not considered as self-propelled fish farms.

4.2.2 National and international regulations

The Owners' attention is drawn to different national or international regulations applicable to self-propelled fish farms.

4.3 Fish farms' structural types

4.3.1 Surface unit

Surface units, for the application of the present Rules, are floating fish farms designed with a displacement-type single hull.

Note 1: This structural type generally excludes the self-elevating fish farms.

4.3.2 Submersible unit

A submersible unit is a fish farm capable of being designed to be completely or partially below the sea surface, while remaining connected to the sea bed by a particular station keeping system, under working condition and capable, when deballasted to be kept afloat in a semi-submerged position.

4.3.3 Column stabilized unit

Column stabilized unit is a fish farm designed with its main deck, which supports most of the equipment, connected to underwater hulls or footings by columns. Bracings may be provided between the lower hulls or footings, the columns and the deck structure.

4.3.4 Self-elevating unit

Self-elevating or jack-up unit is a fish farm designed with legs capable of being lowered to the sea bed and of raising the fish farm hull, which supports the equipment, above the sea surface.

The unit's legs may be of a shell (cylindrical) or truss (tubular or structural sections) type. The legs may be equipped with a lower mat or with footings designed to penetrate the sea bed.

The fish farm's legs may be vertical or slanted.

4.3.5 SPAR

A SPAR is a floating structure consisting of a large diameter single vertical cylinder supporting fixed platform topside.

4.3.6 Other structural types

Fish farms of other structural types will be given special consideration.

4.3.7 Structural type notations

The structural type notations corresponding to the structural types described in [4.3.1] to [4.3.5] are defined in Ch 1, Sec 2, [5].

4.4 Fish farms' operation

4.4.1 Nature of the fish farm

a) Permanent fish farm

A permanent fish farm is a fish farm performing its service for a duration of not less than 5 years on a single site. A permanent fish farm is to be assigned with a site notation.

b) Disconnectable permanent fish farm

A disconnectable permanent fish farm is a permanent fish farm able of disengaging from its mooring system in extreme environmental or emergency conditions.

c) Mobile fish farm

A mobile fish farm is a fish farm which does not correspond to definitions of items a) and b).

4.4.2 Conditions of operations

a) Inhabited fish farms

Inhabited fish farms are those on board which personnel is permanently present, either because they live in accommodation facilities provided on board, or because shift working conditions are organized.

b) Unmanned fish farms

Unmanned fish farms are those which, due to the simplicity of fishfarming operations performed, or to their automation, accommodate personnel only for short periods of time.

Note 1: it is the responsibility of the Owner or of the Party applying for classification to specify to the Society if the fish farm is to be considered as either inhabited or unmaned.

c) Working conditions

Working conditions are conditions wherein a fish farm is on location and performs its service, as defined by its service notation, operational and environmental loads remaining within design limits corresponding to this service. The fish farm may be floating or supported by the sea-bed, as applicable.

d) Severe storm conditions

Severe storm conditions are the most severe environmental conditions which the fish farm is designed to withstand, this fish farm being floating or supported by the sea-bed, as applicable. Only operations which cannot be postponed are carried out, due to the severity of the environment

e) Transit conditions

Transit condition is condition wherein a fish farm is moving from one location to another.

Transit includes short duration field moves, between locations in close proximity, and ocean transit, for which a specific preparation of the fish farm is generally needed.

The fish farm may be self-floating or supported by a transportation barge or vessel, as applicable. Some design limits to environmental loads may be specified.

The initial transportation to site of a permanent fish farm is also considered as a transit condition.

4.5 Essential and emergency services

4.5.1 Essential services

Essential services mean services required to be in continuous operation to maintain the safety of the fish farm and to generate the power supply necessary to meet the operational demand of the fish farm. Operational power demands are to be specified by the party applying for classification.

Services essential to the survival of the fish are to be considered as essential services; it is the responsibility of the party applying for classification to specify these services.

4.5.2 Emergency services

Emergency services mean services required to remain available for the safety of the fish farm under an emergency condition or which cannot be interrupted, even upon a short period, without impairing the safety of the fish farm, or of its personnel or of fish.

4.6 Temporary mooring and position anchoring

4.6.1 Temporary mooring

Surface units may be provided with classical temporary mooring equipment.

The Owners' attention is drawn to applicable national regulations regarding mooring of surface units, particularly self-propelled fish farms.

4.6.2 Station keeping

Station keeping herein means deep sea or location mooring and/or dynamic positioning.

The purpose of positioning equipment and machinery is to maintain the fish farm on location, within station keeping requirements, in view of its designed functions.

Station keeping may be either passive, by means of catenary equipment (position anchoring) or active (dynamic positioning) or may involve a combination of these.

Additional class notations and service features corresponding to position anchoring and to dynamic positioning are dealt with in Ch 1, Sec 2, [6.3] and Ch 1, Sec 2, [8.3] respectively.

4.7 Dimensions and characteristics

4.7.1 Water depth

The nominal water depth is the vertical distance from the sea bed to a reference sea surface level (such as the Chart Datum).

The design maximum water depth is the vertical distance from the sea bed to the highest still water surface, including astronomical tide and storm (wind and pressure differential) tide.

4.7.2 Dimensions

Except for surface units, all dimensions such as length, breadth, depth relate to overall dimensions, measured without taking into account locally protruding elements (for instance stinger foundations, anchor racks, fenders, etc.).

For surface units, definitions of breadth, moulded depth and block coefficient given in the Ship Rules are applicable.

4.7.3 Draughts

The moulded draughts are the vertical distances between the moulded base line and the water lines in different afloat conditions. Certain components of a fish farm's structure, machinery or equipment may extend below the moulded base line.

4.7.4 Lightweight

Lightweight is defined as the weight of the complete fish farm with all its permanently installed machinery, equipment and outfit, including permanent ballast, spare parts normally retained on board and liquids in machinery and piping to their normal working level, but does not include liquids in storage or reserve supply tanks, items of consumable or variable loads, stores or crew and their effects.

4.7.5 Moulded base line

The moulded base line is a horizontal line extending through the upper surface of the bottom plating.

4.8 Other definitions

4.8.1 International instruments

- ILLC means the 1966 International Convention on Load Lines, as amended
- MODU Code means the IMO Code for the Construction and Equipment of Mobile Offshore Drilling Units, as amended.

Section 2 Classification Notations

1 General

1.1 Purpose of the classification notations

1.1.1 The classification notations give the scope according to which the class of the fish farm has been based and refer to the specific rule requirements which are to be complied with for their assignment. In particular, the classification notations are assigned according to the type, service and navigation of the fish farm and other criteria which have been provided by the Interested Party, when applying for classification.

The Society may change the classification notations at any time, when the information available shows that the requested or already assigned notations are not suitable for the intended service, navigation and any other criteria taken into account for classification.

Note 1: Reference should be made to Ch 1, Sec 1, [1.3] on the limits of classification and its meaning.

1.1.2 The classification notations assigned to a fish farm are indicated on the Certificate of Classification, as well as in the Register published by the Society.

1.1.3 The classification notations applicable to existing fish farms conform to the Rules of the Society in force at the date of assignment of class, as indicated in Ch 1, Sec 3. However, the classification notations of existing fish farms may be updated according to the current Rules, as far as applicable.

1.2 Types of notations assigned

1.2.1 The types of classification notations assigned to a fish farm are the following:

- class symbol
- construction marks
- structural type notations with additional service features, as applicable
- service notations with additional service features, as applicable
- site notation
- transit notation
- navigation notations
- additional class notations.

The different classification notations and their conditions of assignment are listed in Articles [2] to [9], according to their types.

1.2.2 As an example, the classification notations assigned to a fish farm may be as follow (the kind of notation shown in brackets does not form part of the classification notation indicated in the Register and on the Certificate of Classification):

I ✕ HULL ✕ MACH

(class symbol, construction marks)

fish farm surface unit

(service notation/structural type notation)

Zhenbao 1 - unrestricted navigation

(site notation/navigation notation)

transit - unrestricted navigation

(transit notation/navigation notation)

INHABITED PERMANENT ✕ POSA

(additional service features)

✕ AUTO ✕ ALM

(additional class notations)

2 Class symbol

2.1 General

2.1.1 The class symbol expresses the degree of compliance of the fish farm with the rule requirements as regards its construction and maintenance. There is one class symbol, which is compulsory for every classed fish farm.

2.1.2 The class symbol **I** is assigned to fish farms built in accordance with the requirements of the Rules or other rules recognised as equivalent, and maintained in a condition considered satisfactory by the Society.

The period of class (or interval between class renewal surveys) assigned to class symbol **I** fish farms is maximum 5 years.

Note 1: The class symbol **I** is to be understood as being the highest class granted by the Society.

2.1.3 The class symbol **II** is assigned to fish farms which do not meet all requirements for class symbol **I**, but are deemed acceptable to be entered into the Register.

The period of class assigned to class symbol **II** fish farms is maximum 3 years.

2.1.4 Except for special cases, class is assigned to a fish farm only when the hull, propulsion and auxiliary machinery installations, and equipment providing essential services have all been reviewed in relation to the requirements of the Rules.

3 Construction marks

3.1 General

3.1.1 The construction mark identifies the procedure under which the fish farm and its main equipment or arrangements have been surveyed for initial assignment of the class. The procedures under which the fish farm is assigned one of the construction marks are detailed in Ch 1, Sec 3.

3.1.2 One of the construction marks defined below is assigned separately to the hull of the fish farm and its appendages, to the machinery installation, and to some installations for which an additional classification notation is assigned.

The construction mark is placed before the symbol **HULL** for the hull, before the symbol **MACH** for the machinery installations, and before the additional class notation granted, when such a notation is eligible for a construction mark.

If the fish farm has no machinery installations covered by classification, the symbol **MACH** is not granted and the construction mark is to be only placed before the symbol **HULL**.

3.1.3 The construction marks refer to the original condition of the fish farm. However, the Society may change the construction mark where the fish farm is subjected to repairs, conversion or alterations.

3.2 List of construction marks

3.2.1 The mark **✕** is assigned to the relevant part of the fish farm, when it has been surveyed by the Society during its construction in compliance with the new building procedure detailed in Ch 1, Sec 3.

3.2.2 The mark **✕** is assigned to the relevant part of the fish farm, when the latter is classed after construction and is changing class from an IACS Society at the time of the admission to class.

3.2.3 The mark **•** is assigned to the relevant part of the fish farm, where the procedure for the assignment of classification is other than those detailed in [3.2.1] and [3.2.2], but however deemed acceptable.

4 Service notation

4.1 General

4.1.1 The service notation defines the service of the unit which has been considered for its classification, according to the request for classification signed by the Interested Party.

The service notation **fish farm** may be assigned to units solely designed for breeding fishes. The service notation is to be completed by a structural type notation and additional service features as defined in Articles [5] and [6].

4.2 Special service ()

4.2.1 The service notation special service () may be assigned to fish farms which, due to the peculiar characteristics of their activity, are not covered by the service notation defined in [4.1]. The classification requirements of such fish farms are considered by the Society on a case by case basis.

An additional service feature may be specified after the notation to identify the particular service for which the fish farm is intended to be operated. The scope and criteria of classification of such fish farms are indicated in a memorandum.

5 Structural type notations and associated additional service features

5.1 General

5.1.1 The structural type notation of a fish farm identifies its structural type, as defined in Ch 1, Sec 1, [4.3] to which it belongs. At least one of the structural type notations listed in Tab 1 is to be assigned to every classed fish farm.

5.1.2 A structural type notation may be completed by one or more additional service features, giving further precision regarding the type of the fish farm for which specific rule requirements are applied.

5.1.3 Surface unit

The structural type notation **surface unit** is assigned to fish farms defined in Ch 1, Sec 1, [4.3.1].

One of the additional service features **INHABITED** or **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

For permanent fish farms, one of the additional service features **POSA**, **POSA-HR** or **POSA JETTY** is to be assigned in accordance with [6.3].

Mobile fish farms may be assigned the additional service feature **POSA MU** as defined in [6.3].

The additional service feature **SELF-PROPELLED** may be assigned in accordance with [6.4.1].

Fish farms assigned the additional service feature **SELF-PROPELLED** can not be assigned the additional service feature **UNMANNED**.

Table 1 : List of structural type notations and associated additional service features

Structural type notation [ref. in Part A]	Reference	Remarks
Additional service feature	Reference	
surface unit [5.1.3]		
INHABITED or UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
POSA , POSA-HR or POSA JETTY [6.3.1] (1)	NR493	mandatory for permanent fish farms
POSA MU [6.3.2] (1)	NR493	
SELF-PROPELLED [6.4.1]		
submersible unit [5.1.4]		
UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
column stabilized unit [5.1.5]	NR571	
INHABITED or UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
POSA , POSA-HR or POSA JETTY [6.3.1] (1)	NR493	mandatory for permanent fish farms
POSA MU [6.3.2] (1)	NR493	
self-elevating unit [5.1.6]	NR534	
INHABITED or UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
SPAR [5.1.7]		
INHABITED or UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
POSA or POSA-HR [6.3.1] (1)	NR493	mandatory
special type () [5.1.8]		
INHABITED or UNMANNED [6.1]		
MOBILE or PERMANENT [6.2]		
POSA , POSA-HR or POSA JETTY [6.3.1] (1)	NR493	mandatory for permanent fish farms
POSA MU [6.3.2] (1)	NR493	
(1) A construction mark is added to the additional service feature.		

5.1.4 Submersible unit

The structural type notation **submersible unit** is assigned to fish farms defined in Ch 1, Sec 1, [4.3.2].

The additional service feature **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

5.1.5 Column stabilized unit

The structural type notation **column stabilized unit** is assigned to fish farms defined in Ch 1, Sec 1, [4.3.3].

One of the additional service features **INHABITED** or **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

For permanent fish farms, one of the additional service features **POSA**, **POSA-HR** or **POSA JETTY** is to be assigned in accordance with [6.3].

Mobile fish farms may be assigned the additional service feature **POSA MU** as defined in [6.3].

5.1.6 Self-elevating unit

The structural type notation **self-elevating unit** is assigned to fish farms defined in Ch 1, Sec 1, [4.3.4].

One of the additional service features **INHABITED** or **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

5.1.7 SPAR

The structural type notation **SPAR** is assigned to fish farms defined in Ch 1, Sec 1, [4.3.5].

One of the additional service features **INHABITED** or **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

The notation is to be completed by one of the additional service features **POSA** or **POSA-HR** as defined in [6.3].

5.1.8 Special type ()

The structural type notation **special type ()** may be assigned to fish farms not belonging to any of the other structural types.

The mention between brackets is to be completed according to the specific type of the fish farm, in agreement with the Society.

One of the additional service features **INHABITED** or **UNMANNED** is to be assigned in accordance with [6.1].

One of the additional service features **MOBILE** or **PERMANENT** is to be assigned in accordance with [6.2].

For permanent fish farms, one of the additional service features **POSA**, **POSA-HR** or **POSA JETTY** is to be assigned in accordance with [6.3].

Mobile fish farms may be assigned the additional service feature **POSA MU** as defined in [6.3].

6 Additional service features

6.1 Condition of operation (INHABITED / UNMANNED)

6.1.1 INHABITED

The additional service feature **INHABITED** is assigned to fish farms on board which personnel is permanently or near permanently present, either because they live in accommodation facilities provided on board or because shift working conditions are organized.

6.1.2 UNMANNED

The additional service feature **UNMANNED** is assigned to fish farms which, due to simplicity of fishfarming operations performed, or to their automation, accommodate personnel only for short periods of time.

The additional service feature **UNMANNED** can not be assigned to fish farms assigned the additional service feature **SELF-PROPELLED**.

6.2 Nature of the fish farms (MOBILE / PERMANENT)

6.2.1 PERMANENT

The additional service feature **PERMANENT** is assigned to fish farms permanently moored for a period equal to or greater than 5 years at a single location with no drydock.

6.2.2 MOBILE

The additional service feature **MOBILE** is assigned to seagoing fish farms or stationary fish farms moored for period less than indicated in [6.2.1].

6.3 Station keeping (POSA)

6.3.1 Permanent fish farms

The additional service feature **POSA** is assigned to fish farms equipped with position anchoring equipment complying with the applicable requirements of NR493 Classification of Mooring Systems for Permanent and Mobile Offshore Units.

The additional service feature **POSA-HR** (Higher Redundancy) may be assigned in substitution to the notation **POSA**, based on the provisions of NR493.

For fish farms moored to a jetty with a permanent position mooring equipment complying with the applicable requirements of NR493 the additional service feature **POSA JETTY** is to be assigned in substitution to **POSA**.

A construction mark is to be added to these additional service features.

The requirements for the maintenance of these notations are given in Ch 2, Sec 6.

Note 1: The scope of **POSA** notation can be extended to tandem connection with a specific second fish farm.

6.3.2 Mobile fish farms

The additional service feature **POSA MU** (Mobile Units) may be assigned to mobile fish farms with station keeping system complying with the applicable requirements of NR493.

A construction mark is to be added to these additional service features.

The requirements for the maintenance of these notations are given in Ch 2, Sec 6.

6.4 Propulsion

6.4.1 SELF-PROPELLED

The additional service feature **SELF-PROPELLED** is assigned to fish farms equipped with a propulsion system providing the unit the capability of unassisted transit between different geographic locations.

Fish farms assigned the additional service feature **SELF-PROPELLED** can not be assigned the additional service feature **UNMANNED**.

7 Site, transit and navigation notations

7.1 Site notation

7.1.1 Fish farms covered by the present Rules are to be granted with a site notation, consisting in the name of field and/or geographical area and/or the most unfavourable sea conditions where the fish farm is intended to operate.

7.1.2 For surface units, as defined in Ch 1, Sec 1, [4.3.1], the site notation may be completed by one of the navigation notations given in [7.4]. This navigation notation is to cover only the site condition of the fish farm. In addition, the requirements of [7.3], are also to be complied with.

Example: **Sanggou bay China - coastal area**

7.1.3 In both cases, with or without navigation notation for site condition, the data, limitations and assumptions used for the assessment of the fish farm on site are stated in the Design Criteria Statement, which is referred to on a memorandum.

7.2 Transit notation

7.2.1 Fish farms involved in towing or sailing by means of own propulsion system between construction shipyard and the intended site, or between different operation sites, are to be granted with the notation **transit**.

Note 1: Dry towing of fish farms is not covered by the notation **transit**.

7.2.2 The notation **transit**, as defined in [7.2.1], is to be completed as follows:

- **transit - specific criteria**, applicable for all types of fish farm, when the criteria for the assessment in towing/transit phase are based on data and assumptions specified by the party applying for classification. These criteria are to be stated in the Design Criteria Statement, which is referred to on a memorandum.
- for surface units, as defined in Ch 1, Sec 1, [4.3.1], the notation **transit** may be completed by one of the navigation notation given in [7.4].

Example: **transit - unrestricted navigation**

7.3 Navigation notations

7.3.1 Navigation notations listed in [7.4] may complete the site notation and/or transit notation of the fish farm, as required in [7.1.2] and [7.2.2].

7.3.2 The assignment of a navigation notation, including the reduction of scantlings or specific arrangements for restricted navigation notations, is subject to compliance with the requirements laid down in Part B and Part C of the Rules.

7.3.3 The assignment of a navigation notation does not absolve the Interested Party from compliance with any international and national regulations established by the Administrations for a fish farm operating in national waters, or a specific area, or a navigation zone. Neither does it waive the requirements in Ch 1, Sec 1, [3.3.1].

7.4 List of navigation notations

7.4.1 The navigation notation **unrestricted navigation** is assigned to fish farms intended to operate in any area and any period of the year.

7.4.2 The navigation notation **summer zone** is assigned to fish farms intended to operate only within the geographical limits as defined in ILLC 1966 for the Summer zones.

7.4.3 The navigation notation **tropical zone** is assigned to fish farms intended to operate only within the geographical limits as defined in ILLC 1966 for the Tropical zones.

7.4.4 The navigation notation **coastal area** is assigned to fish farms intended to operate only within 20 nautical miles from the shore and with a maximum sailing time of six hours from a port of refuge or safe sheltered anchorage.

7.4.5 The navigation notation **sheltered area** is assigned to fish farms intended to operate in sheltered waters, i.e. harbours, estuaries, roadsteads, bays, lagoons and generally calm stretches of water and when the wind force does not exceed 6 Beaufort scale.

8 Additional class notations

8.1 General

8.1.1 An additional class notation expresses the classification of additional equipment or specific arrangement, which has been requested by the Interested Party. Some additional class notations may also be mandatory for certain fish farm types and services when specified in the present Rules.

8.1.2 The assignment of an additional class notation is subject to the compliance with the associated additional rule requirements.

8.1.3 Some additional class notations are assigned a construction mark, according to the principles given in [3.1.2]. This is indicated in the definition of the relevant additional class notations.

8.1.4 The different additional class notations which may be assigned to a fish farm are listed in [8.2] and [8.3] and are summarized in Tab 2.

Table 2 : List of additional class notations

Additional class notation	Defined in	Reference for assignment	Remarks
ALM (1) (ALM) (1) ALM-EN (1) ALM-SUBSEA (1)	[8.2.1]	NR526	ALM, ALM-EN and ALM-SUBSEA may be completed by -MR
AUTO (1)	[8.2.8]	Part C, Chapter 3 of the Offshore Rules	
DYNAPOS SAM (1) DYNAPOS AM (1) DYNAPOS AT (1) DYNAPOS AM/AT (1)	[8.2.2]	Pt F, Ch 11, Sec 5 of the Ship Rules	DYNAPOS AM and DYNAPOS AT may be completed by R or RS . DYNAPOS AM/AT may be completed by R or RS or (xx;xx) (corresponding to the two-number vector for the Environmental Station Keeping Index ESKI) DYNAPOS notations may be completed by -HWIL DYNAPOS AM/AT-R or DYNAPOS AM/AT-RS may be completed by -EI
ETA	[8.2.4]	Pt B, Ch 12, Sec 4 of the Ship Rules	
HEL (1)	[8.2.5]	Pt B, Ch 3, Sec 4, [4]	
INWATERSURVEY	[8.3.2]	Pt F, Ch 15, Sec 3 of the Ship Rules	Mandatory for permanent fish farms
LSA	[8.2.3]	Pt C, Ch 4, Sec 12 of the offshore Rules	
OAS (1)	[8.2.7]	NI 629	
OHS (1)	[8.2.6]	NR595	
Spectral Fatigue ()	[8.3.1]	NI 611	The information between brackets is a short description of routes and/or areas considered for the spectral fatigue analysis
(1) A construction mark is added to the additional class notation.			

8.2 Equipment and facilities

8.2.1 Lifting appliances

Fish farms fitted with lifting appliances meeting the requirements of the NR526 Rules for the Certification of Lifting Appliances onboard Ships and Offshore Units may be assigned the following additional class notations:

- **ALM** for appliances intended to be used in offshore conditions for various lifting operations exclusive of the appliances mentioned in item a).

The additional class notations (**ALM**) may be assigned by the Society in lieu of the notations **ALM**, when the corresponding lifting appliances meet the requirements of specific National Regulations under the conditions defined in NR526.

The additional class notation **ALM** may be completed by:

- **-EN**, when lifting appliances are in compliance with additional specific safety requirements as defined in NR526
- **-SUBSEA**, when lifting appliances are intended to be used for lifting of subsea equipment in compliance with specific requirements as defined in NR526.

The additional class notations **ALM**, **ALM-EN** and **ALM-SUBSEA** may be completed by **-MR** when, in addition, lifting appliances are intended to be used for lifting of personnel and comply with the specific requirements of NR526.

The additional class notations **ALM**, (**ALP**), (**ALM**), **ALM-EN** or **ALM-SUBSEA** are optional. However, the Society may require the compliance of lifting appliances with the assigning conditions of one of the above mentioned additional class notations for the classification of fish farms, when one or several lifting appliances are of a primary importance for their operation, or when such appliances significantly influence their structure.

In compliance with [8.1.3], these notations are assigned a construction mark as defined in [3].

The requirements for assignment and maintenance of these notations are given in NR526.

8.2.2 Dynamic positioning (DYNAPOS)

The additional class notation **DYNAPOS** may be assigned to fish farms equipped with a dynamic station keeping system.

In accordance with [8.1.3], this notation is assigned a construction mark, as defined in Article [3].

The scope of the additional class notation **DYNAPOS**, including the additional notations for the description of capability of the installation (**SAM**, **AM**, **AT**, **AM/AT**), and the requirements for the assignment of this notation are given in Pt F, Ch 11, Sec 5 of the Ship Rules.

The requirements for the maintenance of this notation are given in Pt A, Ch 5, Sec 10 of the Ship Rules.

The additional class notation **DYNAPOS AM/AT R** or **DYNAPOS AM/AT RS** may be completed by **-EI** for fish farms fitted with enhanced dynamic positioning control system and complying with the requirements of Pt F, Ch 11, Sec 5 of the Ship Rules. This notation allows improving the reliability, availability and operability of a DP fish farm.

The notation **-HWIL** is added to the additional class notation **DYNAPOS** when the control system has been verified according to the requirements of NR632 Hardware-in-the-loop Testing.

8.2.3 Life saving appliances (LSA)

The additional class notation **LSA** may be assigned to fish farms the life-saving equipment of which complies with the applicable provisions of Pt C, Ch 4, Sec 12 of the offshore Rules.

Note 1: It is reminded that, except if **LSA** additional class notation is to be granted, life-saving appliances are out of the scope of classification.

8.2.4 Emergency towing arrangement (ETA)

The additional class notation **ETA** may be assigned to fish farms fitted with an emergency towing arrangement.

The requirements for the assignment of this notation are given in Pt B, Ch 12, Sec 4 of the Ship Rules.

8.2.5 Helideck (HEL)

The additional class notation **HEL** may be assigned to fish farms complying with chapter 13 of MODU Code and Civil Aviation Publication (CAP) 437 when they are fitted with helicopter facilities subject to design review and construction and installation survey by the Society.

This notation is assigned a construction mark.

The requirements for the assignment and maintenance of this notation are given respectively in Pt B, Ch 3, Sec 4, [4] and Ch 2, Sec 6, [4].

8.2.6 Offshore Handling Systems (OHS)

The additional class notation **OHS** may be assigned to fish farms having offshore handling systems such as winches, strand jacks, chain jacks, sheaves and their foundations used for lifting/pulling of loads.

This notation is assigned a construction mark.

The requirements for the assignment and maintenance of this notation are given in, respectively, NR595 Classification of Offshore Handling Systems and Ch 2, Sec 6, [3].

8.2.7 Offshore access system (OAS)

The additional class notation **OAS** may be assigned to fish farms having an Offshore Access System such as a motion compensated gangway used for personnel transfer from a mobile fish farm to an offshore facility or to an other mobile fish farm. This notation is assigned a construction mark.

The requirements for the assignment and maintenance of this notation are given in, respectively, NI629 Offshore Access Systems and Ch 2, Sec 6, [5].

8.2.8 Automation systems (AUTO)

The additional class notation **AUTO** may be assigned to fish farms the control and safety systems of which comply with the applicable requirements of Part C, Chapter 3 of the offshore Rules.

This notation is assigned a construction mark.

8.3 Other additional class notations

8.3.1 Spectral fatigue

The Guidance Note NI611 Guidelines for Fatigue Assessment of Ships and Offshore Units is to be used.

The information between brackets is a short description of routes and areas considered for this spectral fatigue analysis.

Example:

Spectral Fatigue (North Atlantic)

The Guidance Note NI611 Guidelines for Fatigue Assessment of Steel Ships and Offshore Units is applicable.

Other methodology may be used subject to approval by the Society.

8.3.2 In-water survey (INWATERSURVEY)

The additional class notation **INWATERSURVEY** may be assigned to fish farms provided with suitable arrangements to facilitate the in-water surveys.

The requirements for the assignment and maintenance of this notation are given respectively in Pt F, Ch 15, Sec 3 of the Ship rules and in Ch 2, Sec 5.

9 Other class notations

9.1 General

9.1.1 On request of the Interested Party, the Society may assign, in addition to those mentioned in the present Section, additional class notations as defined in Part A of the Ship Rules when the fish farm meets the requirements of these Rules or of Guidance Notes to which it is referred.

9.1.2 The Society may also define other notations by means of provisional requirements and guidelines, which may then be published in the form of tentative rules.

Section 3 Assignment of Class

1 General

1.1

1.1.1 Class is assigned to a fish farm upon a survey, with the associated operations, which is held in order to verify whether it is eligible to be classed on the basis of the Rules of the Society (see Ch 1, Sec 1, [1.3.2]). This may be achieved through:

- the completion of the new building, during which a survey has been performed
- a survey carried out according to the agreement developed by the IACS Member Societies when fish farms change class between members, or
- a specific admission to class survey, in cases where a fish farm is classed with a non-IACS Society or is not classed at all.

2 New building procedure

2.1 Fish farms surveyed by the Society during construction

2.1.1 When a fish farm is surveyed by the Society during construction, it is to comply with those requirements of the Rules which are in force and applicable depending on the class of the fish farm, taking into account the provisions of Ch 1, Sec 1, [2.2] and Ch 1, Sec 1, [2.3].

2.1.2 The Society:

- approves the plans and documentation submitted as required by the Rules
- proceeds, if required, with the appraisal of the design of materials and equipment used in the construction of the fish farm and their inspection at works
- carries out surveys or obtains appropriate evidence to satisfy itself that the scantlings and construction meet the rule requirements in relation to the approved drawings
- attends tests and trials provided for in the Rules
- assigns the construction mark \boxtimes ; refer to Ch 1, Sec 2, [3.1.2].

2.1.3 The Society defines in specific Rules which materials and equipment used for the construction of fish farms built under survey are, as a rule, subject to appraisal of their design and to inspection at works, and according to which particulars.

2.1.4 As part of his interventions during the fish farm's construction, the Surveyor will:

- conduct an overall examination of the parts of the fish farm covered by the Rules
- examine the construction methods and procedures when required by the Rules
- check selected items covered by the rule requirements
- attend tests and trials where applicable and deemed necessary.

Note 1: The Society's surveys cannot be considered as a substitute for the construction control which remains the responsibility of the Builder, nor for the fish farm's acceptance which remains the responsibility of the Owner.

2.1.5 Use of materials, machinery, appliances and items

As a general rule, all materials, machinery, boilers, auxiliary installations, equipment, items etc. (generally referred to as "products") which are covered by the class and used or fitted on board fish farms surveyed by the Society during construction are to be new and, where intended for essential services as defined in Ch 1, Sec 1, [1.2.1], tested by the Society.

Second hand materials, machinery, appliances and items may be used subject to the specific agreement of the Society and the Owner.

The requirements for the selection of materials to be used in the construction of the various parts of a fish farm, the characteristics of products to be used for such parts and the checks required for their acceptance are to be as stated in Part C and in NR216 Materials and Welding, as applicable, or in other Parts of the Rules or as specified on approved plans. In particular, the testing of products manufactured according to quality assurance procedures approved by the Society and the approval of such procedures are governed by the requirements of NR216 Materials and Welding.

2.1.6 Defects or deficiencies and their repair

The Society may, at any time, reject items found to be defective or contrary to rule requirements or require supplementary inspections and tests and/or modifications, notwithstanding any previous certificates issued.

All repairs are subject to the preliminary agreement of the Society. When the limits of tolerance for defects are specified in the Rules concerned or by the Manufacturer, they are to be taken into account for repairs.

It is incumbent upon the Interested Party to notify the Society of any defects noted during the construction of the fish farm and/or of any item not complying with the applicable requirements or in any case unsatisfactory. Proposals regarding remedial actions intended to be adopted to eliminate such defects or unsatisfactory items are to be submitted to the Society and, if accepted, carried out to the Surveyor's satisfaction.

2.1.7 Equivalence of Rule testing under certain conditions

Notwithstanding the provisions of [2.1.5], the Society may, at its discretion and subject to conditions and checks deemed appropriate, accept certain materials, appliances or machinery which have not been subjected to rule testing.

2.2 Other cases

2.2.1 When the procedure adopted does not comply with that detailed in [2.1] but the Society deems that it is acceptable for the assignment of class, the construction mark μ is assigned in accordance with Ch 1, Sec 2, [3.2.3].

2.3 Documentation

2.3.1 Documentation relevant to the class applied for is to be submitted for the approval of the Society.

2.3.2 The required documentation listed in Ch 1, Sec 4, [2] for new built fish farms is to be considered as a minimum, to be completed in compliance with the particular requirements of the other chapters, accounting for the fish farm's service(s), structural type and contemplated additional class notations.

The Society may also call for additional information according to the specific nature of the fish farm to be classed.

2.3.3 The documentation submitted to the Society is examined in relation to the class applied for in the request for classification.

Note 1: Should the Interested Party subsequently wish to have the class, in particular the service notation or design data contained in the design criteria statement modified, plans and drawings are generally to be re-examined.

2.3.4 A copy of the submitted plans will be returned duly stamped, with remarks related to the compliance with the rule requirements should the need arise.

2.3.5 As a rule, modifications of the approved plans regarding items covered by classification are to be submitted.

2.3.6 Design data to be submitted to the Society are to incorporate all information necessary for the assessment of the design of the fish farm for the purpose of assignment of class. It is the responsibility of the Interested Party to ascertain that the design data are correct, complete and compatible with the use of the fish farm.

2.3.7 Design calculations are to be provided, when called for, as supporting documents to the submitted plans.

2.3.8 Design data and calculations are to be adequately referenced. It is the duty of the Interested Party to ascertain that the references used are correct, complete and applicable to the design of the fish farm.

2.3.9 The submitted plans are to contain all necessary information for checking the compliance with the requirements of the Rules.

2.3.10 In the case of conflicting information, submitted documentation will be considered in the following order of precedence: design data, plans, design calculations.

2.3.11 It is the responsibility of the Interested Party to ascertain that drawings used for the procurement, construction and other works are in accordance with the approved plans.

2.4 Construction portfolio

2.4.1 For fish farms built in compliance with the construction mark { requirements, a construction portfolio, including items listed in [2.4.2], is to be prepared and a copy placed on board the fish farm.

For fish farms not built in compliance with the construction mark { requirements, it is recommended that a construction portfolio, as complete as possible, be prepared and a copy placed on board the fish farm.

2.4.2 The portfolio is to include the following items:

- quality control plans
- reviewed drawings relating to the structure of the fish farm showing the location and extent of application of different grades and strengths of materials (material list)
- fabrication procedures and qualifications (welding, forming, heat treatment, etc.)
- testing procedures (NDT, pressure testing, functional testing, etc.)
- personnel qualifications (welders, NDT operators)
- material certificates
- test certificates
- as-built drawings.

2.4.3 Restrictions or prohibitions, as applicable, regarding alterations or repairs in connection with [2.4.2] are to be included in the portfolio.

2.4.4 The construction portfolio is to be submitted to the review of the Surveyor attending the construction of the fish farm for review of the items specified in [2.4.2].

3 Fish farms classed after construction

3.1 General

3.1.1 When an Owner applies to the Society for a fish farm already in service to be admitted to class, the application will be processed differently depending on whether the fish farm is:

- classed with an IACS Society
- not classed with an IACS Society.

3.2 Surveys and documentation

3.2.1 Surveys

A programme of surveys, appropriate to the age and condition of the fish farm, is determined by the Society, on the basis of the requirements of the Ship Rules, Pt A, Ch 2, Sec 1, [3].

Note 1: Reference is made to Ch 2, Sec 1, [4.1.7]

3.2.2 Documentation

The documentation listed in Ch 1, Sec 4, [3] is to be submitted.

4 Date of initial classification

4.1 Definitions

4.1.1 Date of build

For a new building the date of build is the year and month at which the new construction survey process is completed. Where there is a substantial delay between the completion of the construction survey process and the fish farm commencing active service, the date of commissioning may be also specified.

If modifications are carried out, the date of build remains assigned to the fish farm. Where a complete replacement or addition of a major portion of the fish farm (e.g. forward section, after section) is involved, the following applies:

- the date of build associated with each major portion of the fish farm is indicated on the Classification Certificate
- survey requirements are based on the date of build associated with each major portion of the fish farm.

For permanent fish farms, the initial classification usually starts at the date of mooring commissioning.

4.1.2 Date of initial classification for new buildings

As a general rule, for new buildings the date of initial classification coincides with the date of build.

4.1.3 Date of initial classification for existing fish farms

In principle, for existing fish farms the date of initial classification is the date of completion of the admission to class survey.

5 Reassignment of class

5.1

5.1.1 At the request of the Owner, a fish farm which was previously classed with the Society, subsequently withdrawn from class and has not been classed since may have the class reassigned subject to an admission to class survey. If applicable and appropriate, account may be taken of any periodical surveys held in the former period of class with the Society.

Section 4 Required Documentation

1 General

1.1 Principle

1.1.1 The documentation listed in the present Section is to be considered as a minimum, to be completed in compliance with the particular requirements of the other chapters, accounting for the fish farm's service(s), structural type and contemplated additional class notations.

1.2 Time of submission

1.2.1 The required plans, drawings and documentation are to be submitted to the Society by the party applying for classification, as early as possible, unless otherwise agreed upon.

1.3 Contents of documentation

1.3.1 The submitted plans and drawings are to clearly show all essential features, arrangements and scantlings of the structure, machinery, boilers, auxiliaries and other equipment covered by the classification.

In addition to the above, drawings and documents may also be required for assigning the requested additional class notations or special notations.

2 New built fish farms

2.1 Design data

2.1.1 Structural data

The following design data are to be submitted for information and plan review purposes:

- environmental including:
 - metocean data, applicable to each mode of operation
 - soil conditions
 - minimum atmospheric and sea water temperatures and ice formation if applicable.

The data are to be as comprehensive as possible and are to give clearly evidence of all applicable environmental restrictions

- for permanent fish farms, background data to the above, such as metocean investigation reports, soil investigation reports, and other relevant documentation, are to be also provided
- distributions of fixed and variable loads for each mode of operation
- maximum loading for all decks areas
- necessary data relevant to corrosion protection
- results of model basin tests, when performed
- results of wind tunnel tests, when performed
- for helidecks, data of the heaviest helicopter intended to be used (see Pt B, Ch 2, Sec 3, [2.4])
- for equipment liable to induce, when in use, significant loads within the structure of the fish farm, all information on these loads (refer to Part B, Chapter 2), such as:
 - crane loads on pedestal and on boom and hook rests (lifting)
 - overall and local forces induced by the nets and net cages into the structure and attachment devices
 - other loads from lifting and handling equipment.

2.1.2 Power consumers

The list of essential and emergency power consumers of all types is to be submitted together with the complete indications of the required power supplies associated to different operational configurations.

2.2 Design calculations

2.2.1 Structural calculations

The following design calculations are to be provided as supporting documents to the submitted plans and drawings:

- calculations of environmental loadings to include forces and moments from wind, waves, currents, ice, snow, earthquakes as applicable
- calculations of the fish farm's resistance against overturning while resting on the sea bed, if applicable
- calculations of fish farm motions, where applicable
- calculations of loads induced by equipment (refer to [2.1.1])
- overall strength calculations
- local strength calculations
- jacking systems calculations, where applicable
- mooring and anchoring calculations, as applicable
- calculations of cathodic protection system.

2.2.2 Stability calculations

The following design calculations are to be provided as supporting documents to the submitted plans and drawings:

- cross curves of stability or equivalent
- wind heeling moment curves or equivalent data
- ice accretion effects, when relevant
- stability calculations for the intact and damaged conditions.

2.2.3 Piping calculations

The following design calculations are to be provided as supporting documents to the submitted plans and drawings:

- piping and pressure vessels strength calculations, in particular for calculation of steam pipes and other pressure piping
- fire water demand and fire pump capacity calculations.

2.2.4 Electrical calculations

Electrical design calculations are to be provided as supporting documents to the submitted plans and drawings, including:

- electrical balance, estimated for the different conditions of operation of fish farm (refer to Ch 1, Sec 1, [1.6.4])
- justification of sizes of conductors (temperature rises and voltage drops)
- for installations where the total rated current of generators arranged to run in parallel is above 1000 A, estimation of the prospective short-circuit currents
- where the main bus-bar maximum symmetrical short-circuit current is expected to exceed 50 kA, justification of the bus-bar and bracket strength related to the induced electromagnetic forces.

2.2.5 Additional class notations

Additional calculations as may be called for concerning the assignment of additional class notations are to be also provided.

2.3 Plans and drawings

2.3.1 General drawings

The following general drawings are to be submitted:

- general arrangement plan
- lines drawings (body plan) and offset table of frames, together with plotting of fore and aft axial longitudinal curves
- capacity plan indicating the volumes, overflows and the positions of the centres of gravity of the various compartments together with their locations
- tank sounding tables
- distribution, actual or estimated, of the fish farm's lightweight
- deck loading plans.

2.3.2 Structural drawings

The following structural plans are to be submitted:

- main structural drawings showing structural arrangements, scantlings, grades of steel, welded connections. These drawings are to include, as applicable: transverse and longitudinal sections, decks including helicopter deck; shell plating and framing; bulkheads and flats; legs; columns, bracings and floaters; hull, footings and mats; superstructures and deck houses
- detailed structural drawings in the areas of connections between main structural members (for instance, connections between bracings, bracing and column, column and floater, column and deck in column stabilized fish farms), in way of foundations of jacking systems for self-elevating fish farms, anchoring equipment, crane foundations and of all other parts liable to be subject to high local loadings or stress concentrations

- test plan of compartments intended for liquids
- arrangements and details of watertight doors and other closing appliances; arrangement and details of all openings and means of closure including locations of overflow and air pipes
- drawings showing corrosion control arrangements.

2.3.3 Machinery and piping systems

The following machinery and piping drawings are to be submitted:

a) General:

- general arrangement showing particularly location of essential machinery and equipment
- bilge and ballast pipings, outside and inside machinery spaces
- sea inlets, scuppers and discharges
- air vents, overflow and sounding piping systems and/or devices
- remote level indicating systems and draught measurements systems
- boiler feed system
- sea water distillation system
- fuel oil and lubricating oil systems, including pipings and tanks not forming part of the fish farm's structure
- live steam piping
- reduced pressure steam, draining, and exhaust piping
- machinery circulation and cooling piping
- compressed air systems for remote control, instrumentation, engine starting, including compressed air vessels and pipings
- accessories such as heaters, coolers, waste heat recovery units, etc.
- exhaust ducts of engines and boilers
- location and arrangement of drip-trays and gutterways
- jacking systems, for self-elevating fish farms
- propulsion and power generating systems.

b) Thermal oil heating installation:

- piping and pumping systems
- general arrangement of the installation
- boilers including their major components
- protections against oil leakage
- monitoring and alarm systems
- nature and characteristics of the thermal oil: viscosity, flash point, fire point, decomposition temperature, auto-ignition temperature, etc.
- operation and maintenance instructions.

c) Hydraulic installations:

- piping and pumping systems
- arrangement of the installations
- protections against leakage
- description of the main components
- protection against overpressure
- monitoring and alarm systems
- nature and characteristics of the hydraulic medium (flash point and auto-ignition temperature in particular)
- operation and maintenance instructions.

d) Incinerators:

- general arrangement of the installation
- incinerators
- piping and pumping systems
- monitoring and alarm systems
- programme of type tests and tests after completion
- operation and maintenance instructions.

- e) Helicopter refuelling system:
- general arrangement of the installation
 - storage vessels, piping and pumping system
 - protection against leakage
 - protection against overpressure
 - jettisoning or emergency draining
 - helideck drainage system
 - emergency shutdown system.

The drawings are to be diagrammatic and are to refer to a single system, in order to facilitate their examination. They are to include:

- pipe service pressures and temperatures, in order to determine their classes
- size and nature of materials for pipes and accessories
- capacity, prime mover and, if needed, location of the pumps
- arrangements proposed when remote control, remote monitoring or automation, are foreseen for the installations concerned
- specification of systems
- fabrication specification
- welding procedure specification
- operation control procedures.
- generally, all information allowing the verification of the requirements of the Rules

2.3.4 Electrical drawings

The following electrical plans and diagrams are to be submitted:

- a) General arrangement of:
- main switchboard
 - other distribution boards
 - emergency switchboard
 - generators
 - electric propulsion plant, if any
 - motors and equipment serving the essential services,
 - batteries
 - cable trays.
- b) Single line diagrams of the main and emergency distribution networks, including single line diagrams of intrinsically safe circuits, indicating:
- make, type, cross section area, of the conductors with mention of the intensity carried under full load
 - make, type and rating of switch-gears, fuses and circuit-breakers.
- c) For main, sub and emergency switchboards:
- assembly drawing showing the various sections and the arrangement of the equipment and instrumentation
 - bus-bar arrangement with mention of their cross section areas.
- d) For fish farms where hazardous area(s) is(are) existing:
- a general diagram showing the location of the electrical equipment within the hazardous area(s) and their safety type (e.g. Ex "d" II BT3)
 - an evidence of the safety character of the above equipment
 - the list of explosion protected equipment.
- e) Impressed current cathodic protection systems if applicable.

2.3.5 Safety documentation

The following plans and documents related to fire safety are to be submitted:

- general arrangement of the installation
- the dedicated sections of the Operating Manual related to classification as specified in Ch 1, Sec 1, [3.4]
- the dedicated sections of the construction portfolio as specified in Ch 1, Sec 3, [2.4.2]
- hazardous areas classification drawing, including information about all openings located in these hazardous areas
- mechanical and natural ventilation systems including location of air intakes and exhausts, air renewal rate per hour, location of fan controls
- air intakes and exhaust outlets of internal combustion engines and boilers
- fire structural protection drawings
- fire detection and extinguishing system description and drawings, including fire-fighting water piping and pumping systems, with flow calculations
- alarm and internal communication systems description and drawings
- fire control plan
- escape way and life saving appliances description and drawings, when applicable.

For unmanned small-sized fish farms with moderate risks, the following drawings and documentation are to be submitted:

- general arrangement plan showing high risk spaces and portable extinguishers
- hazardous areas classification drawing, list of electrical equipment installed in hazardous areas and certified safe type documentation
- drawings showing particulars of the ventilation system for high risk spaces associated
- fire control plan.

2.3.6 Stability file

A stability file is to be submitted by the Owner or its representative. The stability file has to include:

- lines plan
- capacity plan
- lightweight characteristics and justification, results of the inclining experiment results
- booklet of typical loading conditions including allowable ice accretion, wind speed, lifting appliances motions, etc.
- intact trim and stability booklet
- damage stability booklet
- damage control plan and booklet
- allowable vertical centre of gravity (KG max) curves based on intact and damage stability criteria.

When an inclining test is conducted, the Owner has to submit:

- inclining test protocol (prior to being carried out)
- lightweight survey report
- report of water density and wind measurements
- inclining test report and centre of gravity calculations.

2.4 Operating manual

2.4.1 General

An Operating Manual or equivalent is to be placed on board each fish farm. The manual should include the following information, as applicable to the particular fish farm, so as to provide suitable guidance to the operating personnel with regard to safe operation of the fish farm.

The operating manual is to be submitted for review to the Society.

Note 1: When an IMO MODU certificate is granted to the fish farm, the operating manual is to comply with IMO MODU Code Chapter 14 in addition to the present Article.

2.4.2 Content

As a minimum, the operating manual is to include the following informations, where applicable:

- general description and principal particulars of the fish farm
- pertinent data for each approved mode of operation, including design and variable loading, environmental conditions, sea bed conditions, etc.
- minimum anticipated sea and atmospheric temperatures
- general arrangement plan showing watertight compartments, closures, vents, intakes and discharges, down flooding points, fixed and variable deck loads, and the location of draught gauges and draught marks.

If permanent ballast is to be used, the weight, location and substance used are to be clearly indicated.

- hydrostatic curves or equivalent data

- capacity plan showing the capacity, centre of gravity and free surface correction for each tank
- instructions for operation, including precautions to be taken in adverse weather, changing mode of operations, any inherent limitations of operations, etc.
- plans and description of the ballast system and instructions for ballasting
- hazardous areas drawings
- light ship data based on the results of an inclining experiment, etc
- stability information in the form of maximum KG-draught curve, or other suitable parameters based upon compliance with the required intact and damaged stability criteria
- representative examples of loading conditions for each approved mode of operation, together with means for evaluation of other loading conditions
- details of emergency shutdown procedures for electrical equipment
- identification of helicopter uses for the design of the helicopter deck
- any relevant data regarding stability including amount of snow, ice allowable on deck and wind speed
- amount of allowable marine growth
- towing arrangements and limiting conditions of operations
- temporary mooring and position anchoring arrangements
- description of the dynamic positioning systems and limiting conditions of operation
- ballast control system drawings including piping diagram showing remote and manual control devices
- bilge system
- fire bulkhead arrangement drawing
- fire and gas drawings showing types and locations of detection and extinguishing equipment
- schematic diagrams of main emergency power supplies and electrical installations
- operational procedures for onboard cranes and winches
- plan identifying the location of all watertight and weathertight closures and all non-protected openings and identifying the position open/closed of all non-automatic closing devices
- instructions for internal and external openings to be used or to be kept closed during operating conditions and transit
- access manual, as defined in Pt B, Ch 3, Sec 1, [4]
- corrosion protection system including:
 - in case of impressed current system, operating manual and detail of maintenance operations
 - in case of sacrificial anodes: detail of maintenance/retrofit operations
- list of key as-built drawings incorporated in the Operating Manual or in the construction portfolio
- design Criteria Statement issued by the Society, including classification restrictions, if any
- design data sheets referred to in the Design Criteria Statement
- Classification Certificates, continuous survey lists and other certificates issued by the Society.

2.5 Construction portfolio

2.5.1 A set of plans showing the exact location and extent of application of different grades and strengths of structural materials, together with a description of the material and welding procedures employed, is to be placed aboard the fish farm. Any other relevant construction information is to be included in the booklet, including restrictions or prohibitions regarding repairs or modifications.

3 Fish farms classed after construction

3.1 General

3.1.1 The following documentation will be required for the classification of fish farms classed after construction.

3.2 Operating manual

3.2.1 Refer to [2.4].

3.3 Structure

3.3.1 The following documentation is to be submitted:

- general arrangement
- midship section or representative sections, as applicable
- profile and deck plan
- watertight bulkheads
- rudderspan and rudderstock, if any
- shell expansion
- hatch covers, if any
- capacity plan
- loading conditions, calculation of still water bending moment and overall stresses as applicable, relevant documents, particulars of loading calculator and instruction booklet as per Society's requirements, according to the case
- stability documents.

3.4 Machinery and equipment

3.4.1 The following documentation is to be submitted:

- engine room general arrangement
- diagrammatics of fuel (transfer, service), bilge, ballast, lubricating oil, cooling, steam and feed, general service and starting compressed air piping
- drawings of boilers and air receivers
- drawings of shaft line, reduction gear and propeller, if any
- drawings of steering gear, if any
- torsional vibration calculations as per conditions laid down in the Ship Rules; such documents are required only for fish farms less than 2 years old and for older fish farms the propelling system of which has been modified during the two years preceding the classification.

3.5 Electrical systems

3.5.1 The following documentation is to be submitted:

- master plan of power distribution, lighting and emergency power circuits
- single line diagram of networks and switchboards
- location and arrangement of electrical equipment in hazardous areas.

3.6 Safety

3.6.1 The following documentation is to be submitted:

- safety plan
- location and rating of passive fire protection
- diagrammatics of fire-fighting systems
- fire and gas detection and fire protection causes and effects matrix.

3.7 Additional class notation AUTO

3.7.1 The following documentation is to be submitted:

- instrument and alarm list
- fire alarm system
- list of automatic safety functions (eg: slowdowns, shutdown, etc)
- function testing plan.

3.8 Other additional class notations

3.8.1 For installation or equipment covered by an additional class notation, the Society will determine the documentation to be submitted.

Part A

Classification and Surveys

CHAPTER 2

MAINTENANCE OF CLASS

Section 1	General Provisions Concerning Surveys
Section 2	Annual Survey
Section 3	Intermediate Survey
Section 4	Class Renewal Survey
Section 5	Survey of Underwater Parts and Temporary Mooring Equipment
Section 6	Other Surveys
Section 7	Suspension and Withdrawal of Class
Appendix 1	Thickness Measurements: Extent, Determination of Locations, Acceptance Criteria

Section 1 General Provisions Concerning Surveys

1 General principles of surveys

1.1 Survey types

1.1.1 Classed fish farms are submitted to surveys for the maintenance of class. These surveys include the class renewal survey, intermediate and annual survey, bottom survey (either survey in dry condition or in-water survey), propeller shaft survey, boiler survey, and surveys for the maintenance of additional class notations, where applicable. Such surveys are carried out at the intervals and under the conditions laid down in this Section. In addition to the above periodical surveys, fish farms are to be submitted to occasional surveys whenever the circumstances so require; refer to Article [6].

Note 1: For the terminology related to surveys, refer to Pt A, Ch 2, Sec 2, [2.2] of the Ship Rules.

1.1.2 For the requirements related to the extent, determination of locations and acceptance criteria of thickness measurements, reference is made to Ch 2, App 1.

1.1.3 Where there are no specific survey requirements for additional class notations assigned to a fish farm, equipment and/or arrangements related to these additional class notations are to be examined, as applicable, to the Surveyor's satisfaction at each class renewal survey for the class.

The surveys are to be carried out in accordance with the relevant requirements in order to confirm that the hull, machinery, equipment and appliances comply with the applicable Rules and will remain in satisfactory condition based on the understanding and assumptions mentioned in Ch 1, Sec 1, [3.3].

Where the conditions for the maintenance of the class, service notations and additional class notations are not complied with, the class and/or the service notation and/or the additional class notations as appropriate will be suspended and/or withdrawn in accordance with the applicable Rules given in Ch 2, Sec 7.

Note 1: It is understood that requirements for surveys apply to those items that are required according to the Rules or, even if not required, are fitted on board.

1.1.4 Unless otherwise specified, any periodical survey other than bottom survey and propeller shaft survey may be effected by carrying out partial surveys at different times to be agreed upon with the Society, provided that each partial survey is adequately extensive. The splitting of a survey into partial surveys is to be such as not to impair its effectiveness.

1.2 Change of periodicity, postponement or advance of surveys

1.2.1 The Society reserves the right, after due consideration, to change the periodicity, postpone or advance surveys, taking into account particular circumstances.

1.2.2 When a survey becomes overdue during a voyage, the following applies:

a) In the case of a class renewal survey, the Society may grant an extension to allow for completion of this survey provided there is documented agreement to such an extension prior to the expiry date of the Certificate of Classification, adequate arrangements have been made for the attendance of the Surveyor at the first port of call and the Society is satisfied that there is technical justification for such an extension. Such an extension will be granted only until arrival at the first port of call after the expiry date of the Certificate of Classification.

However, if owing to "exceptional circumstances", the class renewal survey cannot be completed at the first port of call, the Society may grant an extension, but the total period of extension shall in no case be longer than three months after the original limit date of the class renewal survey.

b) In the case of annual and intermediate surveys, no postponement is granted. Such surveys are to be completed within their prescribed windows.

c) In the case of all other periodical surveys and recommendations, extension of class may be granted until the arrival of the fish farm at the port of destination.

1.3 Extension of scope of survey

1.3.1 The Society and/or its Surveyors may extend the scope of the provisions in the present Chapter, which set forth the technical requirements for surveys, whenever and so far as considered necessary, or modify them in the case of special fish farms or systems.

1.3.2 The extent of any survey also depends upon the condition of the fish farm and its equipment. Should the Surveyor have any doubt as to the maintenance or condition of the fish farm or its equipment, or be advised of any deficiency or damage which may affect the class, then further examination and testing may be conducted as considered necessary.

1.4 General procedure of survey

1.4.1 The general procedure of survey consists in:

- an overall examination of the parts of the fish farm covered by the rule requirements
- checking selected items covered by the rule requirements
- attending tests and trials where applicable and deemed necessary by the Surveyor.

1.4.2 When a survey results in the identification of significant corrosion, structural defects or damage to hull, machinery and/or any piece of its equipment which, in the opinion of the Surveyor, affect the fish farm's class, remedial measures are to be implemented before the fish farm continues in service (see also Pt A, Ch 2, Sec 2, [2.10] of the Ship Rules).

Note 1: The Society's survey requirements cannot be considered as a substitute for specification and acceptance of repairs and maintenance, which remain the responsibility of the Owner.

Note 2: In accordance with the provisions of Ch 1, Sec 1, [3.1.3], the Society will, at the request of the Owner, apply the regulations of Administrations concerning the scope and periodicity of surveys when they differ from those laid down in [4] and [5].

Note 3: During the surveys, the Surveyor does not check that the spare parts are kept on board, maintained in working order and suitably protected and lashed.

1.5 Appointment of another Surveyor

1.5.1 In compliance with the provisions of Ch 1, Sec 1, [2.5], should a disagreement arise between the Owner and the Surveyor during a survey, the Society may, at the request of the Owner, designate another Surveyor.

1.6 Access for surveys

1.6.1 The Rule requirements for class maintenance surveys are to be given due consideration during the fish farm's design and construction phases as regards all necessary arrangements for access. Arrangements of a special nature are to be brought to the attention of the Society.

1.6.2 For small volume void space without primary structure inside, the Society may accept that no access is provided for inspection. When necessary, the Society may call then for additional requirements.

1.7 Remote inspection techniques (RIT)

1.7.1 The remote inspection techniques (RIT) are to provide the information normally obtained from a close-up survey.

RIT surveys are to be carried out in accordance with the requirements given in the present Article and in NR533 Approval of Service Suppliers.

The proposals for use of a RIT shall be submitted by the Owner in advance of the survey and approved by the Society.

1.7.2 The equipment and the procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the survey, and suitable time is to be allowed to set-up, calibrate and test all equipment in advance.

1.7.3 When using RIT as alternative to close-up survey, it shall be conducted by an approved service supplier according to NR533 and it shall be witnessed by an attending Surveyor.

1.7.4 The structure to be surveyed using the RIT is to be clean to permit meaningful examination. Visibility is to be sufficient to allow meaningful examination. The Society is to be satisfied with the methods and the orientation on the structure.

1.7.5 The attending Surveyor is to be satisfied with the method of live data presentation including pictorial representation. A good two-way communication between the Surveyor and the RIT operator shall be provided.

1.7.6 If the RIT reveals damage or deterioration that requires attention, the Surveyor may require traditional survey to be undertaken without the use of RIT.

1.8 Remote surveys

1.8.1 On a case-by-case basis and subject to special agreement with the Society, remote surveys may be accepted when requirements given in Pt A of the Ship Rules are complied with.

2 Definitions and procedures related to surveys

2.1 General

2.1.1 Period of class

Period of class means the period starting either from the date of the initial classification, or from the credited date of the last class renewal survey, and expiring at the limit date assigned for the next class renewal survey.

2.1.2 Anniversary date

Anniversary date means the day of the month of each year in the period of class which corresponds to the expiry date of the period of class.

2.1.3 Survey time window

Survey time window, or more simply window, mean the fixed period during which annual and intermediate surveys are to be carried out.

2.1.4 Overdue surveys

Each periodical survey is assigned a limit date specified by the relevant requirements of the Rules (end of survey interval or end date of window) by which it is to be completed.

A survey becomes overdue when it has not been completed by its limit date.

Examples:

- Anniversary date: 15 April
The 2000 annual survey can be validly carried out from 16 January 2000 to 15 July 2000. If not completed by 15 July 2000, the annual survey becomes overdue.
- Last bottom survey 20 October 2000:
If not completed by 20 October 2003 or end of the class period, whichever comes first, the bottom survey becomes overdue.

2.1.5 Condition of class

A defect and/or deficiency to be dealt with in order to maintain class, within a specific period of time, is indicated as a condition of class. A condition of class is pending until it is cleared, through a survey by the attending Surveyor or upon evidence that requirements have been completed, to the satisfaction of the Society. Where it is not cleared by its limit date, the condition of class is overdue.

Conditions of class may be imposed in other cases, which, in the Society's opinion, require specific consideration.

2.1.6 Memoranda

Those defects and/or deficiencies which do not affect the maintenance of class and which may therefore be cleared at the Owner's convenience and any other information deemed noteworthy for the Society's convenience are indicated as memoranda. Memoranda are not to be regarded as conditions of class.

2.1.7 Exceptional circumstances

"Exceptional circumstances" means:

- unavailability of dry-docking facilities, or
- unavailability of repair facilities, or
- unavailability of essential materials, equipment or spare parts, or
- delays incurred by action taken to avoid severe weather conditions.

3 Certificate of Classification: issue, validity, endorsement and renewal

3.1 Issue of Certificate of Classification

3.1.1 A Certificate of Classification, bearing the class notations assigned to the fish farm and an expiry date, is issued to any classed fish farm.

3.1.2 A Provisional Certificate of Classification may serve as a Certificate of Classification in some cases, such as after an admission to class survey, after a class renewal survey, or when the Society deems it necessary.

3.1.3 The Certificate of Classification is to be made available to the Society's Surveyors upon request.

3.2 Validity of Certificate of Classification, maintenance of class

3.2.1 According to Ch 1, Sec 1, [2.5], the Society alone is qualified to confirm the class of the fish farm and the validity of its Certificate of Classification.

3.2.2 During the class period, a Certificate of Classification is valid when it is not expired.

The class is maintained during a certain period or at a given date, when during the said period or at such date the conditions for suspension or withdrawal of class are not met.

Refer also to Ch 1, Sec 1, [1.3.3].

3.2.3 At the request of the Owner, a statement confirming the maintenance of class may be issued by the Society based on the information in its records for that fish farm at the time.

This statement is issued on the assumption that the Owner has complied with the Rules, in particular with Article [6].

Should any information which would have prevented the Society from issuing the statement and which was not available at the time subsequently come to light, the statement may be cancelled.

Attention is drawn to Ch 2, Sec 7, [1.2], whereby the Society, upon becoming aware of a breach of the Rules, is empowered to suspend class from the date of the breach, which may be prior to the date of the statement.

3.2.4 According to the same conditions as in [3.2.3], a statement declaring that the class is maintained “clean and free from condition of class” may be issued by the Society when there is no pending condition of class at that date.

3.2.5 Classification-related documents and information are liable to be invalidated by the Society whenever their object is found to differ from that on which they were based or to be contrary to the applicable requirements. The Owner is liable for any damage which may be caused to any third party from improper use of such documents and information.

3.3 Endorsement of Certificate of Classification

3.3.1 Endorsement

When periodical surveys are satisfactorily carried out, the Certificate of Classification is endorsed accordingly.

3.3.2 Possible modifications to endorsements

The Society reserves the right to modify the endorsements made by Surveyors.

3.4 Status of surveys and recommendations

3.4.1 Information given in the Certificate of Classification, associated endorsements, Rules and specific documents enables the Owner to identify the status of surveys and recommendations.

3.4.2 The omission of such information does not absolve the Owner from ensuring that surveys are held by the limit dates and pending conditions of class are cleared to avoid any inconvenience which is liable to result from the suspension or withdrawal of class; see Ch 2, Sec 7.

4 Class renewal survey

4.1 General principles

4.1.1 Class renewal surveys of hull, structure, equipment, and machinery are to be carried out at 5 year intervals to renew the Classification Certificate(s).

4.1.2 The first class renewal survey is to be completed within 5 years from the date of the initial classification survey and thereafter within 5 years from the credited date of the previous class renewal survey. However an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case the next period of class will start from the expiry date of the class renewal survey before the extension was granted.

4.1.3 For survey completed within 3 months before the expiry date of the class renewal survey, the next period of class will start from the expiry date of the class renewal survey. For Survey completed more than three months before the expiry date of the class renewal survey, the period of class will start from the survey completion date.

4.1.4 A new period of class is assigned to the fish farm after the satisfactory completion of the class renewal survey, and a new Certificate of Classification is issued.

4.1.5 When considered necessary by the Society the interval between class renewal surveys may be reduced.

4.1.6 Class renewal survey requirements of fish farms of unusual design, in lay-up or in unusual circumstances will be determined on individual basis.

4.1.7 At the request of the Owner, and upon the Society’s approval of the proposed arrangements, a system of Continuous Survey may be undertaken whereby the class renewal survey requirements are carried out in regular rotation in accordance with the Rules of the Society to complete all the requirements and scope of the particular class renewal survey within a five year period. Any defects that may affect classification found during the survey, are to be reported to the Society and dealt with to the satisfaction of the Surveyor.

4.2 Normal survey system (SS)

4.2.1 When the normal survey system is applied to fish farms with a 5 year period of class, the class renewal survey may be commenced at the fourth annual survey and continued during the following year with a view to completion by its due date. In this case the survey may be carried out by partial surveys at different times. The number of checks to be performed at each partial survey and the interval between partial surveys are to be agreed by the Society.

4.2.2 A class renewal survey may be commenced before the fourth annual survey at the request of the Owner. In this case, the survey is to be completed within fifteen months. The conditions for the execution of partial surveys are the same as those referred to in [4.2.1].

4.3 Continuous survey system (CS)

4.3.1 The request by the Owner for admission to the continuous survey system will be considered by the Society and agreement depends on the type and age of hull and machinery. This system may apply to the class renewal survey of hull (CSH), machinery (CSM) or other installations such as refrigerating installations (CSR) covered by an additional class notation.

4.3.2 When the continuous survey system is applied, appropriate notations as indicated in [4.3.1] are entered in the Register.

4.3.3 fish farms subject to the continuous survey system are provided with lists of items to be surveyed under this system.

4.3.4 For items inspected under the continuous survey system, the following requirements generally apply:

- the interval between two consecutive surveys of each item is not to exceed five years
- the items are to be surveyed in rotation, so far as practicable ensuring that approximately equivalent portions are examined each year
- the Society may credit for continuous survey results of inspections carried out before the admission to the continuous survey scheme
- each item is to be surveyed at one time, as far as practicable; the Society may, however, allow possible repair work to be carried out within a certain period.

4.3.5 For fish farms under continuous survey, items not included in the continuous survey cycle are to be inspected according to the provisions given in [4.2]. Bottom surveys, when relevant, are to be carried out according to the requirements of [5.3]. In addition, the bottom survey which is to be carried out in conjunction with the end of class period is to be performed within 15 months before the end of this class period.

4.3.6 Upon application by the Owner, the Society may agree, subject to certain conditions, that some items of machinery which are included in the continuous survey cycle are examined by the Chief Engineer. The Chief Engineer's inspection is to be followed by a confirmatory survey carried out by a Surveyor. The conditions for the application of this procedure are given in Pt A, Ch 2, App 2 of the Ship Rules.

4.3.7 The continuous survey system does not supersede the annual surveys and other periodical and occasional surveys.

4.3.8 A general examination of the fish farm, as detailed in Pt A, Ch 3, Sec 1 of the Ship Rules for annual surveys, is to be carried out at the end of the period of class.

4.3.9 For laid-up fish farms, specific requirements given in [8.1] apply.

4.3.10 The continuous survey system may be discontinued at any time at the discretion of the Society, or at the request of the Owner, and a specific arrangement devised.

4.4 Planned maintenance survey system for machinery (PMS)

4.4.1 A planned maintenance survey system may be considered as an alternative to the continuous survey system for machinery and is limited to components and systems covered by it. When such a system approved by the Society is implemented, a survey system other than those normally adopted and with intervals different from those of the continuous survey system as detailed in [4.3] may be accepted.

4.4.2 The conditions for approval of the planned maintenance survey system, the determination of survey item intervals and the general scope of surveys are detailed in Pt A, Ch 2, App 1 of the Ship Rules.

4.4.3 When the planned maintenance survey system is applied, the notation PMS is entered in the Register.

4.4.4 The Chief Engineer shall be the responsible person onboard in charge of the PMS.

The conditions related to Chief Engineer's inspections within the scope of PMS are given in Pt A, Ch 2, App 2 of the Ship Rules. Items surveyed by this authorised Chief Engineer will be subject to the confirmatory survey as detailed in Pt A, Ch 2, App 2 of the Ship Rules.

Documentation on overhauls of items covered by the PMS are to be reported and signed by the Chief Engineer.

4.4.5 The planned maintenance survey system does not supersede the annual surveys and other periodical and occasional surveys.

4.4.6 A general examination of the machinery, as detailed in Pt A, Ch 3, Sec 1 of the Ship Rules for annual surveys, is to be carried out at the end of the period of class.

4.4.7 The planned maintenance survey system may be discontinued at any time at the discretion of the Society, or at the request of the Owner, and a specific arrangement devised.

5 Other periodical surveys

5.1 Annual surveys

5.1.1 Annual surveys are to be carried out within 3 months before or after each anniversary date.

5.2 Intermediate surveys

5.2.1 An intermediate survey, where applicable, is to be carried out within the window from three months before the second to three months after the third anniversary date.

5.2.2 The intermediate survey is not applicable to fish farms with class symbol **II**.

5.3 Bottom survey

5.3.1 Bottom survey means the examination of the outside of the fish farm's bottom and related items. This examination may be carried out with the fish farm in dry-dock (or on a slipway) or afloat: in the former case, the survey will be referred to as dry-docking survey, while in the latter case as in-water survey.

5.3.2 The Owner is to notify the Society whenever the outside of the fish farm's bottom and related items can be examined in dry dock or on a slipway.

5.3.3 For fish farms classed with the class symbol **I**, there are to be two examinations of the outside of the fish farm's bottom and related items in each period of class of five years.

The interval between any two such examinations is not to exceed 36 months.

An extension of examination of the fish farm's bottom of three months beyond the due date can be granted in exceptional circumstances, as defined in Pt A, Ch 2, Sec 2, [2.1.7] of Ship Rules.

Note 1: Attention is also drawn to the relevant requirements concerning the application of national and international regulations.

5.3.4 For permanent fish farms and for other fish farms where drydocking is impracticable, the examination of the outside of the fish farm's underwater parts and related items may be carried out during an in-water survey, subject to the agreement of the Society if the additional class notation **INWATERSURVEY** is not granted.

5.3.5 Consideration may be given at the discretion of the Society to any special circumstances justifying an extension or a reduction of these intervals.

5.3.6 For fish farms under the normal survey system, one of the bottom surveys to be performed in each period of class is to be carried out in conjunction with the class renewal survey.

5.3.7 For fish farms under the continuous survey system of hull (CSH), one of the bottom surveys to be performed in each period of class is to be carried out in conjunction with the end of class period.

5.4 Propeller shaft survey

5.4.1 Definition

Propeller shaft survey means survey of propeller shafts and tube shafts (hereafter referred to as propeller shafts) as well as survey of other propulsion systems.

The different types of surveys to which propeller shaft may be subjected and the intervals at which they are to be carried out are given in Chapter 2, Section 2 of the Ship Rules.

These surveys are:

- complete survey
- modified survey.

The scope is detailed in Pt A, Ch 3, Sec 5 of the Ship Rules. The requirements to be complied with at each survey are listed in [5.4.2] and [5.4.3].

5.4.2 Propeller shaft complete survey

Propeller shafts are to be submitted to complete examination as detailed in Pt A, Ch 2, Sec 5 of the Ship Rules. The scope of the modified survey is detailed in Pt A, Ch 3, Sec 5 in the Ship Rules.

5.4.3 Propeller shaft modified survey

A modified survey of the propeller shaft is an alternate way of examination as detailed in Pt A, Ch 2, Sec 5 of the Ship Rules and which scope is given in Pt A, Ch 3, Sec 5 of the Ship Rules.

5.4.4 Propeller shaft Monitoring System (MON-SHAFT)

Where, in addition to the conditions stated in [5.4.3] for modified survey, the additional class notation **MON-SHAFT** is assigned, the propeller shaft need not be withdrawn at both the complete and modified surveys provided that all condition monitoring data is found to be within permissible limits and the remaining requirements for the respective surveys are complied with.

5.4.5 Other propulsion systems

Driving components serving the same purpose as the propeller shaft in other propulsion systems, such as directional propellers, vertical axis propellers, water jet units, dynamic positioning systems and thruster assisted mooring systems, are to be submitted to periodical surveys at intervals not exceeding five years.

5.4.6 Extension of intervals of propeller shaft surveys

In the case of mobile offshore drilling unit, due to low running hours on propeller shafts, extended intervals between propeller shaft surveys may be considered based on:

- satisfactory diver's external examination of stern bearing and outboard seal area including wear-down check, as far as possible
- internal examination of the shaft area (inboard seals) in propulsion room(s)
- confirmation of satisfactory lubricating oil records (oil loss rate, contamination)
- examination/replacement of shaft seal elements in accordance with seal manufacturer's recommendations.

5.5 Boiler survey

5.5.1 There are to be two internal examinations of boilers in each period of class of five years.

In all cases, the interval between any two such examinations is not to exceed 36 months.

5.5.2 There is to be one internal examination of thermal oil heaters in each period of class of five years.

5.5.3 For fish farms of eight years of age and over fitted with one single boiler supplying steam for main propulsion, the interval between two boiler surveys may be specially considered.

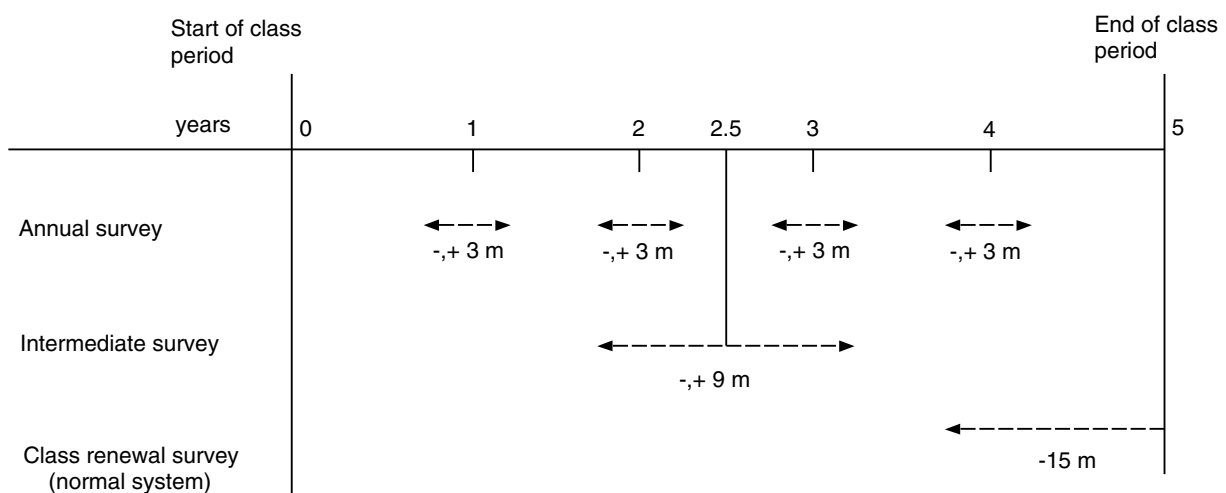
5.5.4 Boilers are also submitted to an external inspection as a part of the annual survey of machinery.

5.5.5 The scope of the boiler survey is detailed in Pt A, Ch 3, Sec 6 of the Ship Rules.

5.6 Links between anniversary dates and annual surveys, intermediate surveys and class renewal surveys

5.6.1 The link between the anniversary dates, the class renewal survey (when carried out according to the normal system), and the annual and intermediate surveys is given in Fig 1.

Figure 1 : Links between anniversary dates and annual, intermediate and class renewal surveys



6 Occasional surveys

6.1 General

6.1.1 Refer to the Ship Rules Pt A, Ch 2, Sec 2, [6].

6.2 Damage survey

6.2.1 It is the responsibility of the owner/operator of the fish farm to report to the Society without delay any damage, defect or breakdown, which could invalidate the conditions for which a classification has been assigned so that it may be examined at the earliest opportunity by the Society's Surveyor(s). All repairs found necessary by the Surveyor are to be carried out to his satisfaction.

6.3 Repairs

6.3.1 Where repairs to hull, legs, columns or other structures, machinery or equipment, which affect or may affect classification, are planned in advance to be carried out, a complete repair procedure including the extent to proposed repair and the need for Surveyors attendance is to be submitted to and agreed upon by the Society reasonably in advance. Failure to notify the Society, in advance of the repairs, may result in suspension of the fish farm's classification until such time as the repair is redone or evidence submitted to satisfy the Surveyor that the repair was properly carried out. This applies also to repairs during voyage or on site.

6.3.2 The above is not intended to include maintenance and overhaul to hull, other structures, machinery and equipment in accordance with recommended manufacturers procedures and established marine practice and which does not require Society approval; however, any repair as a result of such maintenance and overhauls which affects or may affect classification is to be noted in the fish farms log and submitted to the Surveyor.

6.4 Reactivation surveys

6.4.1 In the case of fish farms which have been out of service for an extended period, the requirements for reactivation surveys will be specially considered in each case with due regard given to the status of surveys at the time of the commencement of the lay-up period, the length of the period, and conditions under which the fish farm had been maintained during that period.

6.5 Alterations

6.5.1 No alterations which may affect classification are to be made to the hull or machinery of a classed fish farm unless plans of proposed alterations are submitted and approved by the Society before the work of alterations is commenced. Such work is to be carried out in accordance with approved plans and tested on completion as required by the Rules and to the satisfaction of the Surveyor.

6.6 Welding and replacement of materials

6.6.1 Welding of steels, including high strength structural steel, is to be to the satisfaction of the Society.

6.6.2 Welding or other fabrication performed on steels of special characteristics or repairs or renewals of such steel or in areas adjacent to such steel is to be accomplished with procedures approved by the Society considering the special materials involved. Substitution of steels differing from those originally installed is not to be made without approval by the Society.

6.6.3 The Society may reference IACS Recommendations No 11 - Materials Selection Guideline for Mobile Offshore Drilling Units when considering suitable replacement materials.

7 Change of ownership

7.1

7.1.1 In the case of change of ownership, the fish farm retains its current class with the Society provided that:

- the Society is informed of the change sufficiently in advance to carry out any survey deemed appropriate, and,
- the new Owner signs the appropriate request, involving acceptance of the Society's general conditions and Rules. This request covers inter alia the condition of the fish farm when changing ownership.

Note 1: The fish farm's class is maintained without prejudice to those provisions in the Rules which are to be enforced in cases likely to cause suspension or withdrawal of the class such as particular damages or repairs to the fish farm of which the Society has not been advised by the former or, as the case may be, new Owner.

Note 2: No information whatsoever related to the class of the fish farm will be provided or confirmed to any third party, unless the appropriate request for information is duly completed and signed by the party making the request and the authorisation of the current Owner is obtained.

8 Lay-up and re-commissioning

8.1 General principles

8.1.1 A fish farm put out of commission may be subject to specific requirements for maintenance of class, as specified below, provided that the Owner notifies the Society of the fact.

If the Owner does not notify the Society of the laying-up of the fish farm or does not implement the lay-up maintenance programme, the fish farm's class will be suspended and/or withdrawn when the due surveys are not carried out by their limit dates in accordance with the applicable requirements given in Ch 2, Sec 7.

8.1.2 The lay-up maintenance programme provides for a “laying-up survey” to be performed at the beginning of lay-up and subsequent “annual lay-up condition surveys” to be performed in lieu of the normal annual surveys which are no longer required to be carried out as long as the fish farm remains laid-up. The minimum content of the lay-up maintenance programme as well as the scope of these surveys are given in Pt A, Ch 3, App 1 of the Ship Rules. The other periodical surveys which become overdue during the lay-up period may be postponed until the re-commissioning of the fish farm.

8.1.3 Where the fish farm has an approved lay-up maintenance programme and its period of class expires, the period of class is extended until it is re-commissioned, subject to the satisfactory completion of the annual lay-up condition surveys as described in [8.1.2].

8.1.4 The periodical surveys carried out during the lay-up period may be credited, either wholly or in part, at the discretion of the Society, having particular regard to their extent and dates. These surveys will be taken into account for the determination of the extent of surveys required for the re-commissioning of the fish farm and/or the expiry dates of the next periodical surveys of the same type.

8.1.5 When a fish farm is re-commissioned, the Owner is to notify the Society and make provisions for the fish farm to be submitted to the following surveys:

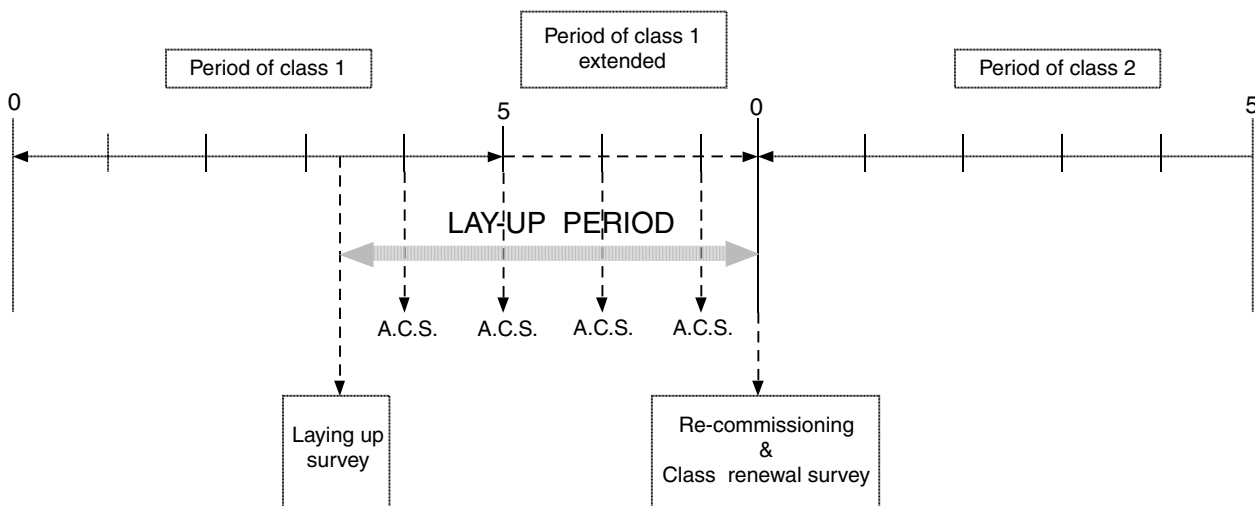
- an occasional survey prior to re-commissioning, the scope of which depends on the duration of the lay-up period
- all periodical surveys which have been postponed in accordance with [8.1.2], taking into account the provisions of [8.1.4].

8.1.6 Where the previous period of class expired before the re-commissioning and was extended as stated in [8.1.3], in addition to the provisions of [8.1.5] a complete class renewal survey is to be carried out prior to re-commissioning. Those items which have been surveyed in compliance with the class renewal survey requirements during the 15 months preceding the re-commissioning may be credited. A new period of class is assigned from the completion of this class renewal survey.

8.1.7 The principles of intervals or limit dates for surveys to be carried out during the lay-up period, as stated in [8.1.1] to [8.1.6], are summarised in Fig 2.

8.1.8 The scope of the laying-up survey and annual lay-up condition surveys are described in detail in Pt A, Ch 3, App 1 of the Ship Rules.

Figure 2 : Survey scheme of a case of a lay-up going beyond the expiry date of the period of class



Note 1: A. C. S. means annual lay-up condition survey.

9 Conversions - Feasibility study

9.1 General

9.1.1 A feasibility study is required for projects based on conversion of existing fish farms.

As a minimum, complete re-measurements of the scantlings including comprehensive surveys are required to evaluate the condition of the fish farm. Minimum requirements will be defined on a case by case basis.

Section 2 Annual Survey

1 General

1.1 Application

1.1.1 The requirements of this Section apply to annual surveys of all fish farms. The specific requirements for annual surveys related to additional class notations assigned to fish farms are addressed in Ch 2, Sec 6.

1.1.2 At the time of annual surveys, the fish farm is to be generally examined. The survey is to include a visual inspection of the hull, equipment and machinery of the fish farm and some tests thereof, so far as necessary and practicable in order to verify that the fish farm is in a acceptable general condition and is properly maintained.

1.1.3 Owners are reminded that any modification to the fish farm's hull, equipment and machinery affecting its classification is to be made known to the Society.

2 Hull

2.1 Hull and hull equipment

2.1.1 The survey is to include a general external examination and testing, where appropriate, of the following items, as applicable:

- outer shell plating above the waterline, relevant shell doors and accessible parts of the rudder(s)
- plating of freeboard deck and exposed decks, superstructures, with their openings and means of closure
- if applicable, structure in the vicinity of moon pool or other major openings or discontinuities
- cargo hatchways and other openings on exposed decks, with their coamings and their means of closure and securing arrangements
- sidescuttles and deadlights, chutes and other openings with their means of closure
- bulwarks, guard rails, freeing ports, gangways and lifelines, ladders
- scuppers and sanitary discharges, valves on discharge lines and their controls
- ventilators, air pipes, overflow pipes and gas vent pipes, with their means of closure and flame screens, where required
- all automatic air pipe heads installed on the exposed decks (i.e. those extending above the freeboard deck or superstructure decks)
- freeboard marks on the fish farm's sides
- deck equipment such as lifeboat davit foundations, bollards, fairleads, hawse pipes, etc., masts and associated rigging, including lightning conductors
- anchoring and mooring equipment, as far as practicable, including housing, supporting equipment and connection to the fish farm's main structure
- watertight bulkheads, their watertight doors and associated local and remote controls, and their watertight penetrations
- main and auxiliary steering arrangements, including their associated equipment and control systems, and manoeuvring gear
- fire divisions and fire doors, dampers in ventilation ducts, means of closure of skylights and other openings
- confirmation that emergency escape routes from accommodation and service spaces are satisfactory
- confirmation that the drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory
- engine room
- where fitted, helicopter deck and its supporting structure, safety net and arrangements for the prevention of sliding
- availability of loading manual or, where required, electronic loading instrument, including standard test
- availability of approved stability documentation
- foundations of areas used for heavy lifting equipment, drilling equipment, diving equipment hoisting appliances, pipelaying stinger, jacket launching equipment (rocker arms, skid beams).

Note 1: Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested where doubts arise.

2.1.2 Suspect areas identified at previous class renewal surveys are to be examined. Areas of substantial corrosion identified at previous class renewal or intermediate surveys are to be subjected to thickness measurements.

2.1.3 Ballast spaces are to be internally examined when required as a consequence of the results of the class renewal survey or the intermediate survey.

Thickness measurements are to be carried out as considered necessary by the Surveyor.

2.1.4 Column stabilized fish farms

For column stabilized fish farms, in addition, the survey includes the following:

- general examination of accessible areas, particularly of columns, lower hull and bracings
- assessment of watertightness of immersed parts
- external examination of parts and areas indicated in Ch 2, Sec 4, [2.2.1] and Ch 2, Sec 4, [2.2.3]
- mooring foundation internally.

2.1.5 Self-elevating fish farms

For self-elevating fish farms, in addition, the survey includes the following:

- external examination, as far as practicable, with due consideration for working water draughts from the last survey, of the jackhouses and their foundations as well as the legs above the waterline
- external examination of the upper structure indicated in Ch 2, Sec 4, [2.2.1] and Ch 2, Sec 4, [2.2.3] including the visible areas of the hull in elevated position.

3 Machinery and systems

3.1 General machinery installations

3.1.1 The survey of general machinery installations is to cover the following items:

- general examination of machinery and boiler spaces with particular attention to the fire and explosion hazards; confirmation that emergency escape routes are practicable and not blocked
- general examination of the machinery, steam, hydraulic, pneumatic and other systems and their associated fittings, for confirmation of their proper maintenance
- testing of the means of communication and order transmission between the navigating bridge and the machinery control positions and other control stations
- confirmation that the rudder angle indicator on the bridge is in working order
- examination, as far as practicable, of the bilge pumping systems and bilge wells, including operation of the pumps, remote reach rods and level alarms, where fitted
- visual examination of the condition of any expansion joints in sea water systems
- external examination of pressure vessels other than boilers and their appurtenances, including safety devices, foundations, controls, relieving gear, high pressure piping, insulation and gauges.

3.1.2 When the fish farm is equipped with a refrigerating plant (whether or not covered by an additional class notation), the annual survey is to include the external examination of:

- pressure vessels of the installation to the same extent as indicated in [3.1.1]
- refrigerant piping, as far as practicable
- for refrigerating machinery spaces using ammonia as refrigerant:
 - ventilation system including functional test
 - water-spraying fire-extinguishing system; see [3.5.2] item d)
 - bilge system including functional test
 - electrical equipment, confirming its proper maintenance
 - gas detection system
 - breathing apparatus and protective clothing.

3.1.3 When the fish farm is equipped with thruster installations, the annual survey is to include:

- an external examination of the machinery installation
- an operating test of the complete installation.

3.1.4 For exhaust gas water heater and Waste Heat Recovery Unit (WHRU), a functional test while in operation is to be carried out, during which the following items are checked:

- the piping and shut off valves for detection of leakages
- the condition of the insulation
- the operation of indication, control and safety device.

3.2 Boilers

3.2.1 For main and auxiliary boilers, the annual survey consists of an external examination of boilers and their appurtenances, including safety devices, foundations, controls, relieving, high pressure and steam escape piping, insulation and gauges.

3.2.2 For thermal oil heaters, a functional test while in operation is to be carried out, during which the following items are checked:

- the heater for detection of leakages
- the condition of the insulation
- the operation of indication, control and safety devices
- the condition of remote controls for shut-off and discharge valves.

A satisfactory analysis of the quality of oil is to be made available to the Surveyor.

3.2.3 For exhaust gas thermal oil heaters, in addition to the requirements of [3.2.2], a visual examination and a tightness testing to the working pressure of the heater tubes are to be carried out.

3.3 Electrical machinery and equipment

3.3.1 The survey of electrical machinery and equipment is to cover the following items:

- general examination, visually and in operation, as feasible, of the electrical installations for power and lighting, in particular main and emergency generators, electric motors, switchboards, switchgears, cables and circuit protective devices, indicators of electrical insulation and automatic starting, where provided, of emergency sources of power
- checking, as far as practicable, the operation of emergency sources of power and, where they are automatic, also including the automatic mode.

3.3.2 The survey is also to cover the bridge control of propulsion machinery, and related arrangements (alarms and safety devices), when fitted.

3.4 Column stabilized fish farms

3.4.1 For column stabilized fish farms, the survey includes also the following additional items:

- visual examination and functional testing of the ballasting systems to the satisfaction of the Surveyor, including the tank level gauges and remote valves
- means of access, ventilation, pumping as well as the emergency lighting into the columns and lower compartments
- if dry bracings are provided with flooding detection means, testing of the plant satisfactory operation
- general examination and review of records of operation of mooring system.

3.5 Fire protection, detection and extinction

3.5.1 The survey of fire prevention and other general arrangements is to cover the following items:

- checking that fire control plans are properly posted
- examination and testing, as feasible, of the operation of manual and/or automatic fire doors, where fitted
- checking, as far as practicable, that the remote controls for stopping fans and machinery and shutting off fuel supplies in machinery spaces and, where fitted, the remote controls for stopping fans in accommodation spaces and the means of cutting off power to the galley are in working order
- examination and testing of the closing arrangements of ventilators, funnel annular spaces, skylights, doorways and tunnel, where applicable
- examination, as far as practicable, and testing, as feasible and at random, of the fire and/or smoke detection systems.

3.5.2 The survey requirements for all types of fire-fighting systems that are usually found on board fish farms related either to machinery spaces or to storage areas and/or spaces or to accommodation spaces, irrespective of the service notation assigned, are the following:

a) Water fire system:

- examination of the fire main system and confirmation that each fire pump including the emergency fire pump can be operated separately so that the two required powerful jets of water can be produced simultaneously from different hydrants, at any part of the fish farm whilst the required pressure is maintained in the fire main
- checking that fire hoses, nozzles, applicators, spanners and international shore connection (where fitted) are in satisfactory working condition and situated at their respective locations.

b) Fixed gas fire-extinguishing system:

- external examination of receivers of CO₂ (or other gas) fixed fire-extinguishing systems and their accessories, including the removal of insulation for insulated low pressure CO₂ containers
- examination of fixed fire-fighting system controls, piping, instructions and marking; checking for evidence of proper maintenance and servicing, including date of last system tests
- test of the alarm triggered before the CO₂ is released.

- c) Sprinkler system:
 - examination of the system, including piping, valves, sprinklers and header tank
 - test of the automatic starting of the pump activated by a pressure drop
 - check of the alarm system while the above test is carried out.
- d) Water-spraying system:
 - examination of the system, including piping, nozzles, distribution valves and header tank
 - test of the starting of the pump activated by a pressure drop (applicable only for machinery spaces).
- e) Fixed foam systems (low or high expansion):
 - examination of the foam system
 - test to confirm that the minimum number of jets of water at the required pressure in the fire main is obtained when the system is in operation
 - checking the supplies of foam concentrate and receiving confirmation that it is periodically tested (not later than three years after manufacture and annually thereafter) by the manufacturer or an agent.
- f) Dry powder system:
 - examination of the dry powder system, including the powder release control devices
 - checking the supplies of powder contained in the receivers and that it has maintained its original smoothness
 - checking that the pressure of propelling inert gas contained in the relevant bottles is satisfactory.

3.5.3 As far as other fire-fighting equipment is concerned, it is to be checked that:

- semi-portable and portable fire extinguishers and foam applicators are in their stowed positions, with evidence of proper maintenance and servicing, and detection of any discharged containers
- firemen's outfits are complete and in satisfactory condition.

3.5.4 Where a helideck is fitted, the following is to be checked, as far as appropriate:

- drainage arrangements around the landing area
- fire fighting appliances and arrangements (to be surveyed as per [3.5.2], according to the equipment installed)
- overall examination of refuelling systems and hangar facilities for cleanliness and absence of leaks, condition of gutters and drainage arrangement.

3.6 Hazardous areas

3.6.1 The survey consists in:

- examination of hazardous areas including their closures and boundaries
- confirmation, as far as practicable, that the following equipment are in satisfactory condition: ventilation systems, ducting arrangements, fire dampers, fans, alarms for loss of pressure, gas detection and associated arrangements, electrical and mechanical safe equipment, arrangement for purging sequences and for black start.

3.7 Other safety equipment

3.7.1 The survey consists in:

- examination of navigation lights, associated alarm and signal devices including helideck lights, if fitted
- confirmation that other safety systems such as the alarm and communication system are in working order.

Section 3 Intermediate Survey

1 General

1.1 Application

1.1.1 The requirements of this Section apply to intermediate surveys of all fish farms. The specific requirements for intermediate surveys related to additional class notations assigned to fish farms are addressed in Ch 2, Sec 6.

1.1.2 The intermediate survey is to include examination and checks on a sufficiently extensive part of the structure to show that the structures of the fish farm are in satisfactory condition so that the fish farm is expected to operate until the end of the current period of class, provided that the fish farm is properly maintained and other surveys for maintenance of class are duly carried out during this period.

1.1.3 Prior to the commencement of any part of the class renewal survey and intermediate survey, a survey planning meeting is to be held between the attending Surveyor(s), the Owner's representative in attendance and the thickness measurement company representative, where involved.

2 Hull

2.1 Survey

2.1.1 The requirements given in Tab 1 for the survey and testing of salt water ballast spaces, storage holds (if any), and storage tanks (if any) are to be complied with.

2.2 Fish farms with particular structure

2.2.1 In addition, examination will be made of particularly critical areas of the structure such as:

- inside of bracings for column stabilized fish farms
- leg-hull connection of self-elevating fish farms
- structure around corners of moon pool or other large openings
- mooring internal supporting structure
- mooring tensioning system general examination and review of records of operation
- other critical areas, as found necessary by the Surveyor.

2.3 Fish farms including hazardous areas

2.3.1 In addition, electrical equipment in hazardous areas will be examined and tested, with particular attention to:

- protective earthing
- integrity of flame-proof enclosures
- integrity of pressurised enclosures and associated fittings
- condition of increased safety equipment
- condition of cabling (damage to outer sheath, corrosion or metal braiding)
- interlocking systems of electrical power supply to spaces protected by air locks such as electric motors rooms, storage control rooms
- operation of pressurised equipment and functioning of alarms.

Table 1 : Intermediate survey of hull (all fish farms)

ITEM	Age of fish farm (in years at time of intermediate survey)		
	5 < age ≤ 10	10 < age ≤ 15	age > 15
SALT WATER BALLAST SPACES (1) (2) (3) (4)	One peak tank and at least two representative spaces between the peak bulkheads are to be internally examined.		
	Thickness measurements, if considered necessary by the Surveyor		
			For fish farms over 15 years of age, tightness test of double bottom ballast spaces in ways of storage holds, if considered necessary by the Surveyor.
<p>(1) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the protective coating remains effective and that the sacrificial anodes, if any, are less than 50% depleted.</p> <p>(2) Where the protective coating is found to be in poor condition, where corrosion or other defects are found, where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, or where sacrificial anodes are found to be more than 50% depleted, the examination is to be extended to other ballast spaces of the same type.</p> <p>(3) For salt water ballast spaces other than double bottom tanks, where a protective coating is found to be in poor condition, and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class is to be subject to the spaces in question being internally examined at annual surveys. The Society may consider waiving such internal examination at annual surveys of tanks protected with soft coating, whose size is 12 m³ or less. For salt water ballast double bottom tanks, where such breakdown of coating is found and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class may be subject to the tanks in question being internally examined at annual intervals.</p> <p>(4) The representative spaces are to be based on the record of the previous class intermediate surveys, previous class renewal surveys, the repair history of the tanks and they should not be the same for each intermediate survey.</p> <p>Note 1: Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested should doubts arise.</p>			

Section 4 Class Renewal Survey

1 General

1.1 Application

1.1.1 The requirements of this Section apply to class renewal surveys of all fish farms. The specific requirements for class renewal surveys related to additional class notations assigned to fish farms are addressed in Ch 2, Sec 6.

1.1.2 The class renewal survey is to include sufficiently extensive examination and checks to show that the structures, main and auxiliary machinery, systems, equipment and various arrangements of the fish farm are in satisfactory condition or restored to such condition as to allow the fish farm to operate for the new period of class to be assigned, provided that the fish farm is properly maintained and other surveys for maintenance of class are duly carried out during this period.

The examinations of the structure are to be supplemented by thickness measurements and testing as deemed necessary, to ensure that the structural integrity remains effective and sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration.

1.1.3 The Owner is to provide the necessary facilities to enable this class renewal survey.

1.1.4 Prior to the commencement of any part of the class renewal survey and intermediate survey, a survey planning meeting is to be held between the attending Surveyor(s), the Owner's representative in attendance and the thickness measurement company representative, where involved.

1.1.5 When the fish farm is under the continuous survey system for hull or machinery, the scope of the class renewal survey as described in this Section is carried out on a continuous basis over the period of class.

When the machinery installation is surveyed under the Planned Maintenance System, a specific programme of survey replaces the scope of the class renewal survey of machinery and systems as laid down in Article [3].

1.1.6 Upon completion of the class renewal survey, or at the end of the period of class (if the relevant part of the fish farm is surveyed under the continuous survey system), a general examination of the fish farm having the same scope as that of an annual survey is to be carried out.

2 Hull and hull equipment

2.1 Bottom survey

2.1.1 A bottom survey in dry condition, including anchoring and mooring equipment, is to be carried out, unless underwater surveys have been accepted by the Society in lieu of dry-docking, as detailed in Ch 2, Sec 5.

2.1.2 Anchors, windlass(es) and chain cables are to be ranged and examined, and the required complement and condition are to be checked. When the fish farm is more than 5 years old, chain cables are to be gauged. Any length of chain cable which is found to be damaged or excessively worn is to be renewed.

2.1.3 Sea valves and cocks are to be opened up for internal examination.

2.1.4 Thickness measurements of the outer shell, as and if required within the scope of the related class renewal survey, are to be carried out, if not already done within 15 months before the end of the class period.

2.2 Decks, hatch covers and equipment

2.2.1 Decks are to be examined, particular attention being given to the areas where stress concentration or increased corrosion are likely to develop, such as hatch corners and other discontinuities of structure.

Deck erections such as hatch coamings, deckhouses and superstructures are to be examined.

Deck and corresponding equipment inducing important loads such as heavy lifting equipment, helideck, drilling equipment, diving equipment hoisting appliances, pipelaying stinger, jacket launching equipment (rocker arms, skid beams).

Examination is also made of the connections of equipment and attachments to load carrying structural elements.

Due attention is to be given to the examination in way of end and side openings and related shell and inner doors.

2.2.2 The survey of hatch covers and coamings, if any, is to include:

- checking of the satisfactory operation of all mechanically operated hatch covers: stowage and securing in open condition, proper fit, locking and efficiency of sealing in closed position, operational testing of hydraulic and power components, wires, chains and link drives

- checking of the effectiveness of sealing arrangements of all hatch covers by means of hose testing or equivalent
- thickness measurements of coaming and attached stiffeners, hatch cover plating and stiffeners (see Tab 3 or Tab 4 or Tab 5).

2.2.3 The survey of hull equipment is also to cover the following points:

- windlass and chain stoppers, with disassembly as deemed necessary to verify the condition of the equipment and control and safety devices, hawse pipes
- steering arrangements, including steering gear, control and indication devices, operational tests and disassembly as deemed necessary; in the case of chain and rod gears, chains, rods, sheaves, pins and rollers are to be examined for wear
- connection of masts and standing rigging to the hull structure as well as condition of structure underneath.

2.2.4 Piping systems outside tanks and compartments are to be visually examined and pressure tested as necessary, as per the requirements laid down for the class renewal survey of machinery and systems; see [3.5].

2.2.5 Automatic air pipe heads installed on the exposed decks (i.e. those extending above the freeboard deck or superstructure decks) are to be completely examined, both externally and internally, in accordance with the requirements given in Tab 1.

2.2.6 For surface units, thorough examination is to be made of outside plating, particularly bottom, side shells and main deck as well as to the structure in way of the drill well or moon pool, or other similar openings. Special attention is to be given to plating damages due to wave slam, impact resulting from surface craft or other causes.

Examination is to be made of the fore and aft structures, particularly of the supporting structures of rudder, line shafting, fixed or steerable nozzles.

2.2.7 For column stabilized fish farms, examination is to be made of the lower hulls, columns and bracings, giving particular attention to the connections of columns to the upper and lower hulls and to the intersections between columns, bracings and diagonals.

Examination is to be made of the upper hull including girders, bulkheads, decks and stiffeners with particular attention being paid to areas subject to high local loadings, vibrations due to machinery or equipment or stress concentrations.

2.2.8 For self-elevating fish farms, examination is to be made of the lower mats and spud cans, particularly of the connections with the legs.

Examination is to be made of the entire length of all legs, supplemented, if deemed necessary by the Surveyor, with non-destructive testing of sensitive areas. For truss legs, the examination is to include all chords with jacking racks and a representative percentage of vertical, horizontal and diagonal truss members to be selected with the agreement of the Surveyor.

Examination is to be made of the upper structure, particularly in way of jack houses, leg wells, substructure and skid beams, including the deck, side and bottom platings.

2.3 Internal spaces

2.3.1 Holds, 'tweendecks, cofferdams, pipe tunnels and duct keels, void spaces and other dry compartments which are integral to the hull structure are to be internally examined, ascertaining the condition of the structure, bilges and drain wells, sounding, venting, pumping and drainage arrangements

Table 1 : Requirements for internal and external examination of automatic air pipe heads at class renewal survey

Age of fish farm (in years at time of class renewal survey)		
age ≤ 5	5 < age ≤ 10	10 < age
Two air pipe heads, one port and one starboard, located on the exposed decks in the forward 0,25 L, preferably air pipes serving ballast tanks. See (1) and (2)	All air pipe heads located on the exposed decks in the forward 0,25 L. See (1) and (2)	All air pipe heads located on the exposed decks. See (3)
Two air pipe heads, one port and one starboard, on the exposed decks, serving spaces aft of 0,25 L, preferably air pipes serving ballast tanks. See (1) and (2)	At least 20% of air pipe heads on the exposed decks serving spaces aft of 0,25 L, preferably air pipes serving ballast tanks. See (1) and (2)	
<p>(1) The selection of air pipe heads to be examined is left to the attending Surveyor.</p> <p>(2) According to the results of this examination, the Surveyor may require the examination of other air pipe heads located on the exposed decks.</p> <p>(3) Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.</p> <p>Note 1: For designs where the inner parts cannot be properly examined from outside, the examination is to include removal of the head from the air pipe.</p> <p>Note 2: Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.</p>		

2.3.2 Machinery and boiler spaces, pump rooms and other spaces containing machinery are to be internally examined, ascertaining the condition of the structure. Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, and bulkheads in way of tank tops and bilge wells. Particular attention is to be given to the sea suctions, sea water cooling pipes and overboard discharge valves and their connections to the shell plating. Where wastage is evident or suspected, thickness measurements are to be carried out, and renewals or repairs effected when wastage exceeds allowable limits.

Piping systems inside these spaces are to be dealt with according to [3.5].

2.3.3 Chain lockers are to be internally examined, while the anchor chains are ranged as required for the bottom survey in dry condition. The pumping arrangements of the chain locker is to be tested.

2.3.4 For column stabilized fish farms, examination is to be made of bulkheads and internal stiffeners, of the lower hulls, columns and bracings, particular attention being given to the connections of the columns to the upper and lower hulls and to the intersections between columns, bracings and diagonals.

2.3.5 For self-elevating fish farms, examination is to be made of the lower mats, spud cans and hull compartments, particularly of the connections with the legs to be non destructively tested if deemed necessary by the Surveyor.

Examination of cylindrical type legs includes the internal plating, vertical frames, bulkheads and ring stiffeners.

Examination is to be made of the upper structure, particularly in way of jack houses, leg wells, substructure and skid beams, including the deck, side and bottom platings, bulkheads, girders and internal stiffeners.

2.4 Tanks

2.4.1 The type and number of tanks to be internally examined at each class renewal survey are detailed in Tab 2, according to the age of the fish farm.

This internal examination is to ascertain the condition of the structure, bilges and drain wells, sounding, venting, pumping and drainage arrangements, including piping systems and their fittings. Due attention is to be given to plating or double plates below the lower end of sounding and suction pipes.

Where the inner surface of the tanks is covered with cement or other compositions, the removal of coverings may be waived provided they are examined, found sound and adhering satisfactorily to the steel structures.

Note 1: For examination of independent (non-structural) tanks, refer to [3.5.9].

Note 2: Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested when the fish farm is more than 10 years old.

2.4.2 For salt water ballast spaces other than double bottom tanks, where a protective coating is found to be in poor condition, and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class is to be subject to the spaces in question being internally examined at annual surveys. The Society may consider waiving such internal examination at annual surveys of tanks protected with soft coating, whose size is 12 m³ or less.

For salt water ballast double bottom tanks, where such breakdown of coating is found and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class may be subject to the tanks in question being internally examined at annual intervals.

Table 2 : Requirements for internal examination of integral (structural) tanks at class renewal survey

Tank	Age of fish farm (in years at time of class renewal survey)			
	age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Peaks (all use)	all	all	all	all
Salt water ballast tanks (all types)	all	all	all	all
Fresh water	none	one	all	all
Fuel oil bunkertanks:				
• engine room	none	none	one	one
• other areas	none	one	two (1)	half, minimum 2 (1)
Lubricating oil tanks	none	none	none	one

(1) One deep tank is to be included, if fitted.

Note 1: Independent non-structural tanks are to be surveyed according to [3.5.9].

Note 2: The extent of the survey of tanks dedicated to liquids other than those indicated in this table will be considered by the Society on a case by case basis according to the nature of the liquids.

Note 3: If a selection of tanks is accepted to be examined, then different tanks are to be examined at each class renewal survey, on a rotational basis. Tanks not internally examined may be examined externally from accessible boundaries.

2.4.3 Boundaries of double bottom, deep, ballast, peak and other tanks, both integral and independent tanks, including holds adapted for the carriage of salt water ballast, are to be tested with a head of liquid to the highest extent possible but not less than the highest point that liquid will rise under service condition.

2.4.4 Boundaries of fuel oil, lube oil and fresh water tanks are to be tested with a head of liquid to the maximum filling level of the tank. Tank testing of fuel oil, lube oil and fresh water tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

2.4.5 Other testing procedures, such as the procedure used for the initial survey during construction, may be accepted.

2.5 Thickness measurements

2.5.1 The extent of thickness measurements is detailed below according to the age of the fish farm:

- Tab 3 for surface units
- Tab 4 for column stabilized unit fish farms
- Tab 5 for self-elevating unit fish farms.

Additionally, for any part of the fish farm where wastage is evident or suspect, the Surveyor may require thickness measurements in order to ascertain the actual thickness of the material.

Table 3 : Requirements for thickness measurements at class renewal survey for surface units

Age of unit (in years at time of class renewal survey)			
age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	Within the storage area or 0,5 L amidships: - selected deck plates - selected bottom plates - selected tank top plates - selected plates in splash zone (4)	Within the storage area or 0,5 L amidships: - each deck plate - selected bottom plates - selected tank top plates - selected plates in splash zone (4)	Within the storage area or 0,5 L amidships: - each deck plate - each bottom plate - each tank top plate - all plates in splash zone (4)
	One transverse section abreast a cargo space within the amidships 0,5L (5)	Two transverse sections abreast of two different cargo spaces within the amidships 0,5L (5)	Three transverse sections in way of cargo spaces within the amidships 0,5L (3) (5)
	Outside the storage area or 0,5 L amidships: - selected deck plates - selected bottom plates - selected plates in splash zone (4)		- All exposed main deck plating full length - representative exposed superstructure deck plating (poop, bridge and forecastle decks) - all plates in splash zone (4) - all keel plates full length - all bottom plates in way of cofferdams, machinery space and aft end of tanks
	Hatch covers and coamings of the two foremost cargo holds (1)	All hatch covers and coamings (1)	
	Collision bulkhead, forward machinery space bulkhead, aft peak bulkhead (1) (2)	All transverse and longitudinal bulkheads (plates and stiffeners) (1) (2)	
	- Sea water manifold in engine room - plating of sea chests - shell plating in way of overboard discharges as considered necessary by the attending Surveyor		
		Internals in forepeak tank	Internals in forepeak and aft tanks
		Selected internal structure such as floors and longitudinals, transverse frames, web frames, deck beams, 'tweendecks, girders, etc. Measurements may be increased if the Surveyor deems it necessary	
<p>(1) Including plates and stiffeners.</p> <p>(2) Measurements may be waived or reduced after satisfactory visual examination, when such bulkheads form the boundaries of dry (void) spaces.</p> <p>(3) The number of transverse sections may be reduced at the Surveyor's discretion for units of length under 90 m.</p> <p>(4) The splash zone includes areas around water line, for the range of working draughts.</p> <p>(5) One being chosen in the vicinity of moon pool or other similar opening, if any.</p>			

Table 4 : Requirements of thickness measurements at class renewal survey (column stabilized unit fish farms)

Age of the fish farm (years)			
age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	In each main structural element of the floater (node, pontoon, column): <ul style="list-style-type: none"> selected deck plates 1 girth belt (4) selected bottom plates 	In each main structural element of the floater (node, pontoon, column): <ul style="list-style-type: none"> selected deck plates 2 girth belts (4) selected bottom plates 	In each main structural element of the floater (node, pontoon, column): <ul style="list-style-type: none"> each deck plate 3 girth belts (4) each bottom plate
	In tanks: selected tank top plates		In tanks: each tank top plate
	In upper hull/deck: <ul style="list-style-type: none"> selected deck plates 1 girth belt (2) (3) (4) selected bottom plates 	In upper hull/deck: <ul style="list-style-type: none"> selected deck plates 2 girth belts (2) (3) (4) selected bottom plates 	In upper hull/deck: <ul style="list-style-type: none"> each deck plate 3 girth belts (2) (3) (4) each bottom plate
	Column and bracings: selected plates and stiffeners in splash zone (1)		Column and bracings: all plates and stiffeners in splash zone (1)
	Forward and aft machinery space bulkheads, peak bulkheads		All transverse and longitudinal bulkheads (plates and stiffeners)
		Selected internal structure such as floors and longitudinals, transverse frames, web frames, deck beams, etc.	Selected internal structure as for fish farms with 10 < age ≤ 15, number of measurements may be increased as the Surveyor finds it necessary
<p>(1) The splash zone includes areas around water line, for the range of working draughts. (2) One being chosen in the vicinity of the connection with a column. (3) One being chosen in the vicinity of moon pool or other similar openings, if any. (4) For column stabilized fish farm, girth belt are transversal to the main structure. It is a section for pontoon. It is an elevation for column. It is a main framing for upper hull.</p>			

2.5.2 When the structure is coated and the coating is found to be in good condition, the Surveyor may, at his discretion, accept a reduced programme of thickness measurements in the corresponding areas. Other effective protective arrangements may also be considered.

2.5.3 When thickness measurements indicate substantial corrosion, the number of thickness measurements is to be increased to determine the extent of substantial corrosion. Tab 6 may be used as guidance for additional thickness measurements.

2.5.4 Special attention is to be paid to free flooding structural members and sea water compartments.

2.6 Critical areas

2.6.1 Those critical areas shall be consider as all the special category elements highlighted on the structural categories drawing. They are located in way or at the vicinity of critical load transmission areas and/or of stress concentration locations.

2.6.2 Non-destructive testing of those area including welded connections shall be done as deemed necessary by the surveyor.

2.6.3 Example of critical area on fish farms:

- Crane pedestral
- Net cage connection to the hull and internal reinforcement
- Thruster support
- Mooring foundation and internal reinforcement
- Casting use for structural purpose
- Node of leg of jack-up
- Interface between leg and fish farm.

2.7 Lightweight survey

2.7.1 A lightweight survey is to be carried out during each class renewal survey. The scope is given in Pt B, Ch 1, Sec 1, [3].

2.7.2 The Society may also require an inclining test to be carried out as specified in Pt B, Ch 1, Sec 1, [3].

2.7.3 For column-stabilized fish farms, alternative to inclining test may be allowed, based on provisions of Pt B, Ch 1, Sec 1, [3].

2.7.4 For permanent fish farms, alternative to inclining test may be allowed, based on provisions of Pt B, Ch 1, Sec 1, [3].

Table 5 : Requirements of thickness measurements at class renewal survey (self-elevating unit fish farms)

Age of the fish farm (years)			
age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	In upper pontoon: <ul style="list-style-type: none"> selected deck plates 1 transverse section (1) (3) selected bottom plates selected tank top plates machinery space bulkheads, other selected bulkheads 	In upper pontoon: <ul style="list-style-type: none"> selected deck plates 2 transverse sections (1) (3) selected bottom plates selected tank top plates machinery space bulkheads, other selected bulkheads selected internal structure such as floors and longitudinals, frames, beams, etc. 	In upper pontoon: <ul style="list-style-type: none"> each deck plate 3 transverse sections (1) (3) each bottom plate each tank top plate all transverse and longitudinal bulkheads (plates and stiffeners) selected internal structure as for fish farms with 10 < age ≤ 15, number of measurements may be increased as the Surveyor finds it necessary
	In truss legs: selected chords, bracings and other truss members in splash zone (2) and in the vicinity of mat or spud can		In truss legs: all chords, bracings and other truss members in splash zone (2) and in the vicinity of mat or spud can
	In cylindrical legs: selected plates and stiffeners in splash zone (2) and in the vicinity of mat or spud can		In cylindrical legs: all plates and stiffeners in splash zone (2) and in the vicinity of mat or spud can
	Mat and spud cans: selected plates and stiffeners		Mat and spud cans: all plates and stiffeners
	Forward and aft machinery space bulkheads, peak bulkheads		All transverse and longitudinal bulkheads (plates and stiffeners)
		Selected internal structure such as floors and longitudinals, transverse frames, web frames, deck beams, etc.	Selected internal structure as for fish farms with 10 < age ≤ 15, number of measurements may be increased as the Surveyor finds it necessary
<p>(1) One being chosen in the vicinity of moonpool or other similar opening, if any.</p> <p>(2) The splash zone includes areas around water line, for the range of working draughts.</p> <p>(3) One being chosen in the vicinity of a leg opening.</p>			

Table 6 : Guidance for additional thickness measurements in way of substantial corrosion areas

Structural member	Extent of measurements	Pattern of measurements
Plating	Suspect area and adjacent plates	5 point pattern over 1 square metre
Stiffeners	Suspect area	3 measurements each in line across web and flange

3 Machinery and systems

3.1 General

3.1.1 The survey items listed below are to be covered to the satisfaction of the Surveyor. However, other survey alternatives deemed equivalent by the Surveyor in relation to the characteristics and general condition of the fish farm concerned may also be accepted.

3.2 Main and auxiliary engines

3.2.1 General

Depending on the type of machinery, the following parts are to be opened up as necessary for inspection. Parts and components are to be pressure tested as appropriate or as deemed necessary by the Surveyor. A working test is also to be carried out, including testing of alarms and safety devices.

3.2.2 Internal combustion engines

- a) Columns and entablature
- b) Cylinders with their liners, cylinder covers (together with valves and valve gear), pistons with their rods, crossheads, slippers and guides (or gudgeon pins), connecting rods (with their top and bottom end bearings), control gear, driven scavange pumps, driven air compressors, driven fuel pumps, supercharging blowers, fuel injection pumps, turning gear, etc.

- c) Crankshafts (together with their main bearings)
- d) Reverse gear, reduction gear and clutches, if fitted.

3.2.3 Electric propulsion

Where the propulsion machinery consists of an electrical system, the propulsion motors, generators, cables and all ancillary electrical gear, exciters and ventilating plant (including coolers) associated therewith are to be examined and the insulation resistance to earth tested. Due attention is to be given to windings, commutations and sliprings. The operation of protective gear and alarm devices is to be checked, as far as practicable. Interlocks intended to prevent unsafe operations or unauthorised access are to be checked to verify that they are functioning correctly.

3.2.4 Thruster installations

When the fish farm is equipped with thruster installations, the class renewal survey is also to include:

- an examination of the machinery and electrical installation, as applicable
- an external examination of the propulsive part of the installation to be carried out at the dry dock survey due as part of the class renewal survey. During this examination other checks such as clearance readings, tightness of hub and blade sealing for controllable pitch propellers are to be verified. Locking arrangements for bolts, if fitted, are to be checked. Results of lubricating oil analysis to detect possible deterioration of internal gears and bearings or the presence of water are to be confirmed as acceptable. The Manufacturer's requirements may be taken into account. Dismantling of the assembly for the examination of internal parts may be required if the foregoing checks are not satisfactory
- a running test of the system under operating conditions.

3.3 Reduction gears, main thrust and intermediate shaft(s)

3.3.1 Reduction gears complete with all wheels, pinions, shafts, couplings, bearings and gear teeth, including incorporated clutch arrangements, are to be opened up, as deemed necessary by the Surveyor, for visual inspection. For complicated assemblies, gears and roller bearings may be inspected without dismantling.

3.3.2 All shafts, thrust blocks and bearings are to be examined.

3.4 Pumps and other machinery items

3.4.1 General

The items listed in [3.4.2] are to be opened up, as deemed necessary by the Surveyor, for visual inspection. Their parts and components are to be pressure tested as appropriate and considered necessary by the Surveyor. A working test is also to be carried out, including testing of alarms and safety devices if deemed necessary by the Surveyor.

3.4.2 Items to be surveyed

- a) Air compressors with their intercoolers, filters and/or oil separators and safety devices
- b) Heat exchangers, ventilation fans for boilers and other equipment used for essential services
- c) Piston pumps and centrifugal pumps for sea water, bilge and salt water ballast
- d) Screw pumps, gear pumps and centrifugal pumps other than those listed in c) above (opening up is not required).

3.5 Systems in machinery spaces

3.5.1 Valves, cocks and strainers of the bilge and ballast systems are to be opened up, as deemed necessary by the Surveyor, for visual inspection, and, together with the piping and safety devices, examined and tested under working conditions.

3.5.2 The fuel oil, lubricating oil, hydraulic oil, thermal oil, and feed and cooling water systems, together with pressure filters, heaters and coolers used for essential services, are to be opened up and examined or tested, as considered necessary by the Surveyor. Safety devices for the foregoing items are to be examined.

3.5.3 The compressed air system together with its valves, fittings and safety devices is to be examined, as considered necessary by the Surveyor.

3.5.4 Compressed air receivers and other pressure vessels for essential services are to be cleaned internally and examined internally and externally. Their fittings, valves and safety devices are to be opened up, as deemed necessary by the Surveyor, for visual inspection and pressure tested as appropriate.

3.5.5 Steel pipes for superheated steam having a temperature of the steam at the superheater outlet exceeding 450°C are to be examined and tested in accordance with [3.5.7] to [3.5.8] at each class renewal survey.

3.5.6 Steel pipes for saturated steam or superheated steam having a temperature of the steam at the superheater outlet not exceeding 450°C are to be examined and tested in accordance with [3.5.7] to [3.5.8] at each class renewal survey for fish farms over 5 years of age. When the fish farm is 5 years of age or less, the inspection may be limited to a check of the satisfactory general condition of pipes.

3.5.7 The examination and hydrostatic test of steel pipes for main steam machinery, and steel pipes for auxiliary steam machinery having internal diameter 75 mm and over, are to be carried out on a number of pipes selected by the Surveyor after the lagging in way is removed.

3.5.8 Representative pipe lengths connected with bolted flanges are to be internally and externally examined, and hydrostatically tested to 1,1 times the working pressure at ambient temperature. Bolts and butt-welded joints between flanges and pipes are to be submitted to a non-destructive test for crack detection.

3.5.9 Non-structural tanks located in machinery spaces are to be externally examined; the relevant fittings, with particular regard to the remote control shut-off valves under hydrostatic head, are to be externally examined to check the efficiency of manoeuvres and the absence of cracks or leakage.

3.5.10 When the fish farm is equipped with a refrigerating plant, the class renewal survey is to include:

- examination and test at the design pressure of the parts of the plant under pressure
- for refrigerating machinery spaces using ammonia as refrigerant:
 - examination and test of the water-spraying fire-extinguishing system to the same extent as indicated in [3.8.3] item d)
 - examination of valves and pumps of the bilge system to the same extent as indicated in [3.4]
 - examination and test of the electrical equipment to the same extent as indicated in [3.6.11]
 - test of the gas detection system.

3.6 Electrical equipment and installations

3.6.1 An electrical insulation resistance test is to be performed on the electrical equipment and cables. If needed, for the purpose of this test, the installation may be subdivided or equipment which may be damaged disconnected.

3.6.2 The following minimum values, when performing the insulation test, are to be considered:

- for main and emergency switchboards, feeder circuit breakers being open, busbar circuit closed, measuring and monitoring instruments disconnected, the resistance of insulation measured across each insulated busbar and the hull, and across insulated busbars, should not be less than 1 megohm
- for generators, the equipment and circuits normally connected between the generator and the first circuit breaker being connected, the resistance of insulation (preferably at working temperature whenever possible), in ohms, is to be greater than 1 000 times the rated voltage, in volts. If appropriate, the Surveyor checks also that the insulation resistance of generators separate exciter gear is not less than 250 000 ohms
- the insulation resistance of the entire electrical system is to be checked with all circuit breakers and protective devices closed, except for generators; in general, the resistance should not be less than 100 000 ohms.

However, the variation of the resistance with time is to be checked, comparing the current figure with previous readings. If the insulation resistance was to drop suddenly or be insufficient, the defective circuits are to be traced, disconnecting the circuits as much as necessary.

3.6.3 The prime movers of generators are to be surveyed in accordance with [3.2] and their governors tested. All generators are to be presented for inspection, clean and with covers opened and examined under working conditions.

3.6.4 Main and emergency switchboards, section boards and distribution boards are to be cleaned and doors or covers opened for examination of their fittings. The condition of overcurrent protective devices and fuses is to be checked. Circuit-breakers of generators are to be tested, as far as practicable, to verify that protective devices including preference tripping relays, if fitted, operate satisfactorily. The tightening of busbar connections is to be checked.

3.6.5 Electrical cables and cable runs are to be examined at random, in particular in places where deterioration is likely to occur; terminal boxes of essential services are also to be subjected to a random check.

3.6.6 The motors and starters concerning essential services together with associated control and switchgear are to be examined and, if considered necessary by the Surveyor, checked, as far as practicable, under working conditions.

3.6.7 Navigation light indicators are to be tested under working conditions, and correct operation on the failure of supply or failure of navigation lights verified.

3.6.8 The emergency sources of electrical power, their automatic arrangements and associated circuits are to be tested.

3.6.9 Emergency lighting, transitional emergency lighting, supplementary emergency lighting, general emergency alarm and public address systems are to be tested as far as practicable.

3.6.10 The visible condition of electrical equipment and installations is also to be checked as regards precautions against shock, fire and other hazards of electrical origin.

3.6.11 A general examination of the electrical equipment in areas where there may be flammable gas or vapour and/or combustible dust is to be carried out to ensure that the integrity of the electrical equipment of a safety type has not been impaired owing to corrosion, missing bolts, etc., and that there is not an excessive build-up of dust on or in dust-protected electrical

equipment. Cable runs are to be examined for sheath and armouring defects, where practicable, and to ensure that the means of supporting the cables are in satisfactory condition. The proper condition of bonding straps for the control of static electricity is to be checked. Alarms and interlocks associated with pressurised equipment or spaces are to be tested for correct operation.

Note 1: Owners are reminded that maintenance, repairs or renewal of certified electrical equipment of a safe type remains their responsibility or that of their representatives.

3.7 Controls

3.7.1 Where remote and/or automatic controls, not covered by an additional class notation related to automated installation, are fitted for essential machinery, they are to be tested to demonstrate that they are in satisfactory condition.

3.8 Safety instrument, Fire detection, protection and extinction

3.8.1 The Owner or his representative is to declare to the attending Surveyor that no significant changes have been made to the arrangement of structural fire protection.

Note 1: Attention is drawn to the provisions of Ch 1, Sec 1, [3.1.1] regarding compliance with any additional and/or more stringent requirements issued by the Administration of the State whose flag the fish farm is entitled to fly.

3.8.2 The class renewal survey of gas and fire prevention arrangements is to cover the following items.

- a) Visible parts of items forming part of structural fire protection arrangements in accommodation spaces and in machinery spaces such as bulkheads, decks, doors, stairways, crew and service lift trunks, and light and air trunks are to be examined, due attention being given to their integrity and that of the insulating material
- b) The operation of manual/automatic fire doors, where fitted, is to be checked
- c) Remote controls for stopping fans and machinery and shutting off fuel supplies in machinery spaces and, where fitted, remote controls for stopping fans in accommodation spaces and means of cutting off power to the galley are to be tested
- d) Closing arrangements of ventilators, funnel annular spaces, skylights, doorways and tunnels, where applicable, are to be tested
- e) Gas and/or Fire and/or smoke detection and alarm systems are to be tested.

3.8.3 The survey requirements for all types of fire-fighting systems that are usually found on board fish farms related either to machinery spaces or to storage areas and/or spaces or to accommodation spaces, irrespective of the service notation assigned, are the following:

a) Water fire system:

- the associated pumps are to be opened up and examined at the Surveyor's discretion
- the fire main is to be hydrostatically tested to the working pressure at the Surveyor's discretion.

b) Fixed gas fire-extinguishing system:

Receivers of CO₂ (or other gas) fixed fire-extinguishing systems are to be externally examined together with all stationary fittings and devices. In addition, the following applies:

- the total loss of CO₂ is not to exceed 10% of the installed quantity (5% for Halon)
- after being repaired or discharged, containers are to be subjected to a hydrostatic test
- hydrostatic testing of high pressure CO₂ containers is to be carried out at intervals not exceeding 10 years; the number of the tested containers is to be not less than 10% of the total number
- low pressure CO₂ containers are to be internally inspected if the content has been released and the container is older than five years; depending upon the result of the internal examination, the Surveyor may require the container to be hydrostatically tested.

It is to be checked that the distribution pipework is proved clear.

c) Sprinkler system:

- the associated pumps are to be opened up and examined at the Surveyor's discretion.

d) Water spraying system:

- the associated pumps are to be opened up and examined at the Surveyor's discretion
- a working test is to be carried out as far as reasonable and appropriate.

e) Fixed foam systems (low or high expansion):

- the associated pumps are to be opened up and examined at the Surveyor's discretion.

f) Dry powder system:

- it is to be verified that the propelling inert gas bottles have been hydrostatically tested. The same applies to bottles disembarked for refilling or embarked for replacement.

3.8.4 As far as other fire-fighting equipment is concerned, the following items are to be hydrostatically tested, at intervals not exceeding 10 years:

- any CO₂ bottles of extinguishers
- shells of foam extinguishers
- shells of powder extinguishers
- air or gas bottles associated with fire extinguishers whose shells are not kept under pressure (if internally examined, the test need not be performed).

3.8.5 Where a helideck is fitted, the following is to be checked, as far as appropriate:

- drainage arrangements around the landing area
- fire fighting appliances and arrangements (to be surveyed as per [3.8.3] and [3.8.4], according to the equipment installed)
- other arrangements for helicopter refuelling and hangar facilities (fuel system, ventilation, fire protection and detection).

3.9 Other systems

3.9.1 For self-elevating fish farms, the Surveyor satisfies himself of the condition of the leg jacking systems including pinions, gears, wedges, locking pins, brakes and their powering sources, or other mechanisms for self-elevation and for leg securing (rack choke), that they are surveyed, opened up as deemed necessary and functionally tested.

Electrical equipment for the jacking system is to be externally examined, opened up if deemed necessary and functionally tested.

Section 5 Survey of Underwater Parts and Temporary Mooring Equipment

1 Scope of survey

1.1 Structure and appurtenances

1.1.1 The underwater parts of the structure are to be examined for corrosion, or deterioration due to chaffing from anchoring equipment or supply craft or contact with the ground and for any undue unfairness or buckling. Special attention is paid to bilge keels if applicable. Plate unfairness or other deterioration which do not necessitate immediate repairs, is to be recorded.

1.1.2 Sea chests and their gratings, sea connections and overboard discharge valves and cocks and their fastenings to the hull or sea chests are to be examined. Valves and cocks need not be opened up more than once in a class term unless considered necessary by the Surveyor.

1.1.3 Particular attention is to be paid to the following areas:

- for surface units:
 - moon pool and other openings
 - spread moored area
- for column stabilized fish farms:
 - connections of columns to the lower hulls
 - intersections between bracings and diagonals
 - covers to any outside access openings
- for self-elevating fish farms:
 - spud cans
 - bracing members
 - trusses of legs
 - leg foundation.

1.1.4 The condition of anodes and of their attachments to the structure are ascertained at random.

1.1.5 Anodes more than 75% depleted are to be replaced.

1.1.6 When a fish farm is in dry-dock or on a slipway, it is to be placed on blocks of sufficient height and with the necessary staging to permit the examination of underwater parts of the structure, including, if fitted, rudder, propeller, sea chests and valves.

1.2 Temporary Mooring equipment

1.2.1 Temporary mooring equipment shall be considered as mooring equipment not covered by **POSA** notation.

1.2.2 For fish farms fitted with temporary mooring equipment, the corresponding anchors, chain cables and/or wire ropes, windlasses and winches are to be examined and checked. This operation does not need to be carried out more than once in a five year period, unless considered necessary by the Surveyor. Worn out or damaged chain lengths and wire ropes are to be renewed.

1.2.3 Housing and supporting equipment (rack, fairleads, etc.), are to be examined together with their outside and inside connection to the fish farm's structure.

1.3 Propulsion and manoeuvring

1.3.1 Visible parts of rudder, rudder pintles, rudder stock and couplings as well as stern frames, if any, are to be examined. If considered necessary by the Surveyor, the rudder is to be lifted or the inspection plates removed for the examination of pintles. The clearance in the rudder bearings and the rudder lowering are to be checked and recorded.

Where applicable, pressure test of the rudder may be required as deemed necessary by the Surveyor.

1.3.2 Visible parts of propeller, stern bush, propeller shaft boss, brackets and tightness systems are to be examined. The clearances of the propeller shaft (or wear down gauge) are to be checked and recorded. For controllable pitch propellers, the Surveyor is to be satisfied with the fastenings and tightness of hub and blade sealing.

Visible parts of other propulsion systems and propellers for steering purposes are also to be examined.

Dismantling is to be carried out, if considered necessary, notably where leakages are detected.

1.3.3 Visible parts of thrusters are to be examined.

2 In-water surveys

2.1 General

2.1.1 The in-water survey is to provide the information normally obtained from a bottom survey in dry condition. Special consideration shall be given to ascertaining rudder bearing clearances and stern bush clearances of oil stern bearings based on a review of the operating history, on board testing and stern oil sample reports. These considerations are to be included in the proposal for in-water surveys.

During in-water survey, cathodic protection potential readings are to be taken. The amount of readings is to be representative of the whole immersed part of the structure of the fish farm.

2.1.2 Proposals for in-water surveys are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Society.

2.1.3 In principle, no outstanding conditions of class are to exist requiring repair work to be carried out to the underwater part of the shell plating, the rudder, the propeller or the propeller shaft, unless the Society is satisfied that such repairs may be carried out while the fish farm is afloat.

2.1.4 The in-water survey is to be carried out with the fish farm at a suitable draught; the in-water visibility is to be good and the structure below waterline is to be sufficiently clean to permit meaningful examination.

The equipment, procedure for observing and reporting the survey are to be discussed with the parties involved prior to the in-water survey, and suitable time is to be allowed to permit the diving company to test all equipment beforehand.

2.1.5 The in-water survey is to be carried out, under surveillance of a Surveyor, by divers or by suitably equipped remotely operated vehicles (ROV's). The divers are to be employed by a firm approved as service supplier by the Society. Upon completion of the survey, the approved diving firm is to submit to the attending Society Surveyor a detailed report including video tapes, as well as photographic documentation of the main parts inspected.

2.1.6 The in-water survey scope of work maybe mergeable over a three months period (weather condition, in-water visibility, diver's safety...). The overlap and the sequence of inspection shall be provided at satisfaction of the surveyor.

2.1.7 The Surveyor is to be satisfied with the methods of localisation of the diver(s) on the plating which should make use where necessary of permanent markings on the plating at selected points and with the method of pictorial representation. An efficient two-way communication between the Surveyor and diver(s) is to be provided.

2.1.8 If the in-water survey reveals damage or deterioration that requires immediate attention, the Surveyor may require that the fish farm be drydocked in order that a detailed survey can be undertaken and the necessary repairs carried out.

2.1.9 The under water marking plan shall be approved by the Society.

2.1.10 An in-water survey may normally be carried out if the fish farm has been granted the additional class notation **INWATERSURVEY** as defined in Ch 1, Sec 2, [8.3.2]. Upon application by the Owner, the Society may also authorise, on a case-by-case basis, such bottom in-water survey for fish farms not assigned with the additional class notation **INWATERSURVEY**.

2.2 Arrangements for in-water surveys

2.2.1 It is advisable that both the Surveyor and the divers are provided with detail drawings of the structure and hull attachments below the water line, including:

- all shell openings
- stem
- rudder and fittings
- sternpost
- propeller, including the means used for identifying each blade
- anodes, including securing arrangements
- bilge keels
- welded seams and butts.

The plans are to include all the necessary instructions to facilitate the divers' work, specially for taking clearance measurement when applicable.

2.2.2 The fish farm is to be provided with special constructional features so as to make the underwater survey easy and efficient, that is:

- a) Markings of a water-resistant nature are to be fitted on the underwater parts of the structure to facilitate the localisation of inspected parts, showing in particular, the location of main bulkheads.
- b) Sea valves, if needed to be opened up as per [1.1.2], including valve chests, are to be provided with suitable blanking arrangements so that cocks, valves and strainers can be examined.
- c) Rudder arrangements are to be such that rudder pintle clearances and fastenings arrangements can be easily checked.
- d) Propeller shaft arrangements are to be such that clearances can be easily checked.

2.2.3 The Society is to take into consideration the fish farms which, for specific reasons, depart from the requirements of [2.2.1] or [2.2.2].

Section 6 Other Surveys

1 Survey of additional class notation AUTO

1.1 Annual survey

1.1.1 The annual survey of classed automated installations consists of the:

- examination of the machinery and automated plant operational record (log book) entries - when such a log book exists - since the last survey in order to check the past performance of the system, and to establish if certain parts have shown any irregularities in operation and which corrective measures have been taken
- general examination of the control systems covered by the notation and random check, as far as possible taking into account operating conditions, of the proper operation of main measuring, monitoring, alarm and automatic shut-down system, in particular for essential auxiliaries
- checking the fire detectors, in particular in machinery spaces, and bilge flooding alarms
- checking a number of other alarms selected at random.

1.2 Class renewal survey

1.2.1 The class renewal survey of classed automated installations consists of:

- the examinations, tests and checks listed in [1.1] for the annual survey, and
- an additional programme of examinations, tests and checks prepared in agreement with the Owner and based on operating data and on the experience of previous surveys.

All points which cannot be checked when the fish farm is in operation will be given particular consideration by this programme. All alarm and safety devices will be tested and settings adjusted if necessary, except if evidence exists of the proper operation of these installations, or if they have been subject of a systematic maintenance.

Fire smoke detectors fitted in the machinery spaces are to be tested in similar conditions as for the first certificate delivery; alternatively, written evidence of reconditioning and recalibrating by the Manufacturer or by his representative may be accepted.

2 Survey of additional service feature POSA, POSA-HR, POSA JETTY and POSA MU

2.1 Periodical surveys

2.1.1 Requirements regarding periodical surveys are given in NR493 Classification of Mooring Systems for Permanent and Mobile Offshore Units.

3 Survey of additional class notation OHS

3.1 Periodical surveys

3.1.1 Requirements regarding periodical surveys, lay-up and re-commissioning surveys, are given in Section 4 of NR595 Classification of Offshore Handling Systems.

4 Survey of additional class notation HEL

4.1 Application

4.1.1 The requirements of this Article apply to fish farms which have been assigned the additional class notation **HEL** defined in Ch 1, Sec 2, [8.3].

4.2 Annual survey

4.2.1 The Society considers that as a minimum these following issues are to be examined during the periodic surveys to confirm that there has been no alteration or deterioration in the condition of the helicopter landing area:

- a) The general examination of the physical characteristics of the helideck is to include:
 - the dimensions as measured
 - the declared D-value
 - the deck shape, and
 - the scale drawings of deck arrangement.

b) The general examination of the preservation of obstacle-protected surfaces is to include:

- the minimum 210° Obstacle Free Sector (OFS) surface
- the 150° Limited Obstacle Sector (LOS) surface, and
- the minimum 180° falling 5:1 gradient surface with respect to significant obstacles.

Note 1: If one or more of these surfaces is infringed due, for example, to the proximity of an adjacent installation or vessel, an assessment is to be made to determine any possible negative effect which may lead to operating restrictions.

c) The general examination of the marking and lighting is to include:

- the adequate helideck perimeter lighting
- the adequate helideck touchdown marking lighting ("H" and TD/PM Circle lighting) and/or floodlighting
- the status lights (for day and night operations)
- the helideck markings
- the dominant obstacle paint schemes and lighting, and
- the general installation lighting levels including floodlighting.

Note 2: Where inadequate helideck lighting exists the Helideck Limitation List (HLL) is to be annotated 'daylight only operations'.

d) The general examination of the deck surface is to include:

- the surface friction
- the Helideck net (as applicable)
- the drainage system
- the deck edge perimeter safety netting
- the tie-down points, and
- the cleaning of all contaminants (to maintain satisfactory recognition of helideck markings and preservation of the helideck friction surface).

e) The verification of the environment effects is to include:

- foreign object damage
- air quality degradation due to exhaust emissions, hot and cold vented gas emissions and physical turbulence generators
- bird control
- any adjacent helideck/installation having significant environmental effects in any air quality assessment, and

f) The general examination of the rescue and fire fighting facilities is to include:

- the primary and complementary media types, quantities, capacity and systems
- the Personal Protective Equipment (PPE), and
- the crash box.

g) The general examination of the communications and navigation system arrangements is to include:

- the aeronautical radio(s)
- the radio/telephone (R/T) call sign to match helideck name and side identification which should be simple and unique
- the Non-Directional Beacon (NDB) or equivalent (as appropriate), and
- the radio log.

h) The general examination of the Fuelling facilities is to include:

- the fuel system, ventilation, fire protection and detection
- the pump and aircraft bonding safety systems

i) The general examination of the additional operational and handling equipment is to include:

- the windsock
- the meteorological information (recorded by an automated means)
- the Helideck Motion System recording and reporting (where applicable)
- the passenger briefing system
- the chocks
- the tie-downs, and
- the weighing scales for passengers, baggage and freight.

5 Survey of additional class notation OAS

5.1 Periodical surveys

5.1.1 Requirements regarding periodical surveys are given in NI 629 Classification of Offshore Access Systems.

Section 7 Suspension and Withdrawal of Class

1 General

1.1 Discontinuance of class

1.1.1 The class may be discontinued either temporarily or permanently. In the former case it is referred to as “suspension” of class, in the latter case as “withdrawal” of class. In both these cases, the class is invalidated in all respects. In the case of withdrawal, the name of the fish farm is deleted from the Register. The current version of the Register can be consulted on the Society website.

1.2 Suspension of class

1.2.1 The class may be suspended either automatically or following the decision of the Society. In any event, the fish farm will be considered as not retaining its class from the date of suspension until the date when class is reinstated.

1.2.2 The class may be automatically suspended when one or more of the following circumstances occur:

- when a fish farm is not operated in compliance with the rule requirements, such as in cases of services or conditions not covered by the service notation, or trade outside the navigation restrictions for which the class was assigned
- when a fish farm proceeds to sea with less freeboard than that assigned, or has the freeboard marks placed on the sides in a position higher than that assigned, or, in cases of fish farm where freeboard are not assigned, the draught is greater than that assigned
- when the Owner fails to inform the Society in order to submit the fish farm to a survey after defects or damages affecting the class have been detected
- when repairs, alterations or conversions affecting the class are carried out either without requesting the attendance of the Society or not to the satisfaction of the Surveyor.

Suspension of class with respect to the above cases will remain in effect until such time as the cause giving rise to suspension has been removed. Moreover, the Society may require any additional surveys deemed necessary taking into account the condition of the fish farm and the cause of the suspension.

1.2.3 In addition, the class is automatically suspended:

- when the class renewal survey has not been completed by its limit date or within the time granted for the completion of the survey, unless the fish farm is under attendance by the Society’s Surveyors with a view to completion prior to resuming trading
- when the annual or intermediate surveys have not been completed by the end of the corresponding survey time window (see Ch 2, Sec 1, [2.1.3]) unless the fish farm is under attendance for completion of the survey.

Continuous survey item(s) due or overdue at the time of annual surveys is (are) to be dealt with. The fish farm's class will be subject to a suspension procedure if the item(s) is (are) not surveyed or postponed by agreement with the Society.

Suspension of class with respect to the above cases will remain in effect until such time as the class is reinstated once the due items and/or surveys have been dealt with.

1.2.4 In addition to the circumstances for which automatic suspension may apply, the class of a fish farm may also be suspended following the decision of the Society:

- when a condition of class is not dealt with within the time limit specified, unless it is postponed before the limit date by agreement with the Society
- when one or more surveys are not held by their limit dates (see Ch 2, Sec 1, [2.1.4]) or the dates stipulated by the Society also taking into account any extensions granted in accordance with the provisions of Part A
- when, due to reported defects, the Society considers that a fish farm is not entitled to retain its class even on a temporary basis (pending necessary repairs or renewals, etc.)
- when the fish farm has not been maintained in proper condition, as set forth in Ch 1, Sec 1, [3.3.2]
- in other circumstances which the Society will consider on their merits (e.g. in the event of non-payment of fees) or where the Owner fails to render the fish farm available for the occasional surveys as listed in Ch 2, Sec 1, [6.1.1].

Suspension of class decided by the Society takes effect from the date when the conditions for suspension of class are met and will remain in effect until such time as the class is reinstated once the due items and/or surveys have been dealt with.

1.3 Withdrawal of class

1.3.1 The Society will withdraw the class of a fish farm in the following cases:

- at the request of the Owner
- as a rule, when the causes that have given rise to a suspension currently in effect have not been removed within six months after due notification of suspension to the Owner
- when the fish farm is reported as a constructive total loss
- when the fish farm is lost
- when the fish farm is reported scrapped.

Withdrawal of class may take effect from the date on which the circumstances causing such withdrawal occur.

The contract for the classification of the fish farm is terminated as of right in the above cases.

The class is also withdrawn according to the provisions of the Marine & Offshore Division General Conditions in case of contract termination.

1.3.2 When the withdrawal of class of a fish farm comes into effect, the Society will:

- forward the Owner written notice
- delete the fish farm from the Register
- notify the flag Administration
- make the information available to the Underwriters, at their request.

1.4 Suspension/withdrawal of additional class notations

1.4.1 If the survey requirements related to maintenance of additional class notations are not complied with, the suspension or withdrawal may be limited to the notations concerned.

1.4.2 The suspension or withdrawal of an additional class notation generally does not affect the class.

Appendix 1 Thickness Measurements: Extent, Determination of Locations, Acceptance Criteria

1 General

1.1 Aim of the Appendix

1.1.1 Thickness measurements are a major part of surveys to be carried out for the maintenance of class, and the analysis of these measurements is a prominent factor in the determination and extent of the repairs and renewals of the fish farm's structure.

1.1.2 This Appendix is intended to provide Owners, companies performing thickness measurements and the Society's Surveyors with a uniform means with a view to fulfilling Rule requirements for thickness measurements. In particular, it will enable all the above-mentioned parties to carry out:

- the planning and preparation
- the determination of extent and location, and
- the analysis

of the thickness measurements in cooperation.

1.2 Scope of the Appendix

1.2.1 Separate Articles below provide the following information:

- references to rule requirements and some additional information on the extent of the thickness measurements to be performed during surveys according to types of fish farm and related surveys (see Article [2])
- locations of the measurements for the main parts of the fish farm (see Article [3])
- acceptance criteria of thickness measurements (see Article [4]).

Tables and sketches are also given to detail the above points according to the types of fish farms.

2 Extent of measurements

2.1 General

2.1.1 For the maintenance of class, thickness measurements may be required during annual, intermediate and class renewal surveys.

Tab 1 gives the references to the requirements for minimum thickness measurements.

Some additional explanations are also given about the wording used in the Rules as well as the general principles of the required thickness measurements during class renewal surveys.

3 Number and locations of measurements

3.1 General

3.1.1 Considering the extent of thickness measurements as required by the Rules and indicated in Article [2], the locations of the points to be measured are given here for the most important items of the structure. Thus the number of points can be estimated.

3.2 Locations of points

3.2.1 Tab 2 provides explanations and/or interpretations for the application of those requirements indicated in the Rules which refer to both systematic thickness measurements related to the calculation of global hull girder strength (for surface unit) and specific measurements connected to close-up surveys.

Figures are also given to facilitate the explanations and/or interpretations given in the table. These figures show typical arrangements and they may be used as guidance for fish farms other than those illustrated.

Table 1 : References to requirements related to thickness measurements

Structural type notation	Type of survey		
	Class renewal	Intermediate	Annual
surface unit	Systematic measurements and suspect areas: Ch 2, Sec 4, [2.5] and Ch 2, Sec 4, Tab 3 Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Ch 2, Sec 3, Tab 1 Thickness measurements to be taken if deemed necessary by the Surveyor Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Areas of substantial corrosion identified at previous surveys: Ch 2, Sec 2, [2.1.2] Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance
column stabilized unit	Systematic measurements and suspect areas: Ch 2, Sec 4, [2.5] and Ch 2, Sec 4, Tab 4 Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Ch 2, Sec 3, Tab 1 Thickness measurements to be taken if deemed necessary by the Surveyor Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Areas of substantial corrosion identified at previous surveys: Ch 2, Sec 2, [2.1.2] Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance
self-elevating unit	Systematic measurements and suspect areas: Ch 2, Sec 4, [2.5] and Ch 2, Sec 4, Tab 5 Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Ch 2, Sec 3, Tab 1 Thickness measurements to be taken if deemed necessary by the Surveyor Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance	Areas of substantial corrosion identified at previous surveys: Ch 2, Sec 2, [2.1.2] Where substantial corrosion is found, the extent of thickness measurements may be increased to the Surveyor's satisfaction, using Ch 2, Sec 4, Tab 6 as guidance

Table 2 : Interpretations of rule requirements for the locations and number of points to be measured

A) SYSTEMATIC MEASUREMENTS		
ITEM	INTERPRETATION	FIGURE
Selected plates on deck, tank top, bottom, double bottom and wind-and-water (for all unit types)	"Selected" means at least a single point on one out of three plates, to be chosen on representative areas of average corrosion	No figure
All deck, tank top and bottom plates and wind-and-water strakes (for all units types)	At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion	No figure
Transverse section	Refer to the definition given in Pt A, Ch 2, Sec 2, [2.2.5] of the Ship rules. One point to be taken on each plate. Both web and flange to be measured on longitudinals. For fish farm with cargo tank older than 10 years of age: within 0,1D (where D is the fish farm's moulded depth) of the deck and bottom at each transverse section to be measured, every longitudinal and girder is to be measured on the web and face plate, and every plate is to be measured at one point between longitudinals	Surface unit: Fig 1 (single hull) and Fig 2 (double hull) For pontoon of column-stabilized fish farm: Fig 7
Transverse rings (1)	At least two points on each plate in a staggered pattern and two points on the corresponding flange where applicable. Minimum 4 points on the first plate below deck. Additional points in way of curved parts. At least one point on each of two stiffeners between stringers / longitudinal girders	For pontoon of column-stabilized fish farm: Fig 8

A) SYSTEMATIC MEASUREMENTS		
ITEM	INTERPRETATION	FIGURE
Bulkheads	“Selected bulkheads” means at least 50% of the bulkheads	Fig 3 for general bulkhead For pontoon of column-stabilized fish farm: Fig 9
Selected internal structure such as floors and longitudinals, transverse frames, web frames, deck beams, ‘tweendecks, girders	The internal structural items to be measured in each space internally surveyed are to be at least 20% within the cargo area and 10% outside the cargo area	No figure
One section of deck plating for the full beam of the surface unit within the cargo area	Two single points on each deck plate (to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion) in the transverse section concerned	No figure
All cargo hold hatch covers and coamings	Including plates and stiffeners	Fig 4 for fish farms fitted with hold hatch covers and coamings
Girth belt	It is applicable for column-stabilized fish farms. It represent the sectional and rings of the main structural element. It is a section for pontoon. It is an elevation for column. It is a main framing for upper hull. On section of the girth belt, one point to be taken on each plate. Both web and flange to be measured on longitudinals. On ring of the girth belt, at least two points on each plate in a staggered pattern and two points on the corresponding flange where applicable. Minimum 4 points on the first plate below deck. Additional points in way of curved parts. At least one point on each of two stiffeners between stringers/girders.	Column section: Fig 10 Node junction (ring type): Fig 11
(1) Transverse rings means all transverse material appearing in a cross-section of the fish farm’s hull, in way of a double bottom floor, vertical web and deck transverse.		

Figure 1 : Location of measurements on transverse section for surface unit (single hull)

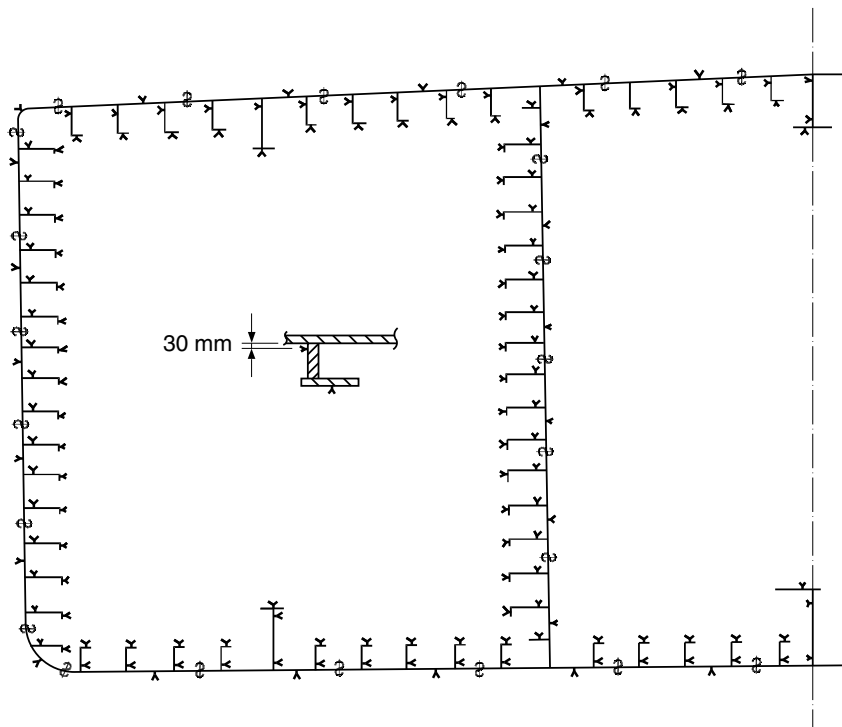


Figure 2 : Location of measurements on transverse section for surface unit (double hull)

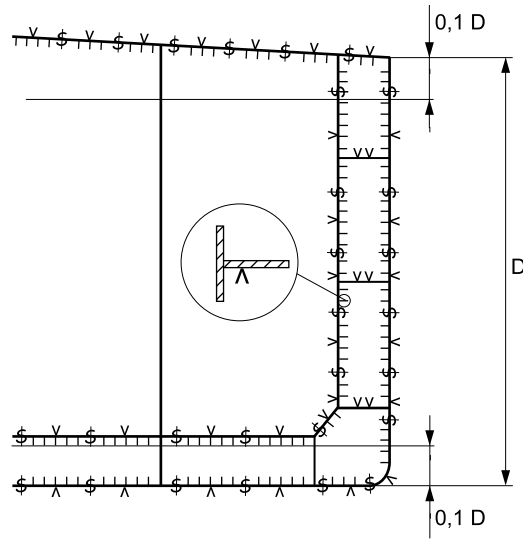


Figure 3 : Locations of measurements on bulkheads (general)

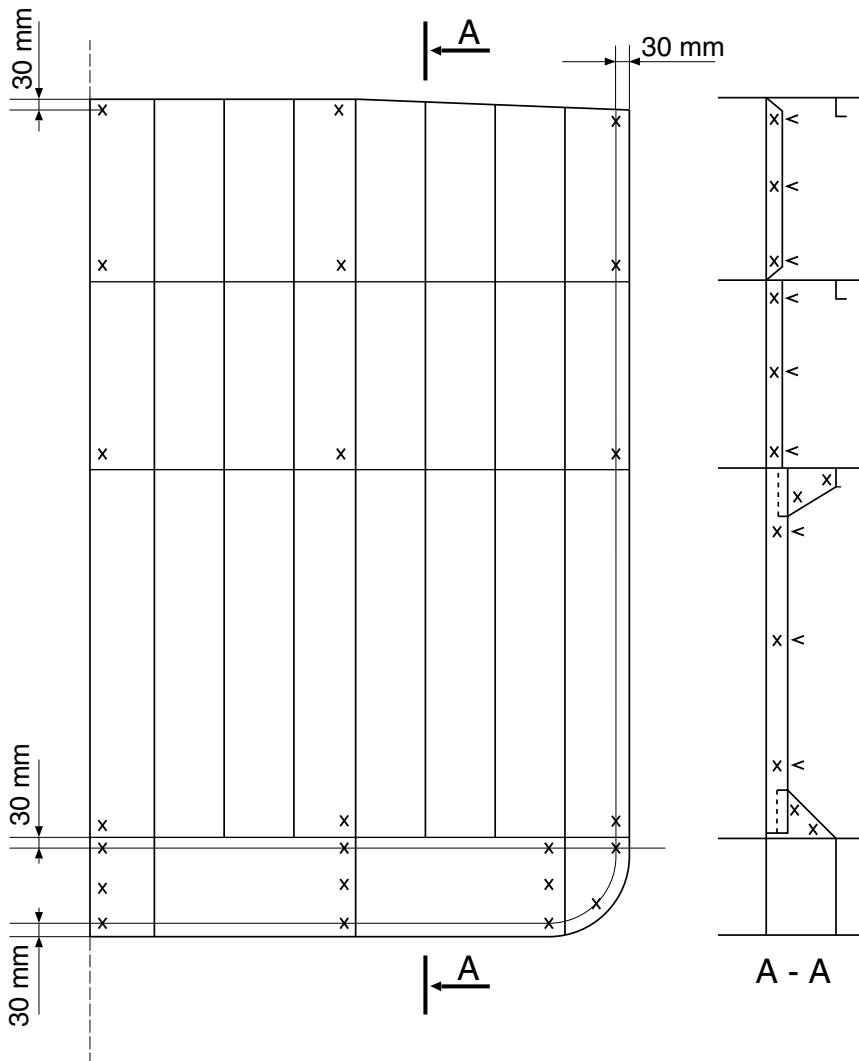
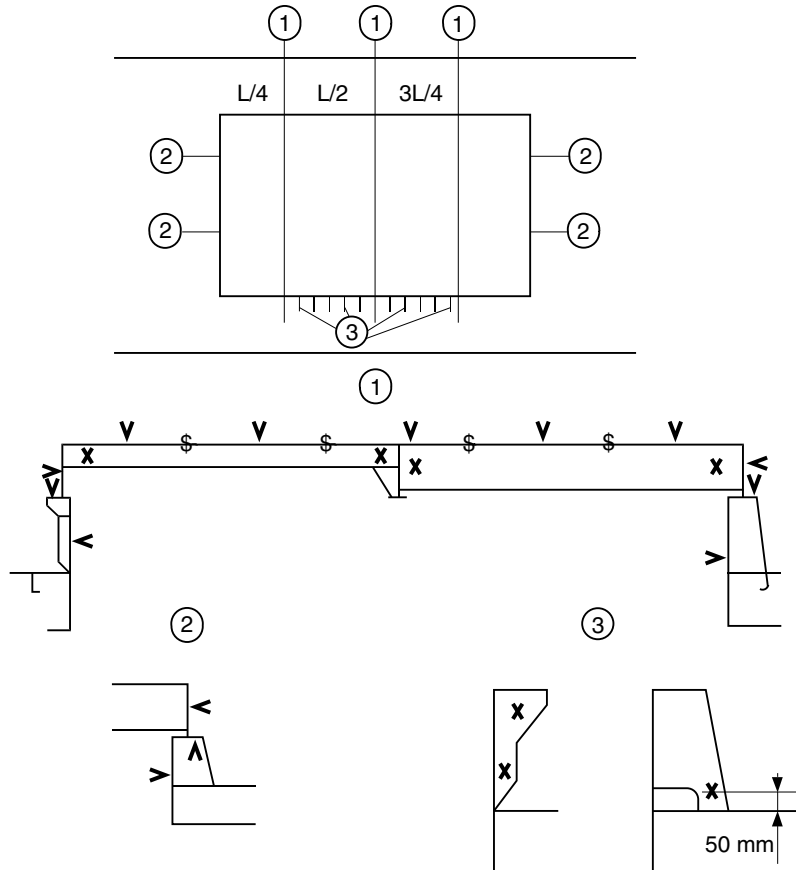


Figure 4 : Locations of measurements on hatch covers and coamings



- (1) Three sections at L/4, L/2, 3L/4 of hatch cover length, including:
- one measurement of each hatch cover plate and skirt plate
 - measurements of adjacent beams and stiffeners
 - one measurement of coaming plates and coaming flange, each side
- (2) Measurements of both ends of hatch cover skirt plate, coaming plate and coaming flange
- (3) One measurement of one out of three hatch coaming brackets and bars, on both sides and both ends

Figure 5 : Location measurements on transverse bulkheads in cargo tanks

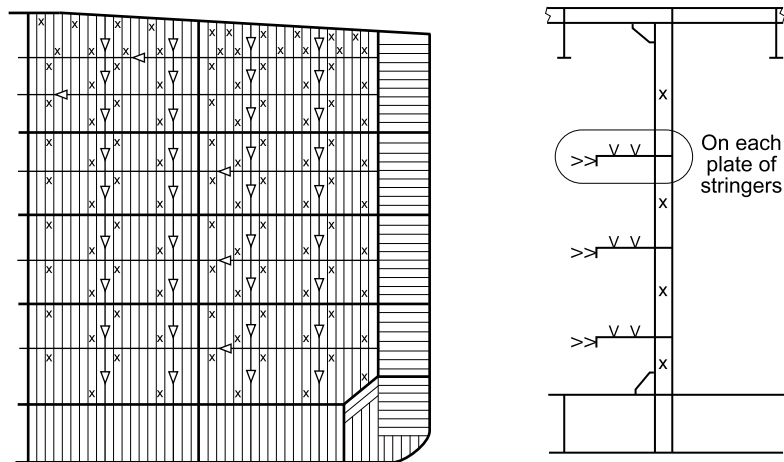


Figure 6 : Location of measurements on transverse bulkhead in ballast tanks

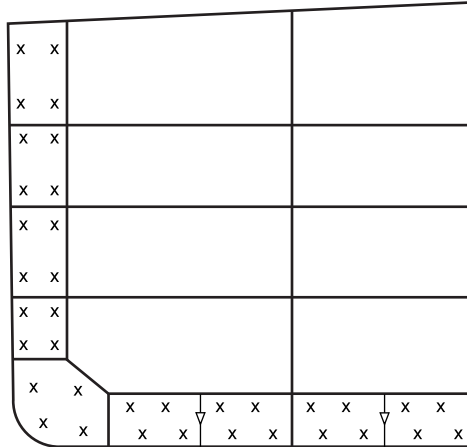


Figure 7 : Typical location of measurement for pontoon normal transverse section of column-stabilized fish farm

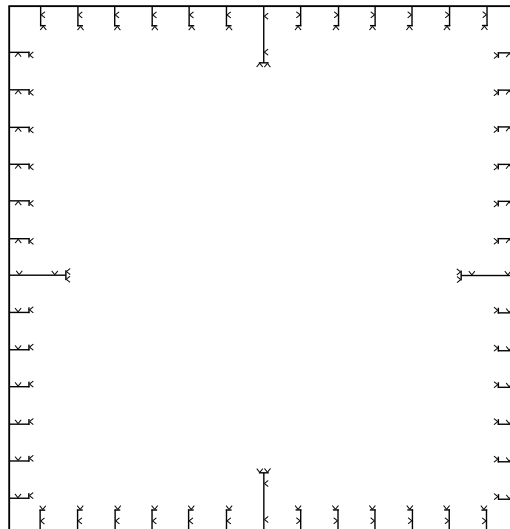


Figure 8 : Typical location of measurement for pontoon reinforced transverse section of column-stabilized fish farm

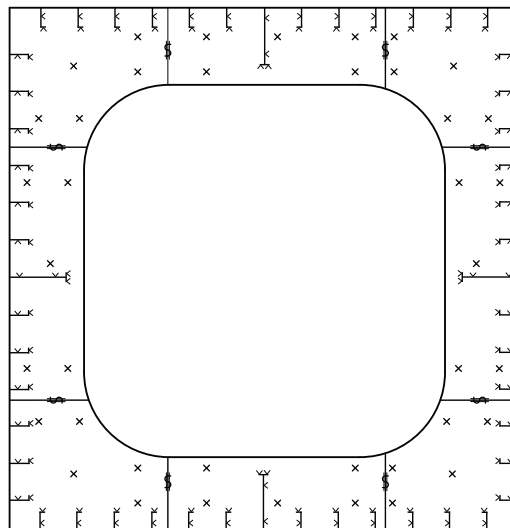


Figure 9 : Typical location of measurement for pontoon bulkhead of column-stabilized fish farm

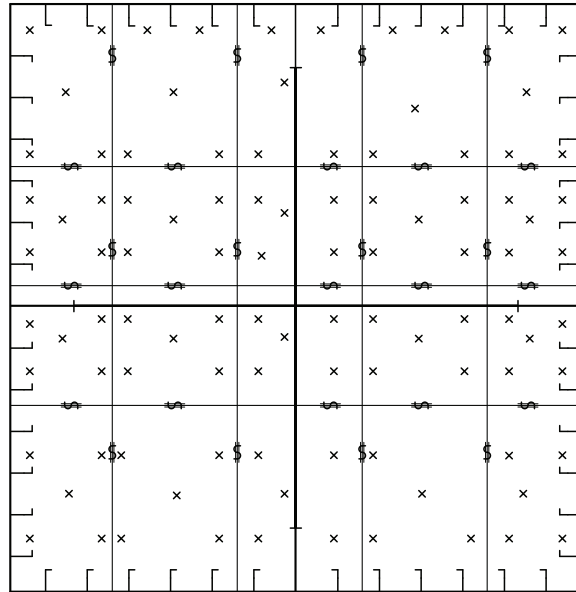


Figure 10 : Typical location of measurement for column-stabilized fish farm

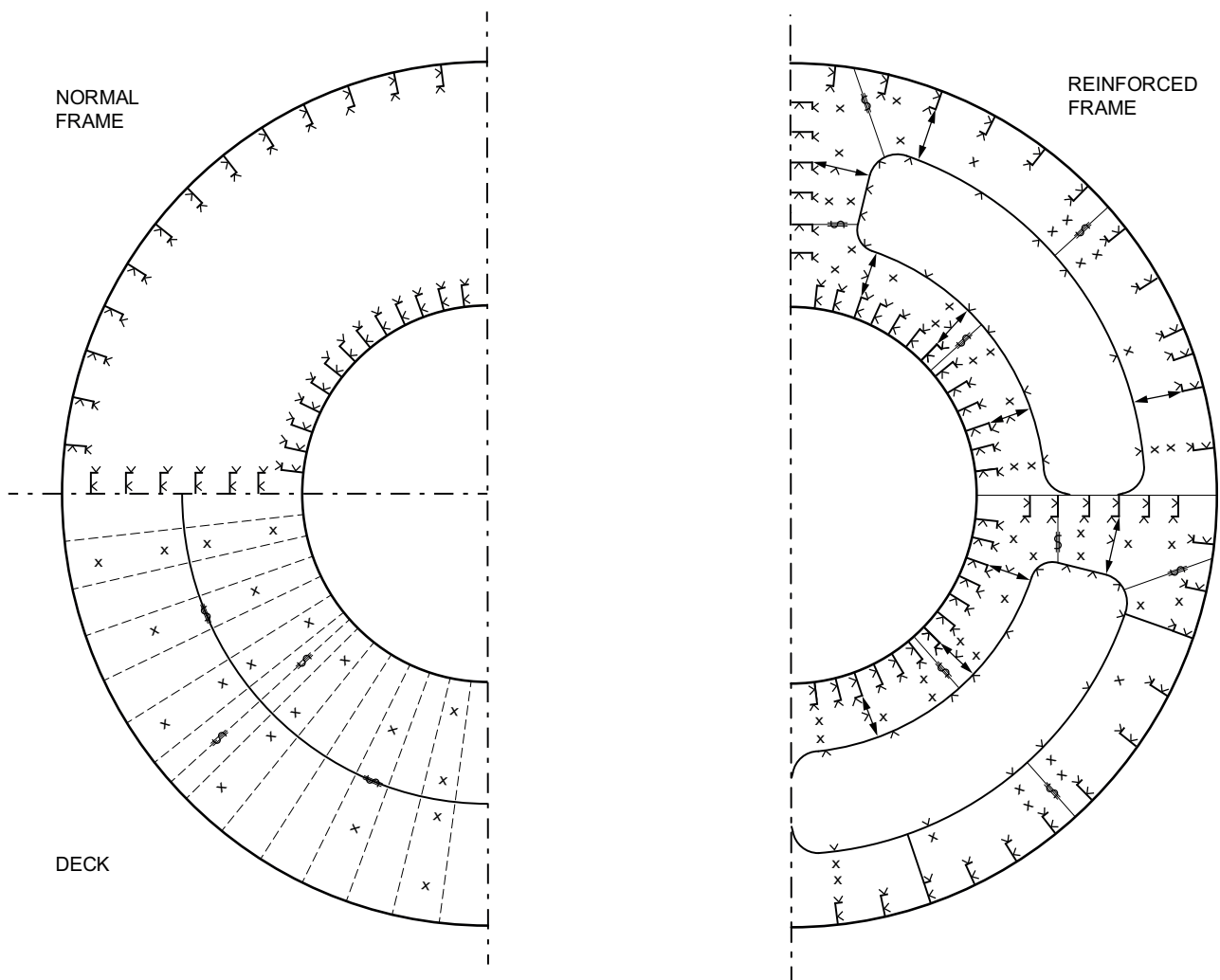
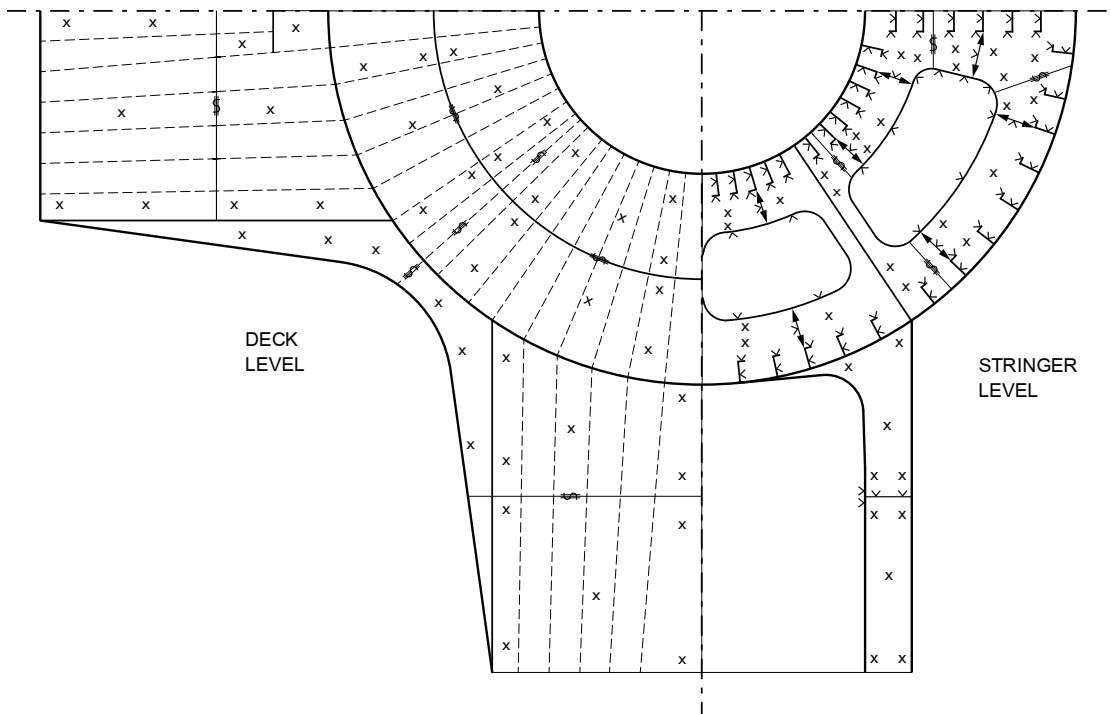


Figure 11 : Typical location of measurement for junction node of column-stabilized fish farm



4 Acceptance criteria for thickness measurements

4.1 General

4.1.1 Acceptance criteria stipulate limits of wastage which are to be taken into account for reinforcements, repairs or renewals of steel structure. These limits are generally expressed for each structural item as a maximum percentage of acceptable wastage (W). When the maximum percentage of wastage is indicated, the minimum acceptable thickness (t_{min}) is that resulting from applying this percentage to the rule thickness (t_{rule}), according to the following formula:

$$t_{min} = \left(1 - \frac{W}{100}\right) t_{rule}$$

However, when the rule thickness is not available, the as-built thickness can be used.

Note 1: When owner corrosion margin is mentioned on drawings, it may not be included in t_{rule} .

Only for criteria related to an item (see [4.3.4] b), the Society may establish a list of renewal thicknesses tailored to the different structural items. In such a case these thicknesses are used in lieu of the minimum thicknesses calculated from the percentage of wastage.

Note 2: In any case, at the request of the Owner, the Society may perform a direct calculation based on the current measurements.

4.1.2 In cases where the fish farm has some structural elements with reduced wear margins (e.g. due to unit conversion, increase of draught), the minimum acceptable thickness for these elements is to be calculated with reference to the rule scantlings without taking account of any reduction originally agreed.

4.1.3 Decisions on steel renewals are taken by the attending Surveyor applying the criteria given in this Article and based on his judgment and the actual condition of the fish farm. Should advice be needed to support his decision, the Surveyor may refer to the relevant technical office of the Society.

4.2 Criteria

4.2.1 The acceptance criteria for the minimum thicknesses are divided into:

- criteria on longitudinal strength for surface unit, given in [4.3]
- criteria on yield strength for column stabilized fish farm, given in [4.4]
- criteria on yield strength for self-elevating fish farm, given in [4.5]
- criteria for critical area, given in [4.6]
- criteria on buckling strength, given in [4.7] for surface unit
- criteria on pitting, given in [4.8].

4.2.2 Each measured structural item is to be checked against the above criteria, as far as applicable. When the criteria are not met, reinforcements, repairs and renewals are to be carried out as appropriate.

4.2.3 For yield strength, each structural item is to be assessed according to four different criteria which vary with regard to the domain under which it is considered, namely:

- a) an isolated area, which is meant as a part of a single structural item. This criterion takes into consideration very local aspects such as grooving of a plate or web, or local severe corrosion; however, it is not to be used for pitting for which separate criteria are considered (see [4.8])
- b) an item, which is meant as an individual element such as a plate, a stiffener, a web, etc. This criterion takes into consideration the average condition of the item, which is assessed by determining its average thickness using the various measurements taken on the same item
- c) a group of items, which is meant as a set of elements of the same nature (plates, longitudinals, girders) contributing either to the longitudinal global strength of the fish farm in a given zone or to the global strength of other primary transverse elements not contributing to the fish farm longitudinal strength, e. g. bulkheads, hatch covers, web frames
- d) a zone for surface unit, which is meant as all and only longitudinal elements contributing to the longitudinal strength of the fish farm; in this regard, the three main zones are defined as deck zone, neutral axis zone and bottom zone. This criterion takes into consideration the average condition of all groups of items belonging to the same zone.

4.3 Longitudinal strength criteria for surface unit

4.3.1 Local and global strength criteria in the present Article are applicable to surface units.

These criteria may also be used for other fish farm types taking into consideration the equivalence or similarity of structural elements and their contribution to local and/or global strength.

4.3.2 For the evaluation of the surface unit longitudinal strength, it is a prerequisite that welding between longitudinal members and deck, side and bottom plating is maintained effective so as to keep continuity of hull structures.

4.3.3 Each structural item to be assessed as illustrated in a typical transverse section (see Fig 12).

These structural items to be assessed are listed in Tab 3 and are grouped according to their position and contribution to the local or global strength of the fish farm.

Figure 12 : layout of items to be assessed for a surface unit

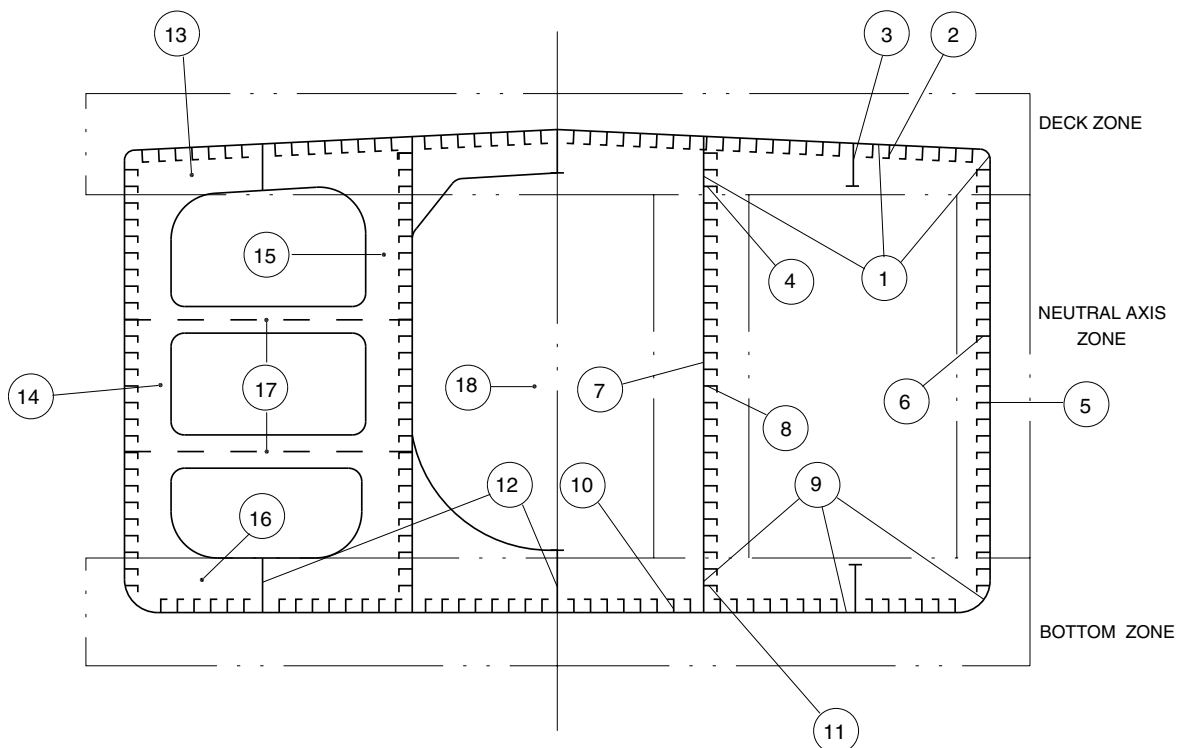


Table 3 : Local and global acceptance criteria for surface unit (given in % of wastage)

Group of items (1)	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
ITEMS CONTRIBUTING TO THE LONGITUDINAL STRENGTH (TRANSVERSE SECTION)					
DECK ZONE (2)		–	–	–	10
1	Deck plating, deck stringer, sheer strake and longitudinal bulkhead upper strake (3)	25	20	10	–
2	Deck and sheer strake longitudinals web flange	–	–	10	–
		25	20	–	–
3	Deck longitudinal girders web flange	20	15	–	–
		–	–	10	–
4	Longitudinals connected to long. bulkhead upper strake (3) web flange	25	20	–	–
		20	15	–	–
NEUTRAL AXIS ZONE (2)		–	–	–	15
5	Side shell plating (3)	25	20	15	–
6	Side shell longitudinals and stringers (3) web flange	–	–	15	–
		25	20	–	–
7	Longitudinal bulkhead plating	20	15	–	–
		25	20	15	–
8	Longitudinal bulkhead longitudinals and stringers web flange	–	–	15	–
		25	20	–	–
9	Bottom girders web flange	20	15	–	–
		25	20	10	–
BOTTOM ZONE (2)		–	–	–	10
9	Bilge and bottom strakes, longitudinal bulkhead lower strake and keel plate (3)	25	20	10	–
10	Bilge and bottom longitudinals (3) web flange	–	–	10	–
		25	20	–	–
11	Longitudinals connected to longitud. bulkhead lower strake web flange	20	15	–	–
		25	20	–	–
12	Bottom girders web flange	–	–	10	–
		25	20	–	–
13	Deck transverse web frame web flange	20	15	–	–
		25	20	–	–
14	Side shell web frame web flange	25	20	–	–
		20	15	–	–
15	Longitudinal bulkhead web frame web flange	25	20	–	–
		20	15	–	–
16	Bottom transverse web frame web flange	25	20	–	–
		20	15	–	–
OTHER ITEMS					
13	brackets / stiffeners	25	20	–	–
		20	15	–	–
14	brackets / stiffeners	25	20	–	–
		20	15	–	–
15	brackets / stiffeners	25	20	–	–
		20	15	–	–
16	brackets / stiffeners	25	20	–	–
		20	15	–	–

Group of items (1)	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
17	Cross tie				
	web	25	15	–	–
	flange	20	15	–	–
	brackets / stiffeners	20	15	–	–
18	Transverse bulkheads (4)				
	plating	25	20	15	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
19	Thruster casing (4)	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
20	Mooring foundation	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
21	Moonpool	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
	derrick beam web	20	15		
	derrick beam flange	20	15		

- (1) Items are shown in the Fig 12. Some items are not called for clarity of drawings.
 (2) Each zone is to be evaluated separately.
 (3) For double hull, the structural elements of the inner skin (plating, longitudinals, girders, bulkheads) are to be included in the corresponding elements of the outer skin.
 (4) Including swash bulkheads, forward and aft peak bulkheads.

4.3.4 The assessment of the thickness measurements is to be performed using the values given in the Tab 3 for each structural element with regard to the four criteria defined in [4.2.3], in the following order:

- assessment of isolated areas (column 1 in the table). If the criterion is not met, the wasted part of the item is to be dealt with as necessary.
- assessment of items (column 2 in the table). If the criterion is not met, the item is to be dealt with as necessary in the measured areas as far as the average condition of the item concerned is satisfactory. In cases where some items are renewed, the average thicknesses of these items to be considered in the next step are the new thicknesses.
- assessment of groups of items (column 3 in the table). If the criterion is not met, a sufficient number of elements are to be renewed in order to obtain an increased average thickness satisfying the considered criterion of the group (generally the elements to be renewed are those most wasted). As an example, for the assessment of the group “deck plates” all deck plates are measured and an average thickness of each of them is estimated. Then the average of all these values is to satisfy the criteria given for this group.
- assessment of zones (column 4 in the table). In principle, the criterion of the zone is met when all groups of items belonging to the zone meet their own criteria (see c) above). However, a greater diminution than those given in column 3 may be accepted for one group of items if, considering the other groups of items belonging to the same zone, the overall diminution of the zone does not exceed the criterion given for it in column 4.

Example: The deck zone consists of two groups of items:

- deck plating, which has an average diminution of 12% (criterion 10%)
- deck longitudinals, which has an average diminution of 4% (criterion 10%).

Even though the deck plating group exceeds its acceptance criterion, the average diminution of the zone, which can be very roughly estimated at 8%, is acceptable and thus the deck plating group can be accepted as it is.

Note 1: This criterion applicable to the zones is based on the general rule that the current hull girder section modulus is not to be less than 90% of the rule section modulus within 0,4L amidships. When the zone criterion is used, the assessment is made on the basis of the original modulus instead of the rule modulus. At the request of the Owner, a direct calculation using the fish farm’s current thicknesses may be performed by the Society in order to accept greater diminutions than those given for this criterion.

4.3.5 These criteria take into consideration two main aspects:

- the overall strength of the hull girder
- the local strength and integrity of the hull structure, such as bulkheads, etc.

As a rule, they are applicable to the structure within the cargo area of surface units having a length greater than 90 metres. However, they may also be used for smaller surface units and for structure outside the cargo area according to the following principles excluding critical areas:

- for surface units having a length less than 90 metres, the percentages of acceptable wastage given in the tables can be increased by 5 (%) (e.g. 15% instead of 10%, etc.), except for those of deck and bottom zones
- for structure outside the cargo area, the same 5 (%) increase can be applied,

on the understanding, however, that both conditions cannot be applied at the same time.

4.4 Yield criteria for column stabilized fish farms

4.4.1 Local and global strength criteria in the present Article are applicable to column stabilized and fish farms .

These criteria may also be used for other fish farm types taking into consideration the equivalence or similarity of structural elements and their contribution to local and/or global strength.

4.4.2 For the evaluation of the fish farm global strength, it is a prerequisite that welding between external shell and internal member is maintained effective so as to keep continuity of hull structures.

4.4.3 Structural items to be assessed include: columns, diagonal and horizontal braces together with any other parts of the upper hull supporting structure as accessible above the waterline as shown in Fig 13, Fig 14 and Fig 15.

Figure 13 : Profile view of pontoon type column-stabilized fish farm

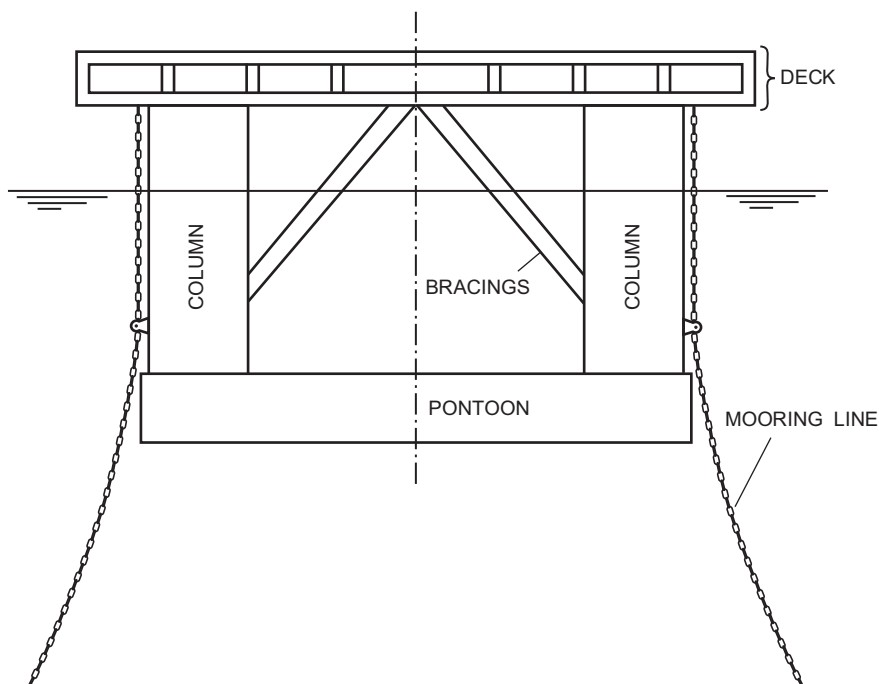


Figure 14 : Transverse view of pontoon type column-stabilized fish farm

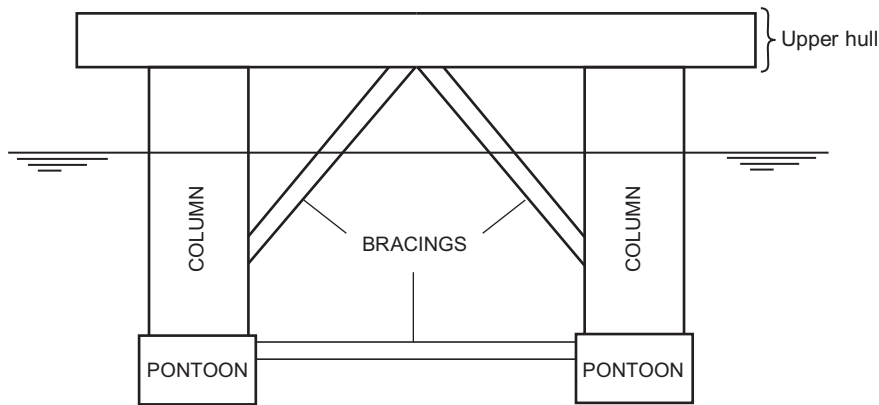
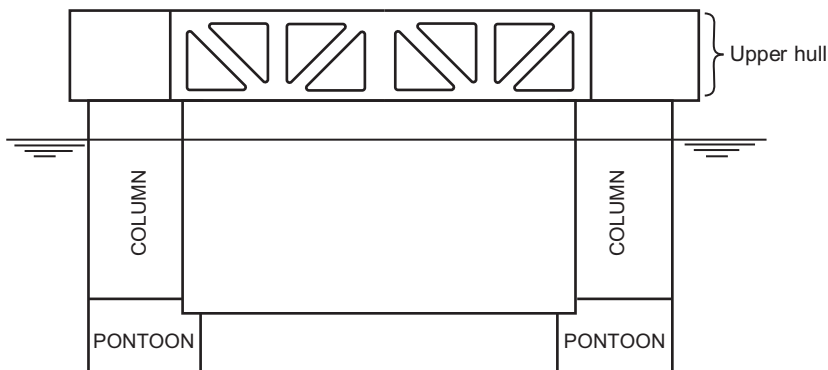


Figure 15 : Profile and transverse view of a ring type column-stabilized fish farm with truss upper hull



4.4.4 The structural items to be assessed are listed in Tab 4 to Tab 8 and grouped according to their position and contribution to the local and/or global strength of the fish farm.

- For twin pontoons type column-stabilized fish farm refer to Tab 4, Tab 5 and Tab 8
- For ring pontoon type of column-stabilized fish farm refer to Tab 4, Tab 5, Tab 6 and Tab 7 or Tab 8 depending on the upper hull type

4.4.5 The assessment of the thickness measurements is to be performed using the values given in the Tab 4 for each structural element with regard to the four criteria defined in [4.2.3], in the following order:

- assessment of isolated areas (column 1 in the table). If the criterion is not met, the wasted part of the item is to be dealt with as necessary.
- assessment of items (column 2 in the table). If the criterion is not met, the item is to be dealt with as necessary in the measured areas as far as the average condition of the item concerned is satisfactory. In cases where some items are renewed, the average thicknesses of these items to be considered in the next step are the new thicknesses.
- assessment of groups of items (column 3 in the table). If the criterion is not met, a sufficient number of elements are to be renewed in order to obtain an increased average thickness satisfying the considered criterion of the group (generally the elements to be renewed are those most wasted). As an example, for the assessment of the group “deck plates” all deck plates are measured and an average thickness of each of them is estimated. Then the average of all these values is to satisfy the criteria given for this group.
- assessment of zones (column 4 in the table), for pontoon only. In principle, the criterion of the zone is met when all groups of items belonging to the zone meet their own criteria (see c) above). However, a greater diminution than those given in column 3 may be accepted for one group of items if, considering the other groups of items belonging to the same zone, the overall diminution of the zone does not exceed the criterion given for it in column 4.

Example: The deck zone consists of two groups of items:

- deck plating, which has an average diminution of 12% (criterion 10%)
- deck longitudinals, which has an average diminution of 4% (criterion 10%).

Even though the deck plating group exceeds its acceptance criterion, the average diminution of the zone, which can be very roughly estimated at 8%, is acceptable and thus the deck plating group can be accepted as it is excluding critical areas.

4.4.6 These criteria take into consideration two main aspects:

- the overall strength of the hull
- the local strength and integrity of the hull structure, such as bulkheads, watertight area, etc.

Figure 16 : Layout of pontoon section for column stabilized fish farm

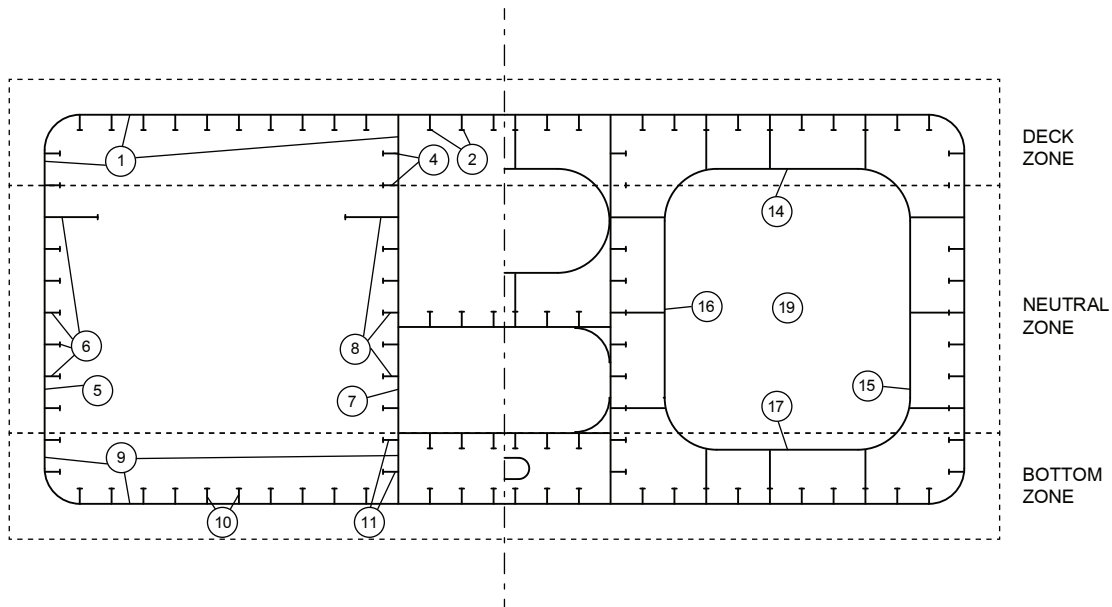


Table 4 : Pontoon section local and global acceptance criteria for column stabilized fish farm (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
ITEMS CONTRIBUTING TO THE GLOBAL STRENGTH (TRANSVERSE SECTION)					
TOP ZONE (1)		-	-	-	10
1	Deck plating, deck stringer, sheer strake and longitudinal bulkhead upper strake	25	20	10	-
2	Deck and sheer strake longitudinals	-	-	10	-
		25 20	20 15	- -	- -
3	Deck longitudinal girders	-	-	10	-
		25	20	-	-
		20	15	-	-
4	Longitudinals connected to long. bulkhead upper strake	-	-	10	-
		25	20	-	-
		20	15	-	-
NEUTRAL AXIS ZONE (1)		-	-	-	15
5	Side shell plating	20	15	-	-
6	Side shell longitudinals and stringers	-	-	15	-
		25	20	-	-
		20	15	-	-
7	Longitudinal bulkhead plating	20	15	-	-
8	Longitudinal bulkhead longitudinals and stringers	-	-	15	-
		25	20	-	-
		20	15	-	-
BOTTOM ZONE (1)		-	-	-	10
9	Bilge and bottom strakes, longitudinal bulkhead lower strake and keel plate (2)	25	20	10	-
10	Bilge and bottom longitudinals (2)	-	-	10	-
		25	20	-	-
		20	15	-	-

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
11	Longitudinals connected to longitud. bulkhead lower strake web	–	–	10	–
	flange	25	20	–	–
		20	15	–	–
12	Bottom girders web	–	–	10	–
	flange	25	20	–	–
		20	15	–	–
BRACING (1)		–	–	–	10
13	plate	20	15	–	–
	web	25	20	–	–
	flange	20	15	–	–
	tube	20	15	–	–
OTHER ITEMS					
14	Deck transverse web frame web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
15	Side shell web frame web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
16	Longitudinal bulkhead web frame web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
17	Bottom transverse web frame web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
18	Cross tie web	25	15	–	–
	flange	20	15	–	–
	brackets / stiffeners	20	15	–	–
19	Transverse bulkheads plating	25	20	15	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
20	Internal reinforcement for outfitting (caisson, tug and pusher point, towing outfitting...)	–	–	10	–
	plating	–	–	–	–
	stringer web	20	15	–	–
	stringer flange	30	20	–	–
	stiffener web	20	15	–	–
	stiffener flange	30	20	–	–
	manhole coaming	20	15	–	–
<p>(1) Each zone is to be evaluated separately.</p> <p>(2) For double bottom, the structural elements of the inner bottom (plating, longitudinals, girders, bulkheads) are to be included in the corresponding elements of the bottom.</p>					

Table 5 : Column section local and global acceptance criteria for column stabilized fish farm (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
1	Deck/platform plating	25	20	15	–
2	Deck/platform stiffeners	–	–	15	–
	web	25	20	–	–
	flange	20	15	–	–
3	Deck/platform web frame			15	
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
4	Side shell plating	25	20	10	–
5	Side shell vertical/horizontal stiffener	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
6	Side shell web frame			10	
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
7	vertical bulkhead plating	25	20	10	–
8	Bulkhead stiffeners	–	–	15	–
	web	25	20	–	–
	flange	20	15	–	–
9	Bulkhead web frame				
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
10	Cross tie				
	web	25	15	–	–
	flange	20	15	–	–
	brackets / stiffeners	20	15	–	–
BRACING (1)		–	–	–	10
12	plate	20	15	–	–
	web	25	20	–	–
	flange	20	15	–	–
	tube	20	15	–	–

(1) Each zone is to be evaluated separately.

Table 6 : Node section local and global acceptance criteria for ring type column stabilized fish farm (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
DECK ZONE (1)		–	–	–	10
1	Deck plating, deck stringer, sheer strake and longitudinal bulkhead upper strake	25	20	10	–
2	Deck and sheer strake longitudinals	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
3	Deck longitudinal girders	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
4	Longitudinals connected to long. bulkhead upper strake	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
SIDE SHELL ZONE (1)		–	–	–	15
5	Side shell plating	25	20	15	–
6	Side shell longitudinals and stringers	–	–	15	–
	web	25	20	–	–
	flange	20	15	–	–
7	Longitudinal bulkhead plating	25	20	15	–
8	Longitudinal bulkhead longitudinals and stringers	–	–	15	–
	web	25	20	–	–
	flange	20	15	–	–
BOTTOM ZONE (1)		–	–	–	10
9	Bilge and bottom strakes, longitudinal bulkhead lower strake and keel plate	25	20	10	–
10	Bilge and bottom longitudinals	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
11	Longitudinals connected to longitud. bulkhead lower strake	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
12	Bottom girders	–	–	10	–
	web	25	20	–	–
	flange	20	15	–	–
OTHER ITEMS					
13	Deck transverse web frame				
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
14	Side shell web frame				
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
15	Longitudinal bulkhead web frame				
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
16	Bottom transverse web frame				
	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
17	Cross tie				
	web	25	15	–	–
	flange	20	15	–	–
	brackets / stiffeners	20	15	–	–
18	Transverse bulkheads				
	plating	25	20	15	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
19	Thruster casing	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
20	Mooring foundation	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
	casting	20	15	–	–

(1) Each zone is to be evaluated separately.

Table 7 : Upper Hull section for truss structure local and global acceptance criteria for column stabilized fish farm (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
ITEMS CONTRIBUTING TO THE LONGITUDINAL STRENGTH (TRANSVERSE SECTION)					
all DECK level (1)		–	–	–	15
1	Deck plating, deck stringer, sheer strake and longitudinal bulkhead upper strake	25	20	15	–
2	Deck and sheer strake vertical web flange	–	–	10	–
		25	20	–	–
		20	15	–	–
3	Deck longitudinal girders web flange	–	–	10	–
		25	20	–	–
		20	15	–	–
4	Longitudinals connected to long. bulkhead upper strake web flange	–	–	10	–
		25	20	–	–
		20	15	–	–
5	Box girder, brace or girder part of the main structure primary web	–	–	10	–
	flange	20	15	–	–
	tubular	20	15	–	–
	plating	20	15	–	–
NEUTRAL AXIS ZONE (1)		–	–	–	15
6	Side shell plating	25	20	15	–
7	Side shell longitudinals and stringers web flange	–	–	15	–
		25	20	–	–
		20	15	–	–
8	Longitudinal bulkhead plating	25	20	15	–
9	Longitudinal bulkhead longitudinals and stringers web flange	–	–	15	–
		25	20	–	–
		20	15	–	–
10	Box girder, brace or girder part of the main structure primary web	–	–	10	–
	flange	20	15	–	–
	tubular	20	15	–	–
	plating	20	15	–	–

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
BOTTOM ZONE (1)		–	–	–	10
11	Bilge and bottom strakes, longitudinal bulkhead lower strake and keel plate	25	20	10	–
12	Bilge and bottom longitudinals	–	–	10	–
	web	25	20	–	–
13	flange	20	15	–	–
	Longitudinals connected to longitud. bulkhead lower strake	–	–	10	–
14	web	25	20	–	–
	flange	20	15	–	–
15	Box girder, brace or girder part of the main structure primary	–	–	10	–
	web	20	15	–	–
	flange	20	15	–	–
	tubular	20	15	–	–
16	plating	20	15	–	–
	OTHER ITEMS				
	Deck transverse web frame	–	–	–	–
	web	25	20	–	–
17	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
18	Side shell web frame	–	–	–	–
	web	25	20	–	–
	flange	20	15	–	–
19	brackets / stiffeners	25	20	–	–
	Longitudinal bulkhead web frame	–	–	–	–
	web	25	20	–	–
20	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
	Bottom transverse web frame	–	–	–	–
21	web	25	20	–	–
	flange	20	15	–	–
	brackets / stiffeners	25	20	–	–
22	Cross tie	–	–	–	–
	web	25	15	–	–
	flange	20	15	–	–
	brackets / stiffeners	20	15	–	–
	Transverse bulkheads (2)	–	–	15	–
23	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
	stiffener flange	25	15	–	–
24	Main equipment support:	–	–	15	–
	plating	20	15	–	–
	stringer web	20	15	–	–
	stringer flange	20	15	–	–
	stiffener web	35	20	–	–
25	stiffener flange	20	15	–	–

- (1) Each zone is to be evaluated separately.
(2) Including swash bulkheads, forward and aft peak bulkheads.

Table 8 : Upper Hull section for deck box local and global acceptance criteria for column stabilized fish farm structure (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
ITEMS CONTRIBUTING TO THE GLOBAL STRENGTH					
TOP ZONE (1)					
		–	–	–	10
1	Deck plating, deck stringer, sheer strake and longitudinal bulkhead upper strake	25	20	10	–
2	Deck and sheer strake longitudinals web flange	– 25 20	– 20 15	10 – –	– – –
3	Deck longitudinal girders web flange	– 25 20	– 20 15	10 – –	– – –
4	Longitudinals connected to long. bulkhead upper strake web flange	– 25 20	– 20 15	10 – –	– – –
NEUTRAL AXIS ZONE (1)					
		–	–	–	15
5	Side shell plating	25	20	15	–
6	Side shell longitudinals and stringers web flange	– 25 20	– 20 15	15 – –	– – –
7	Longitudinal bulkhead plating	25	20	15	–
8	Longitudinal bulkhead longitudinals and stringers web flange	– 25 20	– 20 15	15 – –	– – –
BOTTOM ZONE (1)					
		–	–	–	10
9	Bilge and bottom strakes, longitudinal bulkhead lower strake and keel plate	25	20	10	–
10	Bilge and bottom longitudinals web flange	– 25 20	– 20 15	10 – –	– – –
11	Longitudinals connected to longitud. bulkhead lower strake web flange	– 25 20	– 20 15	10 – –	– – –
12	Bottom girders web flange	– 25 20	– 20 15	10 – –	– – –
OTHER ITEMS					
13	Deck transverse web frame: web flange brackets / stiffeners	25 20 25	20 15 20	– – –	– – –
14	Side shell web frame: web flange brackets / stiffeners	25 20 25	20 15 20	– – –	– – –
15	Longitudinal bulkhead web frame: web flange brackets / stiffeners	25 20 25	20 15 20	– – –	– – –
16	Bottom transverse web frame: web flange brackets / stiffeners	25 20 25	20 15 20	– – –	– – –

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
17	Cross tie:				
	web	25	15	–	–
	flange brackets / stiffeners	20 20	15 15	– –	– –
18	Transverse bulkheads: (2)				
	plating	25	20	15	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web stiffener flange	30 25	20 15	– –	– –
19	other decks: (2)				
	plating	25	20	15	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web stiffener flange	30 25	20 15	– –	– –

(1) Each zone is to be evaluated separately.
(2) Including swash bulkheads, forward and aft peak bulkheads.

4.5 Yield criteria for self-elevating fish farms

4.5.1 Local and global strength criteria in the present Article are applicable to self-elevating fish farms.

4.5.2 The structure of the pontoon of self-elevating fish farms is to be assessed as applicable for the hull of surface unit in [4.3]

4.5.3 The structural items specific to self-elevating fish farms are listed in Tab 9.

4.5.4 The assessment of the thickness measurements is to be performed using the values given in the Tab 9 for each structural element with regard to the four criteria defined in [4.2.3], in the following order:

- a) assessment of isolated areas (column 1 in the table). If the criterion is not met, the wasted part of the item is to be dealt with as necessary.
- b) assessment of items (column 2 in the table). If the criterion is not met, the item is to be dealt with as necessary in the measured areas as far as the average condition of the item concerned is satisfactory. In cases where some items are renewed, the average thicknesses of these items to be considered in the next step are the new thicknesses.
- c) assessment of groups of items (column 3 in the table). If the criterion is not met, a sufficient number of elements are to be renewed in order to obtain an increased average thickness satisfying the considered criterion of the group (generally the elements to be renewed are those most wasted). As an example, for the assessment of the group “deck plates” all deck plates are measured and an average thickness of each of them is estimated. Then the average of all these values is to satisfy the criteria given for this group.
- d) assessment of zones (column 4 in the table). In principle, the criterion of the zone is met when all groups of items belonging to the zone meet their own criteria (see c) above). However, a greater diminution than those given in column 3 may be accepted for one group of items if, considering the other groups of items belonging to the same zone, the overall diminution of the zone does not exceed the criterion given for it in column 4.

Example: The deck zone consists of two groups of items:

- deck plating, which has an average diminution of 12% (criterion 10%)
- deck longitudinals, which has an average diminution of 4% (criterion 10%).

Even though the deck plating group exceeds its acceptance criterion, the average diminution of the zone, which can be very roughly estimated at 8%, is acceptable and thus the deck plating group can be accepted as it is excluding critical areas.

Note 1: This criterion applicable to the zones is based on the general rule that the current hull girder section modulus is not to be less than 90% of the rule section modulus within 0,4L amidships. When the zone criterion is used, the assessment is made on the basis of the original modulus instead of the rule modulus. At the request of the Owner, a direct calculation using the fish farm’s current thicknesses may be performed by the Society in order to accept greater diminutions than those given for this criterion.

4.5.5 These criteria take into consideration two main aspects:

- the overall strength of the hull
- the local strength and integrity of the hull structure, such as bulkheads, etc.

Table 9 : Local and global acceptance criteria for self-elevating fish farm (given in % of wastage)

Group of items (1)	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
STRUCTURAL ITEMS OF THE PONTOON					
As applicable for hull of surface unit, see Tab 3.					
OTHER ITEMS					
19	leg foundation:	–	–	10	–
	plating	25	20	–	–
	stringer web	25	20	–	–
	stringer flange	20	15	–	–
	stiffener web	30	20	–	–
20	stiffener flange	25	15	–	–
	leg:	–	–	10	–
	plating	20	15	–	–
	column	20	15	–	–
21	bracing	20	15	–	–
	spud can:	–	–	10	–
	plating	20	15	–	–
	stringer web	30	25	–	–
	stringer flange	25	20	–	–
	stiffener web	30	25	–	–
	stiffener flange	20	15	–	–
(1) As applicable to surface unit, see Tab 3					

4.6 Yield criteria for critical area

4.6.1 The assessment of the thickness measurements is to be performed using the values given in the Tab 10 for each structural element with regard to the four criteria defined in [4.2.3], in the following order:

- assessment of isolated areas (column 1 in the table). If the criterion is not met, the wasted part of the item is to be dealt with as necessary
- assessment of items (column 2 in the table). If the criterion is not met, the item is to be dealt with as necessary in the measured areas as far as the average condition of the item concerned is satisfactory. In cases where some items are renewed, the average thicknesses of these items to be considered in the next step are the new thicknesses.

Table 10 : Local and global acceptance for critical area (given in % of wastage)

Group of items	Description of items	1 Isolated area	2 Item	3 Group	4 Zone
ALL ITEMS					
1	plating	10	5	–	–
	stringer web	10	5	–	–
	stringer flange	10	5	–	–
	stiffener web	10	5	–	–
	stiffener flange	10	5	–	–
	tubular	10	5	–	–
	box girder	10	5	–	–

4.7 Buckling strength criterion

4.7.1 These criteria are applicable to surface units having a length greater than 120 metres. For other fish farm type those criteria shall be applied.

The structural items contributing to the global strength of the fish farm, such as deck and bottom plating, deck and bottom girders, etc., are to be assessed with regard to their buckling strength, as deemed necessary by the Surveyor. In such a case, buckling strength criteria given in Tab 12 are not to be exceeded.

Note 1: The minimum thickness will be specially considered for fish farms built with excess hull girder section modulus.

Note 2: The surveyor in case of local deformation shall request re-analysis of the section property with actual thickness measurement.

Table 11 : Buckling strength criterion

ITEMS		RATIO	MATERIAL (R_{eH})		
			235	315	355 and 390
Bottom and deck plates		s / t	56,0	51,0	49,0
Longitudinals	flat bar web	h_w / t_w	20,0	18,0	17,5
Flanged longitudinals / girders	web	h_w / t_w	56,0	51,0	49,0
	symmetrical flange	b_f / t_f	34,0	30,0	29,0
	asymmetrical flange	b_f / t_f	17,0	15,0	14,5
Symbols: R_{eH} : minimum yield stress of the material, in N/mm ² ; s : longitudinal spacing, in mm; t : actual plate thickness, in mm; h_w : web height, in mm; t_w : web thickness, in mm; b_f : flange breadth, in mm; t_f : flange thickness, in mm;					

4.8 Pitting

4.8.1 The maximum acceptable depth for isolated pits is 35% of the as-built thickness.

4.8.2 For areas with different pitting intensity, the intensity diagrams shown in Fig 17 are to be used to identify the percentage of affected areas.

For areas having a pitting intensity of 50% or more, the maximum average depth of pits is 20% of the as-built thickness. For intermediate values between isolated pits and 50% of affected area, the interpolation between 35% and 20% is made according to Tab 12.

4.8.3 In addition, the thickness outside the pits in the area considered is to be assessed according to [4.3] to [4.7].

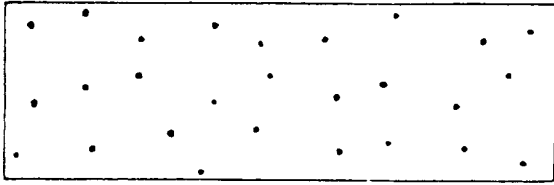
Note 1: Application of filler material (plastic or epoxy compounds) is recommended as a means to stop or reduce the corrosion process, but it is not considered an acceptable repair for pitting exceeding the maximum allowable wastage limits. Welding repairs may be accepted when performed in accordance with procedures agreed with the society.

Table 12 : Pitting intensity and corresponding maximum average depth of pitting

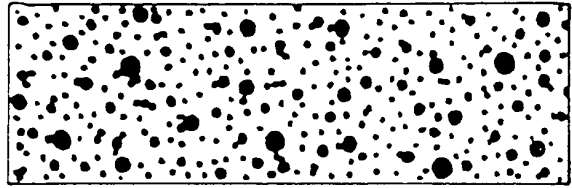
PITTING INTENSITY (%)	MAXIMUM AVERAGE PITTING DEPTH (% of the as-built thickness)
Isolated	35,0
5	33,5
10	32,0
15	30,5
20	29,0
25	27,5
30	26,0
40	23,0
50	20,0

Figure 17 : Pitting intensity diagrams (from 1% to 50% intensity)

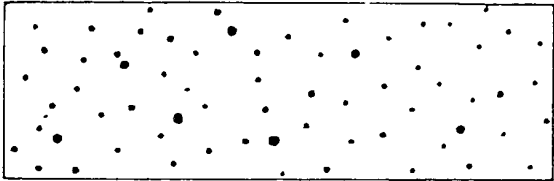
1% SCATTERED



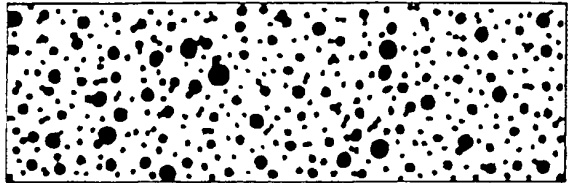
20% SCATTERED



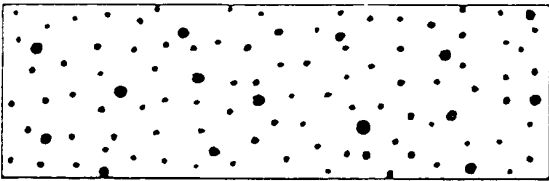
3% SCATTERED



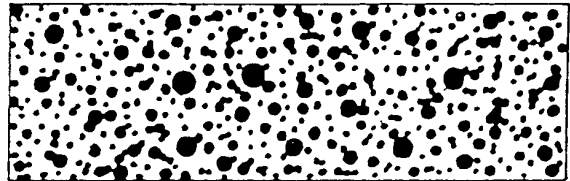
25% SCATTERED



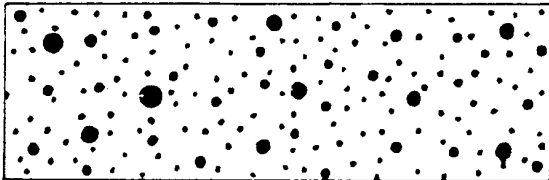
5% SCATTERED



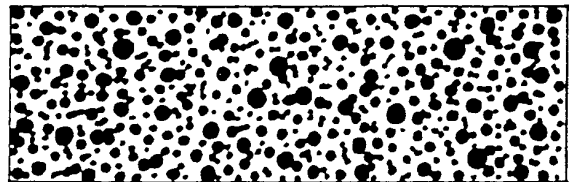
30% SCATTERED



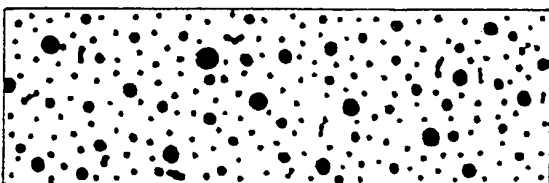
10% SCATTERED



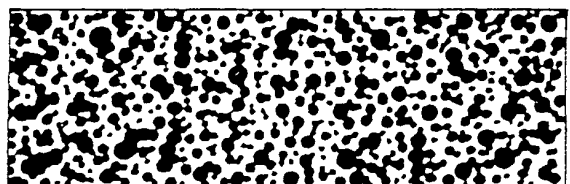
40% SCATTERED



15% SCATTERED



50% SCATTERED





NR387

RULES FOR THE CLASSIFICATION OF FISH FARMS

Part B

Structural Safety

Chapter 1	Stability and Subdivision
Chapter 2	Environmental Conditions - Loadings
Chapter 3	Structure

Part B

Structural Safety

CHAPTER 1

STABILITY AND SUBDIVISION

- Section 1 General
- Section 2 Stability Calculations
- Section 3 Stability Criteria
- Section 4 Watertight Integrity and Weathertight Integrity

Section 1 General

1 Classification requirements

1.1 General

1.1.1 Fish farm stability and watertight integrity are to comply with the applicable requirements of the present Chapter, or, subject to a preliminary agreement, in accordance with other particular specifications based on the same principles or relevant National or International Regulations.

1.2 Damage stability

1.2.1 Damage stability requirements of the present Chapter are applicable to all fish farms.

2 Statutory requirements

2.1 National Authorities requirements

2.1.1 Attention is drawn to special legal provisions enacted by National Authorities which fish farms may have to comply with according to their flag, structural type, size, operational site and intended service, as well as other particulars and details.

2.2 Classification and statutory requirements

2.2.1 Compliance with statutory requirements mentioned in Article [2] is not included in classification scope but, in case of conflict between the Rules and these requirements, the latter ones are to take precedence over the requirements of the present Rules.

The Society may take into consideration particulars which may be called for or authorised by the competent National Authorities.

2.3 Operating procedures

2.3.1 Adequate instructions and information related to the stability, watertight integrity and weathertight integrity of the fish farm are to be provided by the Owner and included in the Operating Manual.

Note 1: The procedures and operating instructions do not fall within the scope of classification and need not to be approved by the Society.

2.4 Specific criteria

2.4.1 If the party applying for classification specifies criteria for intact and damage stability, these criteria are to be taken into account in addition to the criteria in the present Section and stated in the Design Criteria Statement.

3 Inclining test and lightweight survey

3.1 Definitions

3.1.1 Lightweight

The lightweight condition means that the fish farm is complete in all respects, but without consumables, stores, cargo, crew and their effects, and without any liquids on board except for machinery and piping fluids, such as lubricants and hydraulics, which are at operating levels.

3.1.2 Inclining test

The inclining test is a procedure which involves moving a series of known weights, normally in the transverse direction, and then measuring the resulting change in the equilibrium heel angle of the fish farm. By using this information and applying basic naval architecture principles, the vertical centre of gravity (VCG or KG) of the fish farm is determined.

3.1.3 Lightweight survey

The lightweight survey is a procedure which involves auditing all items which are to be added, deducted or relocated on the fish farm at the time of the inclining test so that the observed condition of the fish farm can be adjusted to the lightweight condition. The weight and longitudinal, transverse and vertical location of each item are to be accurately determined and recorded. The lightweight displacement and longitudinal centre of gravity (LCG) can be obtained using this information, as well as the static

waterline of the fish farm at the time of the inclining test as determined by measuring the freeboard or verified draught marks of the fish farm, the fish farm's hydrostatic data and the sea water density.

The transverse centre of gravity (TCG) may also be determined for fish farms which are asymmetrical about the centreline or whose internal arrangement or outfitting is such that an inherent list may develop from off-centre mass.

3.2 Lightweight survey

3.2.1 The requirements regarding the lightweight survey given in Pt B, Ch 1, Sec 1, [3.2] of the Offshore Rules are applicable to all fish farms.

3.3 Inclining test

3.3.1 The requirements regarding the inclining test given in Pt B, Ch 1, Sec 1, [3.3] of the Offshore Rules are applicable to all fish farms.

3.4 Operating Manual

3.4.1 The requirements regarding the Operating Manual given in Pt B, Ch 1, Sec 1, [3.4] of the Offshore Rules are applicable to all fish farms.

4 Load line mark

4.1 General

4.1.1 Mobile fish farms for which the compliance with ILLC or MODU Code is not required, are to have a load line mark which designate the maximum permissible draught when the fish farm is in the afloat condition. Such markings are to be placed at suitable visible locations on the structure, to the satisfaction of the Society.

4.1.2 For fish farms mentioned in [4.1.1] the position of the load line mark is to be established based on the specific requirements given in MODU Code, Ch 3, [3.7].

5 Loading instrument

5.1

5.1.1 The use of a loading instrument is not a class requirement except when stated otherwise by the rules. However, in case a loading instrument is present on board, it is to be approved by the Society.

Section 2 Stability Calculations

1 General

1.1 Calculation methodology

1.1.1 Stability calculations are to be carried out according to the methodology described in Pt B, Ch 1, Sec 2 of the Offshore Rules.

Alternative calculation methodologies may be accepted by the Society on a case-by-case basis.

Section 3 Stability Criteria

1 Inhabited fish farms

1.1 Stability criteria

1.1.1 Fish farms assigned the additional service feature **INHABITED** are to comply with the stability criteria given in Pt B, Ch 1, Sec 3 of the Offshore Rules.

2 Unmanned fish farms

2.1 Stability criteria

2.1.1 Fish farms assigned the additional service feature **UNMANNED** are to fulfil the following criteria:

- in intact condition, no part of the deck or gangways normally used by personnel is to be submerged by water, taking into consideration for the calculation the maximum wind entered into the Design Criteria Statement as the maximum one in working condition.
- with one buoyancy compartment flooded, with the same wind, the fish farm is not to capsize.

For articulated fish farms, rupture of connection between two rigid elements, or loss of a single element, is also to be considered.

3 Articulated fish farms

3.1 General

3.1.1 Articulated structures are to provide sufficient redundancy to prevent any element (floater, for instance) from losing its individual stability upon failure of an individual component (hinge, for instance) or when damaged (when flooded due to the impact of a service craft, for instance).

Section 4 Watertight Integrity and Weathertight Integrity

1 General

1.1 Definitions

1.1.1 A closing appliance is said to be watertight if it remains tight and is capable of withstanding the hydrostatic pressure under service and damage conditions defined in Ch 1, Sec 3, [3] of the Offshore Rules. The waterhead under damage conditions is to account for the sinkage and inclinations of the fish farm induced by the combined effect of wind and flooding.

1.1.2 A closing appliance is said to be weathertight if it is capable, under any sea conditions, of preventing the penetration of water into the fish farm structure. A weathertight closing appliance is not required to remain tight under the hydrostatic pressure occurring after damage.

1.1.3 A manually operated closing appliance meeting the requirements of [1.1.1] or [1.1.2] is not to be considered water or weathertight unless, simultaneously:

- a) the closing appliance is unambiguously required in the Operating Manual to be closed in a particular mode of operation of the fish farm
- b) the closure of the appliance has been ascertained by the party applying for classification to be fully practicable and compatible with the particular mode of operation of the fish farm.

1.1.4 A space is considered buoyant and taken into account in the stability calculations if it complies with [1.2].

1.1.5 A weathertight enclosure is a decked structure above a buoyant space with enclosing bulkheads of adequate strength with any opening fitted with weathertight closing appliances. Enclosed superstructures meeting the requirements of the International Convention on Load Lines, 1966 are considered as weathertight enclosures.

1.1.6 Exposed herein means directly exposed to or not protected from the effect of the sea, spray and rain by a weathertight enclosure.

1.1.7 Downflooding means any flooding of the interior or any part of the buoyant structure of a fish farm through openings which cannot be closed weathertight, watertight or which are required for operations reasons to be left open in all weather conditions.

1.2 Buoyant spaces

1.2.1 Except where otherwise stated, spaces considered buoyant for the purpose of the stability computations are to comply with the following requirements.

1.2.2 If the space is considered buoyant in the damage stability calculation all its openings not fitted with watertight closing appliances are to be located above any final damage water plane.

1.2.3 If the space is considered buoyant in the intact stability calculation any opening in the space, which may become submerged before the heeling angle at which the required area under the intact righting moment curve is achieved, is to be fitted with a weathertight closing appliance or protected by a weathertight enclosure. In addition watertight closing appliances are to be provided for openings which may become submerged before the first intercept equilibrium angle.

1.2.4 All watertight and weathertight boundaries of the considered compartments, spaces and their closing appliances are to have adequate strength to be determined in accordance with the applicable requirements of the Rules.

1.2.5 A drainage system is to be provided for watertight compartments as required in Pt C, Ch 1, Sec 7, [6] of the Offshore Rules.

1.3 Operating manual

1.3.1 An operating manual as defined in Pt A, Ch 1, Sec 4 is to be submitted.

1.3.2 A plan identifying the location of all watertight and weathertight closures and all non-protected openings and identifying the position open/closed of all non-automatic closing devices is to be submitted to the Society for review. This plan is to be included in the Operating Manual.

2 Watertight integrity

2.1 General requirements

2.1.1 All fish farms are to be adequately subdivided with an adequate number of watertight decks and bulkheads to meet the damage stability requirements.

2.1.2 All surface type fish farms are to be fitted with a collision bulkhead. Sluice valves, cocks, manholes, watertight doors, are not to be fitted in the collision bulkhead. Elsewhere, watertight bulkheads are to be fitted as necessary to provide transverse strength and subdivision.

2.1.3 The number of openings in watertight subdivisions is to be kept to a minimum compatible with the design and safe operation of the fish farm. Where penetrations of watertight decks and bulkheads are necessary for access, piping, ventilation, electrical cables, etc., arrangements are to be made to restore the integrity of the enclosed compartments.

2.1.4 In order to minimise the risk of progressive flooding, pipes and ducts are to be, insofar as practicable, routed clear of areas liable to be damaged as defined in Ch 1, Sec 3, [4]. When pipes and ventilation ducts are located within those areas liable to be damaged and serve more than one compartment, they are to be provided with a valve in each compartment served, and non-watertight ventilation ducts are to be provided with a watertight valve at each penetration of a watertight boundary.

2.1.5 Where valves are provided at watertight boundaries to maintain watertight integrity, these valves are to be capable of being locally operated. Remote operations may be from a pump room or other normally manned space, a weather deck, or a deck which is above the final waterline after flooding. In the case of a column stabilized fish farm this is to be the central ballast control station. Valve position indicators are to be provided at the remote control station.

2.1.6 Watertight doors are to be designed to withstand water pressure to a head up to the bulkhead deck or freeboard deck respectively. A prototype pressure test is to be conducted for each type and size of door to be installed on the fish farm at a test pressure corresponding to at least the head required for the intended location. The prototype test is to be carried out before the door is fitted. The installation method and procedure for fitting the door on board shall correspond to that of the prototype test. When fitted on board, each door is to be checked for proper seating between the bulkhead, the frame and the door. Large doors or hatches of a design and size that would make pressure testing impracticable may be exempted from the prototype pressure test, provided that it is demonstrated by calculations that the doors or hatches maintain watertight integrity at the design pressure, with a proper margin of resistance. After installation, every such door, hatch or ramp shall be tested by means of a hose test or equivalent.

2.1.7 For self elevating fish farms the ventilation system valves required to maintain watertight integrity are to be kept closed when the fish farm is afloat. Necessary ventilation in this case is to be arranged by alternative approved methods.

2.2 Scuppers, inlets and sanitary discharges

2.2.1 Scuppers, inlets and discharges are to satisfy the following requirements:

- a) Scuppers and discharges leading through the shell from buoyant spaces are to have an automatic non return valve with a positive means for closing from an accessible position above the final damage waterline, or two automatic non return valves, the upper of which is always to be accessible in service.
- b) In manned machinery spaces sea inlets and discharges in connection with the operation of machinery may be controlled by locally operated valves situated in a readily accessible position.
- c) Indicators showing whether the valves mentioned in item a) or b) above are closed or open are to be provided.
- d) Scuppers leading from non buoyant space are to be led overboard.

2.3 Overflows

2.3.1 Overflow pipes are to be located giving due regard to damage stability and to the location of the worst damage waterline. Overflow pipes which could cause progressive flooding are to be avoided unless special consideration has been taken in the damage stability review.

2.3.2 In cases where overflow pipes terminate externally or in spaces assumed flooded, the corresponding tanks are also to be considered flooded. In cases where tanks are considered damaged, the spaces in which their overflows terminate are also to be considered flooded.

2.3.3 Overflows from tanks not considered flooded as a result of damage and located above the final immersion line may require to be fitted with automatic means of closing.

2.3.4 Where overflows from tanks intended to contain the same liquid or different ones are connected to a common main, provision is to be made to prevent any risk of intercommunication between the various tanks in the course of movements of liquid when emptying or filling.

2.3.5 The openings of overflow pipes discharging overboard are generally to be placed above the load waterline; they are to be fitted where necessary with non-return valves on the plating, or any other device of similar efficiency.

2.4 Internal openings

2.4.1 The means to ensure the watertight integrity of internal openings are to comply with the following:

- a) Doors and hatch covers which are used during the operation of the fish farm while afloat are to be remotely controlled from the central ballast control station and are also to be operable from each side. Open/shut indicators are to be provided at the control station. In addition, remotely operated doors provided to ensure the watertight integrity of internal openings which are used while at sea are to be sliding watertight doors with audible alarm. The power, control and indicators are to be operable in the event of main power failure. Particular attention is to be paid to minimizing the effect of control system failure. Each power-operated sliding watertight door is to be provided with an individual hand-operated mechanism. It is to be possible to open and close the door by hand at the door itself from both sides.
- b) Doors and hatch covers in self-elevating fish farms, or doors placed above the deepest load line draft in column-stabilized and surface units, which are normally closed while the fish farm is afloat, may be of the quick acting type and are to be provided with an alarm system (e.g. light signals) showing personnel both locally and at the central ballast control station whether the doors or hatch covers in question are open or closed. A notice is to be affixed to each such door or hatch cover stating that it is not to be left open while the fish farm is afloat.

2.4.2 The means to ensure the watertight integrity of internal openings which are kept permanently closed during the operation of the fish farm, while afloat, are to comply with the following:

- a) A notice is to be affixed to each closing appliance stating that it is to be kept closed while the fish farm is afloat.

Note 1: The present requirement is not applicable to manholes fitted with watertight bolted covers.

- b) An entry is to be made in the official logbook or tour report, as applicable, stating that all such openings have been witnessed closed before the fish farm becomes waterborne.
- c) The closing appliances are to have strength, packing and means for securing which are sufficient to maintain watertight integrity under the design load.

2.5 External openings

2.5.1 External openings such as air pipes (regardless of closing appliances), ventilators, ventilation intakes and outlets, non-watertight hatches and weathertight doors, which are used during operation of the fish farm while afloat, are not to submerge when the fish farm is inclined to the first intercept between the righting moment and wind heeling moment curves in any intact or damaged condition.

Openings such as side scuttles of the non-opening type, manholes and small hatches, which are fitted with appliances to ensure watertight integrity, may be submerged, provided that the requirements of [2.5.3] and [2.5.4] are complied with. Such openings are not to be regarded as emergency exits.

2.5.2 As a rule, openings such as side scuttles of the non-opening type, manholes and small hatches, that may be submerged, are not allowed in the column of column stabilized fish farms.

2.5.3 All downflooding openings the lower edge of which is submerged when the fish farm is inclined to the first intercept between the righting moment and wind heeling moment curves in any intact or damaged condition are to be fitted with a suitable watertight closing appliance, such as closely spaced bolted covers.

2.5.4 External openings fitted with appliances to ensure watertight integrity, which are kept permanently closed while afloat, are to comply with the requirements of [2.4.2], a), b) and c).

2.5.5 Where flooding of chain lockers or other buoyant volumes may occur, the openings to these spaces are to be considered as downflooding points.

3 Weathertight integrity

3.1 Scope

3.1.1 The conditions given in [3.2] are applicable to all fish farms liable to operate in waters other than sheltered waters. Alternative requirements are to be given for fish farms intended to be used in sheltered waters only after examination of each particular case.

3.1.2 The attention of the Owners and/or the party applying for classification is directed to the applicable requirements of the MODU Code and of the ILLC 1966.

3.2 Assignment conditions

3.2.1 The assignment conditions are applicable to openings leading to spaces considered buoyant in the intact stability computation, to weathertight closing appliances and to weathertight enclosures. Where buoyancy in the damage conditions is required, the applicable requirements of Article [2] are to be satisfied.

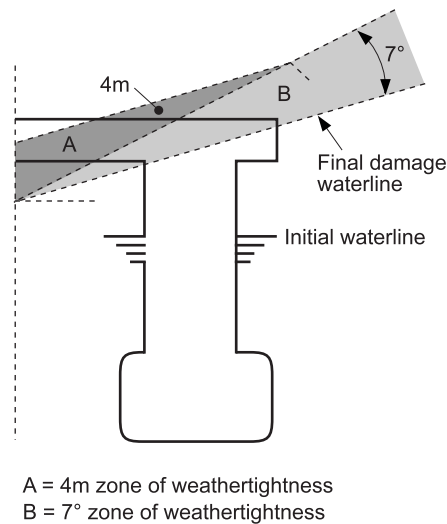
3.2.2 In accordance with [1.2.4], weathertight boundaries and closing appliances fitted to exposed decks and bulkheads of a space or enclosure mentioned in [3.2.1] are to comply with the strength requirements of the Offshore Rules.

Note 1: The present requirement concerns particularly the doors, hatchways covers, machinery casings and ventilators coamings.

3.2.3 Any opening, such as an air pipe, ventilator, ventilation intake or outlet, non-watertight sidescuttle, small hatch, door, etc., having its lower edge submerged below a waterline associated with the zones indicated in items a) and b) below, is to be fitted with a weathertight closing appliance to ensure the weathertight integrity, when:

- a) a fish farm is inclined to the range between the first intercept of the right moment curve and the wind heeling moment curve and the angle necessary to comply with the requirements of Pt B, Ch 1, Sec 3, [1.1] of the Offshore Rules during the intact condition of the fish farm while afloat; and
- b) a column stabilized fish farm is inclined to the range:
 - necessary to comply with the requirements of Pt B, Ch 1, Sec 3, [3.3.1] of the Offshore Rules and with a zone measured 4,0 m perpendicularly above the final damaged waterline referred to Fig 1, and
 - necessary to comply with the requirements of Pt B, Ch 1, Sec 3, [3.3.2] of the Offshore Rules.

Figure 1 : Minimum weathertight integrity requirements for column stabilized fish farms



3.2.4 External openings fitted with appliances to ensure weathertight integrity, which are kept permanently closed while afloat, are to comply with the requirements of [2.4.2], items a) and b).

3.2.5 External openings fitted with appliances to ensure weathertight integrity, which are secured while afloat are to comply with the requirements of [2.4.1].

3.2.6 All access openings in exposed bulkheads of weathertight enclosures are to be fitted with doors of steel or other equivalent material so arranged that they can be operated from both sides of the bulkhead. The means of securing these doors weathertight are to consist of gaskets and clamping devices or other equivalent means permanently attached to the bulkhead or to the doors themselves. Unless otherwise specified the height of the sills of access openings in exposed bulkheads is not to be less than 380 mm above the deck.

3.2.7 Hatchways and other openings in exposed decks of a space or enclosure mentioned in [3.2.1] are to be provided with coamings and weathertight steel covers or other equivalent material fitted with gaskets and clamping devices. The height of coamings is generally required to be not less than 600 mm but may be reduced, or the coamings omitted entirely, subject to the approval of the Society, in each particular case, taking into consideration the structural type and stability characteristics of the fish farm, the space to which the opening leads, its size and location.

Manholes and flush scuttles located on exposed decks or within enclosures not considered weathertight are to be closed by substantial covers capable of being made watertight. Unless secured by closely spaced bolts, the covers are to be permanently attached.

3.2.8 Ventilators leading to spaces or enclosures mentioned in [3.2.1] are to comply with the following:

- a) Coamings of steel or other equivalent material having adequate strength are to be provided and efficiently connected to the deck. The coaming of a ventilator passing through non weathertight enclosures is to be fitted at the exposed deck of the buoyant space.
- b) Coamings are to have a height of at least 900 mm above the deck of a buoyant space and 760 mm above the deck of a weathertight enclosure. For self propelled surface units ventilators coamings are to be at least 900 mm in height if located upon exposed freeboard and raised quarter decks, and upon enclosed superstructures decks situated forward of a point located a quarter of the fish farm's length from the forward perpendicular.
- c) Ventilator openings are to be provided with weathertight closing appliances permanently attached or, subject to the approval of the Society, conveniently stowed near the ventilators to which they are to be fitted. The weathertight closing appliance may however not be required where the ventilator coaming exceeds 2,3 m above the deck and where the intact stability calculations show that the ventilator opening is not submerged before the heeling angle at which the required area ratio is achieved.

3.2.9 Any exposed portion of air pipes to ballast or other tanks considered buoyant in the intact stability calculation is to be of substantial construction and is to be provided with permanently attached weathertight closing appliances. Their height from the exposed deck to the point where water may have access below is to be at least 760 mm on the deck of a buoyant space and 450 mm on the deck of a weathertight enclosure. Lower heights may be accepted by the Society after examination in each case taking into consideration the stability calculations.

3.2.10 Openings to machinery spaces are to be protected by weathertight enclosures or steel casings of equivalent strength and weathertight integrity. Pt B, Ch 1, Sec 3, [3.1.3] of the Offshore Rules is applicable to machinery spaces with emergency equipment.

Part B

Structural Safety

CHAPTER 2

ENVIRONMENTAL CONDITIONS - LOADINGS

- Section 1 General
- Section 2 Environmental Data
- Section 3 Design Loads

Section 1 General

1 General

1.1 Application

1.1.1 The present Chapter contains requirements applicable to all fish farms for which the structural type notations and the service notation are defined in Pt A, Ch 1, Sec 2, [5].

2 Design data

2.1 General

2.1.1 It is the responsibility of the party applying for classification to specify, for each condition of operation of the fish farm, the following data on which the structural design of the fish farm is based as defined in Pt A, Ch 1, Sec 1:

- working condition
- severe storm condition
- transit condition
- other condition, as applicable to subject fish farm.

2.1.2 Data mentioned in [2.1.1] are to include, for each condition, a description of:

- the general configuration of the fish farm
- environmental conditions
- any other relevant data.

2.2 Design Criteria Statement

2.2.1 Design data mentioned in [2.1], on the basis of which class is assigned to the fish farm, is to be entered in the Design Criteria Statement (see Pt A, Ch 1, Sec 1, [1.6]).

3 Operational data

3.1 Situation of the fish farm

3.1.1 The draught or elevation, the situation of main equipment and other relevant parameters defining the general situation of the fish farm in each condition are to be specified by the party applying for classification, taking into account their possible range of variation (e.g. the range of draught of a floating fish farm).

3.1.2 When the structural design relies upon the adjustment of some operational parameters (e.g. altering the loading, draught, trim, orientation or mooring systems parameters) in specific conditions, then the corresponding data are to be clearly specified and are to be entered in the Design Criteria Statement. Where necessary, adequate procedures are to be provided in the Operating Manual.

3.2 Operational loads

3.2.1 Operational loads are to be specified by the party applying for classification in accordance with provisions of Ch 2, Sec 3, [1.3].

3.2.2 Operational instructions concerning the operational loads, including but not limited to the permissible deck loads, variable loads limits and preloading are also to be clearly stated in the Operating Manual.

4 Environmental conditions

4.1 Fish farming sites

4.1.1 The present Rules deal with fish farms installed either offshore or in sheltered waters.

Sheltered waters mean bays, estuaries, fjords, or, as a general rule, areas where the wave significant height does not exceed 2 m. Onshore-based fish farms are not covered by the present Rules.

4.2 Environmental data

4.2.1 Environmental data on which the structural design of the fish farm is based are to be specified by the party applying for classification.

They are to include:

- data for the extreme (severe storm) condition
- data for the limiting environmental (threshold) conditions considered for each working condition, for towing/transit condition (where applicable) or any other specific design condition of the subject fish farm (e.g. jack-up preloading)
- the long term distribution of environmental data on which the design of the structure for fatigue is based
- data for any other particular design condition of the subject fish farm.

Note 1: Different limiting conditions may be associated with different operational loads arising from the various equipment related to each fish farm service but also from a given equipment (e.g. crane, etc.).

Note 2: For surface units, reference is also to be made to the provisions associated with navigation notation when such notation is granted.

4.2.2 As stipulated in Pt A, Ch 1, Sec 1, it is the responsibility of the party applying for classification to ascertain that the environmental parameters are correct, complete and compatible with the use of the fish farm, in accordance with provisions of [4.3].

4.2.3 Environmental data are to be specified in accordance with provisions of Ch 2, Sec 2.

The Society may consider alternative specifications provided that the characteristic parameters most pertinent to the design of the fish farm are available for the purpose of Rules application.

4.3 Environmental loads

4.3.1 Environmental loads are to be evaluated in accordance with provisions of Ch 2, Sec 3, [1.4] and Ch 2, Sec 3, [3].

4.3.2 In order to meet the intent of the Rules, the environmental data for the extreme (severe storm) condition and the methods by which the maximum loads are evaluated are to be such that the resulting loads and stresses in structural members have a return period not lower than:

- 20 years except otherwise specified in Data Criteria Statement
- 50 years for drag-dominated structures (e.g. jack-ups)
- 100 years for permanent installations.

Note 1: This corresponds to probability of exceedence per passing wave of approximately 10^{-8} , $10^{-8.4}$ and $10^{-8.7}$ at the reference site.

4.3.3 In all other conditions, environmental loads are normally to be taken as the maximum loads over a 3 hour period, conditional upon the occurrence of specified conditions.

4.4 Accidental situations

4.4.1 Depending on the type and service of the fish farm, a risk analysis may be required to assess the risk of explosion, collision and dropped objects.

4.4.2 As a rule, the design of the primary structure is to consider the possibility of accidental loads as may result from collisions, dropped objects, fire or explosions.

The risk of accidental damage is normally minimised by suitable preventive and protective measures such as:

- a) adequate operation and maintenance of structures and equipment as stipulated in Pt A, Ch 1, Sec 1, [3.3]; procedures are to specify all operational limits and related limiting environmental conditions
- b) appropriate safety requirements for visiting structures with respect to the limiting environmental conditions, the communication and survey procedures for berthing, landing, stowage and disconnection
- c) adequate arrangement of structure and facilities
- d) adequate protective arrangements such as guarding, fendering, weak links, quick release mechanisms, shut-off means for high pressure piping systems, etc.

4.4.3 The Society is to be advised when the provisions of [4.4.2] cannot be satisfactorily achieved under particular operational conditions. The party applying for classification may then be required to consider some specific accidental loadings.

4.4.4 In accidental conditions, environmental loads are to be evaluated taking into account the circumstances in which the considered situation may realistically occur, and the time needed for evacuation or other remedial action. In principle, the return period of such environmental loads need not be taken greater than 1 month, unless otherwise specified for the considered fish farm.

Section 2 Environmental Data

1 General

1.1 Documentation to be submitted

1.1.1 The party applying for classification is to specify the data defining the environmental conditions to which the fish farm may be subject in each condition of operation, viz.:

- wave data
- wind data
- current data
- waterdepth and tide data
- atmospheric and sea temperatures data

and, where applicable:

- ice and snow data
- soil conditions
- any other relevant information.

1.2 Permanent installations

1.2.1 For permanent installations, the party applying for classification is to submit, in addition to documentation required in [1.1] and in accordance with provisions of Pt A, Ch 1, Sec 1, adequate documentation describing the environmental conditions at site.

1.2.2 The party applying for classification is to derive as necessary from these data the characteristic parameters required for the purpose of Rules application.

The statistical techniques used to derive the required characteristic parameters are to be documented to the satisfaction of the Society.

1.2.3 For waves, wind, current, and for water level when relevant, the extreme omnidirectional data, with a return period as specified in Ch 2, Sec 1, [4.3.2] are to be presented (independent extremes).

1.2.4 Directional data may be considered, where applicable, if sufficient information is available to support their use, subject to the agreement of the Society.

1.2.5 When adequate information is available on the joint occurrence of elements, design data may be further specified as sets of associated values.

2 Waves

2.1 General

2.1.1 Waves data are to be specified, for the purpose of air gap determination, if applicable, and for strength and fatigue analysis. The data are to be specified in a manner compatible with the design techniques and to include design data for each condition of the fish farm, and long term data for fatigue analysis.

2.2 Design data

2.2.1 Where the spectral approach is used, the design sea states are to be specified by their significant wave heights, and mean zero up-crossing (or spectral peak) period, together with adequate formulations of spectral energy distribution and, as applicable, spectral dispersion in direction.

2.2.2 For a given condition of operation of the fish farm, the maximum significant wave height is to be specified for a sufficient range of periods, such that the maximum response of the fish farm is properly covered for all sea states liable to be met in such condition (refer also to Ch 2, Sec 3, [6.2.2]).

Directional data may be considered, where applicable.

2.2.3 Where no particular wave data are specified, significant wave height and mean zero-up crossing period in the (extreme) severe storm condition is to be assumed as follows:

$$H_s = 1,65 T_0 - 4,33 \quad \text{for} \quad T_0 < 13 \text{ seconds}$$

$$H_s = 17 \text{ m} \quad \text{for} \quad T_0 \geq 13 \text{ seconds}$$

where:

T_0 : Mean zero up-crossing period, in seconds

H_s : Significant wave height, in m.

2.2.4 Where the design wave approach is used, waves data are to be specified for each design condition in terms of wave height, associated period or range of periods and, where applicable, associated range of still water level.

2.3 Long term data

2.3.1 Where spectral approach is used, the sea states joint probability of occurrence $p(H_s, T_0) dH_s dT_0$ is to be specified by means of a wave scatter diagram or of any other appropriate format.

2.3.2 Where the design wave approach is used for fatigue evaluation, the long term distribution of wave heights and the corresponding wave periods are to be specified.

3 Wind

3.1 Wind specification

3.1.1 Wind data are to be specified for the purpose of global and local strength analysis and for mooring and stability analysis of floating fish farms.

3.1.2 The wind design data are to be specified as the wind speed at a reference height above the water level (usually taken as 10 m above the mean water level) and averaged over 1 min., or another suitable reference time interval.

The wind speeds averaged over other time intervals and the vertical profiles of wind speed, which are required for the calculation of wind loads, are to be derived from the above reference wind speed using recognised relations.

Directional data may be considered, where applicable.

3.2 Values for classification

3.2.1 Where no particular wind data are specified, the one min. wind velocity at 10 m above the mean water level is to be taken for classification as provided by Tab 1.

3.2.2 Wind speeds for stability analysis are to be taken as provided by Tab 1, unless otherwise provided for in Ch 1, Sec 2.

Table 1 : Winds speeds for classification

Condition of operation	Wind speed (m/s)	
	Column stabilized	Other fish farms
Transit	36,0 (1)	51,5
Working	36,0	36,0
Severe storm	51,5	51,5

(1) If ballasting systems remain fully operative during transit, otherwise 51,5 m/s is to be considered.

4 Current

4.1 Current specification

4.1.1 Current data are to be primarily specified for the purposes of load analysis of drag dominated structures and mooring analysis of floating fish farms.

4.1.2 The current velocity profiles are to be specified taking into account the contribution of all (circulational, tidal and wind generated) relevant components. Unusual bottom or stratified effects are to be clearly stated.

Directional profiles may be considered where applicable.

4.2 Values for classification

4.2.1 Where no particular data are specified, the following current velocities U , in m/s, is to be used for classification:

- at sea bottom: $U = 0,5$
- at the still water level: $U = 0,5 + 0,02 V_{10}$

where:

V_{10} : 10 minutes wind speed, in m/s, at 10 m above still water level.

5 Waterdepth and tides

5.1 General

5.1.1 For general reference, the maximum nominal waterdepth for operation of the fish farm is to be specified.

5.2 Bottom supported fish farms

5.2.1 For bottom supported fish farms, the design maximum waterdepth (as defined in Part A, Chapter 1, i.e. including all tide and surge components), is to be specified for the purposes of air gap determination and for strength and fatigue analysis.

5.2.2 For the purpose of strength analysis of the fish farm at a given site, consideration is also to be given to the minimum waterdepth associated with extreme waves.

5.2.3 Directional data (i.e. data depending on the direction of incoming elements) may be considered where applicable.

6 Design temperatures

6.1 Principle

6.1.1 Design temperature of structural elements is to be taken as follows:

- for the emerged part of the structure (splash zone and above), the design temperature is the air temperature defined in [6.2]
- for the immersed part of the structure, the design temperature is the water temperature defined in [6.3].

6.1.2 The Society may accept values of design temperature obtained through direct calculation, provided that:

- the calculations are based on air temperature and water temperature as defined in [6.2] and [6.3]
- the calculations provide a design temperature corresponding to the worst condition of the fish farm in operation, towing/transit and inspection
- a complete calculation report, including a documentation of methods and software, is submitted to the Society.

6.2 Air temperature

6.2.1 Air temperature requested by [6.1] is to be taken as the mean air temperature of the coldest day (24 h) of the year for any anticipated area of operation.

6.2.2 Where no particular value is specified, classification is to be based upon the following air temperature:

- 0°C for fish farms not intended to operate in cold areas
- – 10°C for fish farms intended to operate in cold areas.

6.3 Water temperature

6.3.1 Water temperature requested by [6.1] is to be taken as the water temperature of the coldest day (24 h) of the year for any anticipated area of operation.

6.3.2 Where no particular value is specified, classification is to be based upon 0°C water temperature.

7 Ice and snow

7.1 Snow and frost

7.1.1 For fish farms liable to operate in areas of snow and glazed frost the following possibilities are to be considered:

- snow accumulation on exposed decks
- ice and snow accumulation on secondary structures or fish farm's undersides
- ice accretion on lattice structures, such as derricks, crane booms, etc.

Relevant parameters (thickness, density) corresponding to these conditions and the associated metocean parameters (e.g. the wind speed) are to be specified.

8 Soil data

8.1 General

8.1.1 For bottom-supported structures and for permanent installations, necessary soil data are to be specified and are to be included in the Design Criteria Statement.

8.1.2 For permanent installations, the soil characteristics are to be taken from the soil survey performed on the location where the fish farm is intended to be installed.

The derivation of the soil engineering characteristics is to be made using recognised techniques and are to be documented to the satisfaction of the Society.

8.2 Soil

8.2.1 As needed, the nature, strength and behavioural parameters (such as liquefaction potential, long term consolidation, etc.) of soil for which the fish farm is designed in relation with the expected type of foundation are to be specified.

8.2.2 As a minimum, the maximum design penetration of leg tip, footings, mat, etc., below mud line is to be specified.

8.3 Earthquake

8.3.1 Earthquake events are excluded from the scope of classification.

Section 3 Design Loads

1 Categories of loads

1.1 General

1.1.1 The following categories of loads are considered: fixed, operational, environmental, accidental, testing and temporary construction loads.

1.2 Fixed loads

1.2.1 Fixed load or light weight is the weight of the complete fish farm with all permanently attached machineries, equipment and other items of outfit such as:

- piping
- deckings, walkways and stairways
- fittings
- spare parts
- furniture.

The light weight of the fish farm includes the weight, to their normal working level, of all permanent ballast and other liquids such as lubricating oil and water in the boilers, but excludes the weight of liquids or other fluids contained in supply, reserve or storage tanks.

1.3 Operational loads

1.3.1 Operational loads are loads associated with the operation of the fish farm and include:

- the weights of all moving equipment and machineries
- variable loads of consumable supplies weights such as fish food products
- other storage loads
- hydrostatic loads (buoyancy)
- liquids in tanks
- ballast loads
- anchoring lines weights or vertical tensions
- loads resulting from lifting appliances in operation
- loads due to pipelaying, etc.

Dynamic loads induced by equipment in operation are to be considered as operational loads.

1.4 Environmental loads

1.4.1 Environmental loads are loads resulting from the action of the environment and include loads resulting from:

- wind
- waves
- current
- ice and snow where relevant
- possible dynamic effects.

Dynamic loads induced by fish farm's motions (inertia forces) or by dynamic response to environment action are to be considered as environmental loads.

Reactions to environmental loads (such as those of foundations or mooring loads) are to be considered as environmental loads.

1.5 Accidental loads

1.5.1 Accidental loads are loads that may be sustained during accidental events, such as:

- collisions by supply boats or other craft
- impact by dropped objects
- breaking of mooring lines.

Accidental loads also include loads resulting of such event (damaged situations) or of other exceptional conditions to be determined with regard to the activities of the fish farm in accordance with Ch 2, Sec 1, [4.4].

1.6 Testing loads

1.6.1 Testing loads are loads sustained by the structure during testing phases of tanks or equipment.

1.7 Temporary construction loads

1.7.1 In accordance with the provisions of Part A, Chapter 1, temporary construction loads not resulting from the tests required to be performed by the applicable Rules requirements are not subject to review by the Society unless a specific request is made. The attention of the Builder is however called upon the provisions of Part B, Chapter 3 concerning construction procedures liable to affect, for instance by prestressing, the strength of the fish farm.

2 Fixed and operational loads

2.1 General

2.1.1 The fixed and operational loads defined in [1.2] and [1.3] are to be clearly specified using a format acceptable by the Society. Where stated, minimum Rules prescribed loads are to be taken into consideration.

2.2 Load distribution

2.2.1 For the purpose of overall structural calculations, a complete description of load distribution is to be provided.

A sufficient number of load cases, adequately representing all possible distributions in each condition of operation, are to be defined unless corresponding restrictions are entered in the Operating Manual.

2.3 Loads on decks

2.3.1 Operational loads acting on decks are to be clearly specified on the permissible loadings decks drawings required in Pt A, Ch 1, Sec 4, [2.3]. All the distributed and concentrated loads in all deck areas are to be shown on the drawings.

For the purpose of local scantling, design distributed deck loads including deck self-weight are not to be taken less than given on Tab 1.

Note 1: for decks used as helideck, refer also to [2.4]

Note 2: for exposed decks, refer also to [3.9]

2.3.2 As appropriate according to deck use, operational concentrated loads applied on decks are to be combined with the distributed loads given in Tab 1.

Table 1 : Minimum deck loads

Deck area	Minimum design loads (kPa)
Non loaded decks	2,0
Crew and similar spaces	4,5
Work areas	9,0
Storage areas	minimum 13,0 or ρH (1)
(1) ρ : Cargo specific weight, in kN/m ³ If the value of this specific weight is not specified, $\rho = 7$ is to be taken for calculation H : Storage height, in m.	

2.4 Loads on helidecks

2.4.1 The design of the helideck is to be based on the loads associated with the largest helicopter intended to be used.

2.4.2 The following information concerning the largest helicopter intended to be used are to be supplied and included in the Design Criteria Statement:

- type and maximum takeoff weight Q
- distance between main wheels or skids
- length of skid contact area or distance between main wheels and tail wheel
- print area of wheels
- rotor diameter and overall length measured across main and tail rotors or across main rotors for helicopters with tandem main rotors.

In addition, general arrangement of the helicopter deck is to be provided.

2.4.3 Two design loading cases, at least, are to be considered:

- helicopter stowed
- helicopter hard landing.

Other conditions may be considered as design cases provided they lead to an equivalent degree of safety.

2.4.4 Corresponding loads are to be calculated according to applicable national standards.

2.5 Loads due to operations

2.5.1 For operational equipment liable to induce, when in use, important loads within the structure of the fish farm, the party applying for classification is to provide, in accordance with Part A, Chapter 1, all necessary information on these loads such as:

- for a revolving crane, calculations of loads on crane pedestal during crane operation, and those on pedestal, boom and hook rests, for the stowed situation
- for the different lifting and handling equipment, the precise indication of the loads they may induce in the structure of the fish farm (magnitude, direction, footprint, etc.), with their nature (permanent, non permanent, normal, extreme, etc.).

2.5.2 Loads are to adequately include all significant static and dynamic components. The wave-induced motions considered in load evaluation are to be specified.

2.5.3 Unless otherwise documented, the dynamic actions and test loads induced by lifting and handling equipment are to be taken as provided for in NR526 Rules for the Certification of Lifting Appliances on board Ships and Offshore Units and in NR595 Classification of Offshore Handling Systems (OHS).

2.6 Hydrostatic loads

2.6.1 The maximum and minimum draughts in each condition of operation are to be considered for calculation of hydrostatic loads on outer shell. If the shell forms tank boundary, the maximum inner pressure or minimum differential inner pressure between internal or external pressure is to be considered as well. Refer also to [3.9].

2.6.2 The panels forming boundaries of ballast, fuel oil and other liquid compartments are to be designed for a liquid specific gravity at least equal to sea water.

Unless adequate means are provided to the satisfaction of the Society, account is not to be taken of counter-pressures from adjoining tanks and compartments. Minimum external counter-pressure may be considered where significant.

2.6.3 Attention is to be paid to the following loading cases:

- static pressure in relation with arrangement of overflow
- dynamic and sloshing pressures occurring in the tanks, in particular where partial fillings are contemplated
- testing condition, as defined in Ch 3, Sec 6
- damaged condition (refer to Article [4]).

2.7 Independent fuel oil tank loads

2.7.1 The provisions of the present requirements apply to fuel oil tanks and bunkers which are not part of the fish farm structure.

2.7.2 The design of the independent tanks is to be based on an internal load equal to the height of the overflow or air pipe above the top of independent tank.

This internal load above the top of the independent tank is not to be taken less than:

- 3,60 m for fuel oil having a flash point lower than 60°C
- 2,40 m otherwise.

3 Environmental loads

3.1 General

3.1.1 Environmental loads are to be computed on the basis of specified environmental data. Where applicable, Rules prescribed minimum values are to be used.

3.1.2 Action of environment is to be also considered to assess loadings to apply for the overall calculation of the structure of the fish farm or a part of it and for fatigue analysis.

Action of environment is to be also considered, where relevant, to derive local pressures to be applied to platings and associated framing.

3.2 Evaluation of environmental loads

3.2.1 Environmental loads are to be computed using recognised techniques to the satisfaction of the Society.

3.2.2 Model tests

Design may be based upon model test results. The actual behaviour of the fish farm is to be adequately simulated. The testing procedures and methods used for the extrapolation to full scale data are to be to the satisfaction of the Society.

Model tests are mandatory to evaluate:

- Permeability to water and deformability of nets
- Effect of current on nets, giving at least the drag per surface unit as a function of the current velocity, the current flow being supposed to be not disturbed by the presence of the net

3.3 Wave loads

3.3.1 Wave loads are to be computed giving due consideration to the loading regime, according to water depth, wave characteristics and dimensions of the structural members of the fish farm.

3.3.2 Results derived from tank tests may be used if adequately documented.

3.3.3 For large bodies, the diffraction-radiation theory may be used to evaluate first order wave loads, and, as needed, second order loads.

Due account is to be taken of second order and other non-linear components, when having a significant effect.

3.3.4 Loads on structures made of slender elements may be evaluated using Morison's formula with an appropriate formulation of water particle kinematics.

3.3.5 The Society may require to consider the possibility of wave induced vibration of structural elements.

3.4 Current loads

3.4.1 For drag-dominated structures, the hydrodynamic forces are to be calculated considering the combination of current and wave particle velocity.

Current and wave are generally to be assumed to act simultaneously in the same direction, unless another combination might be more severe and liable to occur.

3.4.2 For large bodies, whenever possible, adequately documented results of tank or wind tunnel model tests are to be used.

3.5 Wind loads

3.5.1 Loads due to wind are to be taken duly into account for exposed structural elements considering, in particular, the influence of their shape and dimensions.

3.5.2 Whenever possible, adequately documented results from wind tunnel tests or data derived from tests are to be used.

3.5.3 Dynamic wind actions are to be considered where the fish farm's structure, or part of it, may be sensitive to these.

3.6 Inertia loads

3.6.1 The following inertia loads are to be considered:

- loads induced by fish farm's motions when in floating condition
- loads induced by support motions during dry tow condition, if contemplated
- other dynamic actions where relevant (refer to Part B, Chapter 3).

Note 1: Motion performance as such is not covered by classification. However, an accurate enough motion analysis is to be performed in order to evaluate above loads.

3.6.2 Loads sustained during transit are to be calculated taking into account the transit conditions (environmental data, loading conditions, possible dismantling or fastenings) specified in the Design Criteria Statement.

3.7 Ice and snow

3.7.1 For fish farms intended for service in icy waters, ice loads on hull are to be evaluated with consideration of ice conditions and parameters specified in the Design Criteria Statement (refer to Ch 2, Sec 2, [7]).

Both maximum and cyclic loads are to be considered.

Numerical values for ice pressure are to be determined from recognised formulae and/or model tests in ice tanks. The design loads for level ice are to be taken as the maximum between the following possible ice sheet ruptures: crushing, buckling, bending.

3.7.2 For fish farms intended for service in cold areas, the following loads are to be evaluated on the basis of relevant data:

- gravity loads corresponding to ice and snow accumulation
- gravity loads and increase in wind loads due to ice accretion on open structures, such as derrick, crane booms, etc.

3.7.3 For fish farms not intended to operate in icy waters or cold areas, moderate snow loads may be generally considered in minimum design loads.

3.8 Vortex shedding

3.8.1 The Society may require to consider the possibility of flutter of structural members due to vortex shedding.

3.9 Local pressure on hull and exposed decks

3.9.1 Pressure on hull and exposed decks is to be evaluated from the maximum relative motions between hull and water surface with due allowance for:

- irregularities of actual wave profile
- water run-up along columns or walls
- green waters, etc.

Loads are to be calculated according to recognised standards to satisfaction of the Society.

3.9.2 For exposed decks not submitted to any particular load, a distributed load of 25 kN/m² is to be taken as a minimum.

3.10 Slamming

3.10.1 General

Slamming loads are to be considered for horizontal members located in the splash zone and for surface unit fish farms with particular forward structural configuration. The loads are to be estimated using experimental data or techniques acceptable to the Society.

3.10.2 Surface units

For surface units, where more accurate information is not available, indications provided in Part D, Chapter 1 of the Offshore Rules may be used.

3.10.3 Local loads on superstructure walls and decks

Design pressures induced by wind, water spray and wave action (green waters) on exposed walls and decks of superstructures are to be evaluated taking into account:

- their location, (height above water level, horizontal distance from the fish farm's sides and/or ends) and orientation
- environmental conditions liable to be met by the fish farm in various draughts or conditions of operation.

Where appropriate, reference is to be made to Part D, Chapter 1 of the Offshore Rules.

4 Accidental loads

4.1 Damaged condition

4.1.1 Hydrostatic pressure acting on hull and subdivision bulkheads and flats is to be evaluated for the fish farm in damaged condition.

4.1.2 For each item contributing to the watertight integrity of the fish farm, load height is to be taken as the greatest distance, for all possible damage cases, to the waterline in damaged condition, including wind, if any, as resulting from the application of Part B, Chapter 1.

4.1.3 For surface units, load height is to be taken equal to the vertical distance to the freeboard deck.

4.1.4 As necessary, the inclination of gravity loads from the vertical direction in damaged condition is to be taken into account, considering damage cases and wind resulting from the application of Part B, Chapter 1.

4.2 Loads from towing, mooring and anchoring equipment

4.2.1 For the evaluation of loads applied to fairleads, winches and other towing, mooring and anchoring equipment, the line is to be considered as loaded to its guaranteed breaking strength.

4.3 Impact loads

4.3.1 In application of Ch 2, Sec 1, [4.4], loads induced by collision or dropped objects are to be assessed, based on the kinetic energy of impacting object and on the relevant scheme of energy dissipation.

5 Testing loads

5.1 Tank testing loads

5.1.1 The pressure on walls of watertight compartments and members of the structure, during pressure testing of such compartments, is to be taken as per the load heights specified in Ch 3, Sec 6.

5.1.2 The loads induced by testing of equipment such as lifting equipment, davits for life saving appliances, vessels and tanks, and other equipment, are to be duly considered for the design of supports and structure underneath.

Note 1: these testing loads may be, in some cases, much greater than operating loads; typical examples are given by load testing of davits, and hydrostatic testing of large capacities normally filled with only a small amount of liquid.

6 Load combinations

6.1 General

6.1.1 The design loads derived from the design data specified by the party applying for classification and entered in the Design Criteria Statement are to be realistically combined to produce the maximum effect upon each component of the structure of the fish farm.

6.1.2 Load combinations listed in [6.3] are to be considered for each of the conditions of operation corresponding to the structural type and service(s) of the fish farm.

6.1.3 When a load combination liable to occur within the set of design specifications or at the specified site of operation is not considered for the design of the fish farm, adequate instructions are to be stated in the Operating Manual and/or appropriate procedures provided to prevent such combination from occurring.

The present requirement particularly relates to the direction of the applied environmental loading (refer to [6.2]) and to the distribution of operational loads (refer to Ch 2, Sec 1, [3.2]).

6.2 Combination of environmental loads

6.2.1 For the purpose of load combinations, the environmental elements (wind, wave and current) are to be assumed to act simultaneously in the same direction, unless combinations of environmental elements with different directions might be more severe and liable to occur.

The most unfavourable direction, or combination of directions, for each component of the structure is to be considered unless specific operational requirements are formulated in accordance with Ch 2, Sec 1, [3.1.2].

Limitations, if any, with respect to waves directions are to be clearly specified.

6.2.2 For each direction, the environmental elements (wind, waves and current) are to be combined with their design values or associated design values.

For wave loads, the most unfavourable combination of wave height, wave period and water level when relevant, is to be retained.

For wind loads, the 1 minute sustained velocity is to be used in combination with other environmental elements for the design of the primary structure of the fish farm.

6.2.3 Where spectral design procedures are used, wave height and period in [6.2.1] and [6.2.2] relate to the significant height and reference period of sea state, and direction relates to the direction of highest energy density.

Then design loads and stresses are to be taken as the maximum values over a 3 h period.

6.2.4 When this is possible, the extreme environmental loads and stresses may be evaluated through long term statistics, using suitable techniques, to the satisfaction of the Society.

6.3 Load cases for overall strength calculation

6.3.1 The structure of the fish farm is to be designed for at least the load cases defined in [6.3.2] to [6.3.5]. If necessary, other load conditions that might be more critical are also to be investigated.

6.3.2 Load cases 1 “static” (still water)

These load cases refer to the most unfavourable combinations of the fixed and operational loads.

The most severe arrangement of operational loads, in particular with respect to moving equipment and dynamic operational loads, is to be considered.

For these load cases no environmental load is taken into account.

6.3.3 Load cases 2 “design” (with environment)

These load cases refer to the most unfavourable combinations of the fixed, operational and environmental loads, including:

- the extreme (severe storm) environmental loads with fixed and associated operational loads
- environmental loads specified by the Operating Manual as constituting limits for a condition of operation of the fish farm or for the operation of a particular equipment or system, with corresponding fixed and operational loads.

6.3.4 Load cases 3 “accidental”

The accidental loads are to be combined with the fixed, operational and associated environmental loads corresponding to the nature of each accidental load.

For articulated structures, such load cases, where necessary, are also to be considered after rupture of the connection between two rigid elements.

6.3.5 Load cases 4 “testing”

Testing loads are to be considered for the design of structures being tested and of the structures supporting the items to be tested, and also, as necessary, for design of overall structure.

6.4 Load cases for fatigue evaluation

6.4.1 For fatigue evaluation a sufficient number of load cases is to be considered to correctly model loads acting on the fish farm during its whole life, giving due consideration to:

- the various conditions of operation of the fish farm
- the direction and the intensity of environmental actions, as resulting from the long term distributions of relevant environmental parameters with possible limitations corresponding to each of these conditions.

6.5 Local loads

6.5.1 Local loads of different natures are to be combined as relevant. Each combination is to be qualified as “static”, “design”, “accidental” or “testing” according to its contents, on the same principles as detailed in [6.3] for overall loads.

Part B

Structural Safety

CHAPTER 3

STRUCTURE

Section 1	General
Section 2	Structural Steels
Section 3	Structure Strength Requirements
Section 4	Other Structures
Section 5	Corrosion Protection
Section 6	Construction Survey and Testing
Section 7	Particular Unit Types
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Section 1 General

1 General

1.1 Application

1.1.1 The present Chapter contains requirements applicable to all fish farms for which the structural type notations and the service notations are defined in Pt A, Ch 1, Sec 2, [4] and Pt A, Ch 1, Sec 2, [5] respectively.

1.2 Construction materials

1.2.1 Provisions of the present Chapter are applicable to structures of fish farms made of steel or other metallic materials.

1.3 Foundations of equipment

1.3.1 As a rule, the fixed parts of ancillary structures and equipment and their connections to the hull structure are in the scope of classification, even when the certification of the equipment is not required.

1.3.2 Ancillary structures and equipment are in the scope of classification when specific additional class notations are granted.
Note 1: Any equipment the failure of which could induce major consequences upon the safety of the fish farm should be covered by classification.

1.3.3 In case of a bolted connection of such equipment to the hull, limit of classification includes the bolted flange on deck (bolts excluded). In case of a welded connection, the exact limit will be defined after special examination by the Society.

Note 1: As a rule, this limit will be taken at the level where cutting would be performed in case of dismantling of the corresponding piece of equipment.

1.3.4 Adequate reinforcements are to be provided in way of the structural foundations of such equipment as:

- machineries
- fairleads, winches and other towing, mooring and anchoring equipment
- crane foundations and other concentrated loads.

Sufficient strength and stiffness are to be provided in these areas, in order to withstand the loads induced in all the conditions of operation, and avoid vibration that could lead to damage of the structure.

The foundations of lifting appliances are to comply with the applicable requirements of Ship Rules, Pt E, Ch 8, Sec 4.

2 Structural arrangement

2.1 General

2.1.1 The structural arrangement is to be compatible with the design, construction, operation and in-service inspection or maintenance of the fish farm. The arrangement is not to lead to unduly complicated design or fabrication procedures.

2.1.2 In compliance with provisions of Part A, Chapter 1, if the Builder contemplates construction procedures liable to affect the design strength of the fish farm (for instance by prestressing some areas), he is to provide the Society with all necessary additional information.

2.1.3 The structural arrangement is to ensure the possibility of adequate inspection during the construction phase as well as during the service life of the fish farm. Adequate markings and access are to be provided in particular for structural sensitive areas. Where the present requirement cannot be adequately achieved, alternative means (such as leakage detection) and/or additional strength are to be provided in agreement with the Society.

2.1.4 The structural arrangement is to take into account the possibility of accidental situations resulting from accidental loads or unexpected structural failure. In this respect, due consideration is to be given to subdivision, to accidental loadings defined in Part B, Chapter 2 and to the capability of the structure to provide for load redistribution.

3 Subdivision

3.1 Watertight subdivision

3.1.1 On all fish farms, arrangement of watertight bulkheads and decks is to comply with the applicable requirements of Part B, Chapter 1.

3.1.2 On surface units, watertight transverse bulkheads are furthermore to comply with the applicable requirements of Part B, Chapter 1 and Chapter 4 of the Ship Rules.

3.2 Wash bulkheads

3.2.1 The present requirement concerns ballast compartments, or any other compartment generally intended to carry liquids in any quantity of density less or equal to 1,025 t/m³.

3.2.2 A transverse wash bulkhead is to be provided in compartments mentioned in [3.2.1], when:

- fillings between 0,50 H and 0,90 H are contemplated during service, and
- $l_c > 10$ where $L < 100$, or
 $l_c > 0,1 L$ where $L \geq 100$, and

- $T_t < \sqrt{\frac{1,58 l_c}{0,5 + 0,7 \frac{H}{l_c}}}$

In this last formula, the denominator is not to be taken greater than 1.

This transverse wash bulkhead, where required, is to fulfil the following conditions:

- location about midway between watertight bulkheads
- $\alpha < 0,70$.

where:

l_c : Length of the tank, in m

H : Depth of the tank, in m

α : Ratio of the lightening holes sectional area to the total sectional area of the bulkhead

T_t : Minimum pitching period of the fish farm, in s; lacking more precise information, the value $T_t = L/19$, without being less than 6, is to be taken, L being the length of the fish farm.

3.2.3 A longitudinal wash bulkhead is to be provided in compartments mentioned in [3.2.1], when:

- fillings between 0,50 H and 0,90 H are contemplated during service, and
- $b > 21,5$.

where:

b : Breadth of the tank, in m, measured at 0,8 H above its bottom

This longitudinal wash bulkhead, where required, is to fulfil the following conditions:

- location on the centre line of the tank
- $\alpha \leq 0,70$.

This wash bulkhead may be not required, where the hold or bunker includes sloping topside tanks extending down to 0,20 H at least from the tank top.

3.3 Cofferdam arrangement

3.3.1 Cofferdams are to be provided between:

- fuel oil tanks and lubricating oil tanks
- compartments intended for liquid hydrocarbons (fuel oil, lubricating oil) and compartments intended for fresh water (drinking water, water for propelling machinery and boilers)
- compartments intended for liquid hydrocarbons (fuel oil, lubricating oil) and tanks intended for the carriage of liquid foam for fire extinguishing.

3.3.2 Cofferdams separating:

- fuel oil tanks from lubricating oil tanks
- lubricating oil tanks from compartments intended for fresh water or boiler feed water
- lubricating oil tanks from those intended for the carriage of liquid foam for fire extinguishing

may not be required when deemed impracticable or unreasonable by the Society in relation to the characteristics and dimensions of the spaces containing such tanks, provided that:

- the thickness of common boundary plates of adjacent tanks is increased, with respect to the rule required thickness, by 2 mm in the case of tanks carrying fresh water or boiler feed water, and by 1 mm in all other cases
- the sum of the throats of the weld fillets at the edges of these plates is not less than the thickness of the plates themselves
- the structural test is carried out with a head increased by 1 m with respect to Ch 3, Sec 6.

3.3.3 Spaces intended for the carriage of flammable liquids are to be separated from accommodation and service spaces by means of a cofferdam. Where accommodation and service spaces are arranged immediately above such spaces, the cofferdam may be omitted only where the deck is not provided with access openings and is coated with a layer of material recognized as suitable by the Society.

The cofferdam may also be omitted where such spaces are adjacent to a passageway, subject to the conditions stated in [3.3.2] for fuel oil or lubricating oil tanks.

3.4 Fuel oil tank arrangement

3.4.1 The arrangements for the storage, distribution and utilisation of the fuel oil are to be such as to ensure the safety of the fish farm and persons on board.

3.4.2 As far as practicable, fuel oil tanks are to be part of the fish farm's structure and are to be located outside machinery spaces of category A.

Where fuel oil tanks (other than double bottom tanks, if any) are necessarily located adjacent to or within machinery spaces of category A, at least one of their vertical sides is to be contiguous to the machinery space boundaries (they are preferably to have a common boundary with the double bottom tanks, if any) and the area of the tank boundary common with the machinery spaces is to be kept to a minimum.

Where such tanks are situated within the boundaries of machinery spaces of category A, they may not contain fuel oil having a flashpoint of less than 60°C.

3.4.3 Fuel oil tanks may not be located where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. Precautions are to be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.

Fuel oil tanks in boiler spaces may not be located immediately above the boilers or in areas subjected to high temperatures, unless special arrangements are provided in agreement with the Society.

3.4.4 Where a compartment intended for goods is situated in proximity of a heated liquid container, suitable thermal insulation is to be provided.

4 Access

4.1 Means of access

4.1.1 Each space within the fish farm is to be provided with at least one permanent means of access to enable, throughout the life of the fish farm, overall and close-up inspections and thickness measurements.

4.1.2 For the access to horizontal openings, hatches or manholes, the dimensions are to be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of a confined space. The minimum clear opening is not to be less than 600 x 600 mm. When access to a hold is arranged through a flush manhole in the deck or a hatch, the top of the ladder is to be placed as close as possible to the deck or the hatch coaming. Access hatch coamings having a height greater than 900 mm are to be provided with steps on the outside in conjunction with the ladder.

4.1.3 For access to vertical openings or manholes in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening is to be not less than 600 x 800 mm at a height not more than 600 mm from the bottom shell plate unless gratings or other footholds are provided.

4.1.4 Technical provisions of IMO Resolution MSC.158(78) and IACS UI MODU1, as amended, may be used as a reference for the design and arrangement of means of access.

4.1.5 Where a permanent means of access may be susceptible to damage during normal operations or where it is impracticable to fit permanent means of access, the Society may accept, on a case-by-case basis, the provision of movable or portable means of access, provided that the means of attaching, rigging, suspending or supporting the portable means of access forms a permanent part of the fish farm's structure. All portable equipment is to be capable of being readily erected or deployed by fish farm's personnel.

4.1.6 Equipment on deck is to be arranged such as to allow inspections of deck plating and to avoid permanent concentration of dust, mud and remaining water.

4.2 Access to holds, tanks, ballast tanks and other spaces

4.2.1 Safe access is defined in accordance with IMO Resolution A.864(20) Recommendations for entering enclosed spaces aboard ships.

4.2.2 Safe access to holds, cofferdams, tanks and other spaces are to be direct from the deck and such as to ensure their complete inspection. Safe access may be from a machinery space, pump room, deep cofferdam, pipe tunnel, hold, double-hull space or similar compartment not intended for the carriage of oil or hazardous materials, where it is impracticable to provide such access from an open deck.

4.2.3 Tanks or subdivisions of tanks having a length of 35 m or more are to be fitted with two access hatchways and ladders. Tanks less than 35 m in length are to be served with at least one hatchway and ladder. When a tank is subdivided by one or more swash bulkheads or other obstructions which do not allow ready means of access, at least two hatchways and ladders are to be fitted.

When two hatchways are fitted, they are to be placed as far apart as practicable.

4.2.4 Each hold are to be provided with at least two means of access. Generally, these accesses are arranged diagonally.

4.2.5 In general, when two means of access are fitted, they are to be arranged as far apart as practicable.

4.3 Access manual

4.3.1 An access manual is to be incorporated in the operating manual of the fish farm. The access manual is to describe fish farm's means of access to carry out overall and close-up inspections and thickness measurements.

4.3.2 The access manual is to be updated as necessary, and an up-dated copy is to be maintained onboard.

4.3.3 The access manual is to include, for each space, the following information:

- plans showing the means of access to the space, with appropriate technical specifications and dimensions
- plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions; the plans are to indicate from where each area in the space can be inspected
- plans showing the means of access within each space to enable close-up inspection to be carried out, with appropriate technical specifications and dimensions; the plans are to indicate the position of structural critical areas, whether the means of access are permanent or portable and from where each area can be inspected

Note 1: Critical structural areas are locations identified from calculations to require monitoring, or, from the service history of similar or sister fish farms, to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the fish farm.

- instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space
- instructions for safety guidance when rafting is used for close-up inspections and thickness measurements
- instructions for the rigging and use of any portable means of access in a safe manner
- an inventory of all portable means of access
- records of periodical inspections and maintenance of the fish farm's means of access.

5 In-water surveys

5.1 General

5.1.1 When the additional class notation **INWATERSURVEY** is granted to the fish farms, special constructional features are to be provided as defined in Pt A, Ch 2, Sec 5, [2.2].

Section 2 Structural Steels

1 General

1.1 Scope

1.1.1 The present Section defines the requirements governing the selection of structural steels.

1.1.2 At the very beginning of the project, the Society is to be informed of the materials intended to be used so that their characteristics, testing and manufacturing conditions may be examined.

1.1.3 The requirements of the present Section are formulated particularly for steels and products meeting the applicable requirements of NR216 Rules on materials and welding for the classification of marine units.

Steels and products manufactured to other specifications may be accepted in specific cases provided that such specifications give reasonable equivalence to the requirements of these Rules.

1.1.4 The present Section is applicable to typical constructions and the Surveyor, where appropriate, may call for additional requirements to meet the intent of the Rules.

1.2 Steel selection parameters

1.2.1 The selected steels are to have mechanical properties satisfying the structural design of the fish farm and the requirements of this Section.

1.2.2 The steel grade for a structural element is to be selected in accordance with Article [3] on the basis of the:

- design service temperature defined in Ch 2, Sec 2, [6]
- structural category set out in Article [2]
- reference thickness of the element.

1.2.3 The reference thickness of the element to be considered in the steel selection diagrams depends on the type of material used:

- for flat products (plates and wide flats) and for tubulars, the reference thickness is the material thickness
- for sections, the reference thickness is the flange thickness
- for the steel forgings and castings, the reference thickness is to be previously determined in agreement with the Society (it is generally the average largest representative thickness).

Note 1: The reference thickness relates to the as-built thickness including any corrosion allowance.

2 Structural categories

2.1 Categories to be considered

2.1.1 Structural elements in welded steel constructions are classed into three categories: second, first and special categories as listed:

- Second category: Second category elements are structural elements of minor importance, the failure of which might induce only localised effects.
- First category: First category elements are main load carrying elements essential to the overall structural integrity of the fish farm.
- Special category: Special category elements are parts of first category elements located in way or at the vicinity of critical load transmission areas and of stress concentration locations.

2.2 Design drawings

2.2.1 Structural categories are to be indicated on the design drawings submitted to the Society for approval.

2.3 Classification of elements

2.3.1 Guidance is provided for classification of elements into categories, according their nature and to the structural type of fish farm, in NR426 "Construction survey of steel structures of offshore units and installations".

Nevertheless, the Society may, where deemed necessary, upgrade any structural element to account for particular considerations such as novel design features or restrictions regarding access for quality control and in-service inspections.

3 Toughness requirements

3.1 General

3.1.1 Steel toughness requirements are based on Charpy V-notch (KV) impact testing.

Reference is made to NR216 Rules on materials and welding for the classification of marine units for the testing procedure.

3.1.2 Additional tests, such as crack tip opening displacement testing (CTOD) may be requested as complementary investigation.

3.1.3 The toughness requirements herein further assume that, during the fabrication process:

- a) steel is not cold worked to a forming strain in excess of 5%, or
- b) in such a case, a heat treatment is performed (unless otherwise demonstrated to be unnecessary)
- c) normalised steel is not heated to a temperature exceeding 650°C, or any other value specified by the steel maker, whichever is less.

3.1.4 The Society reserves the right to upgrade toughness requirements herein when any of the above conditions is not met or for any particular manufacturing or construction process.

3.2 Charpy V-notch impact properties

3.2.1 The Charpy V-notch impact requirements for rolled products in normal, higher strength structural steels and high strength quenched and tempered steels are given in NR216, Chapter 3.

The Charpy V-notch impact requirements for steel forgings and castings are given in NR216, Chapter 5 and NR216, Chapter 6, respectively.

3.2.2 Transverse Charpy V-notch impact tests are required for rolled products in accordance with Tab 1.

3.2.3 Where no fatigue occurs on the structure and in case of low service stresses, some limited increase in the temperatures of the KV test may be accepted after examination by the Society of a documented request.

Table 1 : Requirements for transverse Charpy V-notch impact tests

Steel type	Structural category	Thickness range	Type of KV tests
$R_{eG} < 420$ MPa	All	$t \leq 49$ mm	KVL or KVT
		$t > 49$ mm	KVT
$420 \text{ MPa} \leq R_{eG} \leq 690$ MPa	Special and first	all t	KVT
Note 1:			
R_{eG} : Minimum specified yield strength of the steel, in MPa			
KVL : Charpy V-notch impact tests with specimens taken in longitudinal direction (refer to NR216, Ch 2, Sec 4)			
KVT : Charpy V-notch impact tests with specimens taken in transverse direction (refer to NR216, Ch 2, Sec 4).			

3.3 Selection of grades for weldable normal and higher strength steels

3.3.1 Fig 1 to Fig 3 provide the required selection criteria for each of the three structural categories.

Note 1: If the categories are not yet defined at the time of procurement, Fig 1 (special category) may be used for all structural steels.

3.3.2 Fig 1 to Fig 3 are applicable to non-alloyed, micro-alloyed or low-alloyed carbon-manganese steels only with minimum specified yield strength R_{eG} less than 420 MPa.

These general diagrams are applicable to rolled plates and sections, as well as welded and seamless tubes with $R_{eG} < 420$ MPa.

These diagrams concern the Charpy V-notch impact test only. For requirements concerning other characteristics, refer to NR216 Materials and Welding.

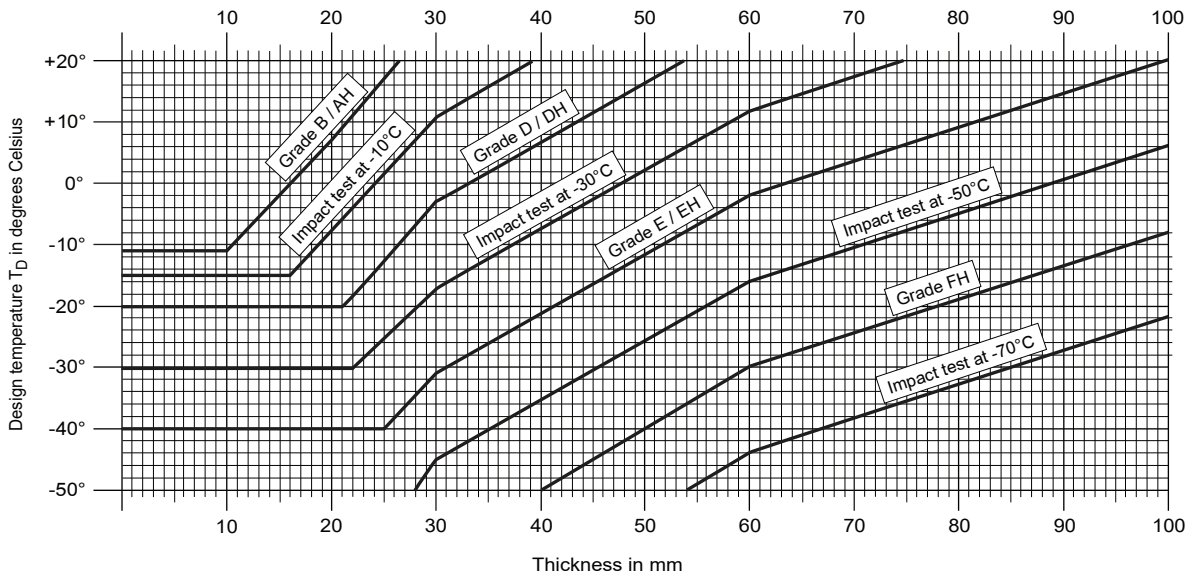
3.3.3 Normal and higher strength hull structural steel grades A to FH manufactured to the requirements of the Society (refer to NR216 Materials and Welding) are generally suitable for most applications requiring minimum specified yield strength R_{eG} less than 420 MPa, as shown on Fig 1 to Fig 3.

3.3.4 On Fig 1 to Fig 3, the temperature of the impact test (T_{KV}) or the required steel grade for a structural element is given as a function of the design temperature T_D and of the thickness of the element.

3.3.5 For important tonnage of steel, an interpolation in Fig 1 to Fig 3 may be authorised, upon request, by the Society. In such a case, the temperature T_{KV} may be obtained by interpolation between temperature T_{KV} at the lower and higher limits of the relevant zone of the diagram, for the same thickness.

Note 1: For the same example as in Note 1 of Fig 2, the value of T_{KV} obtained by interpolation between $T_{KV} = -20^\circ\text{C}$ and $T_{KV} = -30^\circ\text{C}$ is: $T_{KV} = -23^\circ\text{C}$.

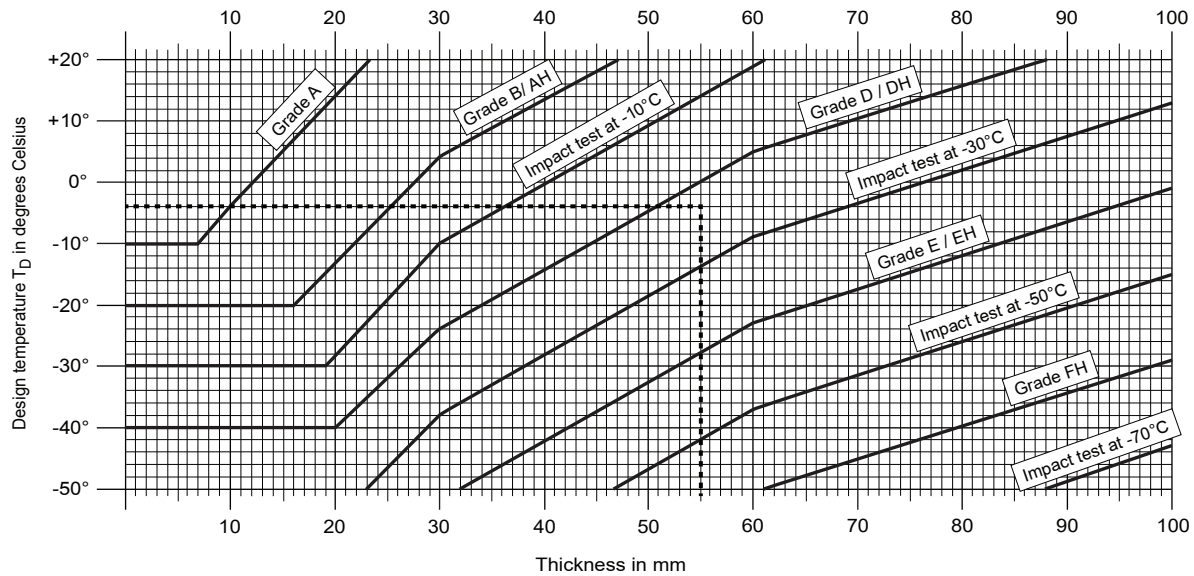
Figure 1 : Steel selection for special category elements as welded, without stress-relieving heat treatment after welding



Note 1:

- Valid for steels with minimum specified yield strength R_{eC} less than 420 MPa.
- For Charpy V-notch values, refer to [3.2].
- (T) means tested in transverse direction for rolled products, refer to [3.2].

Figure 2 : Steel selection for first category elements as welded without stress-relieving heat treatment after welding or for special category elements with stress-relieving heat treatment after welding



Note 1: Example of selection:

$T_d = -4^\circ\text{C}$

thickness = 55 mm

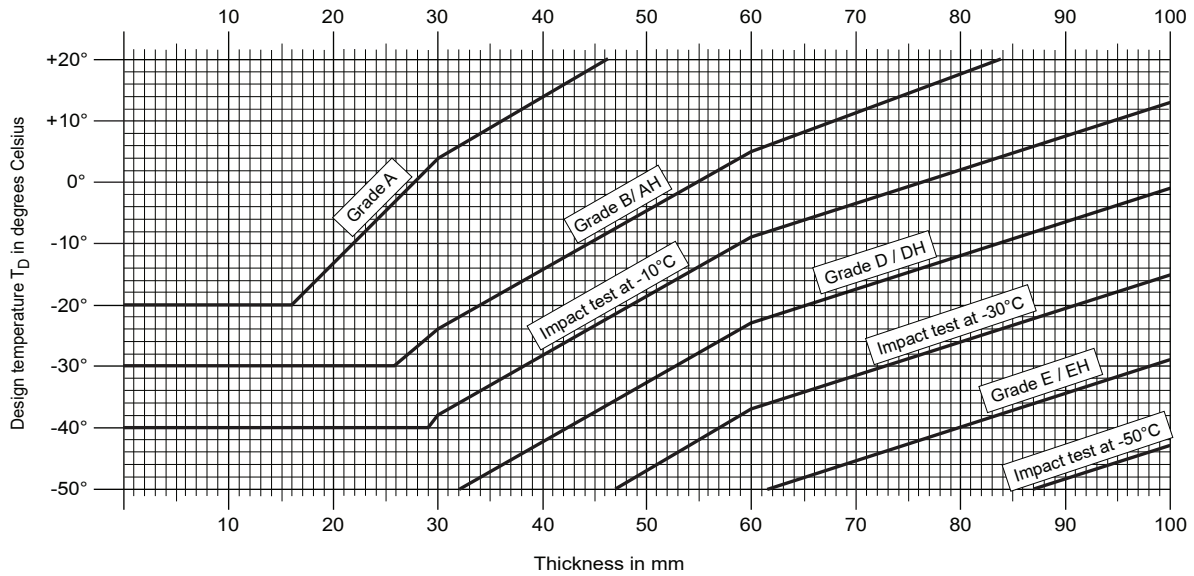
Steel grade is to be Charpy V-notch impact tested at -30°C .

Steel grade E or EH being impact tested at -40°C can be selected.

3.3.6 The grade selection curves on Fig 1 to Fig 3, are based on the following publications:

- IACS Recommendation No. 11 Material Selection Guideline for Mobile Offshore Drilling Units
- Sanz G., 1981. Proposal of a quantitative method for the choice of steel qualities with regards to the risk of brittle fracture, Normes et techniques - AFNOR, IRSID
- Charleux J., 1981. Selection of steel qualities for welded structural elements, SNAME / Artic Section inaugural session, Calgary (Canada). Dec 16.

Figure 3 : Steel selection for second category elements with or without stress-relieving treatment after welding or first category elements with stress-relieving heat treatment after welding



3.4 Selection of grades for forging and casting steels

3.4.1 Fig 1 to Fig 3 provide the required selection criteria for forging and casting steels.

Any deviation from the above requirement is to be submitted to the Society for approval.

3.4.2 These diagrams concern the Charpy V-notch impact test temperature only. For requirements concerning other characteristics, refer to NR216 Materials and Welding, Ch 5, Sec 2 and Ch 6, Sec 2.

3.4.3 **Grade selection criteria** for carbon and carbon-manganese non-welded forging steels are provided in NR216 Materials and Welding, Ch 5, Sec 3.

3.5 Selection of grades for high strength quenched and tempered steels

3.5.1 Fig 4 to Fig 6 provide the required selection criteria for each of the three structural categories.

3.5.2 Fig 4 to Fig 6 are applicable to weldable high strength quenched and tempered steels with minimum yield strength R_{eG} within the range of 420 MPa to 690 MPa as defined in NR216, Ch 3, Sec 3.

Figure 4 : Steel selection for special category high strength quenched and tempered elements

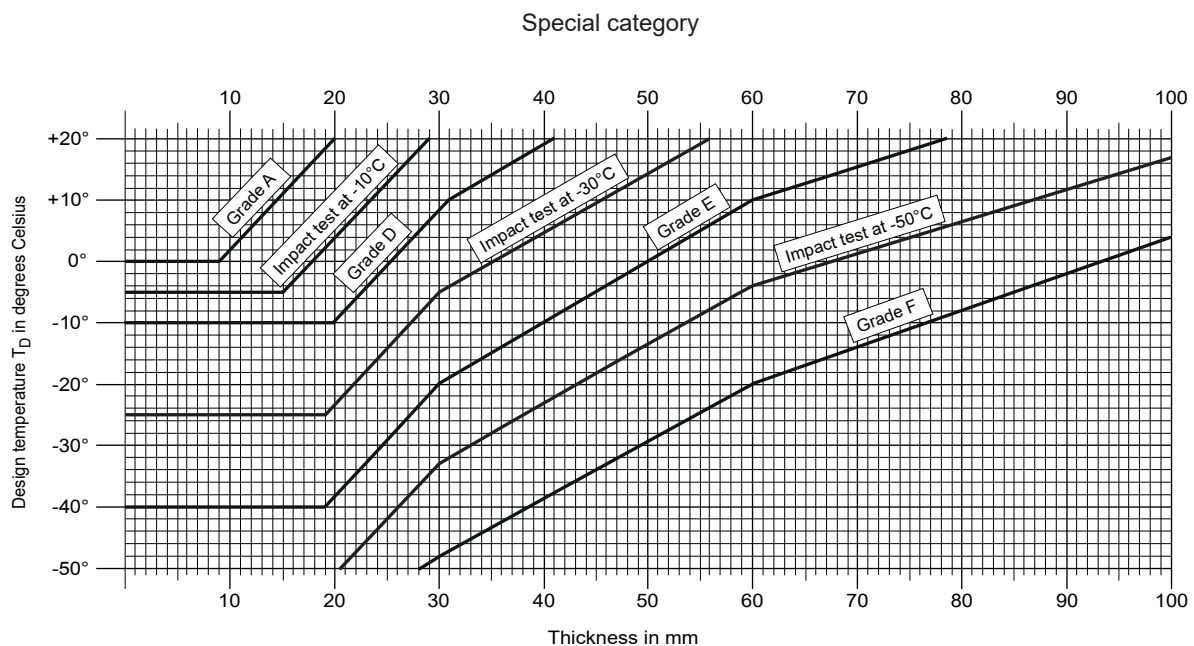


Figure 5 : Steel selection for first category high strength quenched and tempered elements

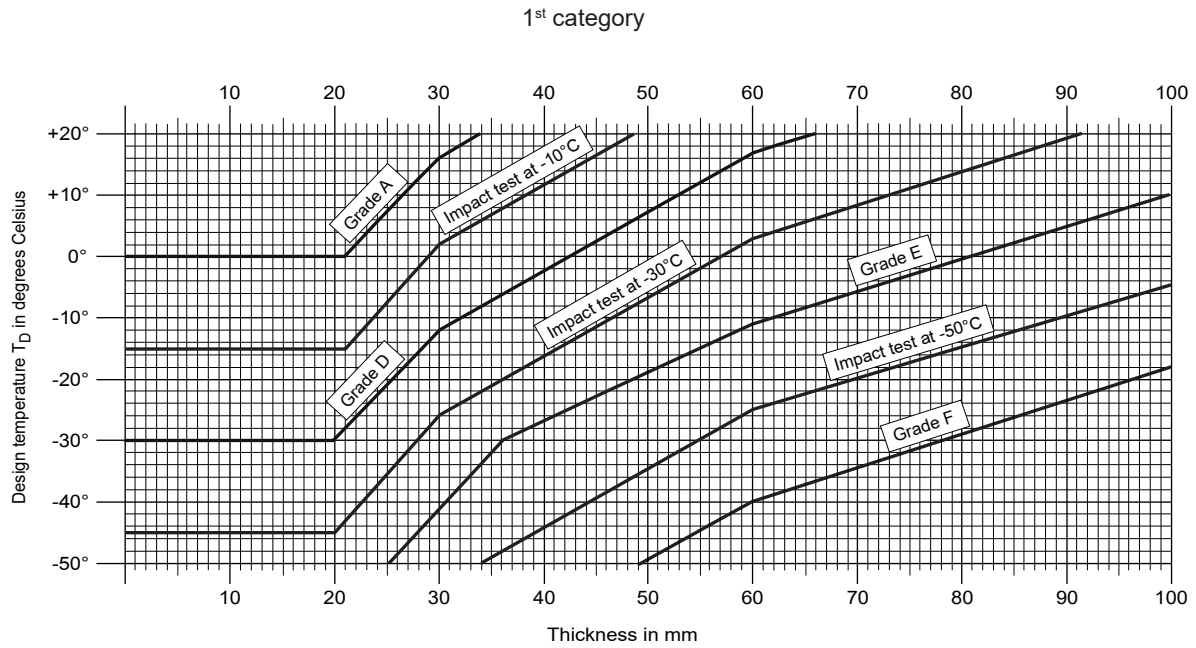
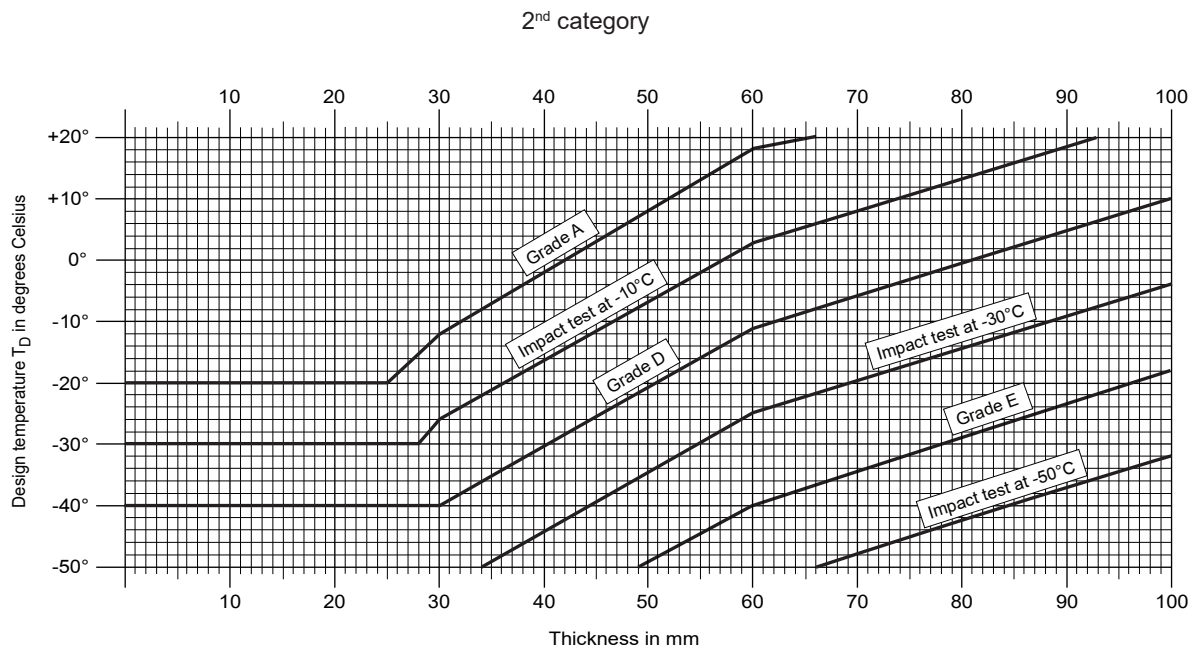


Figure 6 : Steel selection for second category high strength quenched and tempered elements



3.5.3 The requirements apply to carbon-manganese and low alloyed steels.

The steels are classed into six groups indicated by minimum yield strength R_{eG} (N/mm²) 420, 460, 500, 550, 620 and 690.

Each group is further subdivided into four grades A, D, E and F based on the impact test temperature, as defined in NR216, Ch 3, Sec 3.

The letters A, D, E and F mean impact test at 0, -20, -40 and -60°C, respectively.

4 Through-thickness ductility

4.1 Steels with specified through-thickness properties

4.1.1 The designer is to evaluate the risk of any lamellar tearing, i.e. shrinkage stresses of the weld during cooling, clamping of the structure close to a joint, thickness of material, any rolling defects at mid-thickness and importance of the weld runs.

4.1.2 Where normal tensile loads induce out-of-plane stress greater than $0,5R_{eG}$ in steel plates (R_{eG} being the minimum specified yield strength of the steel):

- for plates with $t < 15$ mm: ultrasonic testing is to be performed
- for plates with $t \geq 15$ mm: Z-quality steel is to be used or ultrasonic testing is to be performed in order to prevent laminar tearing.

The above mentioned ultrasonic testing is to be performed, before and after welding, on the area of the plate located within 50 mm or t , whichever is the greater, around the weld, in accordance with NR216, Ch 3, Sec 11.

4.2 Use of Z plates

4.2.1 Where, as a result of service or residual stresses, tensile loads are induced normal to the steel plates, the use of Z steel plates is to be specified and adequate structural detail design and special welding techniques may need to be implemented to minimise through thickness loads and weld shrinkage strains.

Note 1: Tensile loads induced normal to the steel plates can happen in the following cases: e.g. intersection of tubular elements with large fillet or full penetration welds, or cruciform type joints of heavy elements, or connections of the flange type, or reinforcements of cut-outs and penetrations in way of structural elements subject to large tensile stresses.

4.3 Selection of type of Z grade

4.3.1 The requirements for Z grade are given in NR216, Ch 3, Sec 11.

4.3.2 The type of Z grade (Z25 or Z35) is to be determined with respect to the following factors:

- structural category of joint
- level of anticipated tensile stress
- geometric configuration and weld parameters.

Note 1: In general, Z 25 grade can be used in most restraint welding situations. For applications involving special category connections of elements subject to large service tensile stresses with thickness exceeding 40 mm, Z 35 grade is to be considered.

Section 3 Structure Strength Requirements

1 General

1.1 Application

1.1.1 The present Section is applicable to all structures of fish farms constructed of steel or other metallic material and of any structural type other than surface-type.

For surface units, self-elevating fish farms and column stabilized fish farms, Ch 3, Sec 7 is also applicable.

1.1.2 Strength requirements herein formulated are to be considered together with:

- loading conditions defined in Part B, Chapter 2
- construction with materials properties and workmanship defined in Ch 3, Sec 2 and Ch 3, Sec 6
- testing according to provisions of Ch 3, Sec 6
- particular requirements of Ch 3, Sec 7.

1.2 Principles

1.2.1 The structure is to have adequate strength to resist overall and local failure of its components. Relevant modes of failure to be considered include excessive deformations and yielding, general and local instability, fatigue, brittle failure, corrosion damage and occurrence of excessive vibrations.

1.2.2 The design of primary structural elements is to take into account the design life of the fish farm and for all of its conditions of operation. The design life of the structure is to be specified by the party applying for classification. It is normally to be taken not less than 20 years.

The design life of the structure is to be indicated in the Design Criteria Statement.

1.3 Design format

1.3.1 The deterministic linear design format or allowable stresses format is used to formulate the strength criteria of the present Rules.

1.3.2 Other design formats may be used if duly justified and adequately documented to the satisfaction of the Society. The Owner's agreement may be required in cases where the Society deems it appropriate.

1.3.3 The limit state (load and resistance factor) design format may be used, in lieu of the format of the present Rules, if supported by suitable calibration for same type of structure and same type of climate, demonstrating that proposed load and resistance factors result in a level of safety equivalent to that afforded by the direct use of the Rules requirements, to the satisfaction of the Society.

Note 1: Attention is drawn that partial load factors may be not applicable to loads which are not independent; In such case, only a global load factor can be used.

1.3.4 The strength criteria of the present Rules take into account factors such as non-linearities, initial imperfections, residual stresses, etc., to the extent typically encountered. Their use then requires compliance with the Rules materials and workmanship requirements.

1.4 Corrosion allowances

1.4.1 The strength criteria of the present Rules also take into account a moderate and progressive corrosion, up to an amount of 4% in 20 years, except otherwise specified by applicable rules.

Any additional corrosion allowance, as may be provided in accordance with the provisions of Ch 3, Sec 5, is to be deduced from actual nominal thicknesses prior to application of strength criteria.

1.4.2 When the fish farm is converted from an existing unit, the assessment of strength is to be based on actual measured thicknesses reduced by any specified corrosion prediction or corrosion allowance. For a ship conversion into a fish farm surface unit or redeployment of a fish farm surface unit, the Guidance Note NI593 may be applied.

1.5 Plastic design

1.5.1 The strength criteria of the present Rules are based on loads and stresses being determined by elastic analysis, except where otherwise stated in Articles [4] and [5].

1.5.2 Plastic analysis may be used subject to a satisfactory demonstration of the following:

- other modes of failure such as elastic buckling are not liable to occur
- the postulated collapse mechanism (number and location of plastic hinges) results in the smallest ultimate load
- incremental collapse is not liable to occur under progressive and alternating loads (shakedown effect).

Note 1: Attention is to be paid to possible effects, under dynamic loads, of the changes in stiffness of members subject to plastic strains.

2 Materials

2.1 General

2.1.1 Materials including fabrication consumables are to be specified in order to present at least the strength properties considered in the design with due allowance for the service and fabrication requirements.

2.1.2 Structural steels are to be in accordance with the requirements of Ch 3, Sec 2, in particular with respect to brittle failure. Alternative criteria based upon fracture mechanics testing may be accepted by the Society after consideration on a case by case basis.

2.2 Use of high strength steels

2.2.1 Where higher strength steel is used, special care is to be exercised in detail design to ensure an adequate high cycle structural behaviour.

2.2.2 As a general rule, ordinary stiffeners welded on a plate and contributing to the overall strength of the fish farm are to be in a steel having the same reference stress than the corresponding plate.

As a general rule, connections are to be made of a steel having the same reference stress than the connected elements.

2.2.3 When high strength steel is used in some members or areas of the structure, and a lower strength steel is used in adjacent parts, attention is to be given to avoid a weak zone at transition.

For surface units only, extent of use of high strength steel, if used for hull, bottom and deck, is to comply with the relevant requirements of the Ship Rules.

2.3 Other materials

2.3.1 Metallic materials, other than steel, are to be of a type suitable for use in a marine environment, and are to be specified following recognised standards. Reference may be made also to other Rules and Guidance Notes published by the Society.

3 Overall strength

3.1 General

3.1.1 The loads and stresses in the overall structure are to be determined by an overall analysis of the structure.

3.1.2 The use of a particular method of structural analysis is not required provided that the selected methodology is appropriate to the nature of the loads, the geometry, the mode of operation (bottom-supported or floating) of the fish farm and to the nature of the response of the structure.

3.1.3 The party applying for classification is to demonstrate that recognised techniques are used consistently and result in the Rule prescribed level of structural safety.

3.1.4 Same provisions generally apply to overall fatigue analysis and to analysis of any specific part of the structure.

3.2 Structural analysis

3.2.1 The structural modelling is to take satisfactorily into account the geometric and mechanical properties of the fish farm, the distribution of inertia and the boundary conditions.

3.2.2 The method of analysis is to take adequately into account the nature of loads and load application, in particular:

- a) The dynamic effects, where significant, are to be considered in the analysis.
- b) Possible resonances of environmental loads with the structure are to be adequately investigated. Both full dynamic analysis and simplified methods may be used, provided that the computation assumptions, parameters and procedures can be realistically substantiated.
- c) Non-linearities, e.g. due to loads, geometry or materials, are to be considered where significant.

3.2.3 The structural response of the fish farm is to be, at least, determined for the combined load cases defined in Part B, Chapter 2, taking into account specific requirements of Ch 3, Sec 7 applicable to particular structural types of fish farms.

The verifications of the strength and stability of the structure are to be performed in accordance with the provisions of [4].

4 Local strength

4.1 General

4.1.1 The local strength of the structure is to be assessed using loads calculated according to Part B, Chapter 2, subject to particular requirements of Ch 3, Sec 7.

4.1.2 The local strength of the structure is to be assessed according to methods, codes or standards recognised to the satisfaction of the Society.

4.1.3 Stresses in the elements of the structure may be classed into three categories, each of these being usually obtained by separate calculation:

- overall stresses, resulting from the overall loading of the main structure
- grillage stresses, which are the stresses resulting from loads applied to girders and stiffeners
- plate bending stresses, which are the stresses in plates resulting from local pressure loadings.

4.1.4 Overall and grillage stresses are to be combined as relevant.

Resulting stresses are to satisfy the allowable stresses criteria specified in [5], and the buckling strength criteria specified in [6].

As necessary, fatigue evaluations, as provided for in [7], are to be carried out.

4.1.5 Strength of plating under pressure loads is to be separately evaluated, using recognised codes or standards to the satisfaction of the Society.

4.1.6 Strength of lattice type structures is to be assessed using codes or standards recognised by the Society, such as American Institute of Steel Construction - Specification for Structural Steel for Buildings (AISC).

4.1.7 For tubular members, the stresses due to circumferential loading are to be combined with the overall stresses to determine the total stress levels.

4.1.8 When the shear stress in girder webs or bulkheads is calculated through simplified methods, only the effective shear area of the web is to be considered. In this regard, the total depth of the girder is to be taken as the depth of the web or bulkhead.

4.1.9 In accordance with [1.5], plastic design may be considered for local design of elements not contributing to the overall strength of the fish farm and subject to occasional loading, when energy absorption is a primary concern in the design.

4.1.10 The local strength of the independent fuel oil tank is to be assessed using local loads calculated according to Ch 2, Sec 3, [2.7].

4.2 Detailing

4.2.1 Due attention is to be paid to the quality of detail design which is to be performed according to sound engineering practices corresponding to the present state-of-the-art.

4.2.2 Structural connections are to be adequately designed to ensure, as direct as possible, stress transmission avoiding eccentricity of joints.

4.2.3 Stress raisers, notches and local stress concentrations are to be kept to a minimum.

4.2.4 Detail design of highly stressed areas is to take duly into account the residual restraint stresses that may result from fabrication process.

Due precautions are to be given to avoid constraint triaxiality.

4.2.5 The possibility of lamellar tearing is to be minimised, where practicable, by avoiding the transmission of tensile loads through the thickness of plate. Where required, plate materials are to be specified with the through thickness properties prescribed in Ch 3, Sec 2, [4].

4.2.6 The compatibility between design, manufacture and construction is to be ascertained having due regard to practical fabrication techniques and available materials. Where necessary, tolerances are to be clearly stated on detail design drawings.

5 Allowable stresses

5.1 General

5.1.1 The present Article specifies the allowable stress criteria, with respect to yielding or breaking of the elements of structure. For particular calculations or loading cases, the values of the allowable stresses are to be given specific consideration by the Society.

5.2 Material strength

5.2.1 The reference stress of material, R_f , is defined by:

$$R_f = \min\left(R_{eG}, \frac{R}{1,2}\right)$$

where:

R_{eG} : Minimum specified yield stress of the material

R : Tensile strength of the material.

5.2.2 For hull steels, as defined in NR216 Materials and Welding, R_f is equal to the minimum specified yield strength of steel.

5.2.3 For light alloy materials (aluminium), when used in non-welded constructions, R_f is to be defined taking into account the material properties in the specified condition of delivery. For welded aluminium, R_f is to be taken based on R_{eG} in the annealed condition (refer to NR216 Materials and Welding).

5.3 Equivalent stresses

5.3.1 For uniaxial stress condition (e.g. obtained by beam calculation), the equivalent stress σ_c , at each point, is given by:

$$\sigma_c = \sqrt{\sigma^2 + 3\tau^2}$$

where:

σ : Normal stress

τ : Shear stress.

Above stresses are the result of the addition of overall stresses and grillage stresses, as defined in [4.1.3].

5.3.2 For biaxial stress condition (e.g. obtained by finite element calculation with plate elements), the equivalent stress, at each point, is given by:

- when $\sigma_1 \cdot \sigma_2 > 0$:

$$\sigma_c = \max(|\sigma_1|, |\sigma_2|)$$

- when $\sigma_1 \cdot \sigma_2 < 0$:

$$\sigma_c = \sqrt{\sigma_1^2 + \sigma_2^2 + |\sigma_1\sigma_2|}$$

where

σ_1, σ_2 : Principal stresses in the element under study, including the effects of both overall and local loads.

5.4 Criteria

5.4.1 The equivalent stress is not to exceed the allowable stress σ_a , for the loading condition considered, according to the following formula:

$$\sigma_c \leq \sigma_a$$

where:

σ_a : Allowable stress, given by: $\sigma_a = 1,1 \alpha R_f$

α : Basic allowable stress factor defined in [5.4.2].

5.4.2 The basic allowable stress factor α is to be taken as follows:

a) In general:

- for load case 1 ("static"): $\alpha = 0,6$
- for load case 2 ("design"): $\alpha = 0,8$
- for load case 3 ("accidental"): $\alpha = 1,0$

with the load cases 1, 2 and 3 as defined in Ch 2, Sec 3, [6.3]

b) For specific calculations:

- for load case 4 (“testing”): $\alpha = 0,9$ with the load case 4 as defined in Ch 2, Sec 3, [6.3].
- for wash bulkheads: $\alpha = 0,9$
- for foundation of towing, mooring and anchoring equipment: $\alpha = 1,0$; with the design loads defined in Ch 2, Sec 3, [4.2]
- for outer shell and subdivision bulkheads and decks in damaged condition: $\alpha = 1,0$
- for the foundations of offshore handling systems (e.g. winches, sheaves, chain jacks, etc.) used for mooring lines installation, reference is made to NR595 Classification of Offshore Handling Systems.

5.4.3 When the stresses are obtained through a fine mesh Finite Element Model, the Society may give consideration to small hot spot areas not satisfying above stress criteria, providing that the following criteria are fulfilled:

- The Von Mises stress σ_{VM} at the centroid of elements of a peak stress region of no more than $2t \times 2t$, with t being the thickness of the elements, is to comply with the following criteria:
 $\sigma_{VM} \leq 1,3 \alpha R_f$
- Outside the peak stress region of $2t \times 2t$, the Von Mises stress is to comply with [5.4.1].
- For areas where the stress is higher than σ_a a plastic stress redistribution should be demonstrated to the satisfaction of the Society or obvious from engineering judgement.

6 Buckling

6.1 General

6.1.1 The stability of the structure is to be checked, as needed, using methods recognised to the satisfaction of the Society.

6.1.2 As possible, the risk of instability (buckling) of structural elements is to be avoided or minimised by adequate structural arrangement (e.g. by avoiding large unstiffened panels or members with high slenderness, by the proper orientation of stiffeners with respect to direction of compressive stresses, etc.) and by detailing (e.g. by providing lateral restraint by tripping brackets, or additional members).

6.1.3 The buckling strength of structural elements is to be ascertained considering the most unfavourable combinations of loads likely to occur, with respect to possible modes of failure.

6.1.4 For unstiffened or ring-stiffened cylindrical shells, both local buckling and overall buckling modes are to be considered for buckling strength assessment.

6.1.5 For stiffened panels, buckling check is to be performed with NR615 “Buckling Assessment of Plated Structures”. The buckling of tubular members is to be checked according to recognized codes or standards.

6.2 Buckling strength criteria

6.2.1 The buckling strength of structural elements is to be ascertained for the effect of stresses resulting from:

- compression induced by axial loads
- compression induced by bending in flanges and web of members
- shear
- external pressure
- localised compression loads.

6.2.2 The buckling capacity of structural elements for each failure mode is to be evaluated following recognised techniques, taking into account:

- potential overall and local failure mode(s)
- due allowance for the manufacturing and/or construction tolerances and residual stresses
- interaction of buckling with yielding
- when relevant, the interaction between overall and local buckling.

6.2.3 A structural element is considered to have an acceptable buckling capacity if its buckling utilisation factor η satisfies the following criterion:

$$\eta \leq \eta_{ALL}$$

with:

$$\eta_{ALL} = \alpha$$

α : Basic allowable stress factor defined in [5.4.2].

The buckling utilisation factor η of the structural member is defined as the highest value of the ratio between the applied loads and the corresponding ultimate capacity or buckling strength obtained for the different buckling modes.

6.3 Members

6.3.1 In structural members subject to simultaneous compression and bending, due account is to be given to beam-column effect.

6.3.2 Special attention is to be paid to the boundary connections of structural members for which buckling is a possible mode of failure, and to the design of arrangements and items intended to prevent buckling.

7 Fatigue

7.1 General

7.1.1 Structural elements for which fatigue is a probable mode of failure are to be adequately designed to resist the effects of cumulative damage caused by repeated application of fluctuating stresses.

The predominant cause of fluctuating stresses leading to crack propagation and fatigue failure is normally wave loading. However, other sources of cyclic loads such as wind, rotating machinery or cranes may also induce significant fatigue loadings and are to be given due consideration where relevant.

7.1.2 Fatigue evaluations are to be carried out according to recognised methods to the satisfaction of the Society.

7.2 Fatigue life

7.2.1 The design is to ensure a design fatigue life at least equal to the design life mentioned in [1.2.2].

7.2.2 A further increase in the design fatigue life is to be considered for elements in uninspectable areas or areas where repair within the expected life time is not possible or practical.

7.2.3 When a fish farm is converted from an existing unit or an existing fish farm undergoes a redeployment or life extension, due consideration is to be given to fatigue accumulation during the life time already elapsed and to information that can be obtained from the observation of structure. For surface unit, guidelines defined in NI593 are to be considered.

7.3 Design

7.3.1 The level of fluctuating stress is to be adequately limited.

A suitable fatigue life is best achieved by adequate joint detail design and fabrication quality control. Joint detail design is to avoid, as far as possible, joint eccentricities introducing secondary stresses and local restraints, abrupt section changes, re-entrant corners, notches and other stress raisers.

In fatigue sensitive areas, improved joint performance is to be achieved through, as necessary, a combination of reduction in nominal stresses, obtained by increased thicknesses, improved detailing, providing smooth transitions and suitable shape of weld joints.

7.3.2 Fatigue strength is also affected by fabrication induced (residual) stresses and by stress raisers caused by inherent weld defects, particularly surface defects.

This is normally accounted for by joint classifications, provided however that standard quality control procedures are adequately implemented.

7.3.3 Where it is not possible to improve fatigue life by another method, the Society will examine, in each separate case, weld profile improvement techniques such as grinding, shot blasting, TIG dressing and other post-welding treatments.

Where a joint performance depends upon particular fabrication and quality control requirements, adequate procedures are to be drawn up providing the necessary specifications concerning workmanship and inspection.

7.3.4 Due attention is to be given to attachment of fittings onto primary structural members. Unavoidable cut-outs or openings are to be, as far as possible, located outside high stress areas and superposition of notches is to be avoided.

7.4 Fatigue analysis

7.4.1 The long term distribution of fluctuating stresses is to be obtained from an overall structural analysis, for the relevant load cases, in accordance with Ch 2, Sec 3, [6.4].

Spectral analysis is generally to be used. Time domain analysis is to be preferred when both non-linearities and dynamic effects are significant. Deterministic analysis may be used when appropriate.

7.4.2 Geometrical stress concentrations result from openings, transitions in properties or geometry of members, end connections and other discontinuities. When not modelled in the overall analysis, such geometrical stress concentrations may be accounted for by appropriate Stress Concentration Factors (SCF).

Proposed SCF's are to be duly documented to the satisfaction of the Society. SCF's may be obtained from analytical solutions, in some cases, or from adequately calibrated parametric equations or by direct stress analysis. The Society reserves the right to call for such analysis if found necessary.

7.4.3 Local effects, resulting from residual stresses and from weld surface defects, are to be accounted for through joint classification.

7.4.4 The cumulative fatigue damage at each spot is to be calculated using the Palgren-Miner Rule and an appropriate S-N curve, taking into account joint classification, thickness effect and the degree of corrosion protection.

7.4.5 Fracture mechanics methods may also be used for fatigue analysis subject to adequate consideration of the stress history, of the joint geometric configuration and of the following, to the satisfaction of the Society:

- selection of initial crack geometry and size
- crack propagation rate, taking into account corrosion factors
- toughness parameters governing final crack instability for which a verification by appropriate fracture mechanics testing may be required.

Section 4 Other Structures

1 Superstructures and deckhouses

1.1 Surface units

1.1.1 For surface units, the relevant provisions of Pt B, Ch 11, Sec 5 of the Ship Rules are applicable.

1.2 Self-elevating fish farms and column stabilized fish farms

1.2.1 For self-elevating and column stabilized fish farms, deckhouses are to have sufficient strength for their size, function and location, with due consideration given to the environmental conditions to which the fish farm may be exposed. The requirements of Pt B, Ch 8, Sec 4 of the Ship Rules may be applied as far as practicable.

2 Bulwarks, guard rails and gangways

2.1 Surface units

2.1.1 For surface units, the relevant provisions of Pt B, Ch 12, Sec 2 of the Ship Rules are applicable, in addition to those of the present Article [2], which are applicable to all types of fish farms.

Alleviations may be considered by the Society when the application of these requirements would interfere with the operation of the fish farm, provided that equivalent arrangements for protection are provided.

2.2 Bulwarks and guard rails

2.2.1 Efficient bulwarks or guard rails are to be fitted on all exposed parts of the freeboard and superstructure decks. Their height is to be at least 1,0 m from the deck.

Alleviations may be considered by the Society when the application of these requirements would interfere with the operation of the fish farm, provided that equivalent arrangements for protection are provided.

2.2.2 As a rule, the spacing of bulwark stanchions is not to exceed 1,8 m or, when the stanchions are close to the gangway ports, 1,2 m. As far as practicable, stanchions are to coincide with beams.

2.2.3 Where guard rails are provided, the opening below the lowest course is not to exceed 230 mm. The other courses are not to be more than 380 mm apart.

The guard rail supports are not to be spaced more than 1,35 m.

2.3 Gangways – Surfaces

2.3.1 Satisfactory means (gangways, etc.) are to be provided for safe move of personnel on board, in particular between accommodation and work areas.

Gangways, stairs and passages exposed to environment are to be provided with a non-slip surface and, except when contiguous structures provide an equivalent protection, fitted with guard rails in compliance with [2.2].

3 Freeing ports

3.1 Surface units

3.1.1 For surface units, the relevant provisions of Pt B, Ch 11, Sec 12, [6] of the Ship Rules are applicable, in addition to the provisions of [3.2], which are applicable to all types of fish farms.

3.2 Exposed decks

3.2.1 Adequately distributed freeing ports of sufficient section, with lower edges located as near the deck as practicable, or other equivalent means, are to be provided for efficient drainage of water from exposed decks, in particular for areas limited by bulwarks.

4 Helicopter deck

4.1 General

4.1.1 Fish farms having the additional class notation **HEL** are to comply with the present Article.

4.2 Reference standards

4.2.1 The design and arrangement of the helicopter facilities are to be in accordance with the Civil Aviation Publication 437 "Offshore Helicopter Landing Areas – Guidance on Standards" (CAP 437).

4.3 Structure

4.3.1 The scantling of the structure is to comply with the requirements of Pt B, Ch 11, Sec 13 of the Ship Rules.

4.4 Helideck safety net

4.4.1 A 1500 mm wide safety net, with flexible netting is to be provided around helideck.

Section 5 Corrosion Protection

1 General

1.1 Protection methods

1.1.1 General

The structure of the fish farm is to be effectively protected against corrosion damage using either one or a combination of the following methods:

- cathodic protection
- application of protective coatings
- selection of material.

1.2 Design of corrosion protection systems

1.2.1 The design of the corrosion protection systems is to consider the possible effects of environmental and galvanic corrosion, stress corrosion and corrosion fatigue.

1.2.2 Corrosion protection systems for steel structures are to be designed according to a recognised methodology such as the one developed in NI423 “Corrosion Protection of Steel Offshore Units and Installations”.

Design specification and calculation notes of corrosion protection system are to be submitted to the Society for approval.

If the design is conducted without reference to a recognised standard, the methodology and all the values utilized are to be documented and justified to the satisfaction of the Society.

1.2.3 It is the responsibility of the party applying for classification to inform the Society when the environment at an intended site of operation includes unusual corrosive conditions or when the structural elements are exposed to corrosive agents with consideration of the activities of the fish farm.

1.2.4 Both sacrificial and impressed current anodes are to be designed for a minimum service life in accordance with contemplated intervals between surveys in dry condition, unless particular arrangements are made for their replacement afloat.

Note 1: The attention of the Designer and the Owner is drawn upon requirements of Part A, Chapter 2 concerning maximum intervals between two surveys in dry condition.

1.3 Cathodic protection systems

1.3.1 Material certificates covering the corrosion protection equipment are to be submitted to the attending Surveyor.

1.3.2 Electrical continuity is to be ensured between anodes and the fish farm's steel structure. The anodes are to be fitted by welding.

Welding of sacrificial anode supports, or any device, onto structural members is to be carried out by qualified welders in accordance with approved procedures.

1.3.3 Anodes are to be properly installed, in such a way that:

- they do not induce unacceptable local stresses in the structure of the fish farm
- their efficiency is not impaired.

1.3.4 Prior to fish farm's delivery, corrosion protection systems are to be inspected.

1.3.5 For cathodic protection systems, in addition to inspection provided for in [1.3.4], installation effectiveness are to be checked apart from any annual in-service survey:

- for sacrificial anodes cathodic protection system, three months after the system has been put into operation for bare steel structures or one year after the system has been put into operation for coated structures
- for impressed current cathodic protection system, one month after the system has been put into operation.

2 Requirements applicable to particular areas

2.1 Submerged zone

2.1.1 Exposed steel surfaces in the submerged zone are to be provided with a cathodic protection system. This system may be complemented by a coating system.

2.2 Internal zone

2.2.1 Internal parts of tanks intended for sea water ballast are to be protected by coating, possibly complemented by cathodic protection.

2.2.2 A coating system for corrosion protection is normally considered to be a full hard coating. Other coating systems (e.g. soft coating) may be considered acceptable as alternative, provided that:

- they are applied and maintained in compliance with the Manufacturer's specification
- they give a protection against corrosion equivalent to those given by a hard coating for a minimum period of 3 years.

Coating is to be applied according to coating manufacturer recommendations.

2.2.3 Sacrificial anodes may be of aluminium or zinc types. The use of magnesium is limited to the conditions described in NI423 "Corrosion Protection of Steel Offshore Units and Installations".

The amount of sacrificial material and location of anodes are to be chosen in accordance with:

- NI423 "Corrosion Protection of Steel Offshore Units and Installations"
- NI409 "Guidelines for Corrosion Protection of Seawater Ballast Tanks and Hold Spaces"

or other recognised codes or standards.

The design life of the cathodic protection system is not to be less than 5 years.

2.3 Thickness increments

2.3.1 A thickness increment of platings and, where relevant, of stiffeners, is to be added to the Rules prescribed thickness where the concerned structural members are left unprotected or are not sufficiently protected against corrosion.

Thickness increments are to be also provided, if necessary, in special areas subject to mechanical wastage due to abrasion or in areas of difficult maintenance.

Thickness increments are to be evaluated on the basis of an anticipated rate of corrosion in the corresponding areas, and of the design life of the structure.

2.3.2 The party applying for classification is to notify the Society where thickness increments are provided. Adequate indications are to be given in the relevant structural drawings.

2.3.3 The Society reserves the right to require thickness increments, where deemed appropriate.

Section 6 Construction Survey and Testing

1 Construction Survey - General

1.1 Document approval

1.1.1 When a construction is planned, the Builder is to get in contact with the Surveyor(s) of the Society in order to have all necessary documents approved and to provide all information needed for Surveyor(s) to perform in satisfactory conditions the survey of the construction, including the approval of welding procedures, the qualification of welders, the welding inspection and the survey of testings.

1.2 Inspections and testings

1.2.1 As a general rule, construction and all necessary inspections and testings are to be made under the Surveyor's supervision and to his satisfaction.

2 Construction survey scheme

2.1 Reference documents

2.1.1 A construction survey scheme is to be established in compliance with NR426 "Construction Survey of Steel Structures of Offshore Units and Installations", or, subject to a preliminary written agreement, in accordance with other particular specifications based upon recognised principles or construction codes - in particular relevant National Codes.

2.1.2 The codes and standards which are proposed as per [2.1.1] are to be specifically suitable for the type of construction and are to be considered by the Society as equivalent with the NR426, as specified in [2.1.1].

2.1.3 Where appropriate, the Surveyor may call for adaptation of these documents, or additional requirements, to meet the intent of the Rules.

2.2 Construction survey scheme applicable to several constructions

2.2.1 Instead of a construction survey scheme applied case by case, an equivalent construction survey scheme applying to all constructions of the same Builder with minor alterations, may be approved by the Society upon particular request.

3 Application of construction survey code

3.1 Forming

3.1.1 Forming of rolled steel products is to comply with the relevant requirements of the construction survey code which is used (refer to [2.1]).

3.2 Welding

3.2.1 Welding of steel and qualifications of welding procedures and welders are to comply with the relevant requirements of the construction survey code which is used (refer to [2.1]).

3.3 Welding inspection

3.3.1 Weld inspection is to comply with the relevant requirements of the construction survey code which is used (refer to [2.1]).

3.4 Conflicts between reference documents

3.4.1 If requirements mentioned in [3.1] to [3.3] are not similar, or are less stringent than those of NR426 "Construction Survey of Steel Structures of Offshore Units and Installations", requirements of this late document are to be applied.

4 Testing - General

4.1 Application

4.1.1 The present Section deals with the tests of the various compartments and watertight members of the hull structure. The object of such tests is to check the strength of the structure or the watertightness of the compartments or both simultaneously.

4.1.2 The tests are to be carried out in the presence of the Surveyor at a sufficiently advanced stage in the building to prevent later modifications from endangering the strength or watertightness of the parts tested.

4.1.3 The present Section is applicable to wholly welded parts of the fish farm. For the other parts, additional tests may be called for by the Surveyor.

4.1.4 The test loads shown in the following are to be increased to the satisfaction of the Society in the case of heavy density liquids.

4.1.5 Where the tests stated in the present Section are proving impossible or inopportune, the Society may accept other testing methods, provided it be proved that the later enable the checking of the strength and watertightness of the compartments concerned under conditions deemed equivalent.

4.2 Water tests

4.2.1 Where a water test is required, it may be carried out before or after the fish farm is afloat.

4.2.2 Water testing of the double bottom compartments and peaks is to be made before cementing.

4.2.3 A coat of primary paint may be applied before testing. Where the tightness of the compartment has been checked before the water test, the latter may be carried out after the application of the preservative coating.

4.2.4 No water test is required for compartments the sides of which have been checked while water testing the adjoining compartments.

4.3 Air tests

4.3.1 Where an air test is required, the effective air pressure is not to exceed 0,24 bar.

The staff being under cover, the maximum pressure is maintained a few minutes at the beginning of the test, then reduced to 0,12 bar while the welded joints connecting prefabricated members are being examined. These joints are to be tested with an appropriate soapy liquid.

4.3.2 The air pressure is to be clearly shown by means of a water-column pressure gauge. Furthermore, an efficient safety system against overpressures is to be provided in the compartment under testing.

4.3.3 Where the air test concerns a capacity for which a preservative coating is intended, it is to be carried out before applying the coating on the welds which connect the prefabricated members.

4.4 Documents to be submitted

4.4.1 The detail of the tests foreseen by the Builder is to be specified by the test plan of the various compartments as called for in Part A, Chapter 1.

5 Testing - Watertight compartments

5.1 Compartments intended to contain liquids

5.1.1 All compartments intended to contain liquid or used for ballast purposes, are to undergo a water test under the load height relating to the highest of the following levels:

- overflow
- load waterline.

Furthermore, for compartments intended to contain fuel oil, the test load height is not to be less than 2,40 m above the compartment top.

5.1.2 Liquid mains that are parts of the double bottom structure are to undergo a water test under a load height to be determined in agreement with the Society.

5.2 Peaks

5.2.1 A collision bulkhead not bounding a ballast compartment or liquid tank is to undergo a water test under the load height relating to the waterline.

5.3 Fuel oil bunkers and independent fuel oil tanks

5.3.1 Fuel oil bunkers and independent fuel oil tanks are to undergo a water test under the load height relating to the overflow, being not less than 2,40 m above the compartment top.

5.4 Other liquid storage compartments

5.4.1 Integrated fresh water compartments are to be tested according to [5.1.1]

5.4.2 Independent fresh water compartments are to be water tested under the load height relating to the higher of the following levels:

- overflow
- 0,90 m above tank top.

5.4.3 Tanks intended to carry products with a density greater or equal to 1 are to be tested taking into account this density; test program is to be submitted to the Society's approval.

5.5 Shaft tunnel

5.5.1 The shaft tunnel, if one exists, is to be hose tested.

6 Testing - Miscellaneous

6.1 Rudder

6.1.1 After completion, rudders of watertight construction, if any, are to undergo a water test under the load height the value of which is equal to the scantlings draught without being less than 2,40 m.

6.1.2 The preceding test may be replaced by an air test under a pressure of 0,2 bar.

6.1.3 Rudder shaft is to be magnetic particle inspected before installation (or after any repair).

6.2 Doors on watertight bulkheads

6.2.1 Doors on watertight bulkheads are to be hose tested, where such bulkheads are not water tested. Hatch covers on weatherdecks, if any, are to be hose tested.

6.3 Shell openings closures

6.3.1 Shell openings closures are to be hose tested.

Section 7 Particular Fish Farm Types

1 Scope

1.1 Particular types of fish farms

1.1.1 The present Section defines the particular requirements for the design of fish farms, which are depending on their structural types:

- surface units
- self-elevating fish farms
- column stabilized fish farms.

In addition, the Society reserves the right to require that some provisions related to a specific service notation other than **fish farm**, are considered, where deemed relevant, even if the corresponding service notation is not granted.

2 Surface units

2.1 Mobile fish farms

2.1.1 Surface units which are mobile fish farms are to satisfy the requirements of the present Section.

2.1.2 Design and strength of hull structure are to comply with the requirements of Part D, Chapter 1 of the Offshore Rules, as applicable to the construction of the subject vessel, in lieu of the provisions of the present Chapter.

2.1.3 The required strength of the fish farm is to be maintained in way of the moon-pool and in way of large hatches.

In this respect, consideration is to be given to the required main hull girder section modulus and particular attention is to be given to the continuity of fore and aft members.

The design of moon pool walls is to ensure an adequate strength for pressure loadings and particular attention is to be given to possible impact loading due to waves or trapped objects during transit.

The detail design of hatch beams and corners is to comply with the applicable requirements of the Ship Rules.

2.1.4 Additional structures not covered by the Ship Rules such as crane pedestal, etc., are to be designed in accordance with the requirements of Part B, Chapter 2 and Part B, Chapter 3.

For the calculation of dynamic loads induced by the motions of the fish farm, accelerations are to be taken not less than those defined by the Ship Rules, for a probability of 10^{-8} .

2.2 Permanent installations

2.2.1 Surface units which are permanent installations are to comply with the relevant requirements of Part D, Chapter 1 of the Offshore Rules.

3 Self-elevating fish farms

3.1 General

3.1.1 Additional structural requirements and guidance for the classification of self-elevating fish farms are given in NR534 "Rules for the Classification of Self-Elevating Units - Jack-ups and Liftboats".

4 Column stabilized fish farms

4.1 General

4.1.1 Additional structural requirements and guidance for the classification of column stabilized fish farms are given in NR571 "Classification of Column Stabilized Units".

Section 8 Local Structural Improvements

1 General

1.1 Application

1.1.1 The present Section provides requirements and guidance for local structural reinforcements.

1.1.2 Depending on the type of the fish farm, a risk analysis may be required to assess the risk of collision.

2 Collision

2.1 General

2.1.1 Scope

The present Article provides guidance for the verification of the structure in case of collision.

2.1.2 Design against collision

When required by the risk analysis, the effect of collision is to be evaluated in order to assess the damages likely to occur.

Impact energy absorption capability through plastic deformations is to be obtained by the correct use of ductile materials and by avoiding abrupt section changes, notches and other stress raisers.

For fish farms intended to operate in areas where icebergs or ice-islands are expected, an evaluation of resistance to collision may be required in agreement with the party applying for classification.

2.1.3 Definitions

- Minor collision:
Collision between the fish farm and a vessel which dimensions are small compared to the dimensions of the fish farm.
- Major collision:
Collision between the fish farm and a vessel which dimensions are significant compared to the dimensions of the fish farm.
- Hourglass energy:
Hourglass energy generating Hourglass modes represent nonphysical, zero-energy modes of deformation that produce zero strain and no stress and which occur only in under-integrated finite element models.

2.1.4 Safety principles

The consequence of a collision is to be limited as defined below.

- Minor collision:
The collision energy is to be absorbed by the colliding vessel and the side shell of the fish farm without risk of flooding. Therefore the safety criterion is that the side shell may suffer permanent deformations but without any rupture.
For protectors, the collision energy is to be absorbed by the colliding vessel and the protector with no contact with the protected item.
- Major collision:
The collision energy is to be absorbed by the colliding vessel, the side shell and the internal structure of the fish farm without any impairment of the watertightness integrity of the inner hull.

2.1.5 Documents to be submitted

The following documents are to be submitted to the Society for information:

- Risk analysis
When collision analysis is performed, a risk analysis is taking into account the boats operating around the fish farm, such as supply boats, fish transport vessel, etc is to be submitted.
The risk analysis is to determine, for each vessel operating around the fish farm, the speed, the mass and the associated probability of collision. For permanent fish farms: list of shuttle tankers and supply vessels intended to be operated during the fish farm life with the characteristics of these vessels.
- Colliding speeds and justification
- Colliding energy calculation
- Collision analysis report.

2.2 Collision hypothesis

2.2.1 General

As a rule, the collision analysis is to consider the results of the risk analysis.

2.2.2 Collided areas

The following areas of the fish farm should be considered:

- free side shell between two transverse bulkheads
- free side shell at the level of the first transverse ring from a transverse bulkhead
- side shell in way of offloading area.

When protectors are verified, the following areas should be considered, as relevant:

- side shell at spread mooring zones
- side shell at the offloading line protection zones
- side shell at the riser zones.

2.2.3 Collision scenarii

The colliding vessel is considered hitting the side shell by the bow at 90°.

Note 1: Other collision angle may be required when deemed necessary.

- The colliding vessel sizes and bow shapes (with or without bulb) to be considered are selected from the list of shuttle tankers and supply vessels intended to be operated during the fish farm life.
- The colliding vessel speed is to be specified considering the operation instructions.

Without any information, for minor collision, displacement and speed of the colliding vessel are to be taken equal respectively to 5000 t and 2,0 m/s.

2.2.4 Colliding energy

The colliding vessel energy E_c , in kJ, is to be taken equal to:

$$E_c = \frac{1}{2}(M + M_a)V^2$$

where:

M and M_a : displacement and added mass of the colliding vessel

As a rule, hydrodynamic added mass M_a is to be taken equal to 0,1M for bow/stern impact and 0,4M for side impact.

V : Speed of the colliding ship, in m/s.

2.3 Methodology

2.3.1 General

Collisions may be assessed using one of the methods defined here under. Safety factors are defined on a case-by-case basis.

2.3.2 Colliding ship

The bow of the colliding ship is in general considered as non-deformable. Therefore the geometrical contour of the bow defines the indented area of the fish farm.

2.3.3 Finite Element Method

For collision analysis using Finite Element Method, the requirements given in a) to c) are to be complied with.

a) Meshing:

In general, only the studied area is modelled and meshed with shell finite elements. The rest of the fish farm is taken into account by defining a rigid body, stitched to the deformable model and characterized by a mass and inertia matrix associated to the center of gravity of the fish farm. A particular attention is to be paid in the transition area between different meshing sizes and boundary conditions are to be as far as possible and not influence the deformation modes of the structure.

In the impacted area, dimensions of shell elements are not to be greater than 100 mm x 100 mm and a minimum of 3 elements between 2 ordinary stiffeners is recommended. A converging analysis may be performed to ensure that the crushing force does not change substantially when the mesh size is refined.

Element aspect ratio is to be as close to 1 as possible, and not to exceed 3. Element's corner angles are to be greater than 60° and less than 120°. Triangular elements and elements having dimensions less than their thickness are to be avoided.

In the deformation area, the mesh sizes of the colliding vessel and the fish farm are to be identical.

A minimum of 5 integration points in the plate thickness is to be considered to ensure a correct plastic behaviour of the plate element.

b) Material's law and rupture criteria

The elasto-plastic material and the erosive laws are to be considered in the non-linear computation.

The elasto-plastic material characteristics and the failure strain criteria used in the erosive law are to be provided for information.

c) Computation

Finite element calculations are to be performed until the limit state is reached, using a non-linear elasto-plastic recognized software based on a step by step time integration approach.

If under-integrated elements are used, hourglass energy is to be checked and to be less than 5% of the global internal energy.

As a rule, the total energy (sum of kinematic energy, deformation energy,...) should remain constant during the computation.

When deemed necessary, global movements of the fish farm should be taken into account in case of major collision.

2.3.4 Analytical Methods

As an alternative, following analytical methods can be applied.

a) Empirical method

Analytical methods, developed to assess the energy absorbed during a collision, such as Mc Dermott (1) or Rosenblatt (2) methods, in case of minor collision and Minorsky (3) or Pedersen and Zhang (4) methods, in case of major collision, can be applied.

b) Super-element method

The analytical method based on the decomposition of the structure into large structural entities and called super-element method, developed by M. Lutzen (5) or H. Le Sourne (6) and L. Buldgen (7), can be used for minor and major collisions.

c) Critical strain

For analytical methods, the values of critical strain in Tab 1 are to be considered.

Note 1:

(1) McDermott, J.F., et al, 'Tanker Structural Analysis for Minor Collisions', SNAME Transactions, Vol. 82, pp. 382-414, 1974.

(2) Rosenblatt & Son, Inc, 'Tanker Structural Analysis for Minor Collision', USCG Report, CG-D-72-76, 1975.

(3) MINORSKY, V.U., 'An Analysis of Ship Collisions with Reference to Protection of Nuclear Power Plants', Journal of Ship Research, 1959.

(4) PEDERSEN, P.T., ZHANG, S., 'On Impact Mechanics in Ship Collisions', Marine Structures, 1998.

(5) LUTZEN, M., SIMONSEN, B.C., PEDERSEN, P.T., 'Rapid Prediction of Damage to Struck and Striking Vessels in a Collision Even', Int. Conf. of Ship Struct. for the new Millennium: Supporting Quality in Shipbuilding, Arlington, 2000.

(6) Hervé Le Sourne, 'A ship Collision Analysis Program Based on Super-element Method Coupled with Large Rotational Ship Movement Analysis', in 4th International Conference on Collision and Grounding of Ships, Hamburg, 2007.

(7) Loïc Buldgen, Hervé Le Sourne, Nicolas Besnard, and Philippe Rigo , 'Extension of the super-element method to the analysis of the oblique collision between two ships', Marine Structures, vol. 29, 2012.

Table 1 : Critical strain

Steel grade	critical strain
Normal Strength steel (Yield strength less than or equal to 235 Mpa)	20%
High Strength steel (Yield strength less than or equal to 355 Mpa)	15%

2.4 Verification criteria

2.4.1 Criteria

For minor collision, the considered limit state is the first rupture of the side shell elements.

For minor collision in way of protectors, the considered limit is the contact with the protected item.

For major collision, the limit state is the first rupture of the inner hull.

For finite element methods, the justification of the critical strain values is to be submitted.

2.4.2 Results

The results to be provided are:

- the absorbed deformation energy versus penetration
- the deformed structure at the end of the simulation
- the list of cracked plates.



NR387

RULES FOR THE CLASSIFICATION OF FISH FARMS

Part C **Machinery and Systems**

Chapter 1 Facilities and Safety Equipment

Part C

Machinery and Systems

CHAPTER 1

FACILITIES AND SAFETY EQUIPMENT

- Section 1 General
- Section 2 Fish Farms Equipment
- Section 3 Machinery
- Section 4 Electrical Installations
- Section 5 Fire Protection, Detection and Extinction

Section 1 General

1 General

1.1 Application

1.1.1 The present Chapter applies to the design, construction, installation, tests and trials of facilities and safety equipment installed on board fish farms assigned the additional service feature **UNMANNED** and operating in coastal or sheltered waters. For any other cases, the requirements of the Offshore Rules are applicable.

Note 1: Attention is drawn to special legal provisions enacted by National Authorities which fish farms may have to comply with according to their type, size, conditions of manning and operational site, as well as other particulars and details.

2 Essential and emergency services

2.1 Essential services

2.1.1 General

Essential services are defined in Pt A, Ch 1, Sec 1, [4.5.1].

For the application of the present Chapter, the following auxiliaries are considered as essential services:

- the servitude auxiliaries which are permanently necessary to the safety of the fish farm
- the complementary auxiliaries.

2.1.2 Servitude auxiliaries

The following auxiliaries are considered as servitude auxiliaries:

- beaconing systems (position lights, in particular)
- all pumps for auxiliary machines
- diesel generating sets
- emergency sources of power
- forced circulation pumps
- ventilating fans for machinery rooms.

2.1.3 Complementary auxiliaries

Unless otherwise justified, the following auxiliaries are considered as complementary auxiliaries:

- drain pumps
- internal combustion engine starting devices
- position anchoring equipment when powered
- fish farming equipment, in compliance with [2.3].

2.2 Emergency services

2.2.1 General

Emergency services are defined in Pt A, Ch 1, Sec 1, [4.5.2].

The following services are to be considered as emergency services:

- emergency lighting as defined in Ch 1, Sec 4, [3]
- position lights and other beaconing systems required by the International Regulations for Preventing Collision at Sea in force
- all internal communication equipment necessary in a critical condition, if provided
- the fire detection and fire alarm systems and
- intermittent operation of the daylight signaling lamp, the unit's whistle, the manually operated call points, if any, and all internal signals that are required in an emergency
- fire pumps, if provided
- automatic system for tension setting and keeping, if provided
- services related to fish farming, as per [2.3].

2.3 Essential and emergency fish farming services and equipment

2.3.1 Specification of fish farming services and equipment

It is the responsibility of the Party applying for classification to specify, together with design data of the fish farm:

- which services related to fish farming are to be considered as essential or emergency services
- period associated to proper operation of power sources necessary to ensure emergency services
- equipment necessary to the performance of such services.

2.4 Design condition for equipment

2.4.1 Inclination conditions

Piping systems, machinery and electrical systems of fish farms are to be so arranged as to operate satisfactorily under the motions to which the fish farm is intended to be subjected and, in all cases, from the upright condition to the values of inclination specified in Tab 1.

Table 1 : Rule inclination for piping systems, machinery and electrical systems

Type of unit	Equipment	Inclination (degree)	
Converted surface units	Items required for essential services (1)	15° athwartships	5° fore and aft
	Items required for emergency and vitas services (2)	22,5° athwartships	10° fore and aft
Other fish farm types	To be in accordance with Pt C, Ch 1, Sec 1, [2.6.1] of the Offshore Rules		
(1) Essential services are defined in [2.1]			
(2) Emergency services are defined in [2.2].			

2.5 Automation

2.5.1 Fish farms including automated installations are to be specially examined by the Society, taking into account the type of automated systems and extent of automation.

This examination will concern in particular fire detection in electrical energy plant and other spaces with particular risks.

Section 2 Fish Farms Equipment

1 Oxygen system

1.1 General

1.1.1 Scope

The present Section applies to oxygen systems fitted on board, in particular for fish farming purposes.

1.2 Oxygen storage

1.2.1 Oxygen cylinders are to be preferably stored in an open, well ventilated area, and protected against sun by a light roof. They are to be kept far from any possible source of ignition and from any location where combustible materials exist or are liable to be brought.

Means are to be provided also to:

- protect cylinders and associated piping from physical damage
- ensure suitable drainage.

1.2.2 Oxygen cylinders are to be stored in dedicated areas located outside accommodation spaces, enclosed service spaces, control stations and machinery spaces.

Storage rooms are to be constructed of steel, well ventilated and accessible from the open deck. These rooms are to comply with Ch 1, Sec 5, [2] and Ch 1, Sec 5, [3].

1.2.3 Provisions are to be made for the expeditious removal of cylinders in the event of fire.

1.2.4 NO SMOKING signs are to be displayed at the gas cylinder storage locations.

1.2.5 Fire-extinguishing arrangements for the protection of areas or spaces where such cylinders are stored are to be provided to the satisfaction of the Society.

1.3 Distribution of oxygen

1.3.1 Class of piping system

Oxygen piping is to be constructed as Class I piping according to Pt C, Ch 1, Sec 7 of the Offshore Rules.

1.3.2 Distribution pipes are to be permanently arranged and are to comply with requirements of Section 3. Besides, the following requirements are to be complied with:

- all fixed piping is to be of steel and suitable joints are to be fitted
- material containing more than 70% copper is not to be used in the system
- allowance is to be made for expansion of the piping
- the piping system is to be suitable for the intended pressures.

1.3.3 Distribution piping system is to be provided with safety relief valves discharging directly to the atmosphere in a safe location.

Oxygen systems with a pressure greater than 2 bar are to be fitted with slow opening shut-off valves.

1.3.4 Flexible hoses, when provided, are to be type approved by the Society for oxygen use. They are to be of fire-retardant construction.

1.3.5 Oxygen distribution system is to be so arranged that no part of it comes in the vicinity of any possible source of ignition, or crosses enclosed spaces, unless it complies with provisions of [1.2.2].

In particular, all parts of oxygen distribution system liable to induce an oxygen spillage in normal service (valves, taps, etc.) are to be located well apart from anchoring appliances, or other equipment liable to produce sparks. The corresponding risk may be minimized by using adapted guards or synthetic ropes.

High pressure oxygen piping is not to be fitted inside accommodation spaces, machinery spaces and similar spaces.

1.3.6 Measures are to be taken to avoid contact of oxygen with oil, grease, or other readily combustible substances in piping or vessels.

1.3.7 Oxygen piping systems and storage bottles or pressure vessels are to be colour coded white. Each bottle or pressure vessel is to be marked with the name "oxygen" and the symbol "O₂". The marking and colour coding are to be visible from the valve end.

Section 3 Machinery

1 Tank and piping systems

1.1 Design requirements

1.1.1 Applicable rules

In general:

- Piping systems are to be designed, manufactured and surveyed in accordance with Pt C, Ch 1, Sec 7 of the Offshore Rules.
- Pressure vessels are to be designed, manufactured and surveyed in accordance with Pt C, Ch 1, Sec 3 of the Offshore Rules.
- Independent tanks at atmospheric pressure are to be designed, manufactured and surveyed in accordance with Part B.

1.1.2 Piping systems are to be designed and constructed giving due consideration to safety aspects and in particular:

- safety against flooding, in particular for ballastable fish farms
- compatibility between systems, avoiding in particular fire risk due to respective location of an oxygen system and ignition sources
- strength of systems, through appropriate design and choice of materials, correct workmanship and testing
- reliability, involving for all systems sound fixing and protection against shocks and corrosion, and, where needed, capacity to function under predictable abnormal conditions
- sufficient capacity, concerning systems ensuring ancillary functions, such as engine cooling, or, when such ones exist, systems ensuring a safety function by themselves such as fire-fighting systems.

1.2 Tanks

1.2.1 Strength of tanks integrated into the fish farm structure is to be evaluated in compliance with Part B.

2 Machinery

2.1 Design requirements

2.1.1 Applicable Rules

In general, machinery items are to comply with the applicable requirements of Part C, Chapter 1 of the Offshore Rules.

2.1.2 Machinery is to be designed and constructed giving due consideration to safety aspects and, in particular:

- safety against fire and explosion
- strength of equipment, through appropriate design and choice of materials, correct workmanship and testing
- reliability, through appropriate design and choice of materials, correct workmanship and testing
- availability, involving for all equipment sound fixing and protection against shocks and corrosion, and, where needed, capacity to function under predictable abnormal conditions
- sufficient capacity, concerning systems ensuring essential services.

Section 4 Electrical Installations

1 General

1.1 Design requirements

1.1.1 Applicable Rules

In general, electrical systems and equipment are to comply with the applicable requirements of Part C, Chapter 2 of the Offshore Rules.

Note 1: Attention is drawn on National Regulations of the country in which the fish farm is intended to operate applying to electrical equipment.

Note 2: The electrical equipment includes, but is not limited to switchboards and switchgears, cables, rotating machines, transformers, etc.

1.1.2 General design requirements

Electrical systems are to be designed and constructed giving due consideration to safety aspects and, in particular:

- fire safety
- protection of personnel against electrical shocks
- reliability, through appropriate design and choice of materials, correct workmanship and testing
- availability, involving for all systems sound fixing and protection against shocks and corrosion, and, where needed, capacity to function under predictable abnormal conditions
- sufficient capacity, concerning systems ensuring essential and emergency services. For emergency services, electrical systems are to be capable to operate, for the prescribed duration, when the fish farm is in “dead ship” condition, i.e., main power supply being shut off.

2 Sources of electrical power

2.1 Emergency source of electrical power

2.1.1 The emergency source of electrical power is to be capable of supplying simultaneously at least the following services for the periods specified hereafter, if they depend upon an electrical source:

- For a period of 3 h, emergency lighting at embarkation station as described in [3.1.1].
- For a period of 48 h, the position lights and other beaconing systems required by the International Regulations for Preventing Collision at Sea in force.

Note 1: The period indicated may be adapted by the Society to take into account the exact location of the fish farm and the actual risks of collision induced by this location.

- For a period of 18 h:
 - all internal communication equipment necessary in a critical condition, if anyone exists
 - the fire detection and fire alarm systems and
 - intermittent operation of the daylight signalling lamp, the unit's whistle, the manually operated call points, if any, and all internal signals that are required in an emergency.
- For a period of 18 h, operation of one of the fire pumps, if anyone is provided.
- For a period of 48 h, operation of automatic system for tension setting and keeping, when such a system is provided.
- Emergency services related to fish farming, as defined according to Ch 1, Sec 1, [2.3].

3 Emergency lighting

3.1 Emergency lighting at the embarkation station

3.1.1 Emergency lighting is to be provided:

- in a zone located at fish farm side as well protected from environment as practicable, when there is no specific embarkation station
- at the embarkation station when there is a specific embarkation station.

4 Power supply from shore

4.1 General

4.1.1 If the main power supply is ensured by an electrical cable coming from shore, personnel and fish are to be protected from electrical shocks liable to be caused by accidental rupture of this cable.

Supply to emergency services is not to be ensured through this supply cable, but from batteries located on board.

5 Batteries

5.1 General

5.1.1 Batteries are to be located in boxes or rooms without any electrical equipment, except lighting fittings of a certified safe type.

If needed, these boxes or rooms are to be insulated from excessive heat or extreme cold by means on non-combustible insulating materials.

5.2 Ventilation

5.2.1 The ventilation of battery compartments is to be in accordance with requirements of Pt C, Ch 2, Sec 11, [6.6] of the Offshore Rules

Section 5 Fire Protection, Detection and Extinction

1 General

1.1 Application

1.1.1 The present Section applies to fish farms less than 24 m length/diameter assigned the additional service feature **UNMANNED** where the aggregate power output of internal combustion machinery does not exceed 375kW.

For all other cases, the requirements of Part C, Chapter 4 of the Offshore Rules apply.

1.2 Safety equipment

1.2.1 All safety equipment referred to in the present Section is to be of an approved type.

1.3 Fire control plan

1.3.1 A fire control plan complying with Pt C, Ch 4, Sec 9, [1] of the Offshore Rules is to be permanently stored on board.

2 High risk spaces

2.1 General

2.1.1 Definition

High risk spaces are defined, for the purpose of application of the present Rules, as enclosed spaces containing highly combustible materials, or liable to contain combustible gases in case of leakage.

They are in particular enclosed spaces containing oxygen storage bottles, or bottles of other combustible gases, or crossed by pipings distributing such gases, or storage spaces where highly combustible chemicals are stored, if any.

2.1.2 High risk spaces are to be mechanically ventilated. The corresponding ventilation system is to comply with the following:

- Air inlets are to be located in the open air, as far as possible and in all cases at least 3 m apart from:
 - any opening to or from these spaces
 - any internal combustion engine or other possible source of ignition (anchoring
 - pliances may be a source of ignition in case of line breaking).
- Ventilation ducts to and from these spaces are to be constructed of non-combustible material.
- Outlets are to be located in the open air, as far as possible and in all cases at least 3 m apart from any internal combustion engine or other possible source of ignition.
- Air inlets and outlets are to be capable of being closed from outside the spaces being ventilated.
- Ventilating fans are to be of a non-sparking type.
- Ventilation power is to be capable of being stopped from an easily accessible position outside the high risk space.

2.1.3 Electrical appliances

All electrical appliances located in high risk spaces are to be of a certified safe type appropriate to the nature of the hazards, to the satisfaction of the Society.

3 Fire extinguishers

3.1 Portable extinguishers

3.1.1 Portable extinguishers, appropriate in size, number and nature to the different fire hazards existing aboard the fish farm are to be provided to the satisfaction of the Society.

3.1.2 For fish farms assigned the additional service feature **UNMANNED** not equipped with permanent powered equipment, except emergency lighting supplied by batteries, only two multipurpose portable extinguishers are to be provided. They are to be placed near normal and emergency embarkation stations.



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