A TRANSLATION OF

DET NORSKE VERITAS' RULES 1970 FOR THE CONSTRUCTION AND CLASSIFICATION OF WOODEN SHIPS

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SECTION 13

The shipowner's right to assistance

Shipowners with ships classified in the Institution are entitled:

a. to be shown available drawings and survey reports concerning the ship,

b. To have surveys of the ship undertaken even if such surveys are unrelated to classification.

The shipowner may transfer this right to other parties in writing.

SECTION 14

The member's right to assistance

An underwriter who is a member of the Institution is entitled to be shown available survey reports and drawings for classified ships unless the owner of the ship has issued in advance prohibition in this respect and notified the Institution thereof in writing.

In the event of casualties, the Institution may undertake surveys and assignments as an agent of its members.

SECTION 15

Non-liability clause

Det norske Veritas has no liability for loss or damage caused by its organs, officers, employees, or others who act under assignment from the Institution, regardless of whether such person has acted intentionally or negligently and irrespective of whether the loss or damage has affected a shipowning company, a shipyard or others who have requested the Institution's assistance or any third party who without having any contractual relations with the Institution, has acted or made arrangements in reliance on decisions made or information given by or on beh=lf of the Institution.

Nor, in cases as mentioned in the proceding paragraph, can the individual or individuals who have personally caused the loss or damage be held liable.

RULES FOR THE CONSTRUCTION

AND CLASSIFICATION

OF WOODEN SHIPS.

CHAPTER I.

GENERAL REGULATIONS.

Section 1. Rules of the Society.

A. Definitions.

A 10 The Concept of Classification.

11 When a ship is assigned a specific class in Det norske Veritas, this implies that the Society has been satisfied that the said ship meets the Rule requirements for this particular class, and that by means of current control through a system of surveys and recommendations (see Sect. 4) the Society seeks to ensure that the requirements stipulated for the maintenance of class are complied with.

A 20 The Rules.

21 The Rules are to be understood as being all regulations decided by the Permanent Committee concerning classification of ships.

A 30 Tentative Rules.

31 Tentative Rules are Rules applying to new fields and to which the Society reserves the right in each case to grant exemptions or make additions in order to achieve the technical standard reflected in the Rules.

A 40 Rule Requirements.

41 Rule requirements are to be understood as all technical requirements given in the Rules or determined by the Society in accordance with the Rules.

A 50 Guidance.

51 Guidance is to be understood as regulations which are not compulsory for the assignment of class, but which the Society in the light of general experience advises compliance with.

B. Alternative, Equivalent Arrangements.

B 10 General.

11 As basis for classification, the Society may consider alternative arrangements found to represent an overall safety and strength standard equivalent to that of the Rules. If the deviation from the Rules is of great consequence, the owners of the ship and also the shipbuilders, should be consulted.

12 Approval of alternative arrangements may be revoked at any time if subsequent information indicates that the chosen arrangement is not as good as the one stipulated in the Rules.

C. Supplementary Requirements.

C 10 General.

11 The Society may lay down supplementary requirements concerning assignment and retention of class when found necessary in conformity with general good practice, in order to ensure a satisfactory operation and the technical standard reflected in the Rules of those parts covered by the class.

D. Amendments to the Rules.

D 10 Ordinary Amendments.

11 Amendments to the Rules may be undertaken at any time and also be applicable to ships which have already been assigned class. If amended requirements to construction, materials, scantlings, equipment, etc. are to be made applicable to classified ships, necessitating reinforcement or rebuilding of the said ships, this is to be clearly stated in the amendment. Unless otherwise decided, the amendments are to come into force 6 months after they are adopted.

D 20 Temporary Amendments.

21 If it is found at the Head Office that an amendment to the Rules cannot be postponed until it has been up to debate at a meeting of the Permanent Committee, the said amendment can be passed by the Head Office and is in force until the Permanent Committee has reached a final decision upon the point.

E. Rules Applicable for Assignment of Class.

E 10 General.

11 The bases for the assignment of class are the Rules concerning construction, materials, scantlings, equipment, etc. which were in force 6 months before the building of the ship was commenced on the building berth, with subsequent amendments applicable to ships which have been assigned class. The requirements, however, are not to be stricter than the latest Rules in force.

SECTION 2 CLASS NOTATIONS.

A. MAIN CLASS.

A 10 General.

11 Class A 1 indicates that the vessel including machinery and equipment satisfies the rule requirements for the assignment of class in Det norske Veritas.

12 Class A 2, A 3, or A 4 indicate that the vessel satisfies the Rule requirements, but that owing to the vessel's special type, general condition and/or age, the vessel is expected to carry lighter cargoes than vessels with Class A 1 (See Section 7A).
Furthermore, Class A 2, A 3 or A 4 indicate that shorter intervals between surveys are required.
For demotion to Classes A 2, A 3 and A 4
See Chapter III, Section 1.B.

B. RESTRICTED SERVICE.

B 10 General.

11 Ships which are assumed to be used within restricted areas, will be given class for restricted service, which is indicated by main class notation with one of the following additions :

B 20 The letter N indicates a service area which is restricted to :

21 The coast of Norway, the Baltic, the North Sea, Great Britain, the Orkneys, the Shetland Islands and the Fair Islands, including the fishing banks off the Fair Islands, Ireland east of 8^{o} Western Longitude, however, including Cork (Cobh) and the English Channel to and including Brest.

22 Enclosed areas like the Mediterranean and the Black Sea.

23 Areas outside Europe where the open stretches between easily accessible, well protected harbours, or protected coastlines behind islands or skerries do not exceed 400 nautical miles.

The vessel must, however, never proceed further out from the coast than a harbour or anchorage is to be found within a distance of 280 nautical miles.

B 30 Fishing.

31 Vessels with a class notation Fishing, See C 20, have an operational area restricted to coastal areas and open sea within 90 nautical miles from the coast.

B 40 The letter K with possible additions.

41 The letter K indicates operational area which is restricted to coastal trade within the areas which are indicated in B 20 above, which again means trading along coasts where the open stretches between easily accessible, well protected harbours or areas protected by islands or skerries do not exceed 75 nautical miles.
The ship must, however, never proceed further out from the coast than a harbour or anchorage is to be found within a distance of 45 nautical miles.

42 The letter K with addition Partly Sheltered indicates that the operational area is restricted to areas with such protection from islands or skerries that no open stretches exceed 25 nautical miles.

43 The letter K with addition Sheltered indicates that the operational area is restricted to areas with such protection from islands or skerries that no open stretches exceed 5 nautical miles.

B 50 Letter I.

51 The letter I indicates that the operational area is restricted to fully enclosed fjords, rivers or lakes.

B 60 Further additions.

61 The above mentioned restrictions may be extended or decreased geographically, or be given a time limit, for instance, K except Finnmark 1/10 - 1/4.

C. SHIPS FOR SPECIAL PURPOSE AND SHIPS WITH SPECIAL EQUIPMENT, ETC.

C 10 General.

11 The following additions to the main class indicate that the ship is built with special arrangements or with special equipment for particular purposes in accordance with the Rule requirements.

C 20 Fishing Vessels and Sealers.

21 Sealers: Ships which are built in accordance with the Rules, Chapter II, Section 18.

22 Deep Sea Fishing: Ships which are built in accordance with Rules, Chapter II, Section 19.

23 Fishing: Ships which are built in accordance with Rules, Chapter II, Section 19.

C 30 Other Special Notations.

31 Notation KMC : Ships which have refrigeration installation in accordance with Rules for the Building and Classification of Steel Ships.

32 Notation EO : Ships which are equipped with remote control and instrument control of machinery in accordance with Rules for Building and Classification of Steel Ships.

33 Experimental : Ships which have been built or designed in accordance with untried methods. Ships with this notation may be required to be put through survey at shorter intervals than usual.

D. SURVEY DURING CONSTRUCTION.

D 10 General.

11 Ships which in its entirety has been built under the survey of Det norske Veritas, will receive the symbol ✠ in front of the class notation.

12 Ships which have been built under the survey of another classification society and later has been assigned class in the Norwegian Veritas, will receive the symbol ✠ in front of the class notation.

SECTION 3. ASSIGNMENT OF CLASS.

A. REQUEST FOR ASSIGNMENT OF CLASS.

A 10 Procedure.

11 Request for supervision of a ship under construction for assignment of class is to be submitted by the builders.

12 Request for assignment of class to a ship not built under the supervision of the Society, is to be submitted by the ship's owners or by a person who intends to purchase the ship, after obtaining the owner's permission to do so.

A 20 Form of the request.

21 The request must be in writing and should be submitted to Veritas' Head Office via the local surveyors.

A 30 Duties of the person who requests assignment of class for a ship.

31 To provide access to the ship for the surveyor and to assist him so that the survey can be carried out in accordance with the Rule requirements.

32 As far as possible give the Society complete and correct information on all circumstances which he must understand are of importance for the Society when it decides whether or not the ship should be assigned class.

33 To pay expenses and fees which arise as a consequence of his request in accordance with the scale of fees of the Society.

A 40 Submission of drawings etc. for ships which are to be built under supervision.

When a ship is requested to be built under supervision the building yard must, before the building is commenced, submit to the Society :

41 The drawings which are mentioned in the separate chapters of the Rules.

The drawings must clearly show the proposed scantlings and arrangement for all the parts which are covered by the Rules.

42 The corresponding technical descriptions and data including material specifications and the data which according to the Rules are required in order to decide scantlings and arrangement.

A 50 Submission of drawings etc. for ships which are not built under supervision.

When a ship which is not built under the supervision of the Society is requested to be assigned class, whoever is submitting the request must, as far as possible, submit :

51 Drawings of the ship's hull, steering arrangements, machinery with shafting, boilers, pressure vessels, pumps and pipe arrangement, electrical arrangement and refrigerating arrangement.

52 Information re equipment and the materials which have been used in the ship with possible material certificates, also any other technical data which the Society may require.

53 Information as to whether the ship has or has previously had, class in any other Classification Society.

A 60 Number of drawings etc. which are to be submitted.

61 Drawings etc. must be sent to Head Office in 3 copies via the local surveyor. One copy of the drawings will be returned with the approval or comments from the Society.

B. APPROVAL OF DRAWINGS, ETC.

B 10 General.

11 When the drawings etc. which have been submitted in accordance with A 40 and 50 above, have been examined, the Society will inform whether the design, material, scantlings, equipment, arrangements etc. can be approved, or it will inform which alteration will be required in order to obtain approval.

12 Approval may be recalled at any time if new information indicates that the arrangement is not in accordance with the Rule requirements.

C. SURVEY.

C 10 Survey during Construction.

When a ship is being built under supervision of the Society, the Society will check :

11 That the various structural parts are formed and have scantlings in accordance with the Rule requirements and the approved drawings, and that the required material has been used.

12 That the material and those components which are to be used have been tested in accordance with Rule requirements.

13 That all work has been carried out to the satisfaction of the attending surveyor and in accordance with the Rule requirements and normal good practice.

14 That satisfactory tests are carried out to the extent and in the manner which has been prescribed in the Rules.

15 Survey during construction will be carried out at the building yard and/or subcontractors at the discretion of the Society.

The Society will also decide the extent and method of control.

C 20 Survey of ships which have not been built under the survey of the Society.

21 The survey is to be carried out in accordance with the regulations which apply for periodical survey of ships of no less than 12 years of age.

22 In addition to this, the surveyor must, as far as possible, ascertain that the ship's design, material, and scantlings and also machinery, equipment, and other arrangements, satisfy the Rule requirements.

D. ASSIGNMENT OF CLASS.

D 10 Surveyor's report. Interim Class.

11 When the survey has been completed, the surveyor will submit a report to Head Office recommending whether or not the ship should be assigned class.

12 If the surveyor is of the opinion that the ship meets the requirements applying to the Class in question, he may assign an Interim Class, and issue an Interim Class Certificate, which is valid until Head Office has checked the reports and decided whether or not a permanent Class should be assigned.

13 If the main requirements for the assignment of Class have been fulfilled, Interim Class may be assigned if recommendations are made at the same time, stating that the remaining work must be completed within a stipulated short time, or that new surveys or other measures are to be carried out during a trial period.

D 20 Decisions by Head Office.

21 Head Office will examine the surveyor's reports and decide whether the ship satisfies all the requirements for assignment of the Class in question.
Head Office will, on this basis, decide whether or not the ship should be assigned a permanent Class, or if the Interim Class should be confirmed, in which case Point D 13 above will apply.

D 30 Classification Certificates.

31 Classification Certificates for the ship will be issued for the Class which has been assigned to the ship.
Separate certificates may also be issued for propulsion machinery, and equipment which satisfy the Rule requirements.

D 40 Entry into Norwegian Veritas Register.

41 Ships which have been assigned Class must be entered in the Det norske Veritas Register, with indication of Class.

42 For ships which have been built under the supervision of the Society, the Class is stated, together with the year and month for completion of the building survey (month of build). For other ships is entered year and month for completion of the survey which is mentioned above under C 20 (the month of entry).

43 If the vessel is laid up after the delivery from the building yard, the Society can, after a sighting survey before the ship is entered into service, decide that the month during which the sighting survey is being completed, be entered as the month of build. The month of build can, however, not be entered later than 6 months after completion of the building survey.

SECTION 4. CURRENT CONTROL OF CLASSIFIED SHIPS.

A. OBLIGATIONS OF THE OWNER.

A 10 Information to the Society.

11 The Owners are obliged, on application, to give such complete and correct information re the ship and its use as the Society considers necessary in order to judge the condition of the ship and for questions in connection with maintenance of Class. Such information must be given by the Owners on their own initiative and without undue delay when it must be clear to them that the information is of importance to the Society.

A 20 Surveys.

21 A ship in class must be submitted to periodical surveys, survey of damages, control of repairs and control of rebuilding and alterations as described in the Rules, Chapter III.

A 30 Fulfillment of Recommendations.

31 The Owners are obliged to fulfill any recommendations which have been given by the Society in accordance with Rules, Chapter III.

SECTION 5. WITHDRAWAL OF CLASS.

A. CAUSES.

A 10 Defaults regarding surveys, recommendations, etc.

The Society may decide that the ship's Class should be withdrawn with immediate effect or after a specified period of time, if :

11 The Owners do not comply with their duty to request surveys. See Section 4, A.20 above,

12 The Owners do not comply with their duties in connection with the survey,

13 The Owners do not comply with their duties to inform the Society about repairs of the ship,
See Section 4, A.20 above,

14 The Owners do not comply with their duty to submit the ship to survey during conversion, See Section 4, A 20 above,

15 The Owners do not, within the stipulated time, comply with requirements in recommendations which have been informed them in accordance with Section 3, D 10 and 20 in this Section, or in accordance with Chapter III.

A 20 Failure to pay fees, etc.

21 If the Society's fees are not paid within the stipulated time, the Society may withdraw the ship's Class after one month's written notice.

This also applies where payment is due from a shipyard or from a ship's previous Owners.

A 30 Other reasons for withdrawal of Class.

31 The Society may withdraw a ship's class with one month's written notice if the Owners or the Owners' representative wilfully or negligently :

31 Grossly or repeatedly has infringed the regulations for the use of the ship as specified or assumed when the Class was assigned.

Such regulations are specified in the Rules or in recommendations which have been issued.

32 Grossly or repeatedly has neglected his duty to give information.

B. PROCEDURE FOR WITHDRAWAL OF CLASS.

B General.

11 The decision to withdraw a ship's Class will be made by Head Office.

12 The Society's decision will be sent in writing to the Owners.

B 20 Conditional withdrawal of Class.

21 The withdrawal of Class may be made conditional in such a manner that it will only take effect if the Owners do not, within a specified time, correct those conditions which have caused the withdrawal of Class.

B 30 Partial withdrawal of Class.

31 If the Owner's omission in accordance with Section 5, A above covers conditions which concern only a notation to the Main Class, See Section 2, C, the withdrawal of Class may be restricted to cover the actual notation in question.

B 40 Re-Classification.

41 If the circumstances leading to withdrawal of Class no longer exist, the Society may, on request, reinstate the ship in its original Class.

As a condition for reinstatement, the Society may request that the ship be subjected to a survey or to certain specified improvements.

The requirements in Section 3, D 10 and 20 have similar applications.

SECTION 6. SUNDRY REGULATIONS.

A. GENERAL.

A 10 Information to Owners.

11 Information which, according to the Rules, should be given to the Owners, may be given to the ship's Master or another representative from the Owners.

A 20 Transfer of ownership

21 A classified vessel will retain its class even if the vessel is transferred to new ownership.

If a ship is transferred to another owner, the Society must immediately be informed in writing.

Until such has been done, information from the Society may, with binding effect, be sent to the previous owners.

SECTION 7. SUNDRY BASIC ASSUMPTIONS.

A. TREATMENT OF THE VESSEL.

A 10 General.

11 The building rules are based on the assumption that the vessel receives ordinary, seaman-like, treatment, in particular with regard to the stowing of heavy cargo, distribution of ballast and bunkers, possible grounding, reduction of speed in heavy weather, and also that the necessary steps will be taken in order to make the ship easy in a sea-way.

12 If it is necessary to place a large amount of cargo, bunker or ballast on a restricted area of the bottom, it is a condition that suitable strengthening will be arranged.

Heavy cargoes must be placed on a solid platform of sufficient area substantially attached to the inner bottom.

A 20 Assumed cargoes for vessels with a specific class.

21 Wooden ships with a specific class are assumed to be able to carry a full load of cargo with the following weight in tons per cubic metre stowage :

Class	A1	A2	A3	A4
Stowage tons/m^3	All	up to 4.0	up to 1.5	up to 0.75
Corresponding Weight-class	1 - 5	2 - 5	3 - 5	4 - 5

Weight class for various cargoes is given in Addendum 2 at the rear of this book.

22 Vessels with a lower class than A 1 are assumed to be able to carry a certain proportion of cargoes which have a greater weight per cubic metre than is assumed through the ship's class.

See the following table :

Weight-Class.	Proportion of Full Cargo Load (%)			
	Ships Class			
	A1	A2	A3	A4
1	100	85	70	60
2	100	100	80	70
3	100	100	100	85
4	100	100	100	100

23 If a vessel with a lower class than A 1 carries a mixed cargo, it is assumed that the percentage of cargoes to different weight classes is such that the strain on the ship will not be greater than assumed for its class. Examples on compound cargoes are given in the following table :

Examples on the application of the Rules re weight classes.

The amount of the various cargoes under the various weight classes is indicated in percent (to the nearest full figure) of the weight of a full cargo.

	For ships with Class A 2					For ships with Class A 3					For ships with Class A 4				
	Weight class of goods					Weight class of goods					Weight class of goods				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1 type goods	-	100	-	-	-	-	-	100	-	-	-	-	-	100	-
2 types goods	67	-	-	-	33	44	-	-	-	56	30	-	-	-	70
	58	-	-	42	-	33	-	-	67	-	-	45	-	-	55
	50	-	50	-	-	-	66	-	-	34	-	-	67	-	33
						-	50	-	50	-					
3 types goods	60	10	-	-	30	40	-	-	14	46	25	-	-	17	58
	50	25	-	-	25	30	-	-	47	23	20	-	-	34	46
	40	40	-	-	20	40	-	9	-	51	10	-	-	68	22
	30	55	-	-	15	30	-	32	-	38	25	-	11	-	64
	20	70	-	-	10	20	-	54	-	26	20	-	22	-	58
	10	85	-	-	5	10	-	76	-	14	10	-	45	-	45
	50	12	-	38	-	40	6	-	-	54	25	7	-	-	68
	40	27	-	33	-	30	21	-	-	49	20	15	-	-	65
	30	42	-	28	-	20	36	-	-	44	10	30	-	-	60
	20	57	-	23	-	10	51	-	-	39	-	40	-	11	49
	10	72	-	18	-	30	5	-	65	-	-	30	-	34	36
	40	15	45	-	-	20	20	-	60	-	-	20	-	56	24
	30	30	40	-	-	10	35	-	55	-	-	10	-	79	11
	20	45	35	-	-	-	60	-	14	26	-	40	7	-	53
	60	-	16	-	24	-	50	-	36	14	-	30	22	-	48
	50	-	38	-	12	-	60	9	-	31	-	20	37	-	43
	45	-	49	-	6	-	50	24	-	26	-	10	52	-	38
	50	-	18	32	-	-	40	39	-	21	-	-	60	11	29
	40	-	40	20	-	-	30	54	-	16	-	-	50	26	24
	30	-	63	7	-	-	20	69	-	11	-	-	40	41	19
	60	-	-	24	16	-	10	84	-	6	-	-	30	56	14
						-	40	14	46	-	-	-	20	71	9
						-	30	29	41	-	-	-	10	86	4
						-	20	44	36	-					
						-	10	59	31	-					

CHAPTER II

RULES FOR THE BUILDING OF WOODEN SHIPS.

SECTION 1. GENERAL REGULATIONS AND DEFINITIONS.

A. CLASS.

Wooden ships which are built to the Rules in this Chapter may be given Class A 1 with the additional notations as indicated in Chapter I, Section 2.

B. REFERENCES.

B 10 General.

11 For the following items, refer to Steel Ship Rules, as far as same are applicable for wooden ships :

Machinery with pumps and pipe lines, etc.
Electrical Installation.
Rudder and steering arrangement.
Equipment (Anchors, anchor cable and anchor windlass).

C. DEFINITIONS.

C 10 Main Dimensions.

11 The ship's length L is the distance between forward and after perpendicular, but is not to be taken as less than 96% of the length of the water line at the ship's summer freeboard.
The forward perpendicular F.P. is a vertical line at right angles to the summer loadline through this line's intersection with the fore side of the stem.
After perpendicular A.P. is a vertical line at right angles to the summer loadline through this line's intersection with the aft side of the rudder post.

For ships with no rudder post A.P. is taken at the intersection of the summer loadline with the centreline of the rudder stock. See Fig. 1.

12 The ship's breadth B is the greatest breadth over the outer planking.

13 The ship's depth D is the vertical distance measured at the middle of the length L, from the underside of the rabbet in the keel to the upper edge of the beam at side for the uppermost deck.

D. DRAWINGS.

D 10 Approval of Drawings.

11 When a wooden ship is to be built to class in Det norske Veritas, the following drawings of the hull together with information about equipment, etc. must first be approved by the Society :

Midship Section with details of the connections keel/frames and frame/beam.

Longitudinal Section and Deck Plan.

Bulkheads.

Keel and stems.

Engine seatings.

Deck house and companionways with details which indicate sill heights and closing arrangements.

Cargo hatches and cargo hatch covers.

Mast and standing rigging, with information re length of cargo derricks and loads, dimensions and placing of stays and shrouds.

Support of masts, power block, trawl gallows, winches etc. Type and lifting power of a power block should be indicated.

Rudder and steering arrangement with details of rudder stock, rudder bearings including carrier, possible type of steering engine. Equipment with information re type and size of anchors, quality and dimensions of anchor cable, type and breaking strains for steel- and fibre ropes. Type of windlass.

13 Information re type of material which is intended for use for the various parts of the ships must be given on the drawings.

14 The drawings should normally be sent to Head Office through the local surveyor who, in a covering letter, should indicate the alterations which he deems necessary. The drawings must be submitted in three copies, plus one extra copy for each sister ship.

15 The drawings must be submitted in good time before building is commenced.

E. EXECUTION OF THE WORK.

E 10 General.

11 The work must be carried out in a craftsman-like manner. Every fault must be corrected to the satisfaction of the surveyor.

E 20 Wood-work.

21 Wood-work should normally be carried out at works which have experience in building and repair of wooden ships. If not, Det norske Veritas' approval must be obtained before the work is commenced.

E 30 Welding.

31 Important welding must be carried out by welders who have been approved by Det norske Veritas.

F. SCANTLINGS.

F 10 Scantlings for material other than fir.

11 All formulas for scantlings are based on Scandinavian fir with quality as indicated in Section 2.

When materials other than fir are used for frames, keel and beams, the Rule requirements for section modulus for these items should be multiplied by a factor f in accordance with the following table :

Material :	f.
Beech	0.85
Teak	0.90
Oak (except American red oak)	0.95
Fir	1.00
Pine	1.10
American red oak	1.15

Based on tests of the material's strength the factor f can, however, be specially judged.

12 If other materials are used than those which are mentioned in Table in 11, factor f will be individually assigned.

F 20 Scantlings obtained through direct calculations.

21 As strain on the hull for calculation purposes, should be used a pressure corresponding to a water depth D at the keel, with linear reductions to 0.25 D at the deck corner.

22 Acceptable stresses may be taken from Norwegian Standard 446 "Rules for calculation and execution of wooden structures".

SECTION 2. MATERIALS.

A. WOODEN MATERIALS.

A 10 General.

11 Wooden material for use in ships which are to be classed in Det norske Veritas, must be approved by the Society.

The materials should normally be sorted, stored, if necessary impregnated, etc. in accordance with the Rules in this Section.

12 Wooden materials which are not mentioned in the Rules may be judged for acceptance in each individual case.

A 20 Material Quality.

21 Material from pine and fir should, normally, be of a quality which corresponds either to :

4th quality in Østlandske sorting rules or

1st quality in Instructions and measuring rules for wooden material for Trøndelag, or similar, as far as the above mentioned sorting rules are practically applicable, however, with the following alterations :

Material which has grown to shape should be used where the shape of the ship requests it.

Blue material may be used.

Planks for skin and deck and also boards for laminated material must be sharp edged after planing.

22 Different materials from pine and fir must have a quality corresponding to the requirements in 21 above. Beech must be pressure impregnated, but may be used non-impregnated below light water line.

The following qualities of oak may be used :

Quercus robur (summer oak)

" petraca (winter oak)

" alba (American white oak)

" rubra (American red oak))
" falcata (American red oak)) American red oak must be pressure-impregnated.

23 Plywood must be glued with an approved, water-resistant glue. *)

A 30 Drying and impregnating.

31 Wooden material must be dried immediately after sawing (to a moisture content less than 20%), and must be kept dry both during transport and storing.

32 Impregnating media must be approved by Det norske Veritas. They must not cause fretting or corrosion on steel or metal parts and must have no adverse effect on the glue or the gluing process when using laminated materials. **)
In order to have laminated parts approved as being pressure-impregnated, the impregnation must be carried out before gluing. A declaration which indicates impregnating medium and method, must be submitted with the materials.

B. STEEL AND ALUMINIUM.

B 10 General.

11 Steel and aluminium which is to be used in wooden ships must be of a quality as prescribed in the Steel Ship Rules. Aluminium alloys for deck houses and casing must be sea water resistant. Material certificates or material descriptions must be submitted.

SECTION 3. LAMINATED STRUCTURES.

A. GLUE, WORKS FOR PRODUCING LAMINATED PARTS.

A 10 General.

11 Production of laminated parts must be carried out at works which have been approved by Det norske Veritas or in factories which are subject to public control.

12 The glue must be approved by Det norske Veritas. Storing, mixing and application of the glue must be carried out in accordance with instructions from the manufacturers.

13 Books must be kept of the gluing procedure and, on request, the books must be shown to the surveyor.

*) Plywood must satisfy British Standard No. BS 1088:1966 or BS 4079:1966.

**) Impregnating material must be approved by the national authorities with regard to poison.

B. PRODUCTION OF LAMINAE.

B 10 Thickness of laminae.

11 After drying and possible joining of parts for the individual laminae, these must, just before the gluing, be planed smooth on both sides.

12 The thickness t in cm. of the laminae must not be greater than indicated in the following table, dependent on the bending radius (R) in cm :

Type of wood	Fir		Oak	
Straight parts	$t = 3.2$		$t = 2.0$	
	R less than 100 cm.	R greater than 100 cm.	R less than 75 cm.	R greater than 75 cm.
Curved parts	$t = \frac{R}{100}$	*) $t = \frac{0.6R}{100} + 0.4$	$t = \frac{R}{75}$	*) $t = \frac{0.8R}{100} + 0.4$

*) However no greater thickness than what is indicated for straight parts.

13 Each laminae must not have greater variation in thickness than 0.25 mm.

The laminae must, before gluing, be absolutely clean without any grease, oil, pencil marks, or anything else which may prevent a good adhesion.

B 20 Joining of parts for individual laminae.

21 Possible joining of the various laminae must be carried out before gluing to other laminae. A scarphed joint must be used or else a finger joint with a glued area at least 12 times the cross section of the laminae. The finger jointing must be tested before it is allowed to be used.

22 For strength members or part of strength member with a bending radius less than 5 m. the distance between the joints must be at least 0.8 m. 0.6 m. and 0.4 m. for joints in laminae which are positioned next to each other, or with one or two laminae between them, respectively. When the bending radius is greater than 5 m. the distance between joints in two laminae next to each other must be at least 24 times the thickness of the laminae.

C. GLUING AND HARDENING.

C 10 Requirements for environments.

11 The temperatures in the gluing shop and in the material and glue must during the whole of the gluing, hardening and after hardening processes, be at least 15°C. Relative moisture content in the shop must not be less than 65%. There must not be unnecessary draughts in the shop.

C 20 Moisture in the laminae.

21 The laminae must have a moisture content between 8 and 15 %, however, there must be less than 5 % difference in moisture between laminae in the same strength member. From each drying load moisture test must be taken from at least 5 boards.
The tests are to be taken at least 60 cm. from the end of the boards.

C 30 Gluing and hardening.

31 The glue should be mixed in a mixing machine. It should be applied to each side of the laminae with an arrangement which ensures an even application. The applied amount of glue must be checked with regular intervals.

32 During compression there must be used compression boards for even distribution of the load with a thickness at least equal to that of the laminae. If this thickness is less than 19 mm. two boards for distribution of load should be used on either side. The boards for distribution of load must have at least the same width as the laminae. Other methods which will give equally good distribution of the loads may be used. When curved parts are to be glued, the compression should start at the middle and be worked gradually out to the ends.

33 The pressure during hardening should be from 8 to 10 kp/cm^2 for laminated parts from fir or other loose types of wood and from 12 to 16 kp/cm^2 for laminated parts from oak or other hard woods.

The pressure must be checked and adjusted 30 to 45 minutes after the initial compression. Compression time for glue from fenolresorsinol must be at least 16 hours.

34 The hardening temperature must be minimum 40^{o}C.

C 40 After-hardening.

41 After the parts have been removed from the press, they must be stored indoors during at least 7 days at 15^{o}C.

The time for after-hardening may be reduced somewhat if the temperature is increased accordingly. Other combinations of hardening temperatures and hardening pressure than those indicated above and which give equally good results, may be used after consulting Det norske Veritas.

D. TESTI NG.

D 10 General.

11 Laminated strength members must be tested at a testing installation which has been approved by Det norske Veritas.

12 The test pieces must be taken directly from the glued parts.

The parts must, therefore, be given sufficient extra lengths, This extra length must be glued under the same pressure as the remaining part of the member.

The test must comprise the total sectional area and have a length which is at least 150 mm. + 7 mm. for each laminae. The test pieces must not be given any other after-treatment than what the actual strength member has been given.

13 Tests must be taken from at least 10% of frames and beams and from all important longitudinal strength members.

The surveyor may request that more tests from frames and beams should be taken if he so deems necessary.

SECTION 4. FRAMES AND FLOORS, BULWARK STANCHIONS.

A. FRAME SPACE.

A 10 Rule frame space.

11 The Rule frame space for laminated frames is :

$$s = \frac{L}{100} + .3 \text{ metre}$$

L = the ship's length in metres.

12 For double built timber frames the Rule frame space is 5 cm. greater than indicated in 11.

13 Forward of 0.2 L from forward perpendicular the frame space should not exceed 3/4 of the frame space in the ship otherwise.

14 For ships with restricted service K or I the frame space may be increased by 5 or 10 cm. respectively.

B. LAMINATED FRAMES. FLOORS.

B 10 Frames within 0.4 L amidships.

11 Frame must have a minimum section modulus :

$$W = 45\ h\ s\ l^2\ cm^3$$

$$h = \left(\frac{L}{100} + 0.5\right) * 2.5 + D_1$$

l = the length for the determination of scantlings in metres and is to be measured on the midship section as indicated in 12 or 13.

L = length of the ship in metres.

D_1 = depth of the ship in metres, measured at B/4, See Fig. 2. D_1 is not to be taken less than 0.05 L + 1.6 metres.

s = frame space in metres, from middle to middle of frame.

For calculation of section modulus, see example Page 76.

12 For concave frames (See fig. 4a and 4b) the length which determines the scantlings is

$$l = l_o - 3f + 0.3R$$

l_o = the length in metres of the straight part of the frame in bottom, See fig. 4 A.

When the radius in the bilge is not constant, l_o is to be measured as indicated in fig. 4B.

f is measured in metres as shown in fig. 4 B.

R is curvature radius measured in metres, See fig. 4A and 4B.

13 For S-shaped frames the length which determines scantlings is measured as indicated in Fig. 4C and 4D.

D_1 is not to be less than 2/3 of D.

$$K = \frac{l_1}{l}$$

l_1 = the length of frame which determines scantlings and is to be determined in accordance with B 13 for G-shaped frames forward and aft. The length is to be measured on a frame which is situated about 0.2 L from fore or after perpendicular, respectively.

l = the length of the midship frame for determination of scantlings.

K		No. of stringers.
After Body	Fore Body	
Less than 1.25	Less than 1.40	1
From & incl. 1.25 to 1.40	From & incl. 1.40 to 1.65	2
1.40 and over	1.65 and over	3

If the table gives different number of stringers in the fore and after part of the ship, the greatest number is to be used.

23 Scantlings and placing of stringers are indicated in Section 7.

B 30 Floors on laminated frames.

31 If the frames continue across the keel, the height over keel must be 1.5 times the height of the frames otherwise.

32 Every half frame must be connected across the keel by floors. The floors in the fore and after body of the ship may be combined with fore and after breasthooks.

14 When stringers are fitted to S-shaped frames, the value of the formula in 11 must be multiplied by the factor F 1 :

F 1 = 0.9 for one stringer

F 1 = 0.8 when two or more stringers.

15 The formular in 11 gives the nett scantlings of the frame. Bolt holes must be compensated for by giving the frame's breadth an increase like the diameter of the bolts in the outer skin.

B 20 Frames forward and aft (outside 0.4 L amidship).

21 Frames forward and aft may be dimensioned in accordance with B 11. The requirement for section modulus for the frames at the ship's end will then normally be greater than the requirement for section modulus for the frames amidship. If it is desired to keep the scantlings of the frames at ends like the scantlings for the frames amidship, the number of stringers may be increased beyond what is indicated in Section 7. The number of stringers is determined by the factor K. (The number may, however, not be less than required in Section 7).

33 Floors from solid timber shall have a section modulus which is 2.25 times that of the frame calculated in accordance with B 10.

34 Floors made from plywood should have a section modulus 3.25 times that of the frame calculated according to B 10.

35 Floors from steel shall have a section modulus which equals at least 1/3rd of the section modulus of the frame calculated according to B 10.

36 The length of the floor from centre of keel to the outermost bolt in the arm shall not be less than :

$$l = B/10 + 0.2 \text{ metres.}$$

B = the ship's breadth in metres.

37 For calculation of section modulus, see example Page 78.

C. DOUBLE BUILT TIMBER FRAMES AND FLOORS.

C 10 General.

11 Frames and floors must have scantlings as indicated in C20 - C40.

The thickness is to decrease or increase evenly between the points where the dimensions are indicated.

All timbers must have full corners.

12 The two timbers must be planed so that they fit well on to each other.

13 When there is a spacing between the timbers, distance pieces should be fitted where the frame bolts can pass through.

C 20 Frames.

21 Each frame timber should at the lower end of the bilge have a section modulus which is 1.5 times that which is calculated according to the formulas in B 10.

22 From the lower part of the bilge and upwards, the scantlings of the frames may be reduced as indicated in Table 1.

23 The overlapping of futtocks must not be less than B/10 +Q2 metres, where B = the ship's breadth in metres. The ends of the futtocks must have full thickness and join up closely. Filling pieces are not allowed.

C 30 Floors.

31 The floors must over the keel have a height 1.4 times that of the frame at the lower part of the bilge.

32 The floors should be made as long as possible, and must be double with unequal length of arms, so that on either side of the keel are alternately a short and a long arm.
The two floor timbers must have an overlap towards each other which is not shorter than :

$$\frac{B}{10} + Q.2 \text{ metres}$$

B = the ship's breadth in metres.

Where side keelsons are fitted over the overlaps the length of the overlaps may be somewhat modified. The overlap must, however, be sufficiently long to allow the side keelsons to have a complete foundation and bolt attachment also to the shorter arm of the floor. Where on account of the shape of the hull, it is not possible to obtain materials which are grown to the shape which is required for the floors, or where the overlaps cannot be arranged as required, an efficient transverse connection will have to be arranged otherwise.

C 40 Reinforcement in engine room and at hawse pipes.

41 Under the engine seating and in its entire length must be fully timbered if the engine's R.P.M. is less than 1000.

42 Around the hawse pipes there must be no spacing between timbers.

D. BULWARK STANCHIONS.

D 10 Stanchions above deck.

11 Bulwark stanchions should preferably be positioned on top of the deck. The design of the stanchions and the fastening to deck will be examined for approval in each individual case.

D 20 Through Bulwark Stanchions.

21 The stanchions must have at least the same scantlings as the top of the frames. The stanchions must extend at least 75 cm. under the deck stringer planking, and must be properly fastened.

SECTION 5. KEEL AND KEELSON.

A. LAMINATED KEEL.

A 10 **Scantlings.**

11 The keel must not have a section modulus less than :

$$W = 0.5 \frac{D1}{D} L \frac{W\ frame}{s} \quad cm^3$$

W frame = section modulus of midship frame determined in accordance with B 11.

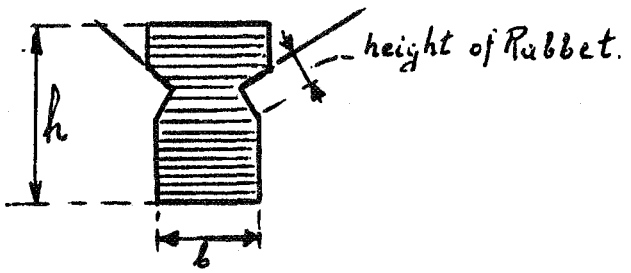
s = frame spacing in metres.

L = ship's length in metres.

D 1 = ship's depth at the quarter breadth.

D = ship's depth at centreline.

12 The keel's height/breadth relation (h/b) must not be greater than 3.



When L/D is greater than 7, the Rule requirements for the section modulus of the keel is to be multiplied by the factor f :

$$F = \frac{L/D - 2}{5}$$

B. KEEL AND KEELSON MADE FROM BOLTED TIMBERS.

B 10 Scantlings.

11 Keel and keelson must have minimum scantlings as indicated in Table 2, as a function of the product L x B x D.

12 If the equation D_1 / D is greater than 0.8 ($L \times B \times D$) should be multiplied with the factor

$F = 1.25 \ D_1/D$

and the scantlings are taken from the table for the last mentioned product. This factor is to be used only for scantlings for keel and keelson.

B 20 Length of keel pieces. Scarphing.

21 If the ship's keel length is less than 25 m. keel and keelson must not be made up of more than 2 pieces each. If the length is over 25 m. but less than 35 m. keel and keelson must not be made up from more than 3 pieces each, and if the length is over 35 m. from not more than 4 pieces.

22 If the height of keel or keelson exceeds 35 cm. they may be built up from two pieces in height.

23 Scarphs in keel and keelson must not be vertical. The scarphs must not be shorter than 6 times the prescribed height of timber, but need not be longer than 2m.

24 The scarphs are to be locked. The locking pieces must be made from hard wood and must have the fibres running across the scarph.

25 The scarphs must be arranged in such a manner that the distance between a keel scarph and keelson scarph will be at least 3 metres measured from half length to half length of scarph.
When keel and/or keelson is made in several heights, the joints in the various parts must be well clear of each other.

B 30 Fastening of Keelson.

31 The keelson is to be secured with substantial wooden knees to the stem and post. See Fig. 3.

C. KEEL AND KEELSON MADE FROM STEEL.

C 10 General.

11 Keel and keelson may be made from steel, provided they are of equal strength to what is indicated in Table 2.
A steel keelson must be connected to the stem and post with angle bars or other satisfactory means.

D. RABBETS.

D 10 General.

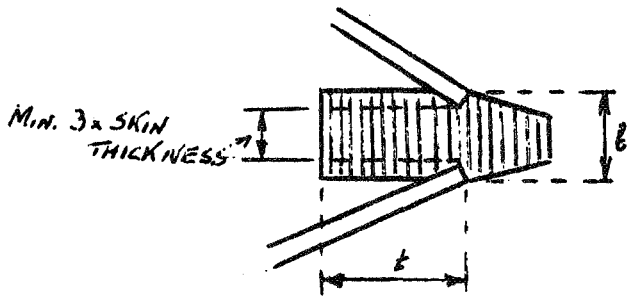
11 Rabbets in keel must in its entirity be in the permanent fixed keel.

See sketch under A12.

SECTION 6. STEM, STERNPOST AND SOLE PIECE.

A 10 Stem and Sternpost of Wood.

11 The stem and sternpost must have a breadth b and thickness t no less than the breadth of the keel. Forward of the rabbet the thickness of the stem may be reduced. The thickness t of a laminated stem is to be measured as shown on the sketch below :



12 Stems from solid timbers must not be made in more than 2 lengths. The scarphs must not be shorter than 3½ times the thickness of the stem measured fore and aft (t). An apron must be fitted with the same scantlings as the stem.

13 The propeller post must be of sufficient dimensions to allow the nett thickness of wood on either side of the sterntube to be at least 25% of the prescribed transverse dimension of the post. The propeller post must normally extend up to the deck and be bolted to a deck beam.

A 20 Stem and Sternpost of Steel.

21 Stem and sternpost may be made from steel.
In that case, they must be of sufficient dimensions and be securely fastened to the remaining parts of the hull, and a rabbet must be arranged for attachment and caulking of the skin planking.

A 30 Fastening of Stem and Sternpost.

31 The stem and sternpost are to be attached to the keel with solid wooden knees (forefoot knee and sternpost knee) which must extend sufficiently high up along the stem and sternpost. On the sides must be fitted solid steel straps over the joints keel/stem and keel/post.

32 The propeller post must be tapped into the keel, or must be otherwise secured against being dislodged.

A 40 Rabbet.

41 The facing for the skin plank in the rabbet on the stem and sternpost must be at least 1.5 times the thickness of the skin.

B. SOLE PIECE.

B 10 Sole Piece from Steel.

11 The sole piece must have a section modulus over the vertical axis which nowhere abaft the fore end of the propeller post is less than :

$$W = A1\ V^2\ cm^3$$

A = the total area of rudder and rudder post in m^2 if necessary increased for parts which may have been attached to the Rudder Stock.

1 = distance in m. from centreline of pintles or rudder stock, to the actual section of the Sole Piece.

V = ship's speed in knots. Normally not to be less than 10.

12 The Sole Piece is to be attached to the keel through a forward extension which extends to 0.03 L forward of forward side of the propeller post. On the part which extends forward of the propeller post the dimensions may be gradually reduced.

SECTION 7. STRINGERS.

A. STRINGERS ON GLUED, LAMINATED FRAMES.

A 10 Number off and placing.

11 On S-shaped frames with length exceeding 1.5 metres stringers must be arranged in accordance with the following table :

Length of frame (l) in m.	No. of Stringers
1.5 - 2.5	1
1.5 - 4.0	2
4.0 and over	3

The length l of the frame is measured along the inner edge of the frame from the underside of the deck beam to the lower end of the frame.

As "the lower end of the frame" is taken the middle of the bolt connection between frame and floor. If the frame extends continually across the keel, the upper edge of the frame in the ship's centreline is taken as "the lower end of the frame."

For S-shaped frames in the fore end of the ship where the midship frame is not S-form, see also Sect. 4.B.21.

12 The stringers are placed in accordance with the following table :

No.	Distance from lower end of frame to :		
	1. Stringer	2. Stringer	3. Stringer.
1	0.40 l		
2	0.25 l	0.55 l	
3	0.20 l	0.40 l	0.70 l

13 The stringer shall as far as possible, follow the run of the planks in the outer skin.

A 20 Scantlings.

21 Laminated stringers must not have a less transverse area than indicated in Table 2, Column 9.

When several stringers are fitted and all are laminated, the area of the second and third stringer counted from bottom, may be reduced with 20 and 40 per cent respectively, in accordance with the Table values.

22 If the stringers are not of a laminated design, the transverse area must be increased by 50% in relation to the values in 21.

The planks in the stringers must be scarphed and no scarph must be less than 0.2 L (min. 4 metres) from stem and sternpost.

The scarphs must be horizontal with a length at least equal to $3\frac{1}{2}$ times the breadth of the timber.

23 Stringers must extend to the stem and sternpost.

In two frame spaces nearest the stem and stern filling timbers must be fitted between stringers and skin planking. The filling timbers must be well fitted.

24 If filling pieces are glued into each frame space along the stringers the transverse area of the stringers may be reduced by 30%.

B. STRINGERS ON DOUBLE BUILT TIMBER FRAMES.

B 10 Scantlings and placing.

11 Stringers shall have dimensions not less than indicated in Table 2, Columns 7 and 8.

12 Stringers must always be fitted in the bilges.

SECTION 8. DECK BEAM CLAMPS, SHELVES AND CEILING.

A. CLAMPS AND SHELVES.

A 10 Scantlings.

11 Scantlings of Clamps and Shelves are given in Table 2.

12 When Clamps and Shelves are laminated, the cross section area may be reduced by 20% in relation to the table.

13 On double built timber frames, both Clamp and Shelf should normally be fitted. Shelf may be omitted provided the clamp is given a cross section area equal to the sum of areas for Clamp and Shelf as given in Table 2.

14 On laminated frames, Shelf only is required.

15 Deck Beams must not be notched into the Clamp unless the remaining net area of the Clamp meets Rule requirements.

A 20 Scarphs.

21 The individual timbers in Clamps and Shelves are to be joined by scarphs of a length at least 3½ times the breadth of the timber. The scarphs should be horizontal in clamps and vertical in shelves. Clamps and shelves may be built up from two thicknesses provided there are 3 metres between butts and the individual parts are substantially bolted to each other.

B. CEILING OR INNER SKIN.

B 10 Ships with laminated glued frames.

11 With laminated frames it is normally not required to fit ceiling or inner skin in ships with a length L less than 25 metres.

B 20 Ships with double built timber frames.

21 Ceiling or inner skin must be well fitted and must have a thickness not less than indicated in Table 2.

22 For ships with a length equal or greater than 30 metres the thickness of ceiling or inner skin, between the stringer and the beam clamp, must not be less than 0.8 times the thickness of the stringer. Further, for ships of this size, the inner skin between the stringer and the beam clamp must be bolted in and out as required for the stringer.

B 30 Air Courses.

31 There must be a sufficient number of air courses in order to allow air circulation between the frames. If the openings between beams for the greater part are covered by knees, air courses must be arranged in the strake nearest to the beam clamp. Sufficient and good air circulation must be arranged between the frames.

32 Advice.

Out of consideration for later survey of the ship, it is advised that already from the building of the ship, air courses are arranged in the ceiling immediately below the stringer on both sides in the fore and after peaks.

SECTION 9. BEAMS, GIRDERS AND STANCHIONS.

A. BEAMS.

A10 Placing.

11 When laminated glued frames and beams are fitted, there must be a beam for each frame. Frame and beam must be in the same plane (not alongside each other) and be connected with hanging knees.

12 Beams on double built frames must be arranged with their ends butting on to the frame top timbers. The beam spacing must not be more than 2 frame spaces.

A20 Scantlings.

21 Laminated deck beams must have a section modulus no less than:

$$W = 60\ s\ h\ l^2\ cm^3$$

s = beam space in metres, measured from centre to centre.

h = 0,175 B metres, minimum .5 metres.

B = ship's breadth in metres.

l = the beam span in metres, measured from the inner edge of frame to inner edge of frame, from inner edge of frame to centre of girder, or from centre to centre of girders.

l is not to be taken less than 0,3 B.

For calculation of section modulus, see example Page 77.

22 Halfbeams may be given scantlings in accordance with the formula above when the span of the beams in the formula is given the value:

$$l = \frac{l_o + B/2}{2} \text{ metres}$$

l_o = length of the halfbeam in metres.

23 Beams which are not laminated, must have a section modulus which is 30 % greater than for laminated beams.

B. DECK GIRDERS.

B10 Laminated Deck Girders.

11 The girders must have a section modulus no less than:

$$W = 70\ b\ h\ l^2\ cm^3$$

b = the breadth in metres of the supported deck area. The breadth is measured from middle to middle of beamspan on either side of the girders.

h = 0,175 B metre, minimum 0,5 metre.

B = ship's breadth in metres.

l = the span of the girders in metres, measured from centre to centre of the supports.

B20 Laminated Beams at Deck Openings.

21 Hatch end beams and beams at the ends of engine room openings must normally be supported in the ship's centreline. The section modulus must then not be less than:

$$W = 50\ b\ h\ l\ S\ cm^3$$

b = distance from ship's centreline to the middle of the span of the half beams, measured in metres.

l = half length of the hatch or engine-room opening in metres.

h = 0,175 B metres, minimum 0,5 metres.

S = the span of the hatch end beams in metres from inner edge to inner edge of frame.

22 Without support in the centreline the hatch end beam must have a section modulus 4 times greater than calculated in accordance with formula in 21.

23 With a stanchion in each hatch corner the hatch end beams may have the same scantlings as the remaining deck beams.

24 Carlings at hatch- and engine room openings must have the same cross section area as the hatch end beams. The carlings must be secured to the hatch end beams and to half beams with horizontal knees.

B30 Girders and Hatch End Beams which are not Laminated.

31 Girders and hatch end beams which are not laminated must have a section modulus 30 % greater than for laminated structures.

C. STANCHIONS.

C10 General.

11 Stanchions must normally be made from steel.

12 Scantlings of stanchions under beams and girders in deck must be at least as indicated in tables 5a and 5b.

C20 Various Stanchions.

21 There must be a stanchion or other efficient support under windlass, winches and other large weights. Scantlings of the support will be calculated in each case.

SECTION 10. KNEES AND RIDERS, FORE AND AFT BREAST HOOKS.

A. HORIZONTAL KNEES.

A10 General.

11 Horizontal knees must be fitted at hatch end beams and at beams at the ends of engine room openings and other deck openings when the distance between end beams is greater than 2 beam spaces, and also at the side of the masts.

12 The knees must be made of steel and have an arm length at least equal to one frame distance. Scantlings otherwise as given in B13. The knees must be fastened with 13 mm through bolts.

13 Halfbeams are to be attached to hatch side coaming or carlings by horizontal knees or angle sections on either side of the beams.

The angle sections must have an arm length along the half beam of at least 100 mm.

B. HANGING KNEES AND RIDERS.

B10 Knees and Riders on Double Built Timber Frames.

11 Ships with a depth D equal to 3 metres or less must have one knee for each beam.

Ships with D greater than 3 metres, must have alternatively one knee and one rider for each beam.

12 Knees and riders are to be fitted vertically over the middle length of the ship. Towards the ships ends they must be fitted slanting with the lower part pointing forward in the fore end of the ship and aft in the after part of the ship.

13 Knees and riders must be made of steel with dimensions at least 65 x 19 mm with a welded-in plate bracket. The plate bracket must be at least 10 mm thick and have at least 300 mm arm lengths.

The brackets may have a rounded inner edge.

14 The arm length of the knees must be at least 500 mm to the beams and 1000 mm to the frame.

15 Arm length of the riders must be at least 600 mm to the beam. Along the frame, arm length must be sufficient to allow the lower end of the rider to be attached with at least one bolt to the floor.

B20 Hanging Knees on Laminated Frames.

21 There must be hanging knees on each beam. Riders are not required. The plate bracket must have dimensions as given in B 13 and with arm length minimum 300 mm.

22 Other knee plate connections on laminated frames may be accepted provided they have equal strength.

C. FORE AND AFTER BREASTHOOKS.

C10 Dimensions and Placing.

11 Breasthooks in the forward and aft end of the ship, should be made from steel, and have a welded-in plate bracket between the arms. Minimum dimensions are 75 x 25 mm. Length of arms minimum 2 frame spaces.

12 The Breasthooks are to be so placed that they give good thwartship connection between all internal longitudinal members such as shelves, clamps, stringers etc. See also Sect. 4B 32. Distance between any two breasthooks should nowhere exceed 750 mm.

SECTION 11 OUTER PLANKING AND DECK.

A. OUTER PLANKING.

A10 Thickness of Planks.

11 Planks in outer skin shall have a thickness not less than given in Table 2.

12 For ships with L x B x D in excess of 400, thickness of the uppermost strakes should be increased by 5 mm. Over light waterline the planks should be as broad as possible, but normally not broader than:

$$15 + \frac{t}{2} \text{ cm.}$$

where t = thickness of the plank according to Table 2.

13 The planks should be fastened with the pith side towards the frame. Planks which are subject to bending, should be steamed before fitting.

A20 Butts in Outer Planking.

21 Distance between butts, should be no less than 3 frame spaces (See fig.5) With 1 strake between - a distance of 2 frame spaces will be accepted. With 2 strakes between, the distance between butts may be 1 frame space. There must be at least 3 strakes between two butts on the same frame. Minor discrepancies may be accepted towards the ship's ends.

Butts in garboard strakes must not be nearer a keel scarph than 3 frame spaces.

22 For frames with breadth less than 100 mm. outer planking should have their butts over filling pieces between the frames. The filling pieces must have thickness at least equal to the thickness of the outer planking. Length of filling pieces should equal the clear opening between frames.

B.DECK

B10 Thickness of Planks.

11 Deck planking, waterway and gunwhale should have minimum thickness as in Table 2.

12 The planks are to be laid with pith side down towards the beams and should have a milled - or planed-in stopper for oakum.

B20 Butts in Deck Planking.

21 Spacing between butts must be minimum 2 beam spaces.

When there is one strake between the butts, spacing may be 1 beam space.

Butts on same beam, must be separated by 3 strakes.

B30 Raised Quarterdeck.

31 Scantlings in Raised Quarterdeck should be as for Main Deck.

32 Waterway and shelves for Main Deck, should be continued below the raised quarterdeck. Shelves and outer water way should be carried about 3 metres beyond the bulkhead, inner waterway, about 2 metres.

C. CAULKING AND TIGHTNESS TESTING.

C10 Caulking.

11 The seams should be formed so as to ensure good caulking. Caulking must be carried out to the satisfaction of the surveyor. At least one run of oakum should be used per 20 mm. plank thickness - however, no less than 2 runs. In butts and rabbets, the oakum must be driven to the bottom of the butt. The oakum is to be carefully covered with pitch, or by a type of putty which has been approved by Det norske Veritas.

12 Instead of caulking, other means of tightening may be used. The method and material must be approved by Det norske Veritas.

C20 Tightness Testing.

21 The Hull must be tested for tightness before launching.

SECTION 12. ENGINE ROOM AND CASING.

A. ENGINE ROOM.

A10 **Engine Seatings.**

11 The seatings must be sufficiently strong and properly designed in relation to the engine power, and must be fitted directly on top of the floors.

12 The seating must be stiffened both longitudinally and transversely.

Under the engine must always be fitted fore-and-aft girders of a height not less than that of the floors.

The girders must be carried at least 2 metres forward of the engine.

13 When power take-off or other equipment is arranged at the fore end of the engine, the engine seating is to be carried so far forward that the equipment in question can also be fitted onto same seating.

A20 **Cladding of Engine Room.**

21 Ships sides, Bulkheads, and under Deck must be clad with incombustible material.

If ceiling (inner skin) is not fitted over the frames, cladding may be omitted, provided outer planking and frames are painted with approved, fire - resistant paint.

22 The engine room flooring is to be of steel or aluminium plates.

A30 **Insulation of Exhaust Pipes.**

31 Insulation where exhaust pipes are led through combustible deck or deckhouse roof, must be carried out as under:

Either: Shapes from rockwool with a thickness of at least 6cm. must be fitted between the funnel and combustible material.

Further the insulation must be completed with rockwool or other incombustible material between closing plates and the combustible material.

Or: A pipe with diameter at least 6cm. greater than that of the funnel must be fitted outside the funnel so that a vertical airstream will pass between the pipes. Between the outer pipe and combustible material must be insulated with shapes of rockwool or asbestos of a thickness of at least 2 cm. In order to prevent condensation in cold weather the whole of the outer pipe should be insulated. The pipe should be carried at least 100 cm. above deck and the opening should be protected with a cover.

32 When the funnel is carried up along a bulkhead, the bulkhead must be insulated by an asbestos plate and galvanised sheet iron or aluminium plate. The funnel must not be carried nearer an insulated bulkhead than 10 cm. An exhaust pipe which is insulated with asbestos of a thickness of at least 1 cm. or similar insulation, may be carried as near as 5 cm. from the insulated bulkhead.

33 Exhaust pipes and exhaust manifolds must be either water cooled or insulated, and be so arranged that they do not come in direct contact with oil if a leakage in an oil pipe occurs or overflowing of the oil tanks occurs. If insulation is carried out in a material which may absorb oil, the insulation must be covered by an oiltight material which is not easily damaged by outside contacts. Insulation of the flanges should also be covered by sheet metal.

A40 Ventilation.

41 Engine room and spaces for fuel oil tanks must be satisfactorily ventilated.

B. CASING.

B 10 General.

11 Engine room openings in open deck must be protected by casings of steel or aluminium. For dimensions of welded connections, See Section 15. As far as possible casings on main deck and raised quarterdeck should be protected by superstructures or deckhouses.

12 The engine room openings in the deck should be as small as possible.

13 The engine room casings must be supported either by stanchions or bulkheads.

B 20 Unprotected Casings.

21 Stiffener spacing and beam spacing should not exceed 760 mm.

22 The plate thickness in the casing should be at least as indicated in the following table:

Thickness in mm.	Steel	Aluminium
Front bulkhead	7.0	7.5
Side and after bulkhead	6.5	7.0
Casing top	5.0	5.5

23 Stiffener scantlings (inverted angles welded to the plate) should be at least as indicated in the following table:

Dimensions in mm.	Steel	Aluminium
Front bulkhead	75 x 50 x 7	90 x 50 x 7
Side, and after bulkhead and casing top.	65 x 50 x 5	65 x 50 x 6

Scantlings of the top stiffeners should be increased if the span exceed 3.5 metres.

24 If stiffener spacing and beam spacing is less than 760 mm., the plate thickness and section scantlings may be individually considered.

25 If the casing ends are particularly exposed to the sea, they must be extra reinforced.

B 30 Casings Inside Deckhouses.

31 Stiffener spacing must not exceed 760 mm.

32 The plate thickness and stiffener scantlings must be at least as indicated in the following table:

Dimensions in mm.	Steel	Aluminium
Plate thickness	5.0	5.5
Stiffeners	65 x 6	75 x 6

B 40 Connections Between Casing and Deck.

41 The casing is to be connected to opening end beams and carlings with 16 mm. through bolts on a maximum spacing of 200 mm. In the deck must either be a solid foot angle or a tieplate welded to the casing.

B 50 Openings in the Casing.

51 Re doors, skylights and portlights, See Section 14.

SECTION 13. DECKHOUSE AND SUPERSTRUCTURES WHICH DO NOT FORM PART OF AN ENGINE ROOM CASING.

A. STEEL OR ALUMINIUM STRUCTURE.

A 10 Scantlings.

11 Stiffener spacing and beam spacing is not to be more than 760 mm.

12 Plate thickness must be at least as indicated in the following table:

Thickness in mm.	Steel	Aluminium
Front	6.0	6.5
Side and afterbulkhead	5.5	6.0
Top	5.0	5.5

13 Scantlings of the stiffeners (inverted angles or flats welded to plate) must be at least as indicated in the following table:

Dimensions in mm.	Steel	Aluminium
Front	75 x 50 x 6	80 x 50 x 7
Side, and after bulkhead and top.	80 x 8	60 x 50 x 5

Scantlings of the top stiffeners must be increased if the span exceeds 3.5 metres.

For scantlings of welded connections see Section 15.

14 If the house front is placed nearer the fore perpendicular than 0.25 L, either the stiffener spacing in the front bulkhead must be reduced to 600 mm. or the plate thickness must be increased by 1 mm.

15 If stiffener spacing and beam spacing is taken less than what is assumed in 11 and 14, the plate thickness and the stiffener scantlings can be separately evaluated.

16 The top stiffeners must as far as possible be connected to side stiffeners.

17 The side bulkheads and top in deckhouse must be extra stiffened underneath boats, davits etc.

A 20 Connections to deck.

21 Deck houses and superstructure should be connected to end beams and carlings with 16 mm. through bolts at a maximum spacing of 200 mm.

In the deck must be either arranged a solid foot angle or a tieplate.

SECTION 14. OPENINGS IN THE HULL. CLOSING APPLIANCES. HATCH COAMINGS AND HATCH COVERS. DRAINAGE OF THE DECK.

A. GENERAL.

A 10 The International Convention of Loadlines 1966.

11 Parts and arrangements which are made in accordance with the Rules in this section, will also satisfy similar requirements in the Loadline Convention. The Convention is, however, more extensive than these Rules. Reference is therefore made to the Convention itself for ships which are to have international loadline certificate or national certificate based on the Convention.

12 In a few of the following points is referred to the appropriate rule in the Loadline Convention through the letter LL and the Convention's numbers.

A 20 Definitions.

21 The requirements for hatches, door openings and ventilators are dependent on the positioning. Positions 1 and 2 are defined as follows:

Position 1 - On exposed freeboard deck and raised quarter decks and on superstructure decks forward of 0.25 L from F.P.

Position 2 - On exposed superstructure deck abaft 0.25 L from F.P.

22 Reference: LL 13.

B. CLOSING APPLIANCES AND SILL HEIGHT FOR BULKHEADS IN SUPERSTRUCTURES AND DECKHOUSES.

B 10 Closing Appliances.

11 All access openings in bulkhead at the ends of closed superstructure, also openings in end - and side bulkheads in deckhouses which cover an access opening to spaces below the freeboard deck or to a room in a closed superstructure, must be fitted with doors of steel or other similar material,

permanently and solidly attached to the bulkhead. The doors must have packings and securing arrangements so that they can be weathertight closed. The doors must be arranged so that they can be opened and closed from either side of the bulkhead.

Guidance:

The doors ought to open outwards in order to give extra security against being broken in by the sea.

R 20 Sill Heights.

The sill height for openings in bulkhead as mentioned in 11, should be at least as follows:

21 Openings in superstructure bulkhead: 380 mm. where nothing else is indicated.

22 Openings in superstructure and in bulkhead in deckhouse in Position 1 which give access to rooms below deck: 600 mm.

23 Openings in deckhouse bulkheads which protects openings in a superstructure deck, or openings in a second tier deckhouse, where the first tier deckhouse is positioned directly on the freeboard deck, and which protects access opening to room below freeboard deck : 380 mm.

24 Openings which are only used when the ship is in port (for handling of spares etc.) may have a reduced sill height provided this has been approved by the National Maritime Authorities.

25 References: LL 12 and 18

C. OPENINGS IN DECK

C 10 Coaming Heights.

11 Minimum coaming heights for cargo hatches with weathertight covers must be:
600 mm. in Position 1
450 mm. in Position 2

12 Small hatches for access to store room etc. may be accepted with less coaming height than indicated in 11, provided the hatches can be closed by solid watertight covers of steel or other similar material.
The covers must be secured with bolts on short spacing or be permanently attached.

13 Lesser coaming height than indicated in 11 may be accepted, provided they are acceptable to the National Maritime Authorities.

C 20 Coaming Arrangements.

21 It is assumed that the coamings are made from steel or aluminium.

22 Plate thickness in the coamings must be at least 7 mm. for steel and at least 8 mm. for aluminium.

23 Hatch coamings with a height of 600 mm. and above must be stiffened by a horizontal stiffener of satisfactory strength. The stiffener must normally not be positioned more than 250 mm. from the upper edge of the hatch coaming and must be supported by a bracket or stays on a maximum spacing of 3 metres. The knee brackets on side coamings must be positioned over deck beams.

24 The hatch coamings shall extend down to the lower edge of carlings and deck beams. The hatch coaming must be connected to the hatch end beams and carlings with 16 mm. through bolts at a maximum distance of 200 mm. In the deck must be arranged either a solid angle sole or a tieplate welded to the hatch coaming.

C 30 Hatch Covers of Steel.

31 The top plate shall have a minimum thickness:

$$t = 10\ s \text{ mm. minimum } 6 \text{ mm.}$$

where s = stiffener spacing in metres.

32 The section modulus W and moment of inertia I of the stiffeners including the plate must be at least:

$$W = 13\ s\ l^2 \text{ cm}^3$$

$$I = 22\ s\ l^3 \text{ cm}^4$$

where l = the span of stiffeners in metres.

For ships length L over 24 metres the section modulus and moment of inertia must be increased by 1% for each extra metre.

33 The top plate must be stiffened along the edges by a flat. The thickness of this flat must at least equal the thickness of the top plate, and the height must be at least half the height of the stiffeners and not less than 30 mm. If two flats are fitted side by side or U - section is fitted a minimum height of 25 mm. will be accepted. The ends of the stiffeners in the cover plate should normally be full welded to the edge stiffeners.

C 40 Hatch Covers of Aluminium.

41 The thickness of the top plate and section modulus of the stiffeners must be at least 10% and 30% respectively greater than the equivalent for hatch covers of steel. The moment of inertia for aluminium stiffeners must be at least 200% greater than for steel.

42 The design of the hatches otherwise must be as for steel covers.

C 50 Hatch Covers of Wood.

51 Hatch covers of wood must in finished condition have a thickness of at least 60 mm. The span must not be greater than 1.5 metres. The bearing surface for each end of the hatch covers must be at least 65 mm.

52 Possible portable beams must be dimensioned in accordance with C32 where s is taken equal to the length of the hatch covers in metres.
The rests or slots for beams must be of a solid design and must give efficient support and securing for the hatch beams.

C 60 References.

61 LL 15, 16 and 18.

D. CLOSING AND SECURING OF HATCH COVERS.

D 10 Hatch Covers of Steel or Aluminium.

11 The following rules apply for an ordinary packing arrangement between hatch cover and coaming and where tightness is achieved by a vertical pressure on the packing in joints between various elements of the covers.
Other packing arrangements will be separately evaluated.

12 The packing material must be a sufficient air and seawater resistant material properly fitted and secured in ridges along the edges of the cover.

13 The covers are to be secured with bolts on a maximum spacing of 800 mm. for steel and maximum 600 mm. for aluminium covers. The bolt diameter in the bottom of threads must be at least 16 mm.

14 Securing arrangements for covers with reduced coaming height will be separately evaluated.

15 After fitting on board weathertight hatch covers must be hose tested.

D 20 Hatches which are Battened Down with Tarpaulin.

21 Tarpaulin. There must be at least 2 tarpaulins in good condition for each hatch in Position 1 or 2. The material must be guaranteed free of jute, properly watertight and of sufficient strength.

The weight of the tarpaulin before impregnating with tar, chemical impregnating means, or oil, must be 0.65, 0.60 and 0.55 kg/m^2 respectively,

A declaration about the quality of the tarpaulin must be supplied with the tarpaulin,

22 Battening Down. Battening cleats must be arranged for all hatches for which tarpaulins are required. The batten cleats must be at least 65 mm. wide and with rounded edges in order to prevent damage to the wedges. The thickness must be at least 10 mm. for cleats manufactured from angle iron and 11 mm. for forged cleats.
The last mentioned must be reinforced along the centreline. Drop forged cleats must be of equal strength. The cleats must be fitted on a distance of no more than 600 mm.
The end cleats must be no further from the hatch corner than 150 mm. Battening iron and wedges must be in good condition. The wedges must be made from a strong kind of wood and no less than 200 mm. long and 50 mm. wide.
They must have a taper of 1:6 and the thickness at the sharp end must not be less than 13 mm.

23 Securing. For all hatch openings in Position 1 or 2 must be fitted a steel section or other similar means in order to secure each section of wooden covers efficiently and independently after the tarpaulin has been battened down.

D 30 References.

31 LL 15 and 16.

E. OPENINGS IN ENGINE ROOM CASING.

E 10 Doors in the casing.

11 Access openings to engine room must be arranged so they are protected as far as possible.

12 Access openings in the casing must be arranged so they can be closed from both sides with permanent strong doors of steel or aluminium. For openings in Position 1 or 2 the doors must be arranged to be closed weathertight and it must be possible to secure the doors from the outside with bolts. Doors and door frames must be stiffened and the arrangement otherwise must give the same strength as the casing surrounding the opening.

E 20 Sill Heights.

21 The sill height for door openings in engine room casing must be minimum:

600 mm.in Position 1

380 mm.in Position 2

E 30 Openings for Lights.

31 Skylights must be strong and solidly secured to the deck. If the top part of the skylight comprises hinged covers, these should be arranged for closing efficiently and be secured by a satisfactory means. Minimum coaming height, See C 10. For skylight in Position 1 deadlights must be arranged.

32 Light openings in casing must be equipped with fire resistant glass.

E 40 Various Access Openings.

41 In Position 1 or 2 openings in the casings for access to funnels or engine room ventilators must be equipped with strong covers of steel or aluminium, permanently attached and the covers must be arranged for weathertight closing.

42 References: LL 17.

F. COMPANIONWAYS.

F10 General.

11 Companionways on open deck must be made from steel or aluminium. They must be stiffened sufficiently and attached to beams or carlings with 16 mm. through bolts on a maximum spacing of 200 mm. In the deck must be arranged either a solid foot angle or a tieplate.

12 Companionways must have solid weathertight doors of steel or other similarly strong material. The doors must be arranged for opening and closing from both sides.
See otherwise B 10.

13 Sill heights must not be less than prescribed for casing openings in E 20.

14 References: LL 12 and 18.

G. PORTLIGHTS.

G 10 General.

11 Portlights for spaces below freeboard deck or to spaces within an enclosed superstructure must be made to an accepted design and must have a strong deadlight. permanently attached to the inside of the portlight frame. The deadlights must be arranged for watertight closing.

12 References: LL 23.

H. VENTILATORS AND AIR AND SOUNDING PIPES.

H 10 Ventilators.

11 The coaming height for ventilators leading to spaces below freeboard deck or to spaces within closed superstructures must be at least:
900 mm. in Position 1
760 mm. in Position 2

12 Thickness of the ventilator coaming of steel must be at least as indicated in the following table:

Internal dia. of the coaming in mm.	Under 200	200	280	330	380	430 & over
Plate thickness in mm.	7.5	8.0	8.5	9.0	9.5	10.0

13 Ventilator coamings of aluminium must be at least 1 mm. thicker than required for ventilator coamings of steel.

14 Ventilator coamings higher than 900 mm. must be extra stiffened.

15 At openings for ventilator coamings, the deck must be extra stiffened between the beams. A steel plate or aluminium plate of the same thickness as the ventilator coaming should be bolted over or under the wooden deck at the ventilator.

16 The openings must be arranged to be closed weathertight through efficient, permanently attached closing appliances.

H 20 Air and Sounding Pipes for Tanks.

21 The height of air pipes from the deck to the point where sea can gain access must be at least 760 mm. from freeboard and 450 mm. from superstructure deck.

22 Where air pipes with a height as required in 21 may make the proper working of the ship difficult, a lower height may be accepted provided the National Maritime Authorities agree that closing arrangements and other circumstances warrant a lower height.

23 Openings in air- and sounding pipes must have efficient closing appliances which are permanently attached. The closing appliances must be so designed that they prevent damage to the tanks through over-pumping or possible through vacuum during emptying.

24 All air- and sounding pipes in cargo holds must be properly protected.

H 30 References.

31 LL 19 and 20.

I. SANITARY DISCHARGES.

I 10 General.

11 Discharges which are carried through the ship's side either from a space below freeboard deck or from a space in closed superstructure and from deckhouses on the freeboard deck, which are equipped with doors which satisfy the requirements in B, must be equipped with efficient means for the prevention of ingress of water.

I 20 Non Return Valves.

21 Each individual discharge mentioned in 11 must normally have an automatic non-return valve with an arrangement for direct closing from a position over the freeboard deck.

22 Where, however, the vertical distance from the summer loadline to the inboard opening of the discharge pipe exceeds 0.01 L, the discharge may have two non-return valves without arrangements for direct closing, provided that the innermost valve is always accessible for examination when the ship is in operation.

23 Where the vertical distance exceeds 0.02 L one automatic non-return valve may be accepted without arrangements for direct closing.

I 30 Arrangements for Direct Closing.

31 Such arrangements must be easily accessible and must be equipped with indicator which shows whether the valve is open or closed.

I 40 Discharge Pipes.

41 Discharge Pipes through the shell must be of galvanised steel or gunmetal or similar and must have an external and internal flange on outer skin and on ceiling respectively. In ships without ceiling, reinforcement must be arranged inside on the outer skin at the place where the pipe penetrates the skin.

The discharge pipes must be secured with through bolts of galvanised steel or brass through both flanges.

42 Discharges from spaces above the freeboard deck must be solid, galvanised steel or metal pipes from the ship's side to freeboard deck, or in cases where the pipe is carried further up in an enclosed superstructure, at least up to 600 mm. over summer loadline.

I 50 Material in Discharge Valves.

51 Valves mentioned in I 20 must be of solid design. The valves must be made from a ductile material. Ordinary cast iron will not be accepted.

I 60 Protection.

61 Anywhere where valves and pipes may be damaged, they must be properly protected.

62 References: LL 22.

J. SCUPPERS

J 10 General.

11 All decks must be equipped with a sufficient number of scuppers, so arranged that efficient drainage of the decks is achieved.

12 References: LL 22.

K. FREEING PORTS.

K 10 General.

11 Where bulwarks on open deck form a well, efficient arrangements must be made for the rapid freeing of the deck from water.

K 20 Area of Freeing Ports.

21 The area of freeing ports on either side in wells on freeboard decks and on raised quarter decks must have a minimum area as indicated in the following table:

Length of well in metres	2	4	6	8	10	12	14	16	18	20
Area of freeing ports in m^2	.77	.84	.91	.98	1.05	1.12	1.19	1.26	1.33	1.40

The length of the well need not be taken larger than 0.7 L.

22 In ships with less than the normal sheer or with a trunk or with a continuous hatch coaming between superstructures, the area of freeing ports must be at least 25% of the area of the bulkwark on either side.

23 On superstructure deck the area of freeing ports must be half of the area indicated in 21.

24 Two thirds of the prescribed freeing port area must be fitted in the half of the well which is nearest to the lowest point of the sheer.

25 The lower edge of the freeing port must be as near to the deck surface as practicable.

26 If shutters are fitted to the freeing ports, the shutters must have good clearances so that they do not stick. Hinges must have bolts or bearings of corrosion resistant material.

27 All openings in the bulwark which are more than 230 mm. high must be protected by rods on a maximum distance of 230 mm. See LL 25

SECTION 15. WELDING OF STEEL AND ALUMINIUM.

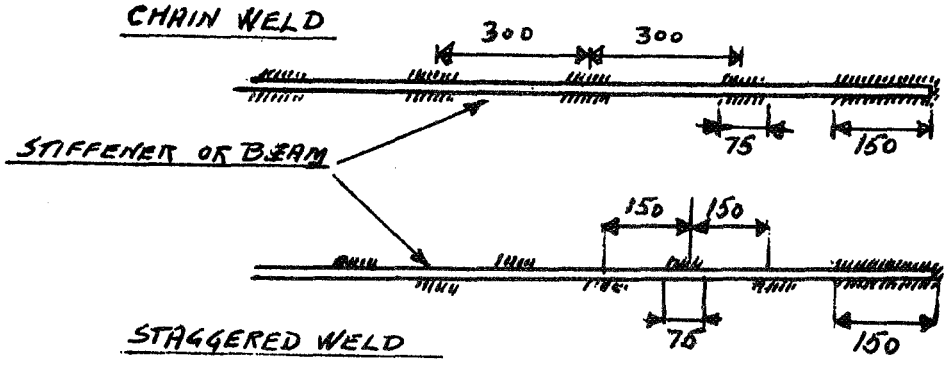
A. DIMENSIONS OF WELDS.

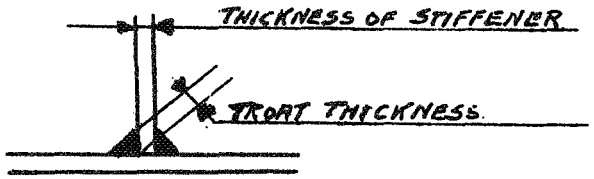
A 10 Connection to Deck Plating.

11 Deckhouses, casings, hatch coamings, companionways etc. must be welded to a deck plating with double continuous fillet weld with a throat thickness at least 3.5 mm.

A 20 Stiffeners and Beams.

21 Stiffeners and beams must be welded to a plate with chain weld or staggered weld with at least 75 mm. long weld. At the end of the section the length of the weld must be at least 150 mm.





Distance between the welds must be not greater than indicated in the sketches, for chain weld and staggered weld. The throat thickness must be at least as indicated in the following table:

Thickness of stiffeners in mm.	Throat thickness in mm.
6.5 and less	3.0
6.5 to 8.5	3.5
over 8.5	4.0

SECTION 16. BULKHEADS.

A. GENERAL.

A 10 Positioning of Bulkheads.

11 A substantial bulkhead must be fitted between engine room and cargo hold, between cargo hold and accommodation, and possibly also between engine room and accommodation. The bulkheads must be as tight as possible.

A 30 Portable Bulkheads in Cargo Holds in Ships which carry Fish Loose in the Hold.

31 The Bulkheads must be fitted and given scantlings as indicated in "Directions re bulkheads etc. for ships which carry fish loose in the cargo holds" of the 30th November, 1967 in the Norwegian Ship Control's Rules.

B. PERMANENT CARGO HOLD BULKHEADS OF WOOD.

B 10 Bulkheads of Vertical or Horizontal Planking.

11 The thickness of planks must not be less than:

$$t = 0.6\ (h + 2.6)\ l \text{ cm}$$

l = length of planks between supports, measured in metres.

h = height from upper edge of deck beam in centre line to the middle of the plank's span, measured in metres.

12 A transverse stringer must be fitted on the bulkhead, placed at about the half height of the bulkhead when:

- the height of the bulkhead from upper edge of keel to under edge of deck beams in centreline equals or is greater than 2 metres.
- the rise of floor at bulkhead is greater than: 1: 2.5

13 The section modulus of the stringer over a vertical axis must not be less than:

$$W = 10\ h\ l^2 \text{ cm}^3$$

h = height of the bulkhead at centreline, measured in metres.

l = the span of the stringer, measured in metres.

The stringer must be continuous from side to side, and must be attached to the frames by knee brackets.

14 On ships with length L equal to or greater than 18 metres a stiffener must be fitted from upper edge of the keel to the intersection between frame and stringer or to the deck corner where the rise of floor at the bulkhead is less than or equal to 1:2.5.

These stiffeners must have the same cross section area as the frames.

Stiffener and stringer must be bolted to each other and must be connected to the frames with solid knee plates which are bolted to frames, stringer and stiffener.

B 20 <u>Single Plywood Bulkheads with Vertical Stiffeners.</u>

21 The plywood plate must not have a thickness less than:

$$t = 0.55\ (h + 2.6)\ s \text{ cm}$$

s = spacing of stiffener, measured in metres.

h = height of bulkhead in centre, in metres.

22 The stiffeners must not have a section modulus less than:

$$W = 30\ s\ h\ l^2\ cm^3$$

l = the span of the stiffeners, measured in metres.

B 30 Double Plywood Bulkheads.

31 The thickness of plywood plates must not be less than:

$$t = 0.55\ \frac{h^3}{T}\ cm$$

h = height of bulkhead in metres.

T = distance in cm. between bulkhead plates.

The thickness must, however, not be less than calculated according to B 21.

32 Plywood plates must be attached to stiffeners between the plates.

The stiffener spacing must normally not be greater than 40 cm.

B 40 Permanent Cargo Hold Bulkheads in Fishing Vessels.

41 For requirements to scantlings of permanent hold bulkheads in ships with class notation Deep Sea Fishing or Fishing See Section 19.

SECTION 17. BOLTING AND NAILING.

A. GENERAL

A 10 Dimensions and Execution.

11 The bolt dimensions are indicated in Table 3 and 4.

The diameter of the bolt head or the washer, must be at least to 2.5 times the bolt diameter.

12 The bolts must as far as possible be through bolts.

13 Screwed bolts with nuts must as far as possible be used.

The bolts must be warm galvanised.

14 Nails must be at least twice as long as the thickness of the plank in which they are used.

15 For bolts or nails which are entered from the outside, a grummet of oakum must be fitted under the head.

16 When connectors for timbers are used the dimenions of the bolt may be reduced. The reduction in size will be estimated in each individual case.

B. BOLTING OF KEEL, FRAMES, SHELF, KNEES, ETC.

B 10 Bolting of Keel.

11 When the keel is made in two heights, the two heights must be substantially bolted to each other between the bolts for the keelson.

12 The keelson should be bolted to the keel with at least 1 bolt through each floor. These bolts should be arranged in zig-zag.

13 If the keelson is arranged in several timbers abreast, the outside timbers must be bolted with 1 bolt through each floor. All these bolts must go right through as far as the shape of the bottom allows.

The keelson timbers must be bolted to each other horizontally with 1 through bolt in each frame space.

B 20 Bolting of Frame Timbers.

21 In double built frames there must be at least 2 bolts in each futtock (on either side of the butt).

Guidance: It is advised that for frame bolts should be used screw bolts with nuts.

B 30 Bolting of Fore Foot Knee and Filling Pieces.

31 Bolts in fore foot knees should as far as possible go right through.

The spacing should not be over 40 cm. However, one bolt in each arm must be as near to the angle corner as possible.

32 Filling pieces over the propeller opening should be bolted to the propeller post with bolts at a maximum spacing of 40 cm.

The diameter of the bolts should be as indicated for breasthooks.

The spacing of the remaining bolts in the stem and post must not be over 80 cm. measured outside. In laminated stems the distance between the bolts must not exceed 40 cm. The bolts must have nuts and washers on the inside. The bolts must as far as possible all be through bolts.

B 40 Bolting of Stringers, Beam Clamps and Shelves.

41 When double built frames are used, the bolts in the stringers must not have a less diameter or be fewer than as indicated in Table 3. The distance between the bolts in each plank of the stringer must be 2 frame spaces, provided that this spacing is not greater than what is indicated in Table 3.

42 On laminated frames the stringers must have 1 through bolt in each frame.

43 The deck clamps and shelves must be bolted horizontally with 1 bolt through each frame (2 timbers or futtocks). For vertical bolts see bolting of waterway in D 35.

B 50 Bolting of Knees, Riders and Breasthooks Forward and Aft.

51 Beam knees and riders on double built frames must be bolted to the frame and to the beam with so many bolts that the spacing does not exceed 35 cm. However 1 bolt in each arm must be as close to the angle corner as possible.

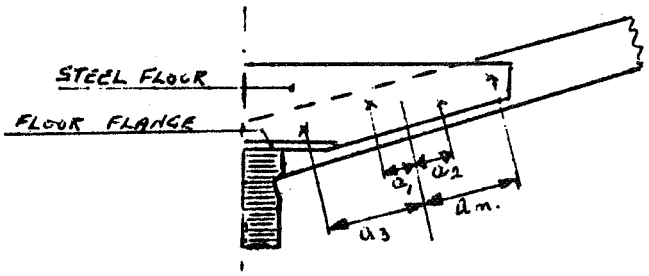
52 On laminated frames there must be at least 3 bolts in each arm of the beam knee.

53 Breasthooks forward and aft must be bolted to the stem and afterpost.

There must also be 1 bolt through each timber, or so many bolts that the spacing is not over 40 cm. The bolts must be through bolts.

C. BOLTING OF FRAMES TO FLOORS.

C 10 **Frames Bolted to the Side of Steel Floors.**



11 The greatest strain P_1 per bolt must not be greater than indicated in the table below, dependent on the breadth of the frame and the bolt's diameter.

P_1 is to be calculated from the following formula:

$$P_1 = \frac{200\ W_{frame}}{I\ bolt}\ ,\ an \cdot kp$$

W frame = the section modulus of the frame according to Section 4.

I bolt $= a_1^2 + a_2^2 + a_3^2 + \ldots\ldots\ cm^2$ where

$a_1, a_2 \ldots$ = the distance in cm. from the middle of the bolted connection to each of the bolts, See the sketch above.

an = the distance in cm. from the middle of the bolted connection to the bolt which is furthest away from the middle.

If the lower end of the frame is terminated before it touches the keel the following equations must be checked:

$$P_2 = \frac{600}{n}\ s\ D^2\ kp$$

s = Frame spacing in metres.

D = the ship's depth in metres.

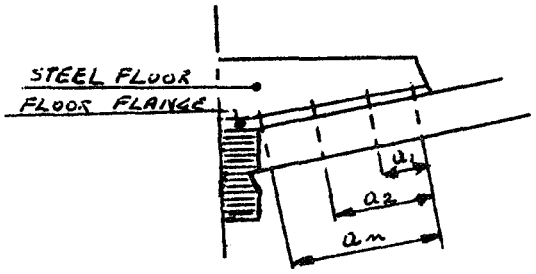
n = number of bolts in the connection.

P_2 must not be greater than indicated in the table below, dependent on the breadth of the frame and the bolt diameter.

Permissible strain on the bolt P1 and P2 in kp.

Breadth of the frame in mm.		50		63		75		100		150	
		P_1	P_2	P_1	P_2	P_1	P_2	P_1	P_2	P_1	P_2
bolt diameter	13 mm	70	180	85	210	100	210	140	210	140	210
	16 mm	85	225	110	280	130	320	175	320	220	320
	19 mm	100	270	130	340	155	400	210	470	330	470
	22 mm			155	395	180	470	240	625	365	635
	25 mm					210	535	280	720	420	825

C 20 Frames Bolted to a Floor which is fitted on top of the frame.



21 Greatest strain should be calculated in accordance with the formula indicated in C10.

The distance a_1, a_2 ..... a_n is to be measured from the uppermost bolt to each of the other bolts in the connection. See sketch above.

P_1 must not be greater than indicated in the table below, dependent on the bolts' diameter:

D	13mm	16 mm	19 mm	22 mm	25 mm
P1	350 kp	525 kp	735 kp	970 kp	1275 kp

If the lower end of the frame is terminated before it touches the keel, P_2 should also be checked as indicated in C 11. P_2 must not be greater than indicated in the table in C 11, however the height of the frame should be used instead of the breadth of the frame in the table.

C 30 Frames Bolted to One-sided Floor of Wood.

31 The floor must not have less breadth than the frame. Allowable strain on the bolts P_1 and P_2 are reduced by 20 % in relation to the values in table in C 11.

C 40 Frames Bolted to Floor of Wood on Both Sides.

41 The floor must not have less breadth than half the frame breadth on either side. Allowable bolt strain P_1 and P_2 are to be increased by 75 % in relation to the values given in tables in C 11 and C 21.

D. BOLTING AND NAILING OF OUTER SKIN AND DECK.

D 10 Skin on Double, Grown Frames.

11 All skin planks must have 1 through bolt and 2 nails at either end.

12 Planks of less than 20 cm. breadth must have 1 nail through each timber. If the breadth is over 20 cm. but less than 28 cm. there should be alternative 2 and 1 nails and if the breadth is 28 cm. or over, 2 nails through each timber.

13 In every 4th frame there must be a bolt of same dimensions as the end bolt.

The bolt must also go through the inner skin.

D 20 Outer Skin on Laminated Frames.

21 On laminated frames, all planks must at each end have 1 through bolt and 2 nails when the butt is on a frame. When the butt is on filling pieces between the frames there must be 2 bolts for plank breadth up to and including 15 cm. For greater breadth the number of bolts is increased by 1 bolt for each commenced 7 cm. breadth.

22 On each frame the planks must be nailed with 1 nail for each commenced 7 cm. breadth of plank.

23 In every third frame a through bolt should be substituted for one of the nails. The bolt must have the same dimensions as the end bolt.

D 30 Sundry.

31 The bolts mentioned under 13 and 23 must be stepped in the various strakes and not be fitted in the same frame in 2 skin planks next to each other.

32 The garboard strake is bolted at the butts as indicated for the skin and in addition with one bolt through each frame, including the bolts which come through the side keelson from the inside. When L x B x D exceeds 200, the garboard strake is to be bolted sideways to the keel as far as the shape of the bottom allows.

33 When L x B x D exceeds 400, the 4 upper strakes of the skin must be vertically bolted to each other for 0.7 L amidships. The distance between the bolts must not exceed 1 metre. The bolt diameter must be as for end bolts in the skin.

34 If the ship is to be metal sheeted, all through bolts and nails in the keel and skin must be made from gunmetal up to at least 25 cm. above the upper edge of the metal sheeting.

35 The waterway is to be bolted to the ship's side with through bolts spaced about 35 cm. and vertically each plank is to be bolted through each beam and half beam. The bolts which pass through the outermost waterway should also go through the shelves or deck clamps.

D 40 Deck Planking.

Deck planks are to be nailed with 2 nails in each beam and 2 nails at each butt. If the plank breadth is greater than 12.5 cm. there should be 3 nails at each butt.

SECTION 18. SEALERS.

A. SUNDRY REQUIREMENTS.

A 10 Classification.

11 Wooden ships may get the class notation SEALER when they in addition to the other requirements in the Rules also meet the requirements in this section.

A 20 Shape of the Hull.

21 The ship must have a shape which makes it suitable for working in ice and prevents it from being screwed down. Thus the ship's side must have a convex form with the greatest breadth at deck level. The angle between the tangent to the ships side at the deck level and a vertical line should not be less than 5°.

B. FRAMES, FLOORS AND BEAMS.

B 10 Frames and Floors.

11 The frame spacing should not be greater than 0.9 x the rule frame spacing as indicated in Section 4.

12 The scantlings of the frames at the lower end of the bilge as calculated in accordance with Section 4, should be maintained up to deck level.

13 When double grown frames and floors are fitted, the shift of butt in the floor timbers must not be less than B/10 + 0.3 m. and the shift of butt in frame timbers must not be less than B/10 + 0.2 m. where B = ship's breadth in metres.

B 20 Beams.

21 The section modulus of deck beams must be 100% greater than indicated in Section 9. There should be a beam fitted on every frame.

C. KNEES AND RIDERS, FORWARD AND AFT BREASTHOOKS.

C 10 Knees and Riders.

11 On double grown frames every second beam end should be equipped with riders and intermediate beams should have knees.

12 On laminated frames the arm length of the knees should be increased by 10 cm. and one extra bolt should be fitted to each arm.

C 20 Breasthooks Forward and Aft.

21 Breasthooks forward and aft should be fitted on a maximum space of 60 cm.

D. OUTER AND INNER SKIN (OR CEILING)

D 10 Inner Skin (Or Ceiling)

11 Ships with double grown frames as well as ships with glued laminated frames must have an inner skin with thickness as indicated in Table 2.

12 The inner skin upward from the stringer and up to the shelf must have the same thickness as the stringer and be bolted to same.

D 20 Outer Skin. Ice Skin.

21 The thickness of the outer skin from the bilge and up to the

deck must be 1.5 cm. thicker than indicated in Table 2.

22 Ice skin made from hard-wood should be fitted from keel to deck. For 30% of L from F.P. the ice skin between light loadline and 0.5 metre above the deep loadline must be made from greenhart.

Ice skin must have its own rabbet to keel and stem and after post The thickness of the ice skin may be 1.5 cm. less than what is indicated in Table 2 for the skin at bottom.

23 From F.P. and aft over a length of 20% of L the hull at the waterline must be strengthened by an ice skin of steel. This ice strengthening should be made from 13 mm. steel plate and must extend for 1 metre below light waterline to 1 metre over deep loadline. The ice skin is to be welded to the bow plate. (Stem Shoe). The ice skin is to be secured by 19 mm. bolts with a conical head outside in the plate. The bolt head must not protrude beyond the surface of the plate. The bolt spacing must not exceed 300 mm.

24 The stem must be protected by a solid stem shoe of steel. This shoe must have at least the same extent as indicated for the ice skin in 23.

E. HOLD STRINGER AND HOLD BEAMS.

E 10 Hold Stringers.

11 Throughout the ship's length a stringer should be fitted in [illegible] inner skin between light and deep load line. Thickness and breadth of the stringer should be 2 and 3 times respectively of the thickness of the normal stringers in accordance with Table 2.

The Stringer should be bolted with through bolts in each frame timber.

Bolt dimensions must be as required for bolts in the normal stringers. Across the stem and the after post the stringers should be connected with substantial knees of steel.

E 20 Hold Beams.

21 On the stringer there must forward and aft be fitted hold beams on every second frame. In the cargo hold a hold beam must be fitted below each 4th deck beam but the distance between hold beams must not exceed 2 metres. The hold beams should have scantlings as deck beams and must be attached to frames with solid knees. The hold beams must be supported in the centreline. In the cargo holds another equally good transverse stiffening may be accepted instead of hold beams.

F. SUNDRY STRENGTHENINGS.

F 10 Transverse Bulkheads.

11 Transverse bulkheads should be made from steel with horizontal stiffening of scantlings as indicated in the steel ship rules.

F 20 Rudder, Steering Arrangement, Propeller and Shafting.

21 Such parts should be dimensioned in accordance with Chapter XIII, Section 28 G, H & I in the Rules for the building and classification of steel ships with a length less than 90 metres.

SECTION 19. FISHING VESSELS.

A. GENERAL REGULATIONS.

A 10 Classification.

11 Ships with a length L exceeding 20 metres, and which are built especially for fishing, may be given the class notation "DEEP SEA FISHING" if they have an arrangement which is considered suitable and which ensures good seaworthiness, and when they in addition to the ordinary regulations, also satisfy the requirements in steel ships rules Chapter XIII, Section 29 D to and including M, as far as these requirements are suitable for wooden ships.

12 Ships which are built in accordance with 11 above, but which do not possess an arrangement which can be considered satisfactory for the class notation DEEP SEA FISHING, may obtain a class notation FISHING.
This also applies to ships with a length L equal to or less than 20 metres. For ships with the class notation FISHING the operational area is restricted to coastal waters and open sea up to 90 nautical miles from the coast.

A 20 Permanent Cargo Holds of Wood.

21 In ships with class notation DEEP SEA FISHING or FISHING permanent cargo hold bulkheads of wood must be given scantlings as indicated below.

22 Thickness of the planks should be 60% greater than calculated in accordance with Section 15 B, however not less than 6.3 cm. for bulkhead heights less than 1.8 metres, and not less than 7.6 cm. for bulkhead heights equal or greater than 1.8 metres.

23 Section modulus of possible horizontal girders on the bulkheads must be 3 times greater than calculated in accordance with Section 16 B 13.

CHAPTER III.

RUNNING CONTROL OF SHIPS IN CLASS.

SECTION 1. SURVEYS FOR MAINTENANCE OF CLASS.

A. GENERAL REGULATIONS.

A 10 Periodical Surveys.

11 In order that a ship which has class in the Society should retain the class, the ship must be submitted to periodical surveys at such time and to such extent as is specified in this Chapter.

A 20 Survey of Damages.

21 If the hull, machinery or equipment which in accordance with the Rules is covered by the class survey, are damaged to such an extent that it must be understood that this can entail recommendations, the ship must be surveyed in the first port of call or in accordance with the instructions from the Society. The survey should be carried out to the extent as decided by the surveyor in order to ascertain the extent of the damage.

A 30 Control of Repairs.

31 When a ship which is in class is to be repaired to any extent, it is the Owner's duty to inform the Society's surveyor at the place where the repair is to be carried out. The repairs should be carried out under the survey of the surveyor in accordance with the same rules which apply for survey of new constructions as far as these rules are applicable. The requirements in Chapter I, Section 3. A.30 apply equally to repairs.

A 40 Control of Alterations and Re-buildings.

41 If it is desired to alter or rebuild a ship which has class in the Society, drawings and technical data should beforehand be approved by the Society in accordance with the rules which apply for new constructions, as far as these rules apply.

42 The alterations or re-building must be carried out under the supervision of the Society, in the same manner as new construction.

43 Requests for the survey of rebuilding or alteration must be submitted in writing by the Owners to the local surveyor where the work is to be carried out. The request should be submitted in good time before the work is commenced. The regulations in Chapter I Section 3.A.30 apply likewise.

A 50 The Owner's Duty to Request Surveys.

51 When a ship in accordance with the Rules is due for survey, it is the duty of the Owners to call in the Society's surveyor at the place where the survey is to be carried out. The surveyor should be notified in ample time so that the survey can be carried out at the required time.

52 In connection with the survey it is the duty of the Owners to arrange access for the surveyor during discharging of cargo, at dry docking, at opening of machinery, cleaning, erection of staging, etc. all to the extent it is necessary for the surveyor to carry out the survey in accordance with the Rules.

A 60 Expenses and Fees.

61 The owner is obliged to pay expenses and fees in connection with the survey in accordance with the Fee Scales of the Society.

A 70 Survey Reports.

71 The Surveyor submits a report to Head Office re a survey which has been carried out. He should describe possible defects which according to his opinion ought to be repaired so that the ship will satisfy the Rule requirements. If the survey has been carried out in connection with repairs or completion of recommendations the surveyor should describe the work which has been carried out and express his opinion as to whether these satisfy the Rule requirements.

A 80 Recommendations.

81 If the hull, machinery or equipment which according to the Rules are covered by the survey, do not satisfy the Rules, the Society must give a recommendation re necessary repairs. The Society should also give recommendation re further surveys or other arrangements which may be considered necessary. This should be done whether or not the object or arrangement which is covered by the recommendation has been previously accepted. If the Society finds it

necessary to survey the ship or carry out other examination in order to find out whether or not damage has occurred or is likely to occur, the Society can give a recommendation to that effect.

82 Recommendations should be given in writing to the Owners. Recommendations for immediate repairs may be given verbally by the surveyor when he, at the same time ascertains that the Owners' representative accepts the recommendation and takes immediate steps to have it complied with.

Written recommendations given by a surveyor must immediately be transmitted to Head Office. If the recommendation is not to be complied with immediately, a time limit should be given within which the repairs must be completed or other arrangement made.

83 Recommendations are given by Head Office or by the surveyor in question. Recommendations which have been given by a surveyor may be appealed to Head Office. The appeal will not postpone the compliance with the recommendation unless the surveyor so decides.

The appeal must not cause postponement of repairs if such postponement would endanger lives or the safety of the ship or cause considerable damage to cargo or other property.

84 An Owner or a Shipyard can require a recommendation to be reconsidered on the basis of a new survey carried out by one or more competent surveyors who have been particularly selected by the Society.

If the recommendation is maintained, the expenses will be carried by whoever has requested a re-survey. In the opposite case the expenses will be carried by the Society.

85 Head Office can at any time alter a recommendation. It can also increase the requirements if this is considered necessary.

86 Head Office must delete a written recommendation when it through a survey or in another way, has been ascertained that the recommendation has been complied with. A verbal recommendation is cleared when the next survey proves that repairs have been carried out satisfactorily.

B. PERIODICAL SURVEYS, GENERAL.

B 10 Ordinary Periodical Surveys.

11 For ships with the class notation A1 the periodical survey is due 4 years after completion of the building or after the date of the last periodical survey.
For ships with class A2 the interval is 3 years, and for ships with Class A3 or A4 the interval is 2 years.

B 20 Reduction in Class for Wooden Ships.

21 Wooden ships retain a given class as long as the ship's general condition is considered satisfactory for the class. Decision re reduction in class is taken by Head Office on the basis of the surveyor's report and advice at the periodical survey.

B 30 Guidance re Estimation of Grade.

31 As a guidance for estimation of the ship's general condition, the ship's main grade should be calculated.
The main grade for a new ship equals 0. Annual additions to the main grade equals the sum of weight number x the material grade for the various components of the hull. See tables in 32 and 33.

32 Table for material grade.

Material	Grade
Pressure impregnated material	0.2
Teak	0.5
Oak (except American Red Oak)	0.6
Non-impregnated Fir	1.0
Pine	1.2
Hot Galvanised Steel.	1.0
Non-galvanised Steel	2.0

33 Table for weight numbers.

Strength Members.	Weight Number
Outer skin	0.75
Frames	1.00
Inner skin, stringers	0.25
Deck Planking	0.40
Deck beams	0.60
Keel, keelson	0.50
Stem and afterpost	0.25
Deck clamps, shelves,gunwhale	0.25
Floors,breasthooks, forward and aft	0.75
Beam knees	0.25
Bolting, nailing	1.00

34 The question re reduction in class is normally raised at the first ordinary special survey after the ship's main grade has passed the value which is indicated for the various classes in the table below.

Guidance re main grades for reduction in class.

Class	Main grade up to
A1	100
A2	145
A3	185
A4	220

B 40 Time Limit for Periodical Surveys.

41 Time limit for periodical survey is counted from month of build or month of entry, see Chapter I Section 3 D 40, or from the completion of the last similar periodical survey.

42 Survey in connection with special periodical survey, must be requested before it is due, and the ship must within that time have arrived at the port where repairs are to be effected.
The ships age is counted from the month of build, - or for ships which are not built under the supervision of the society, from the month when the ship was delivered from the builders.

B 50 Sub-division of Special Periodical Survey.

51 A Special Periodical Survey may be split up if it is carried out before it is due. It can not be commenced more than 6 months ahead of the time when it is due. When Special Periodical Survey is split up, the due time for next survey, is counted from the time when the major part of the survey was completed.
Head Office will decide when the major part of the survey was completed.

B 60 Postponement of Special Periodical Survey.

61 The society may agree to the postponement of a Special Periodical Survey in full or partly up to 6 months.
The owners must submit written request for such postponement before the survey is due. Postponement may only be granted when there is no apparent reason for not granting it, and only after a Sighting Survey has been carried out, (See C).

62 The postponement which may be granted, is dependent on the ship condition and age, but under no circumstances can a postponement beyond 6 months be granted, counted from the due date for the Special Periodical Survey.

63 If the major part of the Special Periodical Survey has been completed, the outstanding surveys must be specified in report to Head Office, with a copy to ship and owners.

64 Head Office may consider a Special Periodical Survey completed when the major part of the survey has been completed, provided a recommendation is at the same time given, stating that the outstanding work and survey be carried out within a stipulated, short time.

B 70 Entry in Det norske Veritas Register.

71 A successfully completed survey is indicated in Det norske Veritas Register, as under:

Year and month for completion of the survey are indicated. If the survey has been split up, the entry is made after completion of the entire survey, and then stating the year and month when the major part of the survey was completed.

C. SIGHTING SURVEYS FOR POSTPONEMENT OF SPECIAL PERIODICAL SURVEY.

C 10 <u>General Extent of the Survey.</u>

11 In order to ascertain the general condition of the ship, it will normally be required to carry out a sighting survey outboard and inboard in drydock or on slipway at the time when the Special Periodical Survey is due.

SKETCHES, TABLES, AND DIAGRAMS.

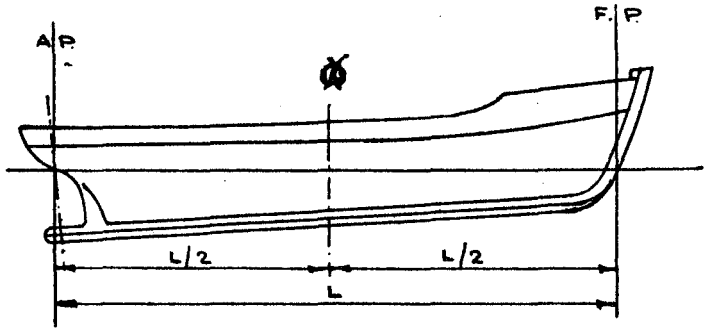


FIG 1. DEFINITION OF PERPENDICULARS AND SHIPS LENGTH L.

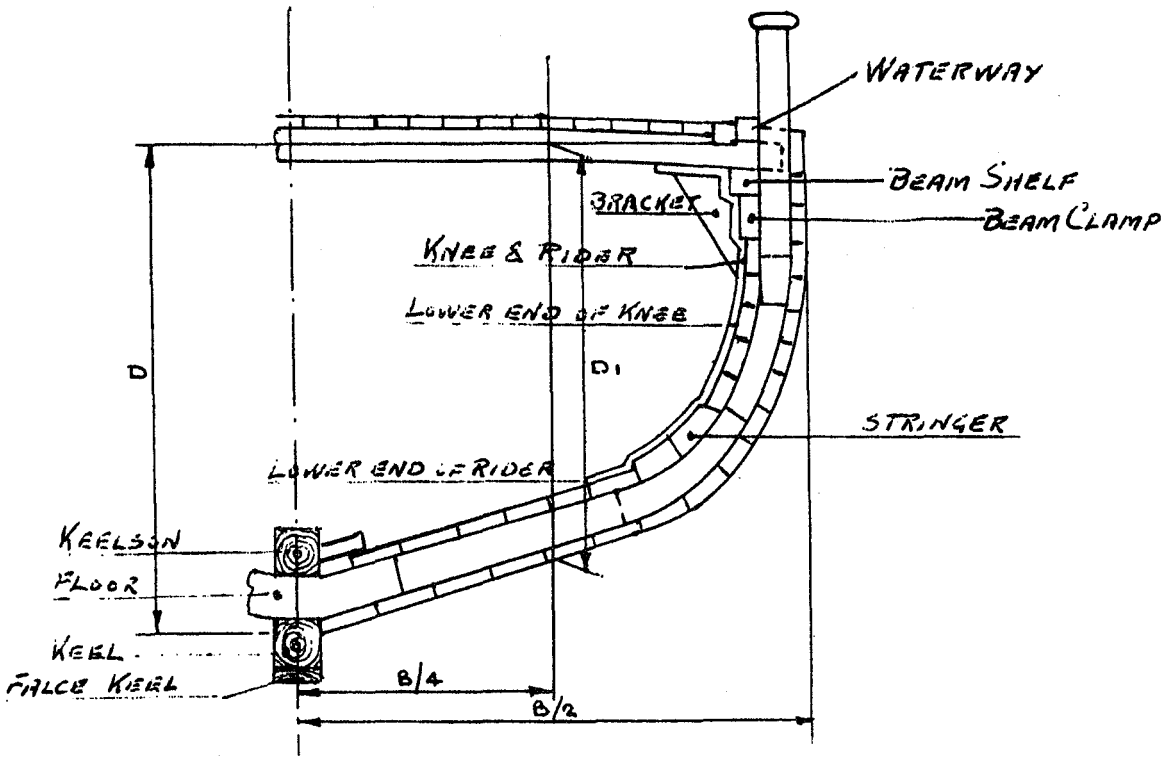
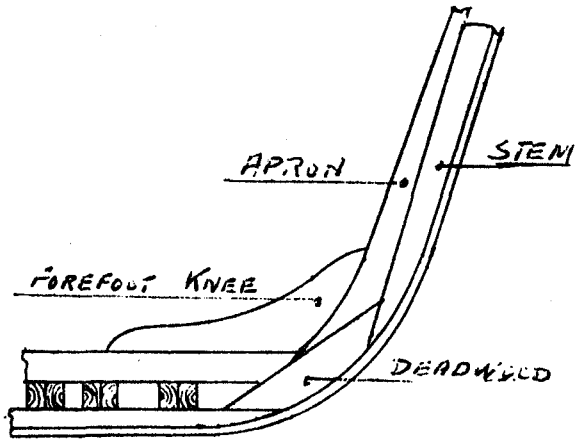


FIG 2 MIDSHIP SECTION OF CONVENTIONAL VESSEL.



KEEL - KEELSON - STEM.

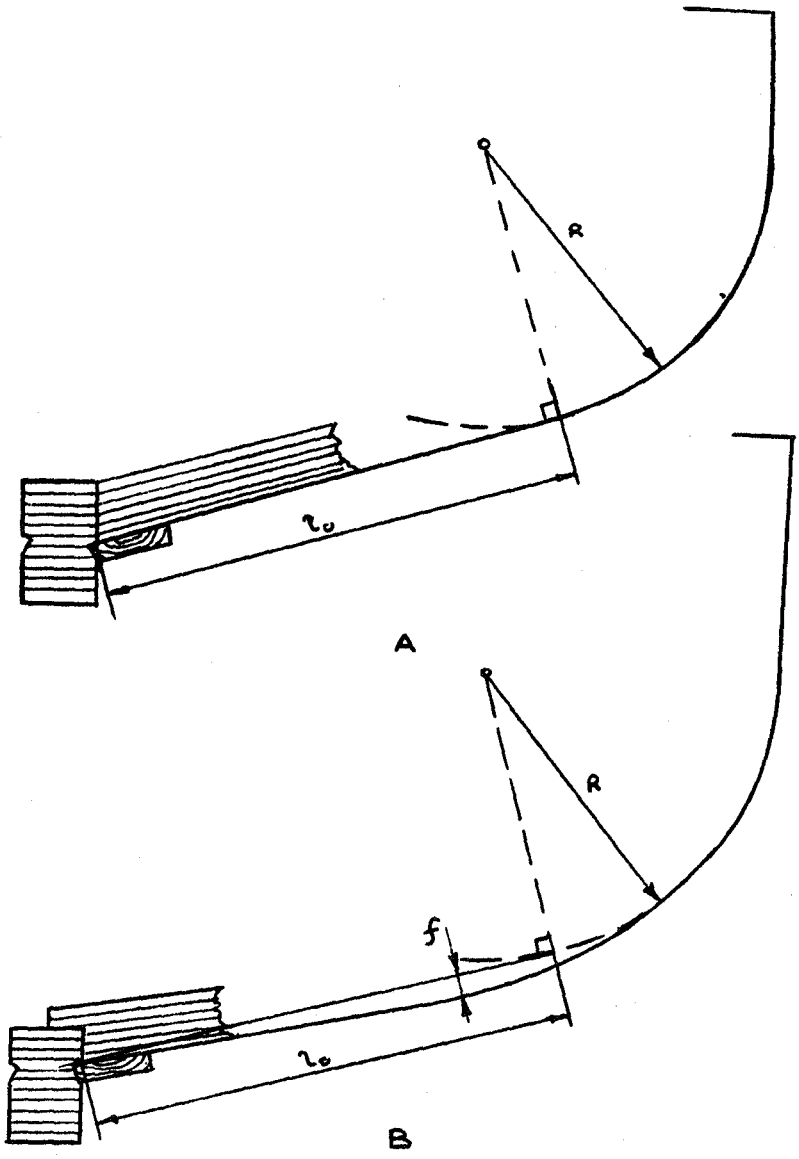


Fig. 4 A-B Definition of "straight" frame length L_s and curvature height f.

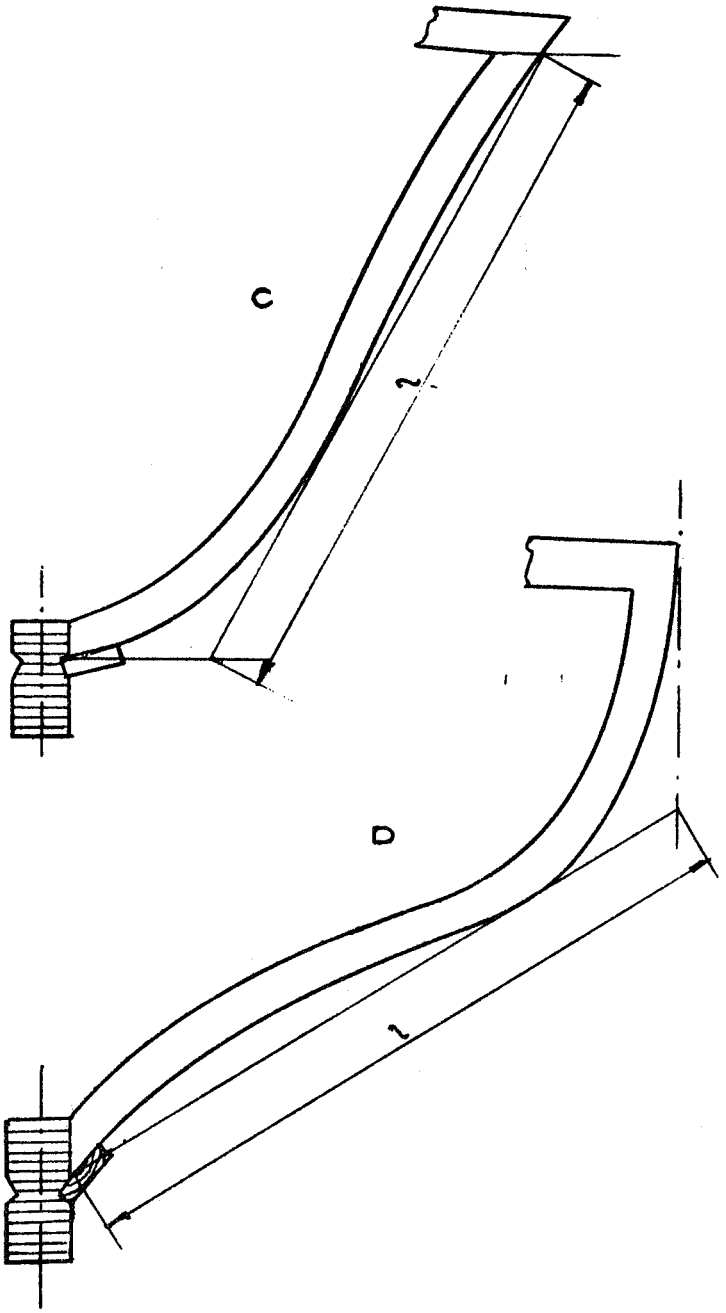


Fig. 4 C-D Definition of frame length l_1 for determination of scantlings for S-shaped frames

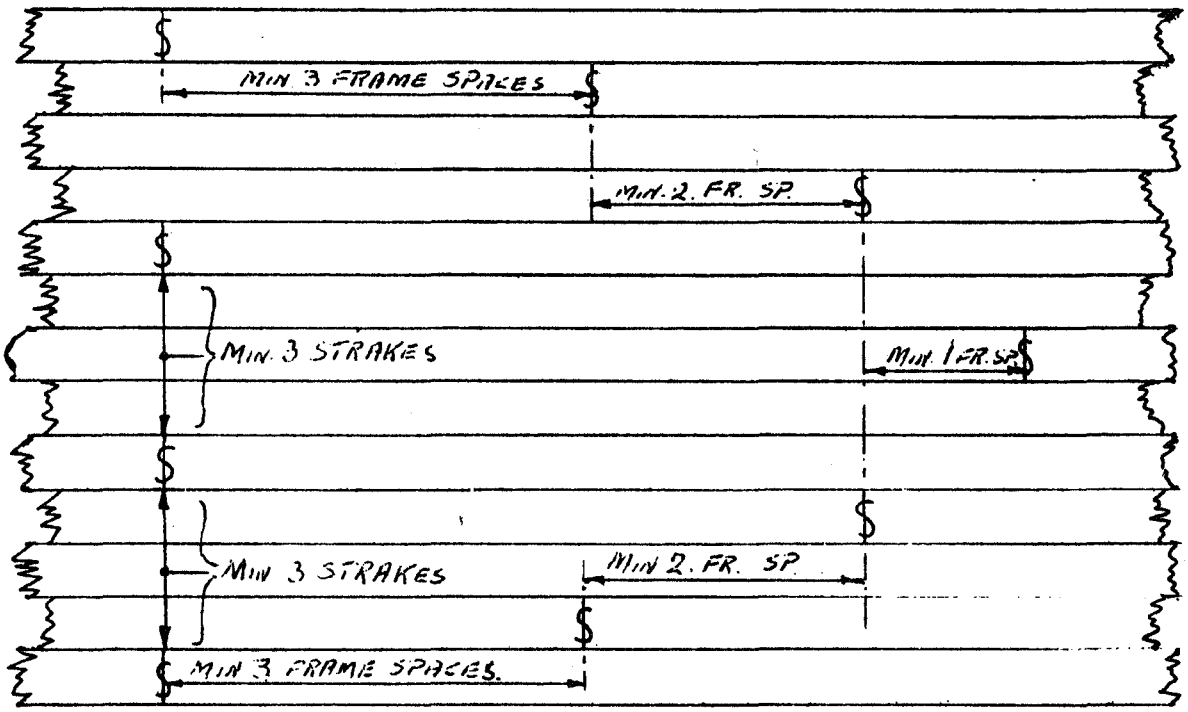


FIG 5. OVERLAPPING OF SKIN PLANKS

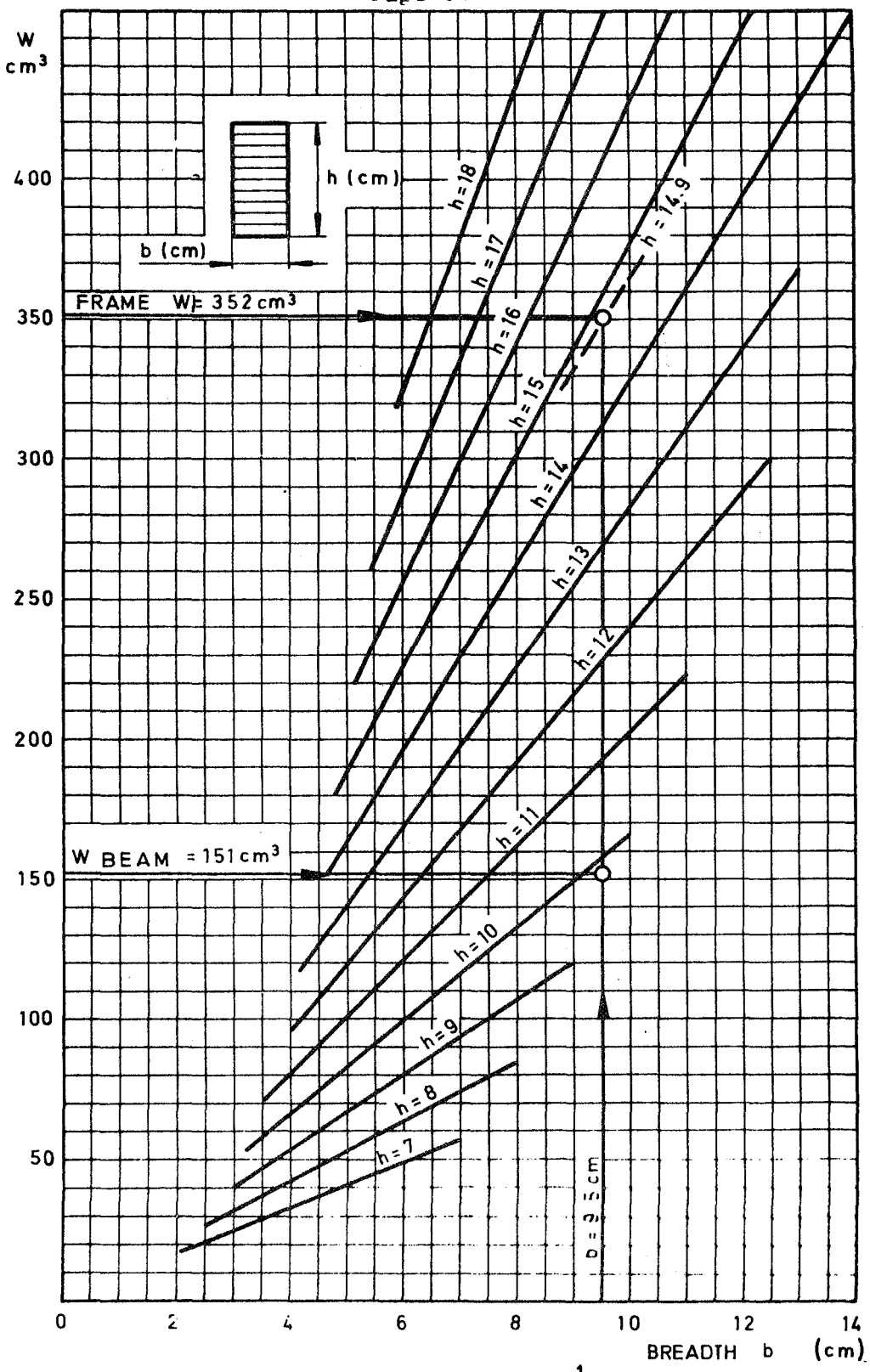


FIG. 6A SECTION MODULUS $W = \frac{1}{6} bh^2$ OF CROSS SECTIONAL AREA WITH BREADTH b (cm) AND HEIGTH h (cm)

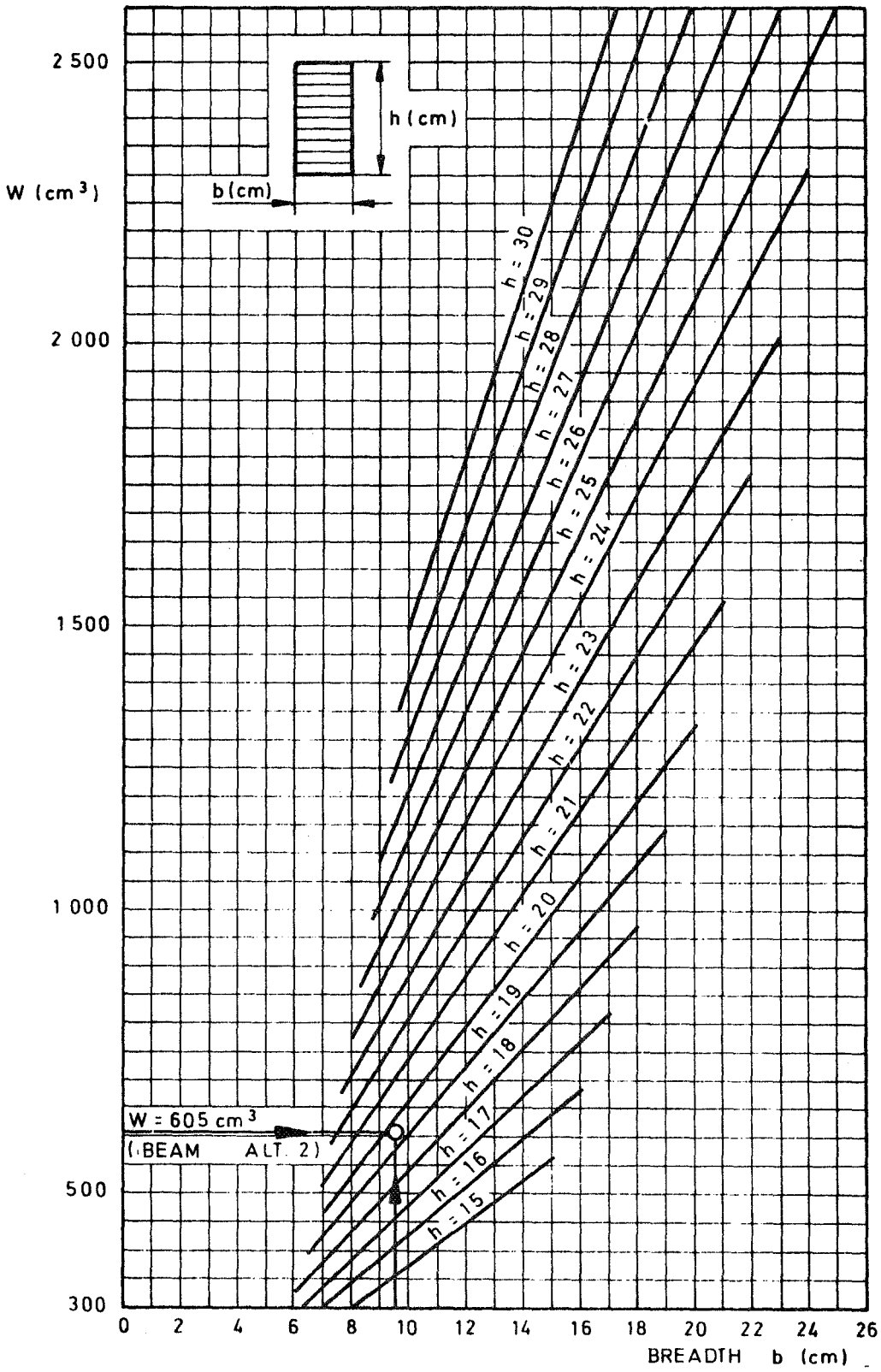


FIG. 6B SECTION MODULUS $W = \frac{1}{6} bh^2$ OF CROSS SECTIONAL AREA WITH BREADTH b (cm) AND HEIGTH h (cm)

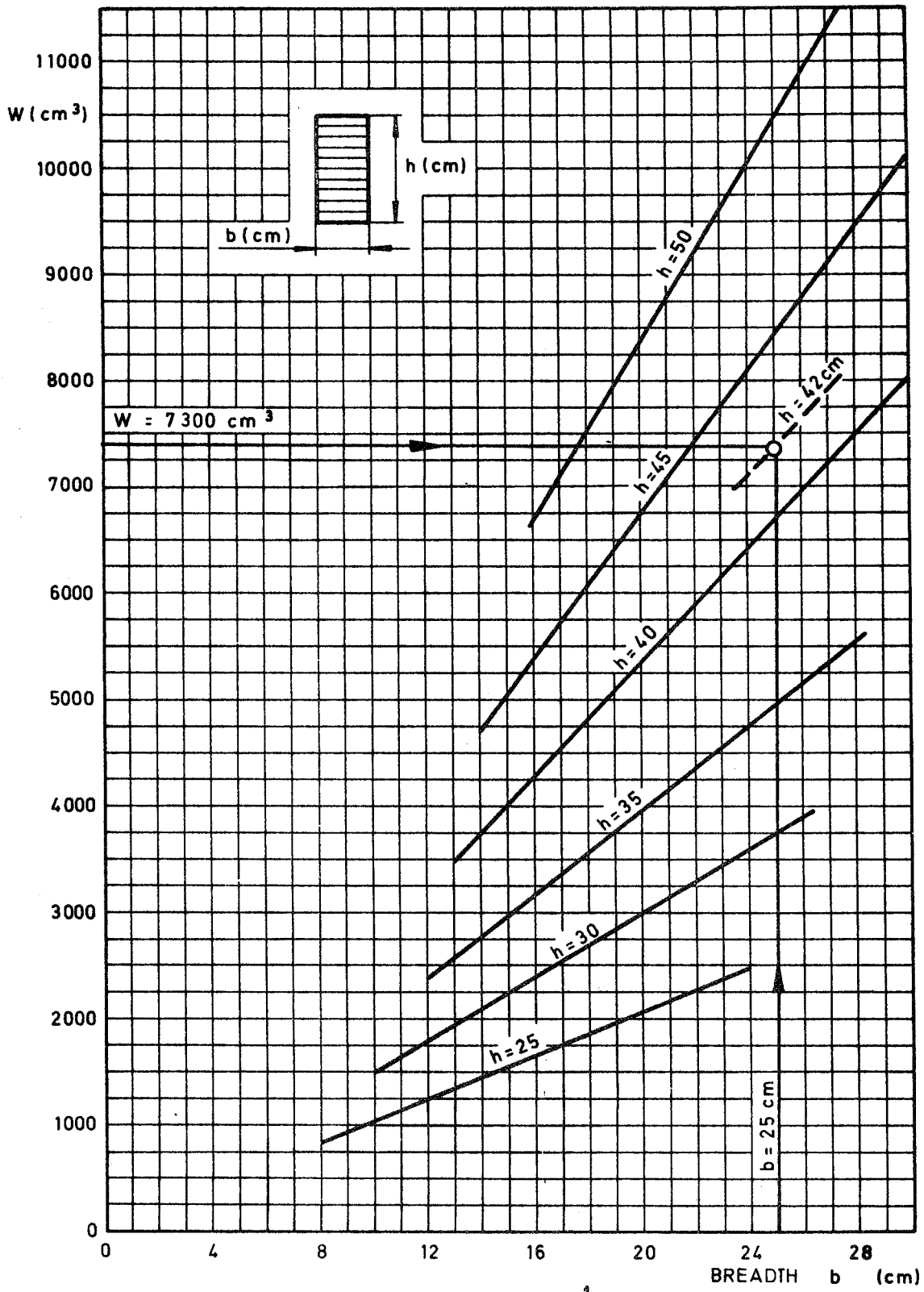


FIG. 6 C SECTION MODULUS $W = \frac{1}{6} bh^2$ OF CROSS SECTIONAL AREA WITH BREADTH b (cm) AND HEIGTH h (cm)

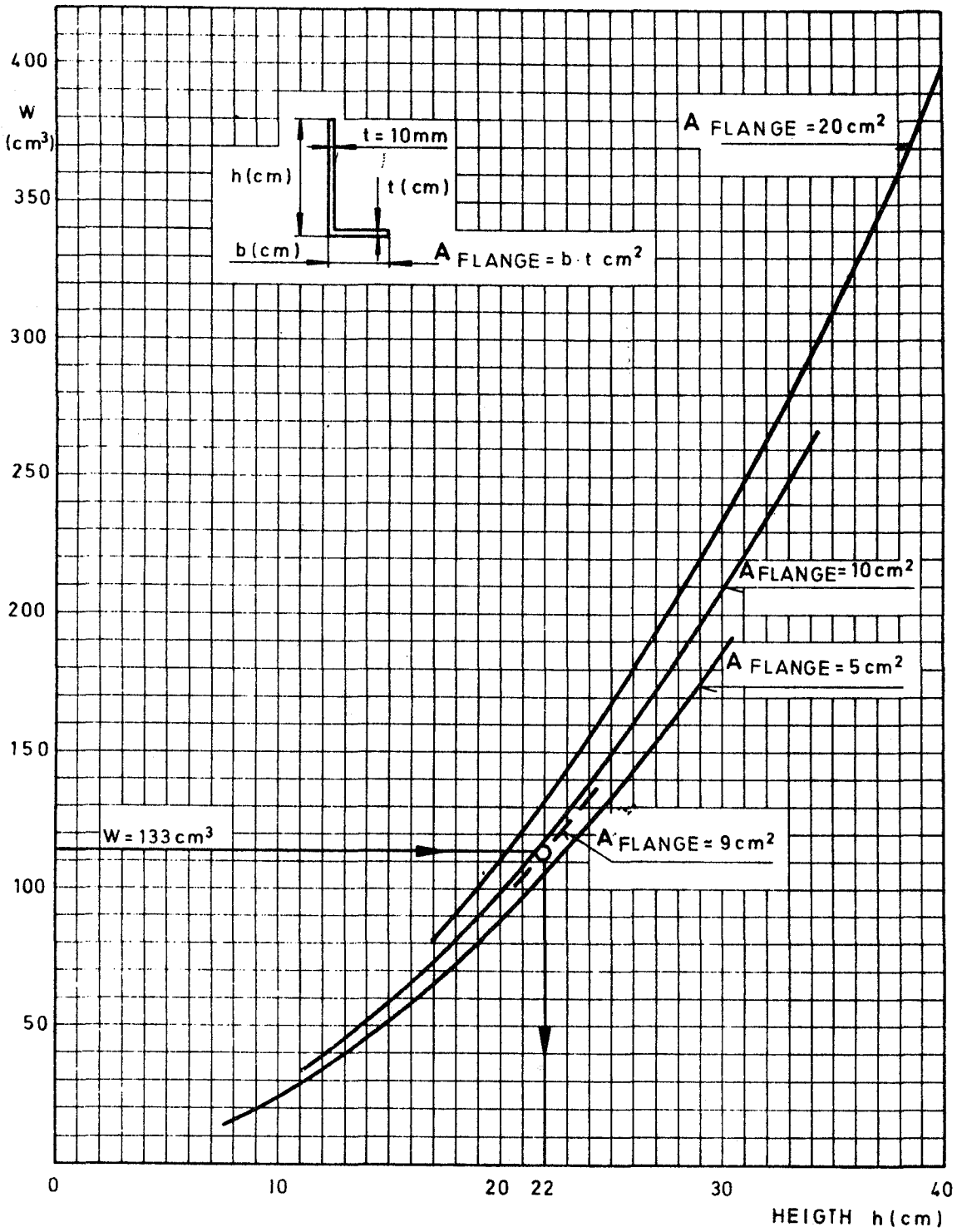


FIG. 7 SECTION MODULUS OF STEEL FLOOR WITH FLANGE

TABLE 1

Double, Built Frames.

Reduction of Frame Depth from Bilge to Deck

Depth of Frame in cm.		
At lower end of Bilge.	At upper end of Bilge.	At Upper Deck.
10	8.5	6.5
11	9.5	7
12	10.5	8
13	11.5	9
14	12.5	10
15	13.5	10.5
16	14	11
17	15	11.5
18	16	12.5
19	17	13.5
20	18	14
21	19	14.5
22	20	15
23	20.5	15.5
24	21.5	16
25	22.5	16.5

TABLE 2. LONGITUDINAL MATERIAL FROM SCANDINAVIAN FIR.

*) L X B X D	KEEL. Height	KEEL. Breadth	KEELSON. Height	KEELSON. Breadth	**) SKIN THICKN. Garb. to lower part of Bilge	SKIN THICKN. Lower Part Bilge to Deck	STRINGER. On Double Built Frames. Thickn.	STRINGER. On Double Built Frames. Breadth	STRINGER. On Lamn. Frames. Sect.Area Lower Str.	BEAM CLAMP Collect. Height.	BEAM CLAMP Thickness	SHELF Height and Breadth	WATERWAY. Collect. Breadth.	WATERWAY. Thickness	Ceiling or Inner Skin Thick.	***) Deck and Gun-Whale Thick.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
Under 60	15	13.5	15	15	4.5	4.5	5.5	23	90	17.5	7	10	15	7.5	3.5	4.5
60 - 80	16	14.5	16	16	4.5	4.5	5.5	25	93	18	7	10	16	8	4	4.5
80-100	17	15.5	17	17	4.5	4.5	6	27	95	18	7	10.5	16	8	4.5	5
100 - 120	18	16.5	18	18	4.5	4.5	6	29	98	19	7	10.5	17	8.5	4.5	5
120- 140	19	17.5	18.5	18.5	4.5	4.5	6.5	31	101	19.5	7.5	11	17	8.5	5	5
140 - 160	20	18	19.5	19.5	4.5	4.5	6.5	33	104	20	7.5	11	18	9	5	5
160 - 185	21	19	21	20.5	5	5	7	37	107	20.5	7.5	11.5	18	9	5.5	5
185 - 210	22	20	22.5	21.5	5	5	7	40	110	21	7.5	11.5	19	9.5	5.5	5
210 - 235	23	21	24	22.5	5	5	7.5	44	115	21.5	8	12	19	9.5	5.5	5
235 - 260	24	21.5	25.5	23.5	5	5.5	7.5	47	122	22	8	12.5	20	10	5.5	5
260 - 290	25	22	26.5	24.5	5	5.5	7.5	51	130	23	8	12.5	21	10.5	5.5	5.5
290 - 325	26	23	28	25	5.5	5.5	8	54	140	23.5	8.5	13	21	10.5	6	5.5
325 - 360	27	24	30	26	5.5	6	8	59	152	24	8.5	13.5	22	11	6	5.5
360 - 405	27.5	24.5	31.5	27	5.5	6	8	64	165	25	9	14	23	11.5	6	5.5
405 - 450	28.5	25.5	33	28	6	6.5	8.5	69	182	26	9	14.5	24	12	6	6
450 - 500	29	26	34.5	29	6	6.5	8.5	74	200	26.5	9.5	15	24	12	6.5	6
500 - 550	30	27	36	30	6	7	9	79	215	27.5	9.5	15.5	25	12.5	6.5	6
550 - 600	31	27.5	38	31	6.5	7	9	84	230	28	10	16	26	13	6.5	6
600 - 660	31.5	28	39.5	32	6.5	7.5	9	89	250	29	10	16.5	27	13.5	6.5	6
660 - 720	32.5	28.5	41	33	6.5	7.5	9.5	94	270	29.5	10.5	17	28	14	6.5	6.5
720 - 790	33	29.5	42.5	34	7	8	9.5	100	295	30.5	11	17.5	29	14.5	6.5	6.5
790 - 860	34	30	44.5	35	7	8	10	106	320	31.5	11	18	30	15	7	6.5
860 - 940	35	30.5	46.5	36	7	8.5	10.5	113	345	32.5	11.5	19	31	15.5	7	6.5
940 -1020	35.5	31	48.5	37	7	8.5	10.5	119	370	33.5	12	19.5	32	16	7	6.5

*) Ships Length L, Breadth B and Depth D in metres.

**) If Frame spacing exceeds rule spacing according to sect. 4A. the skin thickness must be corrected in same proportion.

***) If B AMS on every frame, deck planking need not be thicker than skin planking.

Table 3. Bolts in Strength Members.

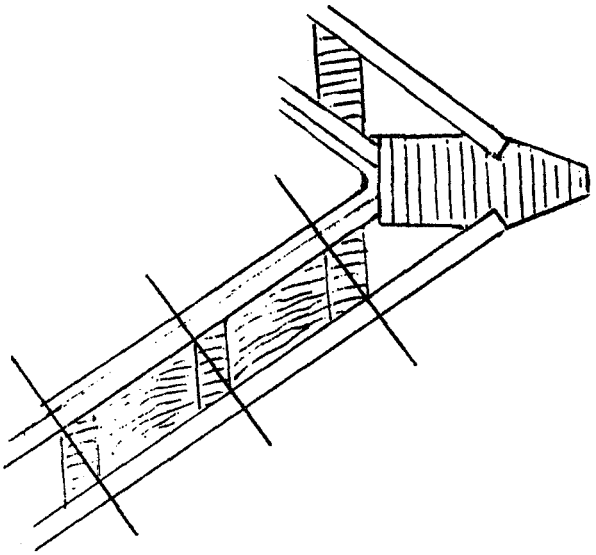
L x B x D	Keel bolts where one in each floor, also bolts in Forefoot and Sternpost Knees.	Keel bolts where two in each floor, Bolts in Garboard strake - Keelson, in Deck Beam Shelf and in Waterways. Frame Bolts.	Bolts in Stringers, and in Clamps for main deck, raised quarter deck, and for hold beams. Horizontal bolts in Keelsons and in Waterways.	Scarph bolts in keel, Keelson and outer skin. Bolts in Clamps and Waterways in Superstructures.	Spacing of bolts in each plank in Stringers. Breadth of plank in cm						
					Less than 15	15 to 17.5	17.5 to 20	20 to 22.5	22.5 to 25	25 to 27.5	27.5 to 30
	mm	mm	mm	mm	cm	cm	cm	cm	cm	cm	cm
Under 50	16	14	13	10							
50- 75	16	14	13	11							
75-100	18	16	13	11							
100- 155	18	16	13	11	128	115	102	91	82	71	59
155- 215	19	17	14	11	126	114	101	90	80	70	58
215- 285	20	18	15	12	124	112	100	88	79	69	57
285- 360	21	19	15	12	122	110	99	87	78	68	56
360- 455	22	19	16	13	120	108	97	86	77	67	55
455- 580	23	20	16	13	118	106	95	84	75	65	54
580- 730	24	21	17	14	116	104	93	82	73	63	53
730- 910	25	21	17	14	113	102	91	80	71	61	51
910-1130	26	22	18	15	110	99	88	78	69	59	49

TABLE 4

Bolts in Knees, Riders and in Fore-and After Breasthooks.

*) B + 2D	Bolts in Knees and Riders.	Bolts in Forward and After Breasthooks.
4.5 - 6.8	13mm	16mm
6.8 - 8.8	16mm	19mm
8.8 - 10.8	19mm	22mm
10.8 - 13.0	22mm	25mm

*) B = Ships breadth in metres.
D = Ships depth in metres.



BOLTING IN BREASTHOOK

TABLE 5a.

Solid, Steel Stanchions.

N	Length of Stanchions in metres.			
	2.0	2.5	3.0	3.5
	Dia. in mm			
3	50	53	56	59
4	53	56	60	64
6	56	60	65	69
8	59	64	69	73
10	62	68	73	78
13	65	71	77	82
16	68	75	81	86
20	71	78	84	90
24	74	81	88	94
29	77	84	91	98
34	80	88	95	102
40	83	91	99	106

Note to table 5a:

N = L x b x h

l and b are length and breadth in metres of the deck area which is supported by the stanchion. The area will in most cases extend half-way to the nearest stanchion, bulkhead or ships side.

h = 0.175 B - minimum 0.5 metre for open deck.
= 0.1 B for accommodation deck.
= 0.075 B for superstructure deck.
B = Ships breadth in metres.

TABLE 5b

Hollow Stanchions Corresponding to Solid Stanchions According to Table 5a

Dia. of Solid Stanchions.	Length of Stanchion in metres.			
	2.0	2.5	3.0	3.5
mm	mm	mm	mm	mm
50	70 x 6.0	70 x 6.0	70 x 6.0	
55	70 x 6.0	70 x 6.0	70 x 6.0	
60	80 x 6.5	75 x 6.0	75 x 6.0	75 x 6.0
65	90 x 6.5	80 x 6.5	80 x 6.5	80 x 6.0
70	100 x 7.0	90 x 6.5	90 x 6.5	90 x 6.0
75	115 x 7.0	110 x 6.5	105 x 6.5	100 x 6.5
80	130 x 7.5	120 x 7.0	115 x 7.0	105 x 6.5
85	145 x 8.0	130 x 7.5	125 x 7.0	115 x 7.0
90	160 x 8.5	145 x 8.0	135 x 7.5	125 x 7.0

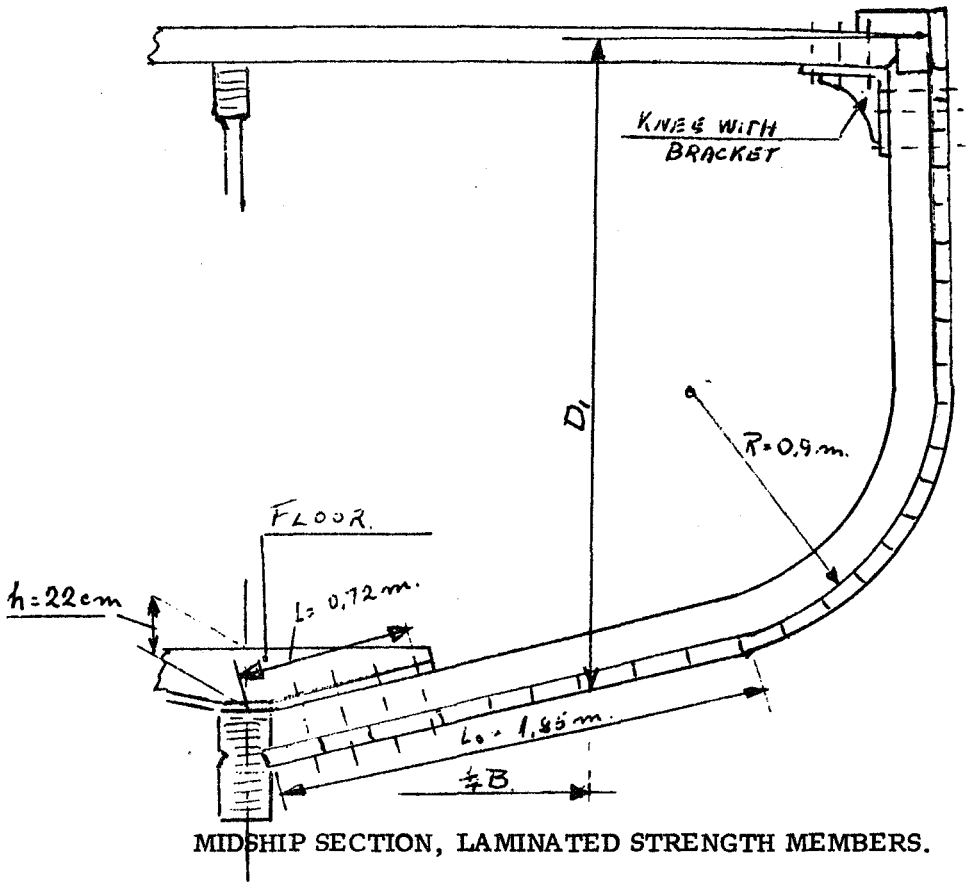
SUPPLEMENTS.

Supplement 1.

EXAMPLE OF CALCULATIONS FOR LAMINATED STRENGTH MEMBERS.

For a ship with main dimensions L = 19.5 m. B = 5.2 m. D = 2.7 m.

the main strength members are to be determined.



MIDSHIP SECTION, LAMINATED STRENGTH MEMBERS.

Computation of Frames. (See Chapter II. Section 4).

Length of frame for determination of scantlings:

$l = l_0 - 3f + 0.3\,R$

From the Midship Section is found:

$l_0 = 1.85$ m

$f = 0$

$R = 0.9$ m

$D_1 = 2.40$ m (Ship's depth at ¼ breadth)

$l = 1.85 + 0.3 \times 0.9 =$ 2.12 m.

Rule spacing of frames :

$$s = \frac{L}{100} + 0,30 = \frac{19,5}{100} + 0,30 = 0,495\text{m}$$

However, in this case the spacing was chosen s = 0,42 m

Rule requirements for frame section modulus (Sect. 4 B) :

$W = 45\ s\ h\ l^2$ where :

$$h = \left(\frac{L}{100} + 0.5\right)\ 2.5 + D_1$$

$= (0.195 + 0.5)\ 2.5 + 2.40$

$= 4.14$ m.

$$W = 45 \times 0.42 \times 4.14 \times 2.12^2 = \underline{352\ cm^3}$$

From fig. 6A, the frame section can be determined. If a breadth of laminae, b, is taken = 9.5 cm. the required depth of frame, h, is found = 14.9 cm - i.e. = 15 cm.

The net scantlings of laminated frame, thus is : b x h = 9.5 x 15 cm.

Laminated Keel (Sect. 5)

$$W = 0.5\ \frac{D1}{D}\ L\ \frac{W\text{frame}}{s}\ \text{cm}^3$$

$$W = 0.5\ \frac{2.4}{2.7} \times 19.5 \times \frac{352}{0.42} = \underline{7300\ cm^3}$$

If Keel breadth is taken = b = 25 cm, the keel height is found from fig. 6C :

h = 42 cm.

Net scantlings of the keel will thus be : b x h = 25 x 42 cm.

Stem (Sect. 6)

Breadth and thickness of stem = breadth of keel :

b = t = 25 cm.

Steel Floors (Sect. 4. B 35)

Section Modulus of the floor must be at least ⅓ of section modulus of Frame.

$W = \frac{1}{3} \times W_{frame} = \frac{1}{3} \times 352$ $\quad W = 117\ cm^3$

From fig. 7, the height of floor is found when flange has been chosen : If flange area Aflange, is taken = 9 cm^2, the figure gives the required height, $h = 22$ cm.

Scantlings of Floor : 220 x 90 x 10 angle section

Length of arm for floor :

$l = B/10 + 0.2 = 0.52 + 0.2 = 0.72$ m

Deck Beams (Sect. 9)

Alternative 1.

The beam is supported by longitudinal girder in centreline:

Length from inner edge of frame to centreline of girder, $l = 2.45$ m.

Rule requirement for section modulus :

$W = 60\ sl^2 = 60 \times 0.42 \times 2.45^2 = 151\ cm^3$

From fig. 6A, the beam scantlings can be determined.

If breadth of laminae is kept = $b = 9.5$ cm as for the frame, the required height of beam h, will be = 10 cm.

Alternative 2.

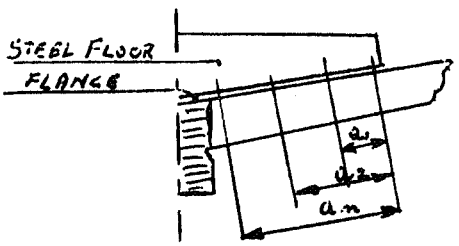
The beam has free span from ships side to ships side :

$l = 4.90$ m.

$W = 60 \times 0.42 \times 4.90^2 = 605\ cm^3$

Fig. 6B gives the required beam height $h = 19.5$ cm when breadth of laminae is retained = $b = 9.5$ cm.

Bolted connection frame/floor.



a_1 = 19 cm

a_2 = 38 cm

a_n = 57 cm

$$I_{bolt} = a_1^2 + a_2^2 + \text{---------} + a_n^2$$

$$= 19^2 + 38^2 + 57^2 = 5050.$$

Strain on lower bolt will be :

$$P_1 = \frac{200\ W_{frame}}{I_{bolt}} \times a_n$$

$$= \frac{200 \times 352}{5050} \times 57 = \underline{795\ kp}$$

From Table 2 is found that the smallest bolt which can take this strain, is a 22 mm. dia. bolt

In this example, the lower end of frame extends down to the keel, and it is not necessary to check P_2 (Sect. 11 C 21).

In the example, a small increase of bolt spacing (if necessary by slightly increased arm length), will reduce P_1 sufficiently to allow the use of a 19 mm. bolt.

If bolt spacing is increased from 19 to 20 cm. the dimension will be as follows :

$I_{bolt} = 20^2 + 40^2 + 60^2 = 5600$

which gives :

$P_1 = 716$ Kp and according to Table 2, the required bolt dimension = 19 mm.

SUPPLEMENT 2.

Weight Class for Various Goods.

	Weight Class.
Aluminium	2
Apatitt	2
Asphalt in barrels	3
Steel Strip closely packed in boxes	1
Steel Strip Scrap	2
Wood fibre plates (solid)	3
Wood fibre plates (porous)	4
Soilpipes	3
Fresh Fish Produce	3
Fresh Fish in Ice	4
Dried Fish Skin	4
Fish Skin, salted in boxes or barrels	3
Scrap Wood	5
Animal Food Flour	3
Boxed Fruit	4
Cobble Stones, Pavement Stones	2
Fertilizer, Artificial	2
Fertilizer, Natural, Dried	3
Fertilizer, Natural, Raw	2
Tinned Goods	4
Baled Hay or Straw	5
Block Ice	3
Granulated Ice	4
Iron Ore	1
Lime in W.T. Packing (Quick Lime is not permitted to be carried loose in the hold)	3
Limestone	2
Bundled Wood for Boxes	5
Klippfish	3
Copper Ingots	1
Coke Ingots	5
Grain	3
Plywood	3
Coal	4
All Kinds of Ore	1
Bagged Flour	3
Treacle in barrels	2
Bricks	3
Paper	3
Potatoes and other roots	3
Pig Iron	1
Salt-loose in hold	2

Salt in barrels or bags	3
Salt Fish - loose in hold	3
Sand and Gravel	2
Bagged Cement	2
Cement Pipes	3
Building Blocks (Porous)	4
Cement Plates	2
Salted Fish and Herring in barrels	4
Herring loose in hold	3
Fish Flour	3
Herring Oil in barrels	3
Slates	2
Sand	2
Scrap Iron	2
Clay	2
Steel Sections, Plates	2
Steel Wire in bundles	3
Sleepers	3
Sulphur	3
Roof Tiles	3
Talc	3
Seaweed - processed, in bags	3
Dried Peat	4
Granulated Peat	5
Codliver Oil in barrels	3
Timber - props and poles	4
Wood Pulp - wet	2
Chipboard	3
Bundles of Barrel Material	5
Stockfish	4
Firewood	4

A TRANSLATION OF
SUPPLEMENT APRIL 1st, 1972

ADDITIONS AND AMENDMENTS

approved by the Permanent Committee as of : April 1st, 1972.

CONTENTS :

- - -

CHAPTER II
RULES FOR THE BUILDING OF WOODEN SHIPS

Section 12. Engine Room and Casing.

B. Casing.

Item 20 has been amended and now reads :

B 20 Unprotected casings.

21 - 24 As existing Rules.

25 Casing front bulkheads located less than 0,25 L from F.P., are either to have the stiffener spacing reduced by 20% or the plating thickness increased by 25%.

26 Other casing bulkheads and sides particularly exposed to shipped sea, are to be reinforced after special consideration.

27 Casing top beams are as far as practicable to be connected to casing side stiffeners.

Section 13. Deckhouses and Superstructures which do not form Part of an Engine Room Casing.

A. Steel or Aluminium Structure.

Item 10 has been amended and now reads :

A 10 Scantlings.

11 - 13 As existing Rules.

14 If the deckhouse front is located less than 0,25 L from F.P., the stiffener spacing is to be reduced by 20% or the plating thickness increased by 25%.

15 Other deckhouse bulkheads and sides particularly exposed to shipped sea, are to be reinforced after special consideration.

16 - 18 As items 15, 16, 17 of existing Rules.

Section 14. Openings in the Hull. Closing Appliances. Hatch Coamings and Hatch Covers. Drainage of Deck.

C. Openings in Deck.

C 30 Hatch covers of steel.

Item 33 has been amended and now reads :

33 The cover edges are to have sufficient stiffness in relation to bolt spacing and packing pressure.

Item 40 has been amended and now reads :

C 40 Hatch covers of aluminium.

41 The thickness of the top plate and the section modulus of the stiffeners are to be at least 35% and 90%, respectively, greater than for hatch covers of steel. For aluminium with tensile strength higher than 22 kp/mm^2 and 0,1% proof stress ($\sigma_{0,1}$) greater than 12,5 kp/mm^2, the above required additions may be reduced.

The moment of inertia of aluminium stiffeners is to be not less than 3 times that required for steel stiffeners.

42 As existing Rules.

Item 50 has been amended and now reads :

C 50 Hatch covers of wood.

51 As existing Rules.

52 Any portable beams may have scantlings determined from C 32, provided section modulus and moment of inertia are increased by 18% and 28%, respectively. In the formulae, s is taken equal to the length of the hatch covers in metres.

The rests or slots for beams are to be of a strong design, and are to give efficient support and securing for the hatch beams.

- - -

CHAPTER III
RUNNING CONTROL OF SHIPS IN CLASS

Section 1. Surveys for Maintenance of Class.

Item B has been amended and now reads :

B. Periodical Surveys, General.

B 10 Special periodical surveys.

11 For ships with class notation A1 the special periodical survey is due 4 years from the date of build or from the last special periodical survey. For ships with class A2 the interval is 3 years, and for ships with class notation A3 or A4

the interval is 2 years.

12 At each special periodical survey the ship is to be placed in a drydock or on a slipway and made ready for access. Loose flooring, orlop deck, shutters, covers for vent openings and other loose equipment are to be removed from the hull and taken ashore. In way of accommodation lining against ship's sides is to be removed to an extent sufficient for access to the hull's strength members. Externally, openings are to be cut in the skin planking at places where the frames are not accessible from inside.

A sufficient number of bolts, rivets and other connections are to be driven out for control. Seawater suctions and discharges above and below the waterline, with valves and cocks are to be dismantled, and their connections to the hull are to be examined.

Rudder, rudder stock with bearings, conical connections etc. are to be surveyed. Rudder bearing clearances are to be measured.

Deckhouses, hatches, companionways with closing appliances and ventilators are to be surveyed. The machinery is to be surveyed as stated in Chapter XI of the Rules for Steel Ships, as far as these rules are applicable to wooden ships.

B 20 Intermediate surveys.

21 For ships with class notation A1 or A2, intermediate survey is to be carried out not later than 2 years from the date of build or from the last special periodical survey. For ships with class notation A3 or A4, the interval is 1 year.

22 At the intermediate survey the ship is to be placed in a drydock or on a slipway. The survey is to comprise the hull externally and internally, as well as deckhouses, hatches, companionways, ventilators etc. as stated in B 12.

Seawater suctions and discharges are to be dismantled only if found necessary by the Surveyor. Rudder bearing clearances are to be measured.

B 30 Reduction in class for wooden ships.

31 Wooden ships retain a given class as long as the ship's general condition is considered satisfactory for the class. Decision re reduction in class is taken by Head Office on the basis of the Surveyor's report and advice at the periodical survey.

B 40 Estimation of grade.

41 As an aid for estimation of the ship's general condition, the ship's main grade should be calculated.

The main grade for a new ship equals 0. Annual additions to the main grade equals the sum of weight number x the material grade for the various components of the hull. See tables in 42 and 43.

42 Table for material grade.

Material	Grade
Pressure-impregnated material	0,2
Teak	0,5
Oak (except American Red Oak)	0,6
Non-impregnated fir	1,0
Pine	1,2
Hot-galvanised steel	1,0
Non-galvanised steel	2,0

43 Table for weight numbers.

Strength members	Weight number
Outer skin	0,75
Frames	1,00
Inner skin, stringers	0,25
Deck planking	0,40
Deck beams	0,60
Keel, keelson	0,50
Stem and afterpost	0,25
Deck clamps, shelves, gunwhale	0,25
Floors, breasthooks, forward and aft	0,75
Beam knees	0,25
Bolting, nailing	1,00

44 The question re reduction in class is normally raised at the first special periodical survey after the ship's main grade has passed the value which is indicated for the various classes in the table below.

Guidance re main grades for reduction in class.

Class	Main grade up to
A1	100
A2	145
A3	185
A4	220

B 50 Time limit for periodical surveys.

51 Time limit for periodical survey is counted from month of build or month of entry, see Chapter I, Sec. 3 D 40, or from the completion of the last similar periodical survey.

52 Survey in connection with special periodical survey must be requested before it is due, and the ship must within that time have arrived at the port where repairs are to be effected.

The ship's age is counted from the month of build - or for ships which are not built under the supervision of the Society, from the month when the ship was delivered from the builders.

B 60 Sub-division of special periodical survey.

61 A special periodical survey may be split up if it is carried out before it is due. It cannot be commenced more than 6 months ahead of the time when it is due. When special periodical survey is split up, the due time for next survey is counted from the time when the major part of the survey was completed.

Head Office will decide when the major part of the survey is regarded as completed.

B 70 Postponement of special periodical survey.

71 The Society may agree to the postponement of a special periodical survey in full or partly up to 6 months. The owners must submit written request for such postponement before the survey is due. Postponement may only be granted when there is no apparent reason for not granting it, and only after a sighting survey has been carried out (see C).

72 The postponement which may be granted, is dependent on the ship's condition and age, but under no circumstances can a postponement beyond 6 months be granted, counted from the due date for the special periodical survey.

73 If the major part of the special periodical survey has been completed, the remaining surveys are specified in report to Head Office, with a copy to ship and owners.

74 Head Office may consider a special periodical survey completed when the major part of the survey has been completed, provided a recommendation is at the same time given, stating that the remaining work and survey be carried out within a stipulated, short time.

B 80 Entry in Det norske Veritas' Register.

81 A successfully completed survey is indicated in Det norske Veritas' Register, as under :

Year and month for completion of the survey are indicated. If the survey has been split up, the entry is made after completion of the entire survey, and then stating the year and month when the major part of the survey was completed.

B 90 Summary of periodical surveys.

91 4-yearly surveys.

1. Special periodical survey of hull and machinery for ships with class A1.
2. Propeller shafts (see Rules for Steel Ships, Chapter XI, Sec. 5).
3. Steering gear - hydraulic.
4. Refrigerating plant (see Rules for Steel Ships, Chapter XI, Sec. 9).
5. Electrical plant.

92 3-yearly surveys.

1. Special periodical survey of hull and machinery for ships with class A2.

93 Biennial surveys.

1. Intermediate survey of hull for ships with class A1 or A2. See B 20.
2. Special periodical survey of hull and machinery for ships with class A3 or A4.
3. Propeller shafts (see Rules for Steel Ships, Chapter XI, Sec. 5).

4. Steering gear, electric or electric/hydraulic.

5. Refrigerating plant (see Rules for Steel Ships, Chapter XI, Sec. 9).

94 Annual surveys.

1. Hatches with closing and securing appliances.
   Ventilators and other deck openings.
   Deckhouses and casings with closing appliances.

2. Intermediate survey of hull for ships with class A3 or A4. See B 20.

3. Steering chains or steel wire ropes and rods.

4. Refrigerating plant (see Rules for Steel Ships, Chapter XI, Sec. 9).

Item C has been amended and now reads :

C. Sighting Surveys for Postponement of Special Periodical Survey.

C 10 General extent of the survey.

11 In order to assess the condition of the ship, an external and internal sighting survey will be required when the special periodical survey is due.

As part of the sighting survey it may be required that the ship is placed in a drydock or on a slipway.

Oslo, February 1973