

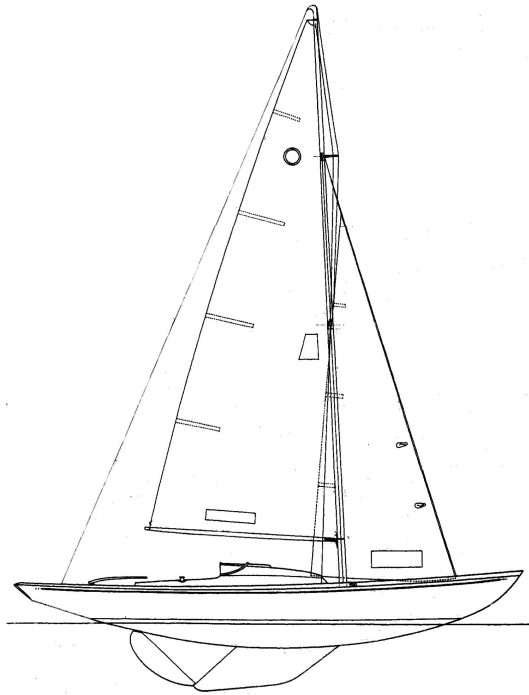
KNARR

INTERNATIONAL

CLASS RULES

2010

The Knarr was designed in 1943 by Erling L. Kristofersen



Closed class rules for the Knarr class
This version is updated to reflect the ERS 2005-2012
Date of this version 2.0: 28.02.2011

INDEX

PART I – ADMINISTRATION

Section A – General

A.1	Language	4
A.2	Abbreviations	4
A.3	Authorities.....	4
A.4	Administration of the Class	4
A.5	ISAF Rules	4
A.6	Class Rules Variations	4
A.7	Class Rules Amendments	4
A.8	Class Rules Interpretation	4
A.9	Sail Numbers	5
A.10	Hull Certification	5
A.11	Initial Hull Certification	5
A.12	Validity of Certificate	5
A.13	Hull Re-Certification	5
A.14	Retention of Certification Documentation	5

Section B – Boat Eligibility

B.1	Class Rules and Certification	6
-----	-------------------------------------	---

PART II – REQUIREMENTS AND LIMITATIONS

Section C – Conditions for Racing

C.1	General	7
C.2	Crew	7
C.3	Personal Equipment	7
C.4	Advertising	7
C.5	Portable Equipment	8
C.6	Boat	8
C.7	Hull	9
C.8	Hull Appendages	9
C.9	Rig	10
C.10	Sails	12

Section D– Hull

D.1	Parts	14
D.2	General	14
D.3	Hull Shell	15
D.4	Deck	16
D.5	Accommodation Inner section ..	18
D.6	Toe Rail.....	18
D.7	Bulkheads	18
D.8	Thwarts and Bench	18
D.9	Assembled Hull	19

Section E – Hull Appendages

E.1	Parts	21
E.2	General	21
E.3	Keel	21
E.4	Rudder Blade, Rudder Stock and Tiller	22

Section F – Rig

F.1	Parts	23
F.2	General	23
F.3	Mast	24
F.4	Boom	26
F.5	Whisker Pole	27
F.6	Standing Rigging	28
F.7	Running Rigging	28

Section G – Sails

G.1	Parts	29
G.2	General	29
G.3	Mainsail	30
G.4	Jib	32

PART III – APPENDICES

.....	34
-------	----

INTRODUCTION

Knarr hulls, hull appendages, rigs and sails are measurement controlled.

Knarr hulls, hull appendages, and rigs shall only be manufactured by manufacturers approved by the Holder of Rights and/or the Knarr International Class Association, in the class rules referred to as licensed manufacturers. Equipment is required to comply with the Knarr Building Specification.

Knarr hulls, hull appendages, rigs and sails may, after having left the manufacturer, only be altered to the extent permitted in Section C of the class rules.

Owners and crews should be aware that compliance with rules in Section C is NOT checked as part of the certification process.

Rules regulating the use of equipment during a race are contained in Section C of these class rules, in ERS Part I and in the Racing Rules of Sailing.

It is the intention that future amendments to these Class Rules should be endeavouring to make the Knarr

- less expensive to build and/or maintain
- equally simple to sail and race
- safer in all aspects.

This introduction only provides an informal background and the International Knarr Class Rules proper begin on the next page.

PART I – ADMINISTRATION

Section A – General

A.1 LANGUAGE

- A.1.1 The official language of the class is English and in case of dispute over translation the English text shall prevail.
- A.1.2 The word “shall” is mandatory and the word “may” is permissive.

A.2 ABBREVIATIONS

- A.2.1 ISAF International Sailing Federation
- MNA ISAF Member National Authority
- ICA Knarr International Class Association
- NCA National Class Association
- ERS Equipment Rules of Sailing
- RRS Racing Rules of Sailing

A.3 AUTHORITIES

- A.3.1 The international authority of the class is the ICA, which shall co-operate with the NCA in all matters concerning these **class rules**.
- A.3.2 Notwithstanding anything contained herein, the **certification authority** has the authority to withdraw a **certificate** and shall do so on the request of the ICA.

A.4 ADMINISTRATION OF THE CLASS

- A.4.1 ICA has delegated its administrative functions (the certification authority) of the class to MNAs. The MNA may delegate part or all of its functions, as stated in these **class rules**, to an NCA.
- A.4.2 In countries where there is no MNA, or the MNA does not wish to administrate the class, its administrative functions as stated in these **class rules** shall be carried out by the ICA which may delegate the administration to an NCA.

A.5 ISAF RULES

- A.5.1 These **class rules** shall be read in conjunction with the ERS.
- A.5.2 Except where used in headings, when a term is printed in “**bold**” the definition in the ERS applies and when a term is printed in “*italics*” the definition in the RRS applies.

A.6 CLASS RULES VARIATIONS

- A.6.1 At Class Events – see RRS 89.1(d) – ISAF Regulation 26.5(f) applies. At all other events RRS 87 applies.

A.7 CLASS RULES AMENDMENTS

- A.7.1 Amendments to these **class rules** are subject to the approval of the MNA.

A.8 CLASS RULES INTERPRETATION

- A.8.1 Interpretation of **class rules** shall be made by the MNA.

A.9 SAIL NUMBERS

- A.9.1 Sail numbers shall be issued by the MNA.
- A.9.2 Sail numbers shall be issued in consecutive order starting at “1”.

A.10 HULL CERTIFICATION

- A.10.1 A **certificate** shall record the following information:
 - (a) Class
 - (b) **Certification authority**
 - (c) Sail number issued by the **certification authority**
 - (d) Owner
 - (e) Hull identification
 - (f) Builder/Manufacturers details
 - (g) Date of issue of initial **certificate**
 - (h) Date of issue of **certificate**

A.11 INITIAL HULL CERTIFICATION

- A.11.1 For a **certificate** to be issued to hull not previously **certified**:
 - (a) **Certification control** shall be carried out by the **official measurer** who shall complete the appropriate documentation.
 - (b) The documentation and **certification** fee, if required, shall be sent to the **certification authority**.
 - (c) Upon receipt of a satisfactorily completed documentation and **certification** fee, if required, the **certification authority** may issue a **certificate**.

A.12 VALIDITY OF CERTIFICATE

- A.12.1 A hull **certificate** becomes invalid upon:
 - (a) The change to any items recorded on the hull **certificate** as required under A.11.
 - (b) The date of expiry,
 - (c) Withdrawal by the **certification authority**,
 - (d) The issue of a new **certificate**,

A.13 HULL RE-CERTIFICATION

- A.13.1 The **certification authority** may issue a **certificate** to a previously certified hull:
 - (a) When it is invalidated under A.12.1(a) or (b), after receipt of the old **certificate**, and **certification** fee if required.
 - (b) When it is invalidated under A.12.1 (c), at its discretion.
 - (c) In other cases, by application of the procedure in A.11.

A.14 RETENTION OF CERTIFICATION DOCUMENTATION

- A.14.1 The **certification authority** shall:
 - (a) Retain the original documentation upon which the current **certificate** is based.

- (b) upon request, transfer this documentation to the new **certification authority** if the hull is exported.

Section B – Boat Eligibility

For a **boat** to be eligible for *racing*, it shall comply with the rules in this section.

B.1 CLASS RULES AND CERTIFICATION

B.1.1 The boat shall:

- (a) Be in compliance with the **class rules**.
- (b) Have a valid hull **certificate**.
- (c) Have valid **certification marks** as in compliance with the **class rules**.

PART II – REQUIREMENTS AND LIMITATIONS

The **crew** and the **boat** shall comply with the rules in Part II when *racing*. In case of conflict Section C shall prevail.

The rules in Part II are **closed class rules**. **Certification control** and **equipment inspection** shall be carried out in accordance with the ERS except where varied in this Part.

Section C – Conditions for Racing

C.1 GENERAL

C.1.1 MEASUREMENT

- (a) Measurements shall be carried out in accordance with the ERS.

C.2 CREW

C.2.1 LIMITATIONS

- (a) The **crew** shall consist of 2-4 persons.

C.2.2 WEIGHT

- a) Total combined weight of the crew must not exceed a maximum of 300 kg

C.2.3 PLACEMENT

- (a) The use of any apparatus or contrivance where the purpose is to support or assist in supporting a member of the crew outboard or partially outboard is prohibited.
- (b) It is prohibited to hike further out over the sheer line than the middle of the thigh.

C.3 PERSONAL EQUIPMENT

C.3.1 MANDATORY

- (a) The boat shall be equipped with **personal buoyancy** for each crew member to the minimum standard ISO 12402-5 (CE 50 Newton), or USCG Type III, or AUS PFD 1.

C.4 ADVERTISING

C.4.1 LIMITATIONS

Advertising shall only be displayed in accordance with the ISAF Advertising Code. (See ISAF Regulation 20)

C.5 PORTABLE EQUIPMENT

C.5.1 FOR USE

(a) MANDATORY

- (1) One bilge pump fixed
- (2) One bucket that can take a minimum of 10 liters
- (3) One anchor of not less than 13.5 kg in weight or one anchor not less than 8 kg with chain (6 mm), i.e. the combined weight of anchor and chain is not less than 13.5 kg.
- (4) One anchor line, not less than 30 m long. Line strength shall correspond to commercially available 12 mm three-strand synthetic anchor rope.

(b) OPTIONAL

- (1) Compass – entirely self-contained unit containing heading, tactical indicator and race timer functions only.
- (2) Electronic or mechanical timing devices

C.5.2 NOT FOR USE

(a) Mandatory

- (1) Towing rope minimum 10 m long of not less than 10 mm in diameter.
- (2) One paddle minimum 1400 mm long and with a blade area of minimum 0.06 m²

(b) OPTIONAL

- (1) Electronic navigation devices.
- (2) One outboard engine.
- (3) Mobile (cell) phones.
- (4) Other devices such as log, depth sounder and wind speed instruments.

C.6 BOAT

C.6.1 MODIFICATIONS, MAINTENANCE AND REPAIR

Only routine maintenance and repair such as painting and polishing is allowed. Major repairs or overhaul requires a re-measurement.

C.6.2 DIMENSIONS

	Minimum	Maximum
Length (LOA)	9240 mm	9280 mm
Beam (BMAX)	2110 mm	2140 mm

C.6.3 WEIGHT

	Minimum	Maximum
The weight of the boat in dry condition. The weight shall be taken excluding sails and rig and all portable equipment as listed in C.5. Other equipment permanently fixed to the boat shall be included in the weight.	2225 kg	

C.6.4 CORRECTOR WEIGHTS

- (a) **Corrector weights** of lead shall be permanently fastened to the hull when the **boat** weight is less than the minimum requirement.

The corrector weights shall be divided in four equal parts and permanently fastened to the vertical aft side of the cockpit shelves, as close to the top of the shelf as possible and under the base of the berths in the forepeak 500 mm forward of forward chain plates.

- (b) The total weight of such **corrector weights** shall not exceed 100 kg.

C.7 HULL

C.7.1 MODIFICATIONS, MAINTENANCE AND REPAIR

- (a) Only routine maintenance and repair such as light sanding, painting and polishing is allowed.

Major repairs or overhaul requires a re-measurement.

C.8 HULL APPENDAGES

C.8.1 MODIFICATIONS, MAINTENANCE AND REPAIR

- (a) Only routine maintenance and repair such as light sanding, painting and polishing is allowed.

Major repairs or overhaul requires a re-measurement

C.8.2 LIMITATIONS

- (a) Only one **keel** and one **rudder** blade shall be used during an event, except when a **hull appendage** has been lost or damaged beyond repair.

C.8.3 KEEL

- (a) DIMENSIONS

	Minimum	Maximum
Maximum projection from the bottom of the hull	760 mm	780 mm

C.8.5 RUDDER

(a) DIMENSIONS

	Minimum	Maximum
Length parallel to rudderstock centreline	1545 mm	1555 mm
Width of rudder blade perpendicular to rudderstock centreline	440 mm	450 mm

C.9 RIG

C.9.1 MODIFICATIONS, MAINTENANCE AND REPAIR

Only routine maintenance and repair such as painting and polishing is allowed.
Light sanding and repainting of wooden mast is allowed.

C.9.2 FITTINGS

(a) Fittings are optional for all purposes specified on the drawings or mentioned in the rules

C.9.3 LIMITATIONS

- (a) Only one set of **spars** and **standing rigging** shall be used except when an item has been lost or damaged beyond repair.
- (b) The spars shall be built either of spruce (Picea or Abies) or aluminum grade 6005.

C.9.4 MAST

(a) DIMENSIONS

	Minimum	Maximum
Limit mark width	13 mm	-
Outer point distance	-	10250mm

(b) USE

- (1) The **spar** shall be stepped in the mast step in such a way that the heel shall not be capable of moving more than 5 mm.
- (2) The position of the mast in the fore and aft plan is free.
- (3) The mast shall be led through the deck in the fore and aft plane and stand on a mast step immediately above the keelson or keel reinforcement.
- (4) The mast hole through deck shall be constructed in such a way that movement of the mast in the mast hole is restricted to 20 mm in the fore and aft direction, and the mast may be fixed in the transverse direction. The width of the mast hole shall not exceed 105 mm.

- (5) The **mast spar** shall be stepped with the **Mast datum point** (see F.2.4) at level (+/- 10 mm) with the upper surface of the deck.

C.9.5 BOOM

(a) DIMENSIONS

	Minimum	Maximum
Limit mark width	13 mm	-
Outer point distance	-	3400 mm

(b) USE

- (1) The intersection of the aft edge of the mast **spar** and the top of the boom **spar**, each extended as necessary, shall not be below the upper edge of the mast **lower limit mark** when the boom **spar** is at 90° to the mast **spar**.

C.9.6 WHISKER POLE

(a) USE

- (1) The projected length of the whisker pole shall not exceed 2500mm.

C.9.7 STANDING RIGGING

(a) DIMENSIONS

The upper shrouds shall intersect the deck in such a way that the plane formed by the two shrouds pass through the free opening of the mast hole.

The lower shrouds shall intersect the deck at a distance measured horizontally, of 350 mm (+/- 5 mm) aft of the upper shrouds.

	Minimum	Maximum
Fore triangle base (J-measurement)	1980 mm	2000 mm

(b) USE

- (1) Rigging links and rigging screws shall not be adjusted.
- (2) Shrouds shall be connected to chain plates with turnbuckles.
- (3) The permanent backstay does not require any rigging screw and may be adjusted. The permanent backstay may be led under deck.
- (4) The forestay may be connected to a deck fitting with an under deck furling system. The furling system must not be used.

C.9.8 RUNNING RIGGING

(a) USE

- (1) The mainsail shall be sheeted either from a double block from the end of the boom to two blocks on deck situated equidistant to hull centreplane and 900 mm +/- 20 mm apart (cf. plan B), or to a traveller post allowing max. 200 mm sideways travel of the sheet fastening point. The height of the post shall be minimum 210 mm below the sheer line. The position of the post as shown in plan F. The design and the purchase of the sheeting system is optional and systems with more than one ratio are permitted. However, all parts of the sheet shall run directly between the boom and post. The tailing end may be led to cleat or jammer. Position of cleat or jammer is free. Use of winch on the post is permitted. The point of fastening on the boom shall be above the post. If more than one sheeting block is used, the distance between the centres of the blocks situated furthest from each other shall not exceed 250 mm.
- (2) The sheeting of the jib is free.
- (3) A kicking strap or rod-kick is permitted. The rod-kick shall not be capable of providing an upward pressure on the boom. The haul shall be fastened above deck and may be led aft.
- (4) The **foot** of the mainsail may be adjusted by either a clew outhaul or a tack inhaul. The inhaul cringle shall not be more than 250 mm from the **tack point** and 30 mm above the **foot**. The haul shall be fastened above deck and may be led aft.
- (5) A mainsail Cunningham haul is permitted. The haul shall not be more than 250 mm above the **tack point** and 30 mm from the **luff**. The haul shall be fastened above deck and may be led aft.
- (6) The halyards may be adjusted; the halyards shall be fastened above deck and may be led aft.
- (7) Cunningham haul in the jib is permitted; the haul shall be fastened above deck.
- (8) Barber hauls (inhaul and outhaul) for the jib sheets are permitted; the haul shall be fastened above deck and may be led aft.
- (9) Hook systems or halyard locks are prohibited.

C.10 SAIL

C.10.1 MODIFICATIONS, MAINTENANCE AND REPAIR

- (a) **Sails** shall not be altered in any way except as permitted by these **class rules**.

C.10.2 LIMITATIONS

- (a) Only **certified** sails with an attached **certification mark** can be used.
- (b) Not more than one mainsail and two jibs shall be carried aboard.
- (c) At Class Championship or events where **equipment control** is carried out on sails, not more than 1 mainsail and two jibs shall be used, except when a **sail** has been lost or damaged beyond repair.

- (d) In case of loss or damaged beyond repair of any sail during the event, the Jury or Race Committee may permit the use of substitute sails. Such sail shall be **certified** and have a **certification mark** attached. Use of sails without the certification mark is prohibited.

C.10.3 MAINSAIL

(a) IDENTIFICATION

The national letters and sail numbers shall comply with the RRS except where prescribed otherwise in these **class rules**.

National letters and numbers shall be of the following minimum dimension (RRS 77 and Appendix G 1.3. a-b-c)

Height:	375 mm
Thickness:	50 mm
Width (excluding number one and letter I)	230 mm
Minimum space between characters or edge of sail:	75 mm

(b) USE

- (1) The **Mainsail** shall be hoisted on a halyard. The arrangement shall be entirely above deck and permit hoisting and lowering of the **sail** whilst afloat. Hook or halyard lock is not permitted.
- (2) The highest visible point of the **sail**, projected at 90° to the mast **spar**, shall not be set above the lower edge of the mast **upper limit mark**. The intersection of the **leech** and the top of the boom **spar**, each extended as necessary, shall not be behind the fore side of the boom **outer limit mark**.
- (3) **Luff** of mainsail shall be attached to the mast by slides, minimum 15 and maximum 25. **Foot** of mainsail shall be attached to the boom either by means of a full-length boltrope (cut-out at clew permitted) or slides, minimum 5 and maximum 12.
- (4) Any method for reducing sail area is permitted

C.10.4 JIB

(a) USE

- (1) The sail shall be hoisted using a halyard. The use of the halyard shall be entirely above deck and the arrangement shall permit hoisting and lowering of the sail whilst afloat.
- (2) The jib shall be attached to the **forestay** using hanks or similar. Not more than 20 hanks or similar shall be permitted along the **luff**.

Section D – Hull

D1 PARTS

D.1.1 MANDATORY

- (a) Hull shell
- (b) Deck
- (c) Cabin roof
- (d) Toe rail
- (e) Bulkheads
- (f) Thwarts and bench
- (g) Accommodation

D.1.2 OPTIONAL

- (a) Sliding hatch
- (b) Hand rails
- (c) Portholes in cabin top
- (d) Spray hood with fixtures
- (e) Hatches

D.2 GENERAL

D.2.1 RULES

- (a) The Knarr shall be constructed over a plug or in a mould approved by a measurer recognized by the International Knarr Committee. All GRP parts and keel for the GRP Knarr shall be constructed in the moulds from Børresens Bådebyggeri A/S or in an approved mould made over the plug constructed from these moulds. The minimum construction basis for the GRP Knarr is hull and keel.
- (b) The **hull** shall comply with the **class rules** in force at the time of initial **certification**.
- (c) Epoxy, vinylester and aromatic fibers are not permitted.
- (d) A Knarr shall be built in one of following combinations:
 - 1. Wooden hull and wooden deck.
 - 2. GRP hull and GRP deck
 - 3. GRP hull and wooden deck

D.2.2 CERTIFICATION

See Rule A.11.

D.2.3 MODIFICATIONS, MAINTENANCE AND REPAIR

- (a) The hull shell, deck, main-bulkhead shall not be altered in any way except as permitted by these **class rules**.
- (b) Holes not bigger than necessary for the installation fittings and passage of lines may be made in the deck aft of the main bulkhead.

- (c) Routine maintenance such as painting, light sanding and polishing is permitted without re-measurement and re-**certification**.
- (d) If any hull moulding is repaired in any other way than described in D.2.3(c), an **official measurer** shall verify on the **certificate** that the external shape is the same as before the repair and that no substantial stiffness, or other, advantage has been gained as a result of the repair.
The **official measurer** shall also describe the details of the repair on the **certificate**.

D.2.4 DEFINITIONS

(a) HULL DATUM POINT

The **hull datum point** is situated at section 0 where the outside surface of the transom meets the **sheer**.

D.2.5 IDENTIFICATION

- (a) In the wooden Knarr the registration number shall be cut on the inside of the forepart of the cabin or printed on a signboard.
- (b) In the GRP Knarr the sail number shall be shown inside the hull aft of the rudder well. The year and building no. of the yard shall be on a signboard.

D.2.6 BUILDERS

- (a) The hull shall be built by a builder licensed by the holder of the rights.
- (b) All moulds for GRP boats shall be approved by the holder of the rights
- (c) All plugs for wooden boats shall be approved by the holder of the rights

D.3 HULL SHELL

D.3.1 MATERIALS

- (a) The hull shell shall be built either from wooden planks or glass reinforced plastic (GRP) and be in accordance with the official construction plans and specifications.
- (b) The wooden hull shall be built on a plug approved by holder of the rights in accordance with plan E.
- (c) The GRP hull shall be build in a mould approved by holder of the rights
- (d) Resin shall be polyester (not epoxy or vinylester).

D.3.2 CONSTRUCTION

- (a) The Wooden hull in accordance with plan A.

Hull skin thickness minimum 20 mm Douglas fir (*Pseudotsugataxifolia*), Oregon pine, or Scots Pine (*Pinussylvestris*)

Frames 28 x 30 to 28 x 20 mm ash

Carling 10 x 30 to 70 x 20 mm pine

Floor timbers oak or mahogany

Keel and stern oak or mahogany

- (b) The GRP Knarr shall conform to the laminate specifications

Different numbers of layers of Chopped Strand Mat are permitted as long as the total minimum weights of the laminate are as stated.

Unless otherwise specified layers of GRP shall be 450 g per m² glass mat with polyester at a total weight of 1.5 kg per m²

HULL SHELL

2 layers of gelcoat	0,6 kg/m ²
8 layers of GRP	12,0 kg/m ²
1 layer of topcoat	<u>0,3 kg/m²</u>
	12,9 kg/m ²

KEEL AND STEM REINFORCEMENT

Beginning 0.60 m from the stern and 0.45 m shorter for each layer, all layers with 15 cm overlap on the centreline

2 layers of GRP of 0,40 m x 8,10 m =	6,48 m ²
2 layers of GRP of 0,45 m x 7,20 m =	6,48 m ²
2 layers of GRP of 0,50 m x 6,30 m =	6,30 m ²
2 layers of GRP of 0,55 m x 5,40 m =	5,94 m ²
2 layers of GRP of 0,60 m x 4,50 m =	<u>5,40 m²</u>
	30,60 m ² ~45,9 kg

D.4 DECK

D.4.1 MATERIALS

- (a) The deck shall be built either from wood or glass reinforced plastic (GRP) and be in accordance with the official construction plans and specifications.
- (b) The wooden deck shall be build in accordance with plan A
- (c) The GRP deck shall be build in a mould approved by holder of the rights

D.4.2 CONSTRUCTION

- (a) Deck Wood.

Deck beams 40 x 40-50 mm of Pine

Cockpit aft and cabin fore 40 x 50-60mm of Pine

Half beams 20 x 35 mm of Pine

The Shelf 100 x 30 –70 x 20 mm of Pine

Deck min. 16 mm pine or minimum 12 mm plywood.

Deck to be covered with painted canvas, vinyl, teak or other waterproof material.

(b) Cabin

Comblings and cabin side min 18 mm mahogany

Cabin roof 12 mm pine on 25 x 30mm beams or minimum 16 mm cold moulded veneer without beams.

Cabin roof to be covered with painted canvas, vinyl, teak or other waterproof material.

(c) DECK GRP

Different numbers of layers of Chopped Strand Mat are permitted as long as the total minimum weights of the laminate are as stated.

Unless otherwise specified layers of GRP shall be 450 g per m² glass chop strand mat with polyester at a total weight of 1.5 kg per m²

2 layers of gelcoat (uppermost layer with anti-slip pattern can be replaced by teak)	1,0 kg/m ²
3 layers of GRP	4,5 kg/m ²
12 mm Balsa	2,0 kg/m ²
Polyester for Balsa	0,4 kg/m ²
3 layers of GRP	4,5 kg/m ²
1 layer of topcoat	<u>0,5 kg/m²</u>
	12,9 kg/m ²

INNER SHELL CABIN TOP

2 layer of gelcoat	0,6 kg/m ²
2 layers of GRP	<u>3,0 kg/m²</u>
	3,6 kg/m ²

The inner shell of GRP cabin sides and top may be omitted in return for additional layers of GRP in the outer shell corresponding to the weight of the inner shell.

BONDING HULL TO DECK

20 m long strips, 4 of 0,03 m, 4 of 0,05 m and
2 of 0,07 m, total width 0,46 m = 9,20 m²

450 g glass matt with polyester at 1,6 kg/ m² 10,7 kg

- (d) 1 deck beam may be fitted to underside of deck, immediately aft of the mast collar. The beam shall run to the point where the deck core material ends.

Beam measure max 50 mm x 60 – 40 mm

D.5 ACCOMMODATION INNERSECTION

D.5.1 CONSTRUCTION

The accommodation shall provide reasonable berth for minimum 2 persons.

Changes in the accommodation may be made as long weight distribution and the stiffness of the hull is not altered.

(a) **Wooden boat**

The wooden Knarr shall follow the principle in plan A or C

(b) **GRP boat**

The GRP Knarr shall follow the principle in plan H

INNER SECTIONS CABIN AND COCKPIT

2 layer of gelcoat	0,6 kg/m ²
5 layers of GRP	7,5 kg/m ²
1 layer of topcoat	<u>0,3 kg/m²</u>
	8,4 kg/m ²

D.6 TOE RAIL

D.6.1 MATERIALS

(a) The toe rail shall be made from teak or mahogany.

D.6.2 CONSTRUCTION

(a) Except at the transom a toe rail shall be fitted and run unbroken along each gunwale. Minimum height forward of 55 mm evenly decreasing to 35 mm aft. For GRP Knar, a toe rail of a constant height of 40 mm +/- 5 mm is permitted.

D.7 BULKHEADS

D.7.1 MATERIALS

(a) Plywood

D.7.2 CONSTRUCTION

(a) Main Bulkhead: minimum 15 mm – 8,2 kg/m²

(b) Front bulkhead minimum 9 mm – 4,9 kg/m²

(c) All other bulkheads minimum 12 mm - 6,6 kg/m²

D.8 THWARTS AND BENCH

D.8.1 MATERIALS

(a) Wood

D.8.2 CONSTRUCTION

(a) Free

D.9 ASSEMBLED HULL

D.9.1 FITTINGS

(a) MANDATORY

The following fittings shall be positioned in accordance with the measurement diagram:

- (1) Stem head fitting
- (2) Forestay fitting
- (3) Shroud plates
- (4) Tiller
- (5) Mooring cleats
- (6) Mast step
- (7) Jib sheet winches

(b) OPTIONAL

- (1) Halyard winches or tensioners
- (2) Mainsail sheet blocks, fairleads and cleats
- (3) Mainsail Cunningham blocks, fairleads and cleats
- (4) Sitting boards on deck.
- (5) Jib sheet blocks, fairleads and cleats
- (6) Jib Cunningham blocks, fairleads and cleats
- (7) Jib Barber hauler fairleads, blocks and cleats
- (8) The cabin top may be fitted with a sliding hatch.
- (9) Handrails.
- (10) Tiller lock
- (11) Stowage clips for paddle(s), whisker pole and other equipment
- (12) Windows and openings for ventilation are permitted: Positioning is free
- (13) Bilge pump(s), which may discharge through hull shell or deck
- (14) Magnetic compasses
- (15) A spray hood
- (16) Deck clips for cockpit cover and/or tent
- (17) Fore hatch. Size, position and material is free
- (18) One tie-rod fitted in the **hull** centre plane, just aft of the mast collar, between the underside of the deck and the mast step. Tie-rod may be steel rod, wire or rope and fitted with a tightening device.
- (19) Mainsheet track with traveller
- (20) Jib tracks
- (21) Tiller extension

D.9.2 DIMENSIONS

The keel line shall be taken as the intersection line from transom to stem of the hull shell and the **hull** centre plane.

The sections shall be taken as vertical, transverse planes at the following positions:

- Section 2: at 615 mm from **hull datum point** as defined in D.2.4
- Section 5: at 1215 mm from **hull datum point** as defined in D.2.4
- Section 8: at 1815 mm from **hull datum point** as defined in D.2.4
- Section 11: at 2415 mm from **hull datum point** as defined in D.2.4
- Section 14: at 3015 mm from **hull datum point** as defined in D.2.4
- Section 17: at 3615 mm from **hull datum point** as defined in D.2.4
- Section 20: at 4215 mm from **hull datum point** as defined in D.2.4
- Section 23: at 4845 mm from **hull datum point** as defined in D.2.4
- Section 26: at 5445 mm from **hull datum point** as defined in D.2.4
- Section 29: at 6045 mm from **hull datum point** as defined in D.2.4
- Section 32: at 6645 mm from **hull datum point** as defined in D.2.4
- Section 35: at 7245 mm from **hull datum point** as defined in D.2.4
- Section 38: at 7845 mm from **hull datum point** as defined in D.2.4
- Section 41: at 8445 mm from **hull datum point** as defined in D.2.4
- Extreme forward: at 9225 mm from **hull datum point** as defined in D.2.4

The baseline shall be on the **hull** centre plane at the following vertical distances (1350 mm below CWL):

	Minimum	Maximum
Hull length excl. Toe rail, incl. deck bend	9220 mm	9260 mm
Vertical distance from baseline to underside of hull shell;		
at section 2 :	1589 mm	
at section 5 :	1410 mm	
at section 8 :	1245 mm	
at section 11 :	1099 mm	
at section 14 :	979 mm	
at section 17 :	884 mm	
at section 20 :	821 mm	
at section 23 :	796 mm	
at section 26 :	812 mm	
at section 29 :	875 mm	
at section 32 :	989 mm	
at section 35 :	1139 mm	
at section 38 :	1324 mm	
at section 41 :	1573 mm	
Vertical distance from baseline to underside of keel		
at section 17	30 mm	40 mm

Beam of hull , excluding rubbing strakes and fittings, at sheerline;		
at section 20	2125 mm	
Longitudinal distance from hull datum point as defined in D.2.4;		
to intersection of keel trailing edge and hull	2457 mm	mm
Gunwale rubbing strakes;		
Depth	8 mm	12 mm
Width	18 mm	22 mm
Deck camber at sections 26 - 29	85 mm	90 mm

Section E – Hull Appendages

E.1 PARTS

E.1.1 MANDATORY

- (a) **Keel**
- (b) **Rudder**

E.2 GENERAL

E.2.1 RULES

- (a) **Hull appendages** shall comply with the **class rules** in force at the time of **certification**.

E.2.2 MODIFICATIONS, MAINTENANCE AND REPAIR

- (a) Major repairs or overhaul require partial or complete re-measurement.
- (b) Hull appendages shall not be altered in any way except as permitted by these class rules.
- (c) Routine maintenance such as painting and sanding are permitted without re-measurement and re-certification.

E.3 KEEL

E.3.1 RULES

- (a) The **keel** shall comply with the **class rules** in force at the time of the initial **certification** of the **hull** as specified in plan N.

E.3.2 MANUFACTURERS

- (a) Manufacturers shall be licensed by the holder of the rights.

E.3.3 MATERIALS

- (a) The **keel** shall be of cast iron

(b) The **keel** may be covered with GRP or epoxy

E.3.4 CONSTRUCTION

(a) The **keel** shall be manufactured from a pattern approved by the holder of the rights.

(b) The keel shall be in accordance with the plan A

E.3.5 FITTINGS

(a) MANDATORY

Keel bolt diameter minimum 16 mm, maximum 20 mm stainless steel

E.3.6 DIMENSIONS

	Minimum	Maximum
Height	835 mm	845 mm
Length	2615 mm	2635 mm

E.3.7 WEIGHTS

	Minimum	Maximum
Keel weight wooden boats excl. keel bolts	1260 kg	1300 kg
Keel weight GRP boats incl. keel bolts	1280 kg	1320 kg

E.4 RUDDER BLADE, RUDDER STOCK AND TILLER

E.4.1 RULES

(a) The **rudder** blade shall comply with the **class rules** in force at the time of **certification**.

E.4.2 DEFINITIONS

(a) The rudder shall be in accordance with plan **G**

E.4.3 MANUFACTURERS

(a) Manufacturers of GRP rudders shall be licensed by the holder of the rights or the NCA.

E.4.4 MATERIALS

(a) The **rudder** blade shall be of solid wood, plywood or GRP or plywood covered with GRP.

(b) The **rudderstock** shall be of a solid round stainless steel rod.

(c) The tiller shall be of wood

E.4.5 CONSTRUCTION

(a) The **rudder** blade may be manufactured in a mould approved by the holder of the rights or the NCA.

E.4.6 FITTINGS

(a) MANDATORY

(1) Rudder head Tiller fitting

(b) OPTIONAL

(1) A tiller extension with connecting fitting

E.4.7 Dimensions

(a) The **rudderstock** shall be minimum 25 mm. of diameter.

E.4.8 WEIGHT

	Minimum	Maximum
Weight of rudder including rudderstock	18,5 kg	22,5 kg

Section F – Rig

F.1 PARTS

F.1.1 MANDATORY

(a) **Mast**

(b) **Boom**

(c) Standing **rigging**

(d) Running **rigging**

F.1.2 OPTIONAL

(a) **Whisker pole**

F.2 GENERAL

F.2.1 RULES

(a) The **spars** and their fittings shall comply with the **class rules** in force at the time of **measurement** of the **spar**.

(b) The standing and running **rigging** shall comply with the **class rules**.

F.2.2 MODIFICATIONS, MAINTENANCE AND REPAIR

(a) **Spars** shall not be altered in any way except as permitted by these **class rules**.

(b) Routine maintenance such as light sanding and painting is permitted without re-measurement.

F.2.3 CERTIFICATION

(a) No **certification** of standing and running **rigging** is required.

F.2.4 DEFINITIONS

(a) MAST DATUM POINT

The **mast datum point** is situated 800 mm below the **upper edge of the lower black band**. This point is to be clearly marked on the aft side of the mast.

F.2.5 MANUFACTURER

- (a) Mast and boom shall be supplied by a mast/boom builder approved by the NCA.

F.3 MAST

F.3.1 MATERIALS

- (a) The wooden **spar** shall be spruce (Picea or Abies)
(b) The aluminium spar shall be built of aluminium grade 6005.
(c) The aluminium spar shall be painted white.

F.3.2 CONSTRUCTION

- (a) The wooden **spar** shall be laminated with a minimum thickness per layer of 20 mm after planning. The same quality and species of wood shall be used in each layer. Lamination shall be in one direction only, but the direction of lamination is free.
- (b) The aluminium spar shall be a single extrusion using 6005 quality aluminium at a minimum weight of 2.3 kg/m.
- (c) Fitting the **mast spar** with a thin layer of shock absorbing material from minimum 100 mm above the deck to maximum 2.000 mm above the deck, is permitted provided that the material fitted has no significant influence on the physical properties of the **mast spar**.

F.3.3 FITTINGS

(a) MANDATORY

- (1) Mast head fitting
- (2) Shroud tangs
- (3) A set of fixed spreaders
- (4) A set of jumpers
- (5) A mainsail halyard sheave box
- (6) A jib halyard sheave box
- (7) Gooseneck
- (8) Whisker pole fitting
- (9) Kicking strap attachment
- (10) Heel fitting.

(b) OPTIONAL

- (1) One mechanical wind indicator
- (2) Compass bracket

- (3) Adjustments for halyard tensioning
- (4) A navigation light at the masthead is permitted. On a wooden **mast spar** the electric wire may be led through a groove covered with a wooden strip, rubber sealant or the like. On the aluminium **mast spar** the wire may be led inside the mast.
- (5) Halyard sheave box at masthead.
- (6) Masthead halyard.

F.3.5 DIMENSIONS

Wooden Mast	Minimum	Maximum
Mast limit mark width	13 mm	-
Mast datum point to lower point		800mm
Lower point to upper point		9450 mm
Spreader length	640 mm	-
Jumpers length	400 mm	-
Jumper angle	145°	155°

The dimensions and layout of the wooden mast is shown on plan L.

The longitudinal tolerance for the wooden **mast** is +/- 5 mm and the tolerance of the cross section is +/- 2 mm.

Aluminium Mast	Minimum	Maximum
Mast length above mast datum point	10.590 mm	10.610 mm
Mast spar deflection in longitudinal plane when loaded with 10 kg at the spreaders	45 mm	55 mm
Mast spar cross section between mast heel and 7900 mm above mast datum point;		
Fore-and-aft	120 mm	125 mm
Transverse	80 mm	85 mm
Mast limit mark width	13 mm	-
Lower point height		800mm
Upper point height	-	10.250 mm
Lower point to upper point	-	9.450 mm
Forestay height	7.740 mm	7.750 mm
Shroud height	7.740 mm	7.750 mm
Whisker pole fitting:		
Height	670 mm	700 mm
Projection	-	2.500 mm
Spreader;		
Length	640 mm	650 mm
Height	4745 mm	4755 mm

Aluminium Mast	Minimum	Maximum
Mast tip weight in condition as defined in ERS F.2.3 (p) and H.4.6.	14,0 kg	-

Aluminium Mast	Minimum	Maximum
Jumpers length	400 mm	405 mm
Distance between jumper stays at the end of jumber struts	830mm	840 mm
Inertia Y-axis	143 cm4	-
Inertia X-axis	69 cm4	-

The dimensions and cross-section of the aluminium spar are shown on plan M

F.3.16 WEIGHTS

	Minimum	Maximum
Mast Mass	38,6 kg	-

F.4 BOOM

F.4.1 MATERIALS

- (a) The wooden **spar** shall be spruce (Picea or Abies)
- (b) The aluminium spar shall be built of aluminium grade 6005.
- (c) The aluminium spar shall be painted white.

F.4.2 CONSTRUCTION

- (a) The wooden **spar** may be laminated with a maximum of four layers of wood. Glue based on resorcinol phenol resin or similar weather resistant glue shall be used.
- (b) The aluminium **spar** extrusion shall include a fixed sail groove, which shall be integral with the spar.

F.4.3 FITTINGS

(a) MANDATORY

- (1) Not more than two mainsheet blocks with attachments
- (2) Clew outhaul blocks and attachments
- (3) Kicking strap fitting
- (4) Gooseneck attachment

(b) OPTIONAL

- (1) Whisker pole stowage fittings
- (2) Reef lines
- (3) Chafe pads

F.4.5 DIMENSIONS

Aluminium boom	Minimum	Maximum
Boom spar cross section between outer limit mark and 3300 mm forward of the outer limit mark ;		
Vertical	90 mm	100 mm
Transverse	65 mm	72 mm
Inertia Y-axis	64 cm ⁴	
Inertia X-axis	30 cm ⁴	

The dimensions and layout of the wooden **spar** is shown on plan L.
The longitudinal tolerance for the wooden **spar** is +/- 5 mm and the tolerance of the cross section is +/- 2 mm.

The dimensions and cross-section of the aluminium boom are shown on plan M

F.4.6 WEIGHTS

Aluminium boom	Minimum	Maximum
Boom Mass	6,5 kg	7,2 kg

F.5 WHISKER POLE

F.5.1 MANUFACTURER

(a) Manufacturer is optional.

F.5.2 MATERIALS

(a) The **spar** shall be of wood or aluminium grade 6005.

F.5.3 CONSTRUCTION

(a) The whisker pole may be in laminated in solid wood.

(b) The whisker pole may be of aluminium tubing.

F.5.4 FITTINGS

(a) Fittings are optional.

F.5.5 DIMENSIONS

Wooden pole:	Minimum	Maximum
Spinnaker pole spar cross section		
middle diameter	40 mm	-
end diameter	28 mm	-

Aluminium pole	Minimum	Maximum
Spinnaker pole spar cross section		
Diameter	35 mm	-

F.6 STANDING RIGGING

F.6.1 MATERIALS

- (a) The standing **rigging** shall be of standard non-faired 19-strand stainless steel wire.

F.6.2 CONSTRUCTION

(a) MANDATORY

- (1) A forestay of “non faired” 19 strand stainless steel wire
- (2) Four shrouds of “non faired” 19 strand stainless steel wire
- (3) A backstay of “non faired” 19 strand stainless steel wire
- (4) Three jumper stays of “non-faired” 19 strand stainless steel wire

F.6.3 FITTINGS

(a) MANDATORY

- (1) Forestay rigging link
- (2) Shroud rigging screws
- (3) Jumper rigging screws

(b) OPTIONAL

- (1) Backstay adjustment

F.6.4 DIMENSIONS

	Minimum	Maximum
Forestay diameter	5 mm	6 mm
Shroud diameter	5 mm	6 mm
Backstay diameter	3 mm	4 mm
Jumperstay diameter	4 mm	5 mm

F.7 RUNNING RIGGING

F.7.1 MATERIALS

- (a) Materials are optional.

F.7.2 CONSTRUCTION

(a) MANDATORY

- (1) Mainsail halyard
- (2) Mainsail sheet
- (3) Kicking strap
- (4) Headsail halyard
- (5) Jib sheets

(b) OPTIONAL

- (1) Mainsail Cunningham line
- (2) Mainsail outhaul
- (3) Jib Cunningham line
- (4) Single line jib barber haulers capable of moving the sheet athwartships.
- (5) Halyard from mast top for asymmetric spinnaker.

F.7.3 FITTINGS

(b) OPTIONAL

- (1) One block or eye in each jib barber hauler to run on jib sheet

Section G – Sails

G.1 PARTS

G.1.1 MANDATORY

- (a) Mainsail
- (b) Jib

G.2 GENERAL

G.2.1 RULES

- (a) **Sails** shall be made and measured in accordance with ISAF's Equipment Rules section G except otherwise specified in the **class rules** in force at the time of **certification**.

G.2.2 CERTIFICATION

- (a) The **official measurer** shall **certify** mainsails and jibs in the **tack** and shall sign and date the **certification mark**.
- (b) An MNA may appoint one or more persons employed at a sailmaker to measure and **certify sails** produced by that manufacturer in accordance with the principles of the ISAF In-house Certification Guidelines.

G.2.3 SAILMAKER

- (a) Sailmaker is optional.

- (b) The weight in g/m^2 of the **body of the sail** shall be indelibly marked near the **tack** by the sailmaker together with the date and his signature or stamp.

G.3 MAINSAIL

G.3.1 IDENTIFICATION

- (a) The class insignia shall have following dimensions and placed above the national letters and numbers. The class insignia shall be on top of each other.

Class Insignia:

- a) A circular ring with an outer diameter of: 400 mm
b) Thickness: 65 mm

- (b) The national letters and numbers see rule C 10.3

G.3.2 MATERIALS

- (a) The **ply** fibres shall consist of synthetic Polyester woven into a sailcloth with a cloth weight of not less than 310 gr/m^2 (7,24 oz/Sailmaker Square yard – 28,5" x 36"). Unwoven transparent panels with a total area not exceeding $1,0 \text{ m}^2$. Windows shall not be less than 150 mm from any edge of the sail.
- (b) **Sail reinforcement** shall consist of woven Polyester ply fibres woven into sailcloth.

G.3.3 CONSTRUCTION

- (a) The construction shall be: **soft sail, single ply sail**.
- (b) The **body of the sail** shall consist of the same **woven ply** throughout.
- (c) The **sail** shall have four (4) batten **pockets** in the **leech**.
- (d) The sail may be constructed so that it can be reefed.
- (e) The following are permitted: Stitching, glues, tapes, bolt ropes, corner eyes, headboard with fixings, Cunningham eye or pulley, **batten pocket patches**, batten pocket elastic, batten pocket end caps, mast and boom slides, leech line with cleat, **windows**, tell tales, sail shape indicator stripes and items as permitted or prescribed by other applicable *rules*.
- (f) The **leech** shall not extend aft of straight lines between:
- (1) the **aft head point** and the intersection of the **leech** and the upper edge of the nearest **batten pocket**,
 - (2) the intersection of the **leech** and the lower edge of a **batten pocket** and the intersection of the **leech** and the upper edge of an adjacent **batten pocket** below,
 - (3) the **clew point** and the intersection of the **leech** and the lower edge of the nearest **batten pocket**.

G.3.4 DIMENSIONS

	Minimum	Maximum
Leech length	-	9700 mm
Half width (MGM)	-	2130 mm
Three-quarter width (MGU)	-	1170 mm
One-quarter-width (MGL)		2860 mm
Top width	-	120 mm
Mass of ply of the body of the sail	310 g/m ²	
Primary reinforcement	-	430 mm
Secondary reinforcement:		
From sail corner measurement points	-	1300 mm
For flutter patches	-	115 mm
For chafing patches	-	200 mm
For batten pocket patches	-	200 mm
at a reefing point adjacent to luff or	-	900 mm
Leech	-	900 mm
Tabling width	-	40 mm
Seam width	-	40 mm
Window area	-	1,0 m ²
Window to sail edge	150 mm	
Extension of headboard from head point		120 mm
Batten pocket length:		
uppermost pocket: Full length permitted	-	-
Second batten pocket from top:		
Inside	-	1000 mm
Outside	-	1050 mm
Third batten pocket from top:		
Inside	-	1200 mm
Outside	-	1250 mm
Lowermost batten pocket:		
Inside	-	1400 mm
Outside	-	1450 mm
Batten pocket width:		
inside	-	65 mm
Outside	-	80 mm
Head point to intersection of leech and centreline of uppermost batten pocket	1900 mm	2000 mm
Clew point to intersection of leech and centreline of lowermost batten pocket	1900 mm	2000 mm
Distance between centrelines of intermediate pockets:	1900 mm	2000 mm

G.4 JIB

G.4.1 MATERIALS

- (a) The **ply** fibres shall consist of synthetic Polyester woven into a sailcloth with a cloth weight of not less than 310 gr/m² (7,24 oz/Sailmaker Square yard – 28,5” x 36”). Unwoven transparent panels with a total area not exceeding 0,5 m². Windows shall not be less than 150 mm from any edge of the sail.
- (b) **Sail reinforcement** shall consist of woven Polyester ply fibres woven into sailcloth.

G.4.2 CONSTRUCTION

- (a) The construction shall be: **soft sail, single ply sail**.
- (b) The **body of the sail** shall consist of the same **woven ply** throughout.
- (c) The jib shall have three (3) **batten pockets** in the **leech**.
- (d) The **leech** shall not extend beyond a straight line from the aft **head point** to the **clew point**.
- (e) The following are permitted: Stitching, glues, tapes, corner eyes, hanks, batten pocket elastic, **batten pocket patches**, batten pocket end caps, leech line with cleat, **windows**, tell tales, sail shape indicator stripes and items as permitted or prescribed by other applicable *rules*.

G.4.3 DIMENSIONS

	Minimum	Maximum
Luff length		6900 mm
Leech length		6700 mm
Foot length		2600 mm
Foot median		6820 mm
Upper width taken from the leech 2950mm from the head point to the nearest point on the luff		1135mm
Lower width taken from the leech 4800mm from the head point to the nearest point on the luff		1850 mm
Top width	-	45 mm
Foot irregularity	-	40 mm
Mass of ply of the body of the sail	310 g/m ²	-
Primary reinforcement		360 mm
Secondary reinforcement:		
From sail corner measurement points		1080 mm
For flutter patches		150 mm
For chafing patches		200 mm
for batten pocket patches		200 mm
Tabling width		40 mm
Seam width		40 mm

	Minimum	Maximum
Window area	-	0,5 m ²
Window to sail edge	150 mm	
Batten pocket length:		
uppermost pocket: May be full length	-	-
intermediate pocket:		
Inside		600 mm
Outside		650 mm
lowermost pocket:		
Inside		800 mm
Outside		850 mm
Batten pocket width:		
Inside	-	65 Mm
Outside	-	80 mm
Head point to intersection of leech and centreline of uppermost batten pocket	1600 mm	1700 mm
Distance between intersection of leech and uppermost, lowermost and intermediate batten pockets:	1600 mm	1700 mm
Clew point to intersection of leech and centreline of lowermost batten pocket	1600 mm	1700 mm

PART III – APPENDICES

The rules in Part III are **closed class rules**. Measurement shall be carried out in accordance with the ERS except where varied in this Part.

Section H

H.1

Drawings:

Drawing A	Wooden Knarr construction
Drawing B	Sail Plan – 16.10.1950
Drawing C	Wooden Knarr interior layout
Drawing D	Knarr Lines Drawing - 23.12.1958
Drawing E	Wooden plug for Knarr - 10.11.1961
Drawing F	Traveller post for Main sheeting - January 1964
Drawing G	Knarr Rudder – 24.10.1952
Drawing H	GRP Knarr by Børresen – 20.05.1973
Drawing J	Sail Plan by Børresen – 20.05.1973
Drawing K	Knarr Sails – revised November 1989
Drawing L	Knarr Spars and Struts – Wooden mast – March 1990
Drawing M	Aluminium Spars for Knarr – 15.01.2011
Drawing N	Cockpit seat short version
Drawing O	Sitting board
Drawing P	Sails – Knarr Measurement Form with long battens
Drawing Q	Jumper details for Knarr Alu mast
Drawing R	Wooden Deck beam for GRP Knarr – Deck camber
Drawing S	Mast Step GRP Knarr
Drawing T	Hull Profile definition
Drawing U	Sheer Line
Drawing V	Rudder – 26.01.2011