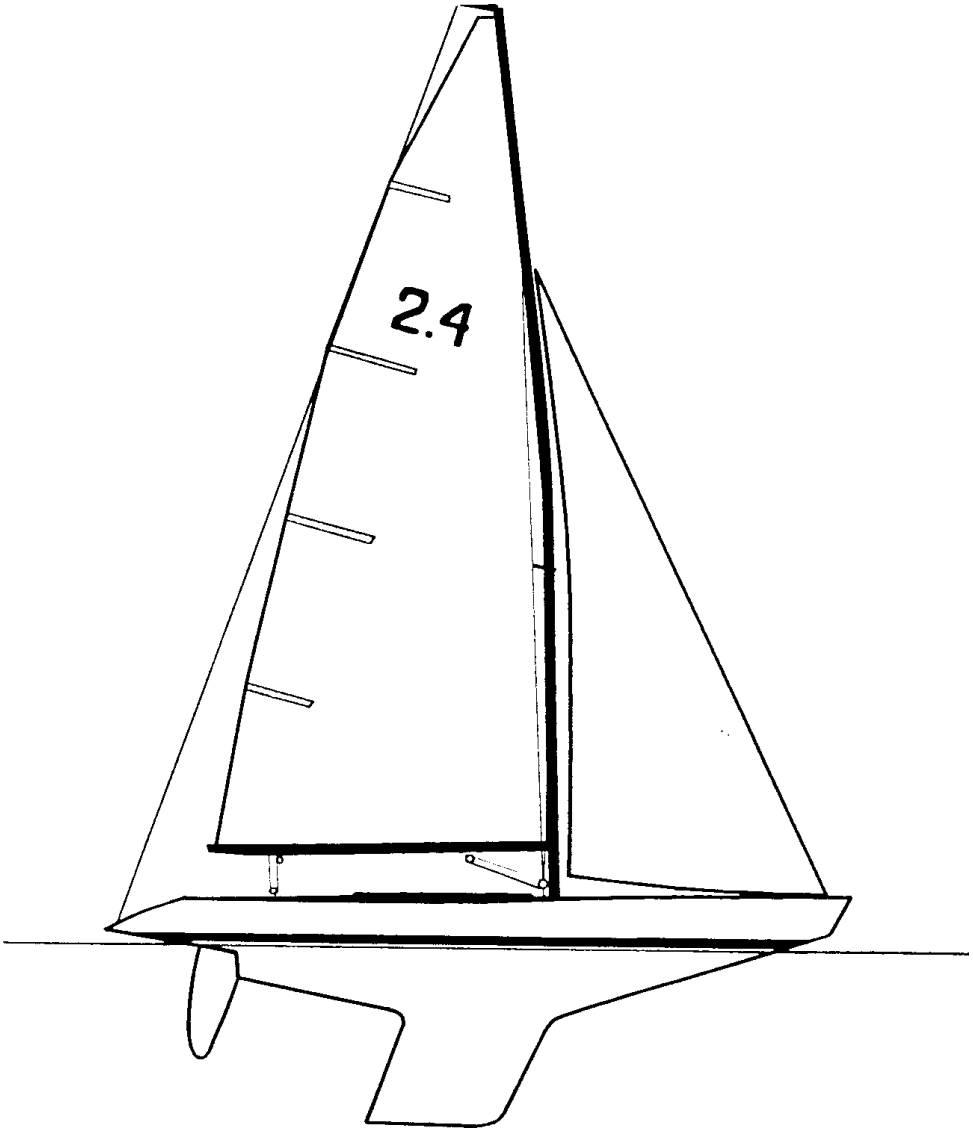
2002
RATING RULE OF THE INTERNATIONAL 2.4 METRE CLASS

Authority*: International Sailing Federation
Ariadne House, Town Quay, Southampton SO14 2AQ



* **The International Sailing Federation (ISAF) is not a National Authority (NA).**

1. GENERAL

1.1 PURPOSE OF THE CLASS RULE

1.1.1 The 2.4m R Class is a Development Class.

1.1.2 The purpose of these rules is to give a designer the possibilities to develop and produce a fast boat within the limitations of the rules.

1.2 AUTHORITY

1.2.1 The international administration of the class is the responsibility of the International 2.4m R Class Association.

1.2.2 The final authority of the class is the ISAF, which will co-operate with the International 2.4m R Class Association in all matters concerning these rules.

1.2.3 Neither the ISAF nor the International 2.4m R Class Association accept any legal responsibility in respect of these rules and/or the Rating Certificate.

1.3 CONDITIONS

1.3.1 To be allowed to race the following conditions must be fulfilled:

1.3.1.1 An ISAF plaque shall be fixed to the inside of the hull near the front of the cockpit on the port side.

1.3.1.2 The boat and its equipment shall be measured by an official measurer.

1.3.1.3 The Rating Certificate shall be issued by the owner's National Authority.

1.4 CLASS RULES and their INTERPRETATION

1.4.1 These rules are complementary to any plans, measurement diagrams and to the measurement form.

1.4.2 In the event of discrepancy between these rules, the measurement form and/or measurement diagrams the matter shall be referred to the ISAF.

1.4.3 Any interpretation of these rules shall be made by the ISAF.

1.4.4 Boats measured and certificated before 31st March 1988, and

Boats measured and certificated before 1st March 1993 and produced from a mould built before 31st March 1988 are excepted from the following rules:

(a) Rule 3.4 re the calculation value of the freeboard,
(b) Rule 3.10 re hollows,
(c) Rule 5.1 re internal ballast,
(d) Rule 5.5 and 5.6 re keels (date of exception the 1st of Nov 1988),
(e) Rule 7.2 re deck openings,
(f) Rule 7.3 re flotation. Boats built before 20th October 1990 are entitled to follow rule 8.2.
(g) Rule 2.3.1 ISAF Plaque. Boats built before 1st March 1993 may have a plaque issued by National Authority (NA).

1.5 MEASUREMENT and MEASURERS

1.5.1 Only a measurer officially recognised by his National Authority (NA) shall measure a yacht, her spars, sails and equipment and sign the measurement form.

1.5.2 Measurement shall be taken in accordance with the `ISAF Equipment Rules of Sailing ' unless otherwise specified in these rules

1.5.3 A measurer shall not measure a boat, her spars or equipment owned, designed or built by himself, or in which he is an interested party or in which he has a vested interest.

1.5.4 New or altered sails shall be measured by an official measurer who shall stamp, date and sign the sail near the tack.

1.5.5 Check measurement at regattas shall be performed by an official measurer.

2. ADMINISTRATION

2.1 LANGUAGE

2.1.1 The official language of the class is English. In case of dispute over translation the English text shall prevail.

2.1.2 The word "shall" is mandatory and the word "may" is permissive.

2.1.3 Anywhere the words "Class Rules" are used in these rules it includes the plans and measurement form.

2.2 CLASS ADMINISTRATION

2.2.1 The class is administered by the International 2.4m Class Association. The administration of the rule on a national basis is delegated to the ISAF National Authorities.

2.3 CLASS FEE

2.3.1 ISAF Plaque.

Boats built before 1st of March 1993 may have a plaque issued by National Authority (NA). Boats built after 1st of March 1993 and before the ISAF Plaques were available may have a plaque issued by the Scandinavian Sailing Federation.

2.4 BUILDERS

2.4.1 A builder does not need a licence.

2.5 REGISTRATION and RATING CERTIFICATE

2.5.1 A measurement form or a copy thereof signed and stamped by a (NA) makes a valid Rating Certificate.

2.5.2 Procedure to obtain a Rating Certificate:

1. The builder shall buy a plaque (see rule 2.3.1)
2. The plaque shall be fixed to the hull
3. The owner shall apply to his NA for an official sail number. An application for registration shall be enclosed to the application for the sail number. Each country issues sail numbers in a consecutive order starting with 1, preceded by the National letters.
4. The boat and her equipment shall be measured by an official measurer. The measurement form shall, when it is correct and complete and signed, be sent to the NA. The NA shall check, stamp and sign the measurement form.

5. The original measurement form is kept by the NA. A copy, signed and stamped is sent to the new owner. For new designs a copy of the measurement form shall be sent to the Int. 2.4 Class Association.

2.5.3. Change of ownership invalidates the Certificate. The new owner shall return the Certificate to the NA together with a written application containing name and address of the new owner and any re-registration fee. The NA sends the Certificate to the new owner.

3. CALCULATION of RATING

3.1 FORMULA

The Rating is given by the formula

$$R = \frac{L + 2d - F + S}{2.37}$$

where: R = Rating = 2.400 m (max)
L = Length (metres) see rule 3.2
d = mid-ship girth difference (metres) see rule 3.3
F = Freeboard (metres) see rule 3.4
S = Sail area (square metres) see rules 3.12.2.1 and 3.12.3.1

3.2 LENGTH

The Length "L" for the formula shall be the sum of:

(a) The length measured 36mm above the waterline (LWL); and

(b) 1.5 times the difference between:
- the chain girth at the forward end of this length (the bow section) measured to points 120mm above "L1"
- and 240mm; and

(c) 1/3 of the difference between:
- the chain girth from sheerline to sheerline at the aft end of this length (the stern section)
- and twice the vertical height at the side of the yacht at this section.

For the purpose of calculating the rating the girth difference at the bow shall not be taken as less than 72mm; the girth difference at the stern shall not be taken as less than 240mm.

The afterbody of the yacht shall be so shaped that an aft chain girth can be taken at the section intersecting the aft overhang at a height of 72mm above the LWL (L2).

If the girth difference at the L2-section, ie, the chain girth from sheer-line (or the intersection of the sides of the yacht with the transom) less twice the vertical height, is less than 65 per cent of the stern girth difference at L1, 1/3 of the deficiency shall be added to the stern girth difference in calculating the yacht's rating. The horizontal distance from L1 to L2 shall be not less than 76mm.

The girth at each section shall be the shortest chain girth (ie, "the great circle" distance along the surface of the hull) between the measurement points, 0, or sheerline through the outer edge of the length marks L1 and L2.

3.3 MIDSHIP GIRTH DIFFERENCE

The midship girth difference `d' is the sum of the difference between the skin girth and chain girth on the port and starboard sides of the yacht measured at the section 0.55 LWL from the forward end of the LWL from the sheerline to points on the surface of the hull 300mm below the LWL.

The skin girth is the measurement along the surface of the hull from the sheerline, through the upper `d' mark and the I mark to the centre of the lower `d' mark. The chain girth is the measurement between the same points with the measuring tape pulled taut.

The yacht shall be so designed that it is possible to place the lower d1 marks on the surface of the hull or the keel and to measure a continuous skin girth at the station. The radius of the hull, measured in a horizontal plane at or above the lower `d', mark shall not be less than 600mm.

Local bridging by a strut to reduce the d measurement is not permitted.

3.4 FREEBOARD

The freeboard `F' shall be a third of the sum of the freeboards at the bow and stern endings of L1 plus the freeboard at the midship girth section. The word "freeboard" at each section means the mean of starboard and port readings.

From a point 75mm abaft the foremostpoint of the hull to the stern section at L1 the sheerline shall form a continuous, even, concave curve.

When calculating the rating the freeboard aft shall not be taken as more than 0.95 times of the freeboard forward. The actual freeboard forward shall not be less than 1.1 times the freeboard mid-ships, but for calculating the rating shall not be taken as more than 1.5 times the freeboard midships.

When calculating the rating the calculation value of F shall not be more than 292mm.

3.5 DRAFT

The maximum draft without penalty shall be 1000mm. If the draft exceeds that allowed, three times the excess shall be added to the rating.

3.6 DISPLACEMENT

The displacement of the yacht in cubic metres shall be not less than $(0.2 \times LWL + 0.06)^3$. (Note: This minimum displacement includes the additional 35kg specified in Rule 8.1.1 (a)). If a yacht has a displacement less than that required by the rule for her length on LWL, then the difference between the length of the LWL to which her actual displacement corresponds by the rule and her actual length on LWL shall be doubled and added to the length measurement `L' in the rating formula.

The measured displacement shall be determined for sea water of specific gravity of 1.025. If water with a specific gravity other than 1.025 is used the extra internal 35 kg and the distance 100mm shall be recalculated according to physical laws. See Appendix A

3.7 WATERLINE LENGTH

The waterline length shall be measured between the forward `L' mark and aftmost of:

1. Where the waterline meets the aft end of the hull:, or
2. The axis of the rudder stock.

3.8 BEAM

The beam, measured at the point of the greatest beam in the plane one-third of the freeboard at the mid-ship girth station above the LWL shall not be less than 720mm. A deficiency shall be multiplied by 4 and added to the length measured L in the rating formula.

3.9 TUMBLE HOME

The tumble home on the side of the yacht shall not exceed 15mm. When the tumble home exceeds this amount, three times the excess shall be added to the rating.

3.10 HOLLOWS

There shall be no hollows in the surface of the hull between the LWL plane and sheerline except an area at the stern within buttock lines 100mm from the yacht centerline and below L1. Should there be any irregular hollows or notches in the stem of the yacht within a vertical distance of 30mm above or below the flotation water line, they shall be bridged across within the limits of said vertical distance. The extent that bridging increases the length for measurements or the waterline length, the increased length shall be used for the purpose of rating or displacement.

3.11 MARKS

The following marks shall be painted or fastened to the hull:

A. A mark not less than 60 x 10mm:

(a) At ends of LWL (L)

(b) At ends of measured length (L1)

(c) At L2.

The inner edges of the marks denote the measurement point.

B. An immersion mark at 0.55 x LWL from the forward end of LWL, a triangular mark (a right-angled triangle with a hypotenuse of 50mm). The bottom corner of the immersion mark denotes the measurement point.

C. A round mark of 10mm diameter

(a) At the freeboard points above L1 forward and at the stern, and above the

(b) immersion marks 0.55 x LWL.

(c) At d1 in the mid-ship girth station

(d) At the points 120mm above forward L1.

3.12 SAIL PLAN

The sail area S is the sum of the calculated areas of mainsail and fore-triangle.

3.12.1 Prohibitions

3.12.1.1 Double-surfaced inflatable sails, whether inflated by the action of the wind or any other way are not permitted.

3.12.2 Mainsail

3.12.2.1 The rated area of a mainsail is:

0.5 x P x E, where

P = the distance between the upper and lower measurement bands on the mast
E = the distance from the inner edge of the boom measurement band to the aft side of the mast

3.12.2.2 Measurement bands

The upper measurement shall not be more than 5000mm above the measurement point.
The lower measurement shall be not less than 250mm above the measurement point.
The measurement point is situated 36mm above the covering board.

3.12.2.3 Headboard

The greatest dimension of the headboard from the *head point* shall not exceed 72mm.

3.12.2.4 Mainsail Widths

Maximum *half width* 68% of E.
Maximum *three-quarter width* 41% of E.

E is the measurement defined in 3.12.2.1

3.12.2.5 Battens

Not more than four battens shall be fitted in the leech of the mainsail. They shall divide the leech into approximately equal parts. The Length of the battens shall not exceed:

Upper and lower battens	360mm
Intermediate battens	500mm

3.12.3 Foretriangle

3.12.3.1 The rated area of the fore-triangle is:

0.5 x 0.85 x I x J, where

I = the height of the fore-triangle measured from the measurement point to the highest point of:

(a) the intersection of the line of the aft side of the forestay with the fore-side of the mast
(b) the intersection of the line of the forward side of the headfoil into which the luff of a headsail is fitted, with the fore-side of the mast
(c) bottom of the groove of the jib sheave where the halyard leaves the mast

I shall not exceed 3750mm

J = the base of the fore-triangle measured from the fore-side of the mast to whichever gives the greater measurement:

- the intersection of the line of the aft side of the forestay with the deck
- the intersection of the line of the fore-side of the headfoil with the deck

3.12.4 Headsail

3.12.4.1 For the headsail without battens the following measurements shall not exceed:

Foot	110% of J
Three-quarter width	28% of J
Half width	53% of J
Top width	40mm

3.12.4.2 For the headsail with battens the following measurements shall not exceed:

Number of battens	3
Foot	95% of J
Batten length	400 mm
Three-quarter width	30% of J
Half width	54.5% of J
Top width	40 mm

The battens shall not be positioned closer to the head point or the clew than 700mm.

3.12.4.3 RRS 50.4 shall not apply.

3.12.5 Class insignia and sail numbers

The Class Insignia shall conform to the diagram, see Appendix B, with the following nominal dimensions. Sail measured before 1/3/00 shall be grand fathered. As an alteration to RRS Appendix H 1.3 the Insignia may be placed on the starboard side only.

The National letters and distinguishing numbers shall be placed on the mainsail as laid down in the RRS. They shall be of the following minimum dimensions:

Height of insignia	220mm
Width of insignia	520mm
Width of figures	200mm
Thickness of figures	40mm
Thickness of line	40mm
Diameter of point	55mm
Space between line and figures	10mm

3.13 CALCULATIONS

Calculations shall be carried out to the nearest millimetre.

4. RUDDER

Only one rudder blade made of GRP, wood, polyurethane foam, or any combination thereof is permitted. The rudder stock shall be made of stainless steel or aluminium. The rudder stock, or main piece of rudder, measured athwartships shall not exceed 36mm when the rudder extends beyond the aft end of water line.

5. KEEL, BALLAST

5.1 In the keel there shall be at least 8 and not more than 16 pieces of internal ballast. They shall be removable from the inside.

5.2 Ballast materials with a density greater than lead are prohibited.

5.3 Centreboards, movable keels and similar devices are prohibited.

5.4 No horizontal keel section shall be longer or wider than any of the horizontal keel sections above. Boats certificated before 1st March 1993 shall be grandfathered.

6. SPARS

6.1 MAST

6.1.1 The mast shall be made of wood, GRP or an aluminium alloy. Any combination of these materials is not permitted.

6.1.2 The mast, including the luff groove or track, shall comply with the following dimensions (mm):

	Ahwartships	Fore and aft	
	min	max	min
At the upper measurement band	24	66	28
From the measurement point to a point 3500mm above the measurement point	38	66	56

Between the point 3500mm above the measurement point and the upper measurement band the profile of the mast may have a fair rounding taper.

6.1.3 The weight of the mast, including all fixed fittings and spreaders, standing and running rigging, shall not be less than 6.50kg.

6.1.4 The tip weight of the mast shall not be less than 2.00kg. The tip weight is found by supporting the mast at the lower measurement band and the weight of the mast at its top measurement band is taken. Standing rigging shall be lashed along the mast with the lower ends resting on the ground. The halyards shall be fully hoisted and the tails shall be resting on the ground at the same side of the support as the lower end of the mast.

6.1.5 Rotating and/or masts with a permanent set exceeding 30mm between the upper and lower measurement band are not permitted.

6.2 BOOM

6.2.1 The boom shall be made of wood, GRP or an aluminium alloy. Any combination of these materials is not permitted.

6.2.2 The boom including the sail groove or track, but excluding other fittings shall not exceed 75mm and shall not have its width greater than 55mm nor less than 27mm.

6.2.3 Booms with a permanent set exceeding 15mm between the mast and the measurement band are prohibited.

6.3 WHISKER POLE

6.3.1 The whisker pole shall be made of wood, aluminium alloy, GRP or any combination thereof.

6.3.2 The length of the whisker pole shall not exceed 1.35 x J.

7. CONSTRUCTION AND MATERIALS

7.1 HULL

7.1.1 The hulls shall be made of wood and/or GRP. Kevlar, carbon-fibre reinforced plastic or similar materials are not permitted. Sandwich construction is permitted, in which case balsa or PVC foam shall be used as core material. The core material shall be of density not less than 60kg/m^3.

7.1.2 The exterior hull and deck mouldings shall weigh not less than 3.60kg/m^2.

7.2 DECK OPENINGS

7.2.1 The total area of deck openings shall not exceed 0.7m^2.

7.2.2 No part of a deck opening shall be closer to the sheerline than 100mm.

7.3 FLOTATION

To ensure the yacht complies with Rule 8.2 it shall have either:

A sufficient quantity of rigid non-communicating aircell foam plastic incorporated into the yacht.

or

Watertight bulkheads and a sufficient volume of PVC buoyancy bags of a minimum thickness of 0.5mm. The compartments shall have inspection ports (on the deck for the bow tank).

8. SPECIAL REGULATIONS

8.1.1 When displacement is checked the boat shall be in racing condition. The lower edges of the immersion marks shall be at the water level with the equipment given in 8.1.2 and 8.1.3 stowed in its normal position, and with an extra internal 35kg lead ballast placed within 100mm from 0.55 x LWL from the bow station.

8.1.2 The following equipment shall be on board when measuring:

(a) mainsail and headsail.
(b) Mast and boom with standing and running rig.
(c) Fittings, equipment and ropes normally used while racing
(d) Floors and hatches
(e) One manual bilge pump

8.1.3 The following equipment shall be on board when measuring only if this will be on board when racing:

(a) An electrical bilge pump including battery
(b) An anchor according to 8.3

8.2 FLOATATION TRIM WHEN THE BOAT IS FILLED WITH WATER

The boat shall float in a horizontal position filled with water and loaded with an extra 35kg of lead ballast placed within 100mm of the `0.55 x LWL station'. This extra internal ballast shall not be in the yacht when racing.

During this test the extra ballast and the equipment shall be placed as defined in 8.1.1.

8.3 ANCHOR

The weight of anchor and chain shall not exceed 2.00kg.

8.4 CREW POSITION

While racing the torso and/or the legs of the crew shall not be outside the sheerline.

8.5 ADVERTISING

Advertising shall be in accordance with RRS category C without restrictions.

8.6 BILGEPUMP

One manual bilge pump with a minimum capacity of 0.5 litre/stroke. Additional bilge pumps may be carried which may be manual or electric powered.

8.7 TOWING ARRANGEMENT

A suitable fitting or system to enable the boat to be towed shall be installed in the bow area. The fitting/system shall be easy to access by rescue craft. The fitting/system shall be able to handle line of at least 5mm in diameter.

8.8 MANUAL POWER

RRS Rule 52 shall not apply

APPENDIX A, CHECKING THE WATER LINE MARKS IN WATER WITH SPECIFIC GRAVITY OTHER THAN 1,025

When checking the marks the extra lead ballast of 35 kg shall be replaced by another lead ballast with a different weight. This weight and the distance e from the 0,55L station can be defined accordingly

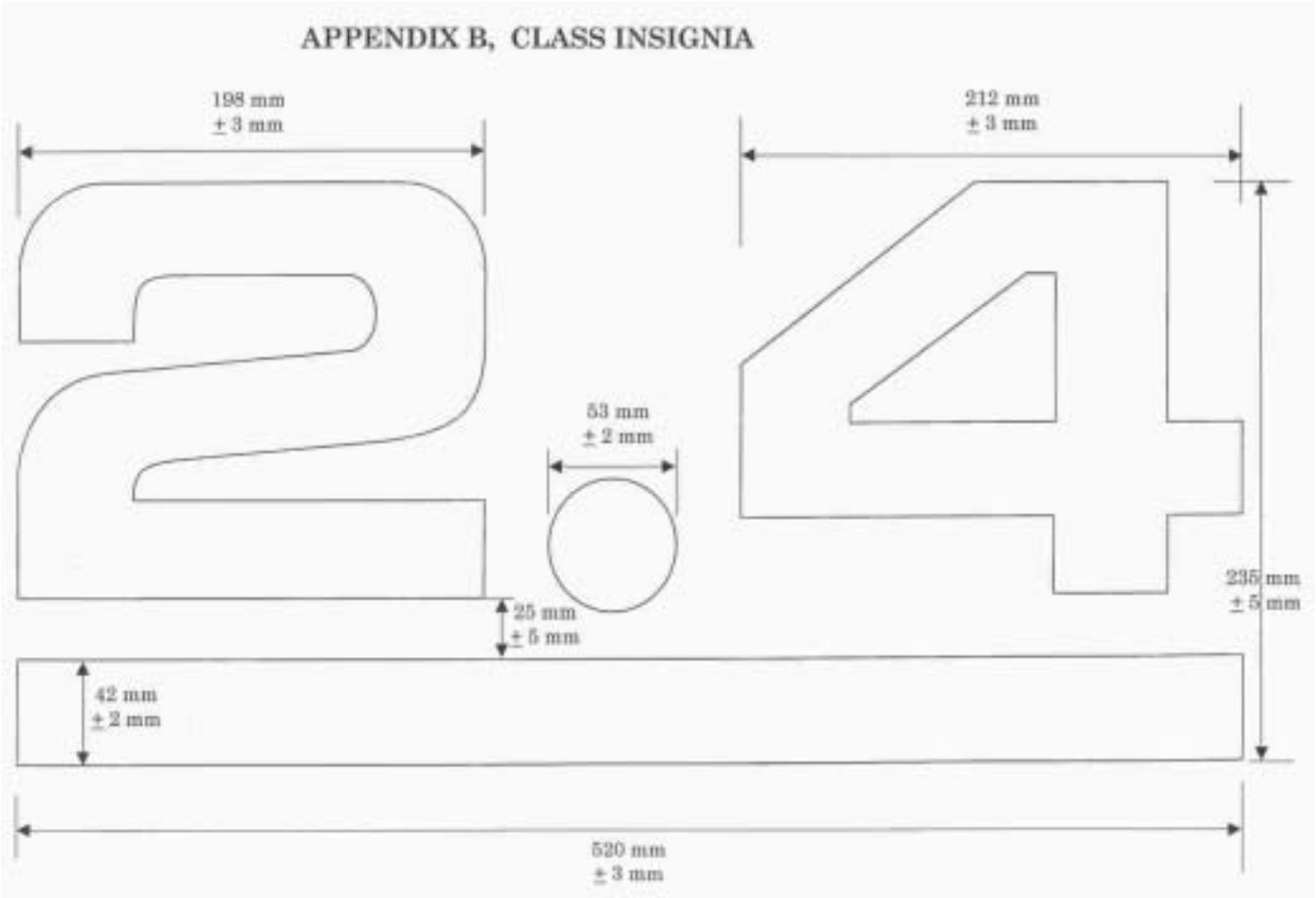
Boat weight	Q kg
Displacement	D liters
Salt water	
Lead ballast	$\Delta Q_0 = 35$ kg
Total weight	$Q_{t0} = Q + \Delta Q_0 = Q + 35$
Specific gravity of water	$\rho_0 = 1{,}025$
Distance from 0.55L	$e_0 = 100$ mm
Actual water	
Lead ballast	ΔQ_1
Total weight	$Q_{t1} = Q + \Delta Q_1$
Specific gravity of water	ρ_1
Distance from 0.55L	e_1

$D * \rho_0 = Q_{t0} = Q + \Delta Q_0$;
$D * \rho_1 = Q_{t1} = Q + \Delta Q_1$;

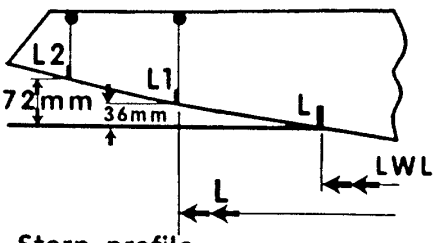
$\Delta Q_1 = Q (\rho_1 / \rho_0 - 1) + \Delta Q_0 * \rho_1 / \rho_1$;
$e_1 = e_0 * \Delta Q_0 / \Delta Q_1$

For fresh water with $\rho_1 = 1.000$ will give
$\Delta Q_1 = 35 / 1{,}025 - 0{,}025 * Q / 1{,}025$
For a Norlin mark III normally Q = 259 kg, will give $\Delta Q_1 = 27{,}8$ kg and $e_1 = 126$ mm

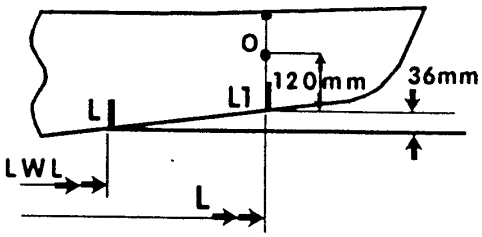
APPENDIX B, CLASS INSIGNIA



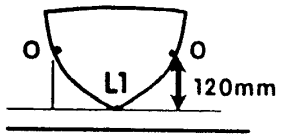
Measurement Diagrams



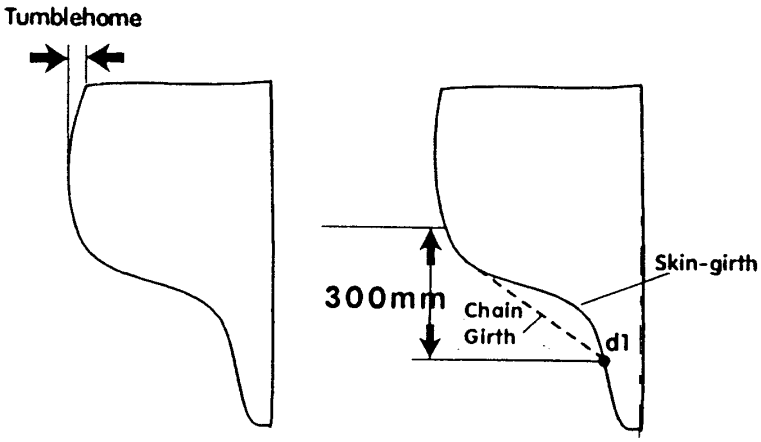
Stern profile



Bow profile



Section through bow at L1



Midship immersion mark

Midship Cross-section at 0.55 x LWL from forward end of LWL

 Effective: 1st March 2002