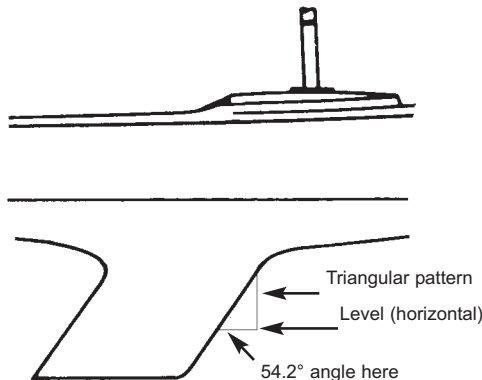


Keel Measurement Information

A. INSTRUCTIONS AND REQUIREMENTS

FOR USE OF ETHELLS KEEL TEMPLATE: E22DEC98

1. The boat is braced and supported in position so that the keel centre-line is accurately vertical athwartships, and the bottom of the keel is approximately level.
2. Check that the leading edge of the keel is straight.
3. The offsets of the new keel are designed on a chord at an angle to the leading edge of 54.2° . Therefore, the template must always be applied at exactly this angle to the leading edge. An easy way to accomplish this is as follows. Make a right-angled triangular pattern (template) of sheet metal or plastic with dimensions of the sides 180mm and 250mm and the hypotenuse 308mm. It is recommended that the hypotenuse be very slightly concave between the ends to ensure that it makes contact with the leading edge without rocking. With this triangle held snugly against the leading edge of the keel, adjust the level of the boat so that the short (bottom) side of the triangle comes exactly level, by means of a spirit gauge (bubble level).



4. After setting-up the boat per Figure A, determine the height differential, Station 1 to Station 10 (Measurement Form, Item 43). The procedure shown in Figure 3 can be modified to set-up the boat per Figure A, and Item 43 can then be found by $X_2 - X_1$.
5. The keel template is now applied, held horizontal both fore and aft and athwartships by means of a small spirit level resting on the template, at any station between a point 845mm above the base of the keel and the top of the bottom Vee sections (Figure 4). See Rule 3.6.2 for measurement items.
6. The template must be held firmly against the keel at the forward end, fitting snugly in the 10mm arc. That automatically centres the forward end. The after end of the template must also be centered.
7. Because of the thickness of the aluminium, the aft end of the template will touch first at the bottom face of the template, raising the top face slightly. To correct this discrepancy it is necessary to file the edge of the under side to an angle of about 54° , at the trailing edge only, so that the top face will be at the same level forward as it is aft.

B. PREPARATION OF KEEL TEMPLATES

The keel template is manufactured from aluminium and is subject to oxidation and corrosion.

An acrylic coating or equivalent should be sprayed on the template to retard oxidation. A stiffener should be fastened to both halves of the template to prevent any distortion from a straight plane when held horizontally. It is also recommended that a length of metal tape be attached at the aft end of the template. Figure 1 shows a tape attached to IYRU/ISAF 1976 template. The E22DEC98 template can be similarly prepared with a 9mm length tape.

C. LOCATING STATIONS 0, 6 AND 10

Station 0 is 1735mm from Measurement Point "A" (Figure 2), following the line of the profile. Station 10 is 1105mm from Measurement Point "C", following the line of the profile. Most boats have marks, indicating stations 0 (approximately 340mm below the boottop on the bow profile) and 10 (approximately 280mm below the boottop on the stern profile) moulded into the hull. To locate Station 6, see Measurement Diagram..

D. INSTRUCTIONS AND REQUIREMENTS FOR USE OF ETHELLS KEEL TEMPLATE: IYRU/ISAF 1976

The boat is leveled so that the distances from the reference line to the underwater profile at stations 0 and 10 are equal or within 2mm (Figure 3). The reference line is the line on the transit/dumpy level or the height of the water of the water level. A spirit level is placed on the template in order to level the template. The forward point of the template shall always be in contact with the leading edge of the keel. See Appendix H for measurement items. The keel shall be measured at all waterplanes from 845mm above the bottom of the keel to the top of the Vee. Figure 4. The maximum thickness of the keel is measured with a large caliper.

E. LEADING EDGE RADIUS — BOTH TEMPLATES

If the radius of the leading edge is 10mm or less, the centreline of the leading edge will touch the centreline of the template. If the leading edge radius exceeds the maximum permissible tolerance (10mm), the centreline of the leading edge will not touch the template centreline (Figure 5).

F. MEASUREMENT OF FORE AND AFT KEEL LOCATION AND KEEL BOTTOM VEE SECTION

1. The boat does not need to be leveled for these measurements and is to be resting on its keel with minimum support at the bulkheads. If the boat is rigged, all standing rigging shall be slack. To obtain access to the bottom Vee section and fore/aft ends of the keel when the boat is measured on a trailer, position a wood block across the trailer's keel stop on which to rest the keel between 125-180 mm of the keel leading edge intersection point, and raise the trailer fore and aft supports as needed.
2. Measurement Point "C" is the theoretical intersection of the transom and the counter at the centreline (Figure 6). The "International Etchells Measurement Diagram" depicts the measurement from Measurement Point "C" to the intersections of the keel leading edge and trailing edge with the bottom of the keel. Both measurements are taken as straight lines. The leading edge intersection point must be offset perpendicularly from the centreline in order to avoid bending the tape around the keel (Figure 7). The keel intersection points are determined by extending the leading and trailing edges until they intersect the keel bottom extension; any local humps or hollows shall be disregarded or bridged. To simplify the determination of the two theoretical intersection points, it is recommended a device be assembled consisting of two straight arms, approximately 450mm long, hinged together (Figure 8).
3. The keel bottom Vee section is measured by an adjustable protractor triangle or Vee templates. Dwg 3MKB-9G shows that the side of the keel meets the Vee at a sharp angle of 135° as viewed in cross section. Any rounding of this angle or of the bottom of the Vee shall not exceed 10mm in radius. These limitations and the Vee itself shall be checked along the length of the keel, except within 180mm aft of the theoretical intersection of the leading edge to keel bottom.
4. Measured from the theoretical intersection of the keel leading edge to the keel bottom, the profile of the forward bottom corner of the keel shall not be measured within a distance of 100mm up the leading edge and 125mm along the bottom edge.