

**Clements Marine** manufactures a large number of rudder profiles to suit the individual hull, ranging from slow speed displacement boats to 'deep vee' planing designs, and covering many other applications. The principal designs are shown above and include dagger type, conventional spade and wedge profile rudders.

Rudder design is of paramount importance to the performance of the boat, especially for high speed craft. Steering performance must be optimised, whilst drag is kept to a minimum. Clements Marine's experience will help the boat designer optimise conditions both in terms of high speed directional sensitivity, and low speed manoeuvrability.

**Through-Hull mounted** rudders are generally cast in one piece from either AB2 (nickel aluminium bronze) or HTB1 (high tensile brass). They are mounted through the hull in a rudder tube fixed to the inside of the hull (see common alternatives page 2). Bearing and sealing arrangements depend on the particular design selected.

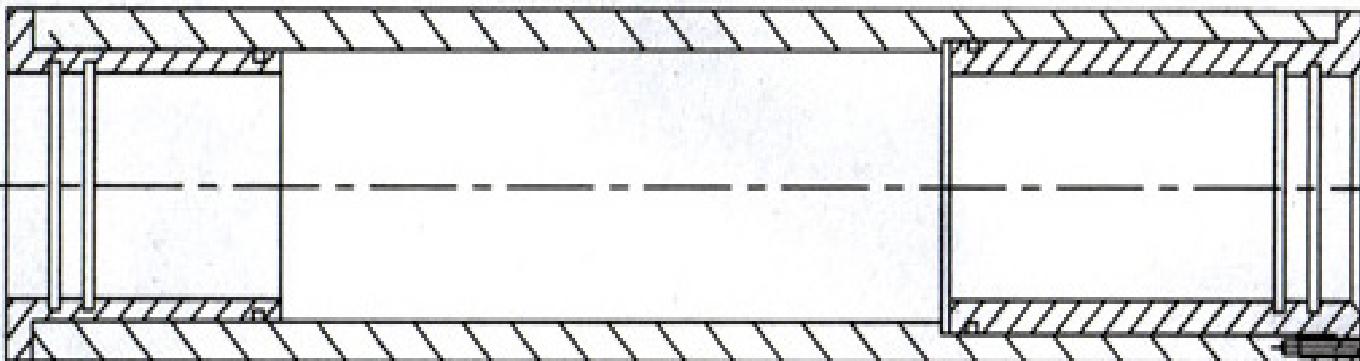
**Transom mounted** rudder assemblies are precision machined from one piece castings in HTB1 or AB2 and are fitted with seals to prevent ingress of water. Backing plates can be supplied with fixing bolts and greasers for lubricating bearings. These can include an integrally cast, anti-cavitation plate at the top of the blade.

When required Clements Marine can manufacture **bespoke plate rudder profiles** from either mild steel or type 316 stainless steel. Alternatively, hollow aerofoil type 316 stainless rudder/stock assemblies are available from in-house designs or to customers drawing. All rudder/rudder stock assemblies can be supplied to order under Lloyds/Norske Veritas/ABS survey.

## Rudder Tubes, Bearings and Tillers Arms.

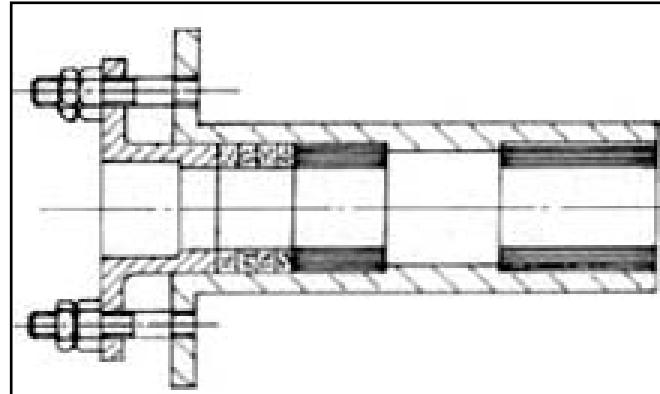
Bronze and GRP rudder housing assemblies are designed for through hull installation and are either bolted to the hull or glassed in. Metal tubes are cast in LG2 (Gunmetal) and can have a grease lubrication point provided. The glass type tubes are made from high quality marine grade GRP, using polyacetal bearings.

The basic range of our rudder tube assemblies, and the new composite bearing products now available are shown below. Thick wall GRP rudder tubes can be supplied with polyacetal 'top hat' bearings, each complete with 'O' ring seals as standard, alternatively there is a complete range of LG2 (Gunmetal) or HTB1 (High Tensile Brass) glands. A full range of cast tiller arms is available using HTB1(High Tensile Brass), or AB2 (Aluminium Bronze), alternatively fabricated tillers can also be provided to customers drawing.

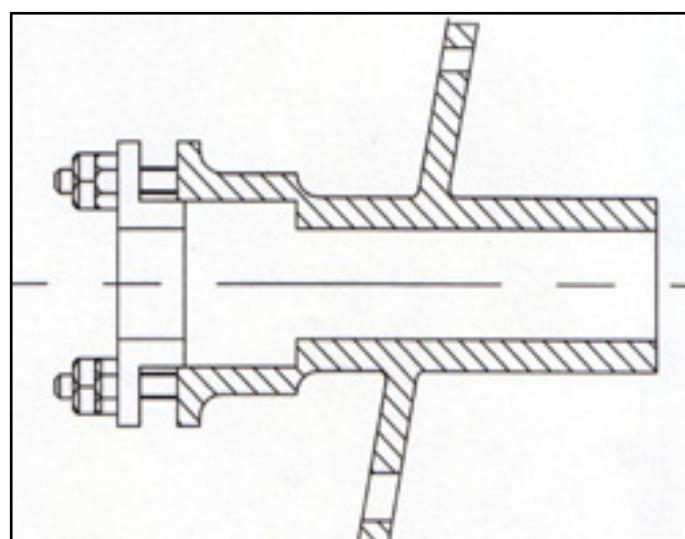
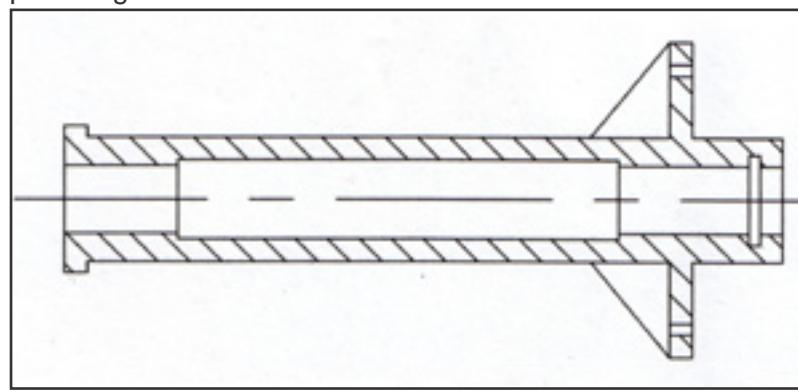


**Standard Rudder Tube.(Above)** Manufactured from marine grade GRP and incorporating precision machined polyacetal bearings.

**GRP Rudder Tube.(Right)** Constructed from a cast LG2 gunmetal housing, GRP tube, polyacetal bearings and a packed gland.



**Gunmetal Rudder Tubes. (Below and Right)** Made from cast LG2 (Gunmetal) with different flange arrangements machined and assembled using polyacetal bearings and a packed gland.



**Alternative Rudder Bearing Systems** are now available to the more conventional Metal and GRP methods of rudder installations which are being utilised by a growing number of Builders. In line with our philosophy to supply an increasingly broad range of sterngear products, we have introduced the **STRONG** products upper rudder bearing system to complement the conventional product designs. This product range is covered in Technical Data Sheet TD09.