



# The Advantages of Fitting Aqualube Bearings

## Principle of Operation :

Rubber and water make the perfect combination for a bearing material and lubricant.

The natural resilience of rubber gives the bearing its shock, vibration and noise absorption properties. The shape of the Aqualube bearing is the main reason for its success. Unlike many other bearings in the market the Aqualube bearing strips are shaped in such a way that a hydrodynamic water wedge is formed between shaft and bearing, even at very low shaft speed.

Water is the perfect lubrication medium, particularly for marine craft, because of its natural abundance, non-compressibility, cooling properties, and low coefficient of friction when between bearing strip and shaft.

The water enters the bearing through the longitudinal grooves and moves radially between the propeller shaft and the bearing face in a thin film. Once this film, or wedge, has developed the shaft does not actually come into contact with the bearing.



## Abrasion Resistance

The unique shape of the Aqualube bearing gives it an excellent resistance to abrasion. This helps to reduce wear on the bearing surfaces in environments where sand and other abrasive particulates are held in suspension, as found in shallow water.

The bearing is designed to let these abrasive particles across its surface and into the grooves where they are flushed out by the water feed pressure. The system prevents the particles from getting embedded into the bearing surface and causing severe wear on the propeller shaft.

## Construction of Aqualube Bearings

Aqualube bearings are moulded from a specially compounded oil and chemical resistant nitrile rubber. The nitrile rubber displays an excellent resistance to wear and abrasion and is also tough and durable. Bonding techniques ensure that the strength of the bond to the shell is at least equal to the strength of the rubber itself.

The finished product has a smooth, shiny surface to the rubber lining which, when compared with similar products on the market, provides visual testament to the quality of the bearing. Bearing shells can be manufactured from a wide range of materials to suit special applications. The standard range bearings are made from manganese bronze and non-metallic shells. Each and every bearing is centreless ground on the outside diameter and the bore is also ground to ensure concentricity and that the correct clearance between bearing and shaft is maintained.

## **Shaft Speed**

The maximum recommended operating speed of an Aqualube bearing is in the region of 35 metres per second, or 7,000 feet per minute. The minimum speed is 0.5 metres per second or 10 feet per minute. For applications outside these parameters the Teignbridge Technical Department should be consulted, as special provision for lubrication may be required.

## **Lubrication – Wear and Durability**

All types of water lubricated rubber bearings will eventually experience wear in service. For bearings operating in clean water the wear down effect will be less rapid than when operating in shallow, heavily contaminated water.

In any event it is recommended that bearings should be inspected for wear whenever the vessel is hauled out. In cases where the bearing is operating in shallow water an annual inspection is recommended.

Where a vessel is continually operating in contaminated water it is recommended that a sealed lubrication system is installed. A relatively simple system to design and fit, it is an effective and economical solution to the problems and downtime created by shaft wear.

As can be seen from the drawing below, the system is completely enclosed so only filtered water can enter.

The sterntube is fitted with inboard and outboard seals, which prevent seawater from entering the system. A stuffing box and gland can be fitted to the inboard end of the sterntube with equal effect.

The lubricating water is pumped from the holding tank into the inboard housing and returns to the tank after flowing through the sterntube bearings. An audible low-level alarm can be connected to the bridge to warn the vessel operator in the event of a seal failure.

Bearings fitted to struts and completely immersed pump bearings have adequate lubrication. However, where bearings are installed in a position where the water flow is not good they should be lubricated by a forced water flow system. This also applies to bearings which have to cope with low shaft speed and high loads.

## **Load and Deflection**

Aqualube water lubrication bearings have a shore hardness of  $70\pm 3$  and are suitable for operation in the temperature range of  $-25^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . Special compounds are available, which will allow the working temperature to increase to  $200^{\circ}\text{C}$ . For temperatures above  $30^{\circ}\text{C}$  advice should be sought from the Technical Department relating to the clearance between the bearing and the shaft.

The load which can be carried by an Aqualube bearing is dependant upon the quality of the lubricating water and the tolerance or deflection of the shaft. A normal working load of  $2.5\text{ kgs/cm}^2$  (35PSI) is acceptable. Higher loadings of up to  $5\text{ kg/cm}^2$  have been recorded on segmental bearings. For further details on loads and deflection contact the Teignbridge Technical Department.