Choosing the correct propeller

For every combination of engine, gear ratio and hull there is a propeller that represents the optimum performance.

As a general rule, a larger diameter and reduced pitch gives improved acceleration and lower fuel consumption. Conversely, a smaller diameter and increased pitch gives higher top speeds. There are, however, many factors that influence the way in which a propeller functions, including the shape of the hull, the load, the engine's output and the way in which the boat is used. Practical testing is often the best way to find out whether the propeller you have chosen is the best one for your own particular boat and your own particular purposes.

The tables in this brochure are intended to help you. Find your combination of engine and drive in the left-hand margin. Then follow the speed scale along the foot of the table until you find your boat's top speed. Read off the recommended size of propeller, and select the diameter according to the performance you require from your boat.

These tables are intended for **general guidance only.** Your Volvo Penta dealer has a detailed table of recommendations — and the professional know-how needed. He will be pleased to help you.

Engine speed range, full throttle

When choosing a propeller it is sometimes difficult to hit on a size that will always give the recommended full throttle engine speed, irrespective of load and whatever the weather conditions.

With some boats it may be better to use a lower full throttle engine speed than the recommended maximum to reduce fuel consumption, reduce the levels of noise and vibration, or give a higher degree of propeller efficiency, etc. For this reason we have compiled a list of "Engine speed range, full throttle" recommendations. Cruising speed should always be at least 300—500 rpm lower than full throttle speed.

Pitch of 14×17 propeller
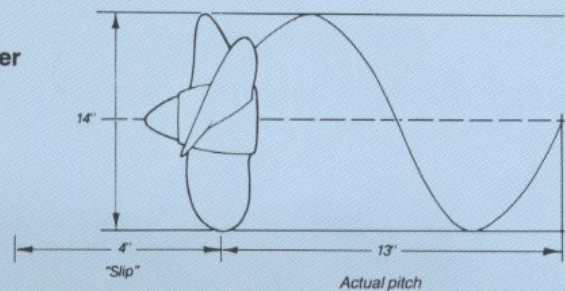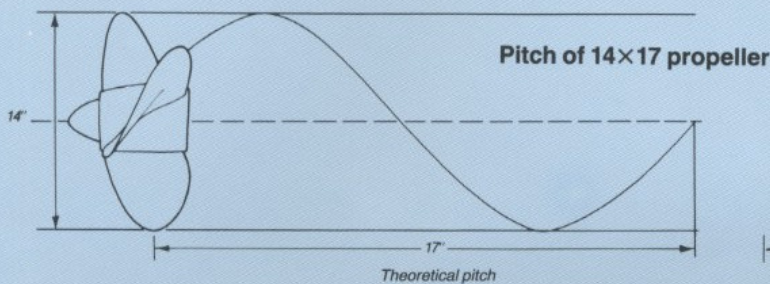
Dimensions

A propeller's dimensions are expressed as two measurements, e.g. 14×17 (except for DP propellers, which have a special size code). The first figure states the diameter, the second specifies the pitch.

Diameter

When it rotates, a propeller tip describes a circle. The diameter of this circle is also the diameter of the propeller.

Pitch

Pitch is the distance the propeller travels forwards when it makes a full turn — rather like a screw going into a piece of wood. But, as water is not a solid, the measurement is theoretical only, and the propeller actually travels between 70% and 90% of the distance, the remaining 10% to 30% being known as the slip.

Cavitation and cavitation erosion

As a propeller rotates, water is forced against the pressure sides of the propeller blades. The faster the blades cut through the water, the lower the pressure on the suction sides of the blades. When a certain speed is reached (it varies from case to case), the pressure on the suction sides of the blades will be so low that the water will start to "boil", and vapour bubbles (which include air) will form.

The effects of cavitation make themselves felt in terms of a boat's performance. By clinging to the propeller blades, the bubbles make the blades thicker, and increase their resistance through the water. As a result, the propeller becomes less efficient.

The bubbles now migrate along the blades. When a bubble reaches an area where the water pressure is higher, it implodes. The energy released generates a hammering action, gouging into the blade and flaking away its surface. The result is cavitation erosion.

There are various causes of cavitation; unevenness in the leading edge of a propeller blade, excessive cupping, blade edges that are too sharp, or an imperfect finish to the blade surface being typical examples.

Cupping

Cupping means that the rear edge of a propeller blade is scooped, to increase the pitch. Cupped blades are used with high engine outputs, as they give a propeller a better grip in the water.
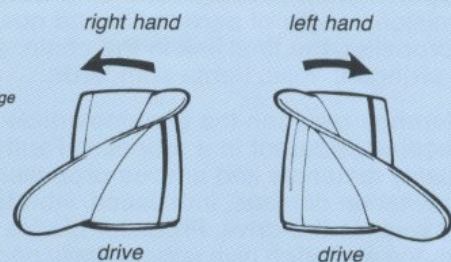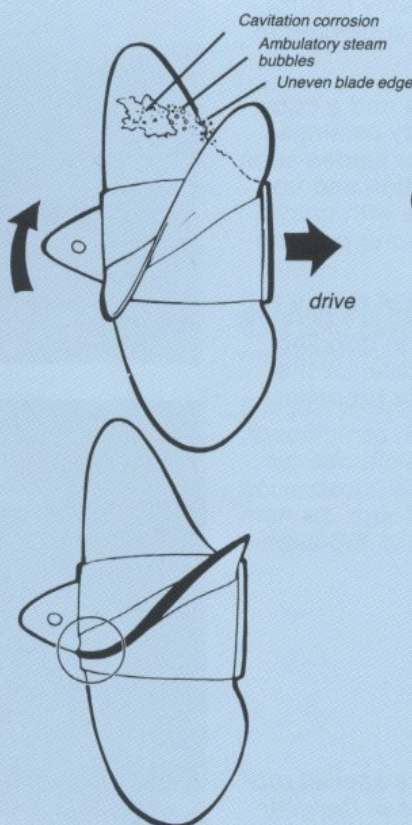
Right-hand or left-hand?

When you are changing propellers it is absolutely essential that the new one you select is the correct type. The first point to decide is, do you need a right-hand or a left-hand propeller?

The diagram above shows how to tell which is which.
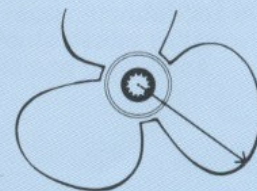
How to measure the diameter

It's sometimes difficult to find the size marking on a propeller. If this is the case, measure it from the centre of the hub to the tip on one of the blades, and then multiply by two.