AQUAMATIC AND DUOPROP PROPELLERS

VOLVO PENTA

A step ahead...

From the invention of the first revolutionary Aquamatic in 1959 to the revolutionary Duoprop of today, Volvo Penta has always been a step ahead in sterndrive and propeller development.

Our expertise has resulted in new, pioneering developments, with ever greater emphasis on performance, precision, quality and length of service life.

Consider our propellers ... Every one of our original Volvo Penta propellers has been designed, manufactured, and tested to ensure its optimum efficiency. When your boat's propeller is matched to its drive, you can be sure of the synergistic effect that yields optimum performance, lower running costs, and maximum service life.

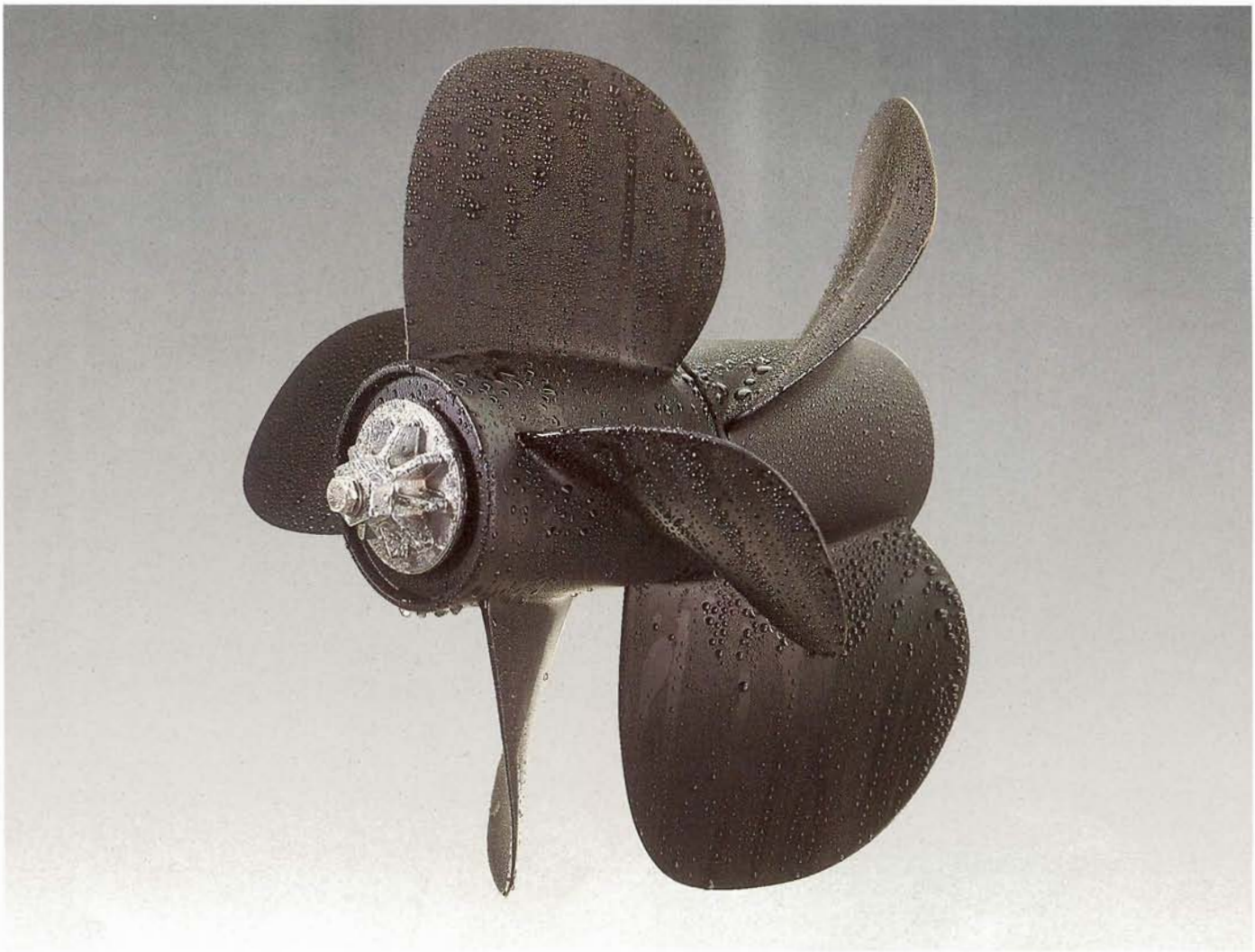
The Volvo Penta Aquamatic was revolutionary when unveiled at the New York Boat Show in 1959. For the first time the boater was able to combine the power of an inboard with the maneuverability of an outboard.

We have continued to develop and refine the basic design throughout the years. Our outdrive model 290 A is an example of this evolution. It features powertrim with fingertip control and a digital display which enables the boater to control trim for optimum performance and economy, without the help of extra trim devices.

The Duoprop drive is the latest example of Volvo Penta's innovative skills. Thrust, acceleration, handling, and top speed are all substantially improved. The ultimate combination that only Volvo Penta can deliver.

Our new gas Duoprop model has made the superior acceleration, handling, top speed, and fuel economy associated with the Duoprop system available to boaters who prefer the performance of a V8 engine.

Duoprop propellers for diesel engines



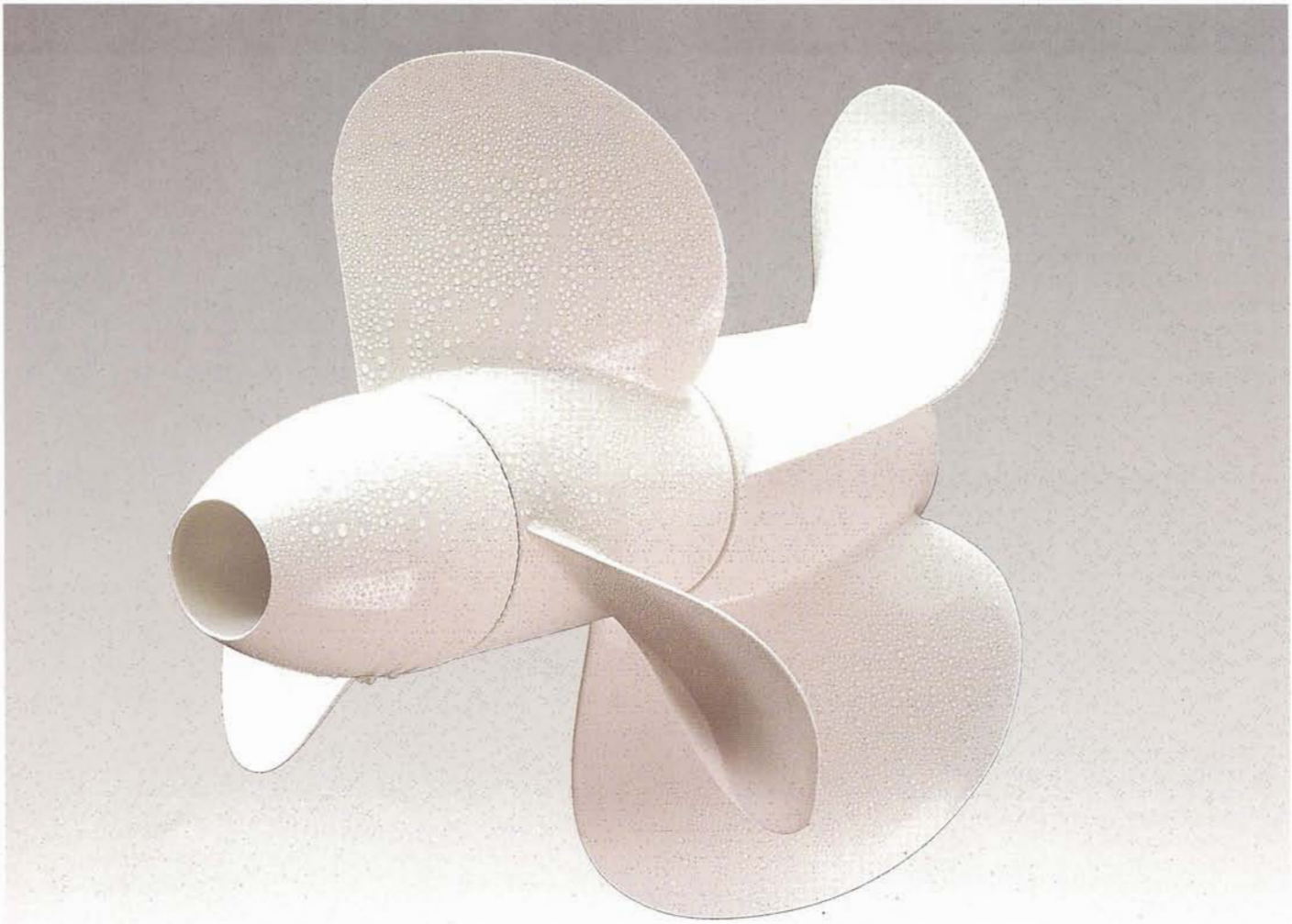
The unique design of the Duoprop with its two counter-rotating propellers increases thrust by up to 15%, improves acceleration by up to 30%, and gives greater control at the helm. Top speeds are higher, while relative fuel consumption is lower, a unique combination. The Duoprop design also provides for better maneuverability and quieter running. The propellers' thin blade profile requires the highest level of precision manufacture and quality control. The counteraction of the three-bladed propeller up front and the four-bladed propeller astern is extremely important in achieving optimum performance.

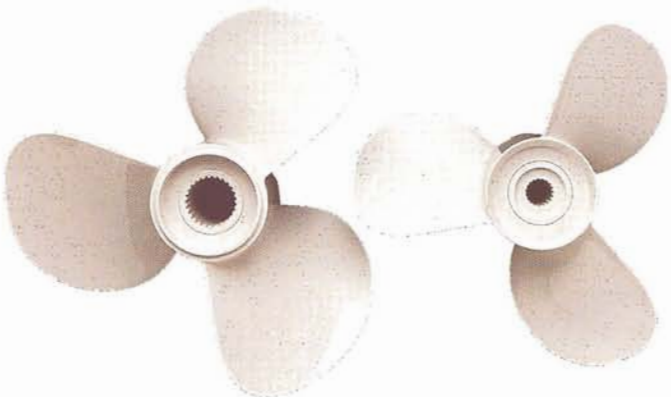
Duoprop propellers for diesel engines

Code	Color	Set Order no.	LH 3-blade front prop.	RH 4-blade rear prop.
A 1	Light blue	852681-6	852247-6	852249-2
A 2	Yellow	852682-4	852243-5	852245-0
A 3	Red	852683-2	852239-3	852241-9
A 4	Dark green	852684-0	852235-1	852237-7
A 5	Light brown	852685-7	852231-0	852233-6
A 6	Orange	852680-8	852251-8	852253-4
A 7	Light green	852679-0	852259-1	852261-7
A 8	Violet	852678-2	852263-3	852265-8
A 9	Dark blue	852677-4	852267-4	852269-0
A10	Dark brown	852676-6	852271-6	852273-2

WARNING: Never fit DP propellers with different color codings to the same drive. Only Size A propellers should be fitted on drives with diesel engines, and only Size B propellers on drives with gas engines.

Duoprop propellers for gas engines





Volvo Penta has developed the Duoprop drive for gas engines to take advantage of the power generated by our higher reving V8 engines.

The chief advantages of the Duoprop are greater maneuverability and safety.

The two counter-rotating propellers practically eliminate cavitation.

Duoprop drives can cope with very sharp turns at high speed without cavitating and losing their grip. Power steering systems are not normally required. Noise levels are much lower, as is the level of vibration. Other important advantages are the reduction in fuel consumption, lower bowrise, lower planing speed, quicker planing, and increased top speeds.

The two triple-bladed propellers have a very thin blade profile, which requires a great deal of precision in manufacturing and quality control.

Propeller Cone Kit, **Order No. 853825-8**
The propeller cone is designed for use with DP propellers for drives with gas engines, but when fitted with a spacer can also be used with DP propellers for drives with diesel engines, to give improved performance in certain cases.

Duoprop propellers for gas engines

Code	Color	Set Order no.	LH 3-blade front prop.	RH 3-blade rear prop.
B 1	Light blue	**853631-0**	**853611-2**	**853621-1**
B 2	Yellow	**853632-8**	**853612-0**	**853622-9**
B 3	Red	**853633-6**	**853613-8**	**853623-7**
B 4	Dark green	**853634-4**	**853614-6**	**853624-5**
B 5	Light brown	**853635-1**	**853615-3**	**853625-2**
B 6	Orange	**853636-9**	**853616-1**	**853626-0**
B 7	Light green	**853637-7**	**853617-9**	**853627-8**
B 8	Violet	**853638-5**	**853618-7**	**853628-6**

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.

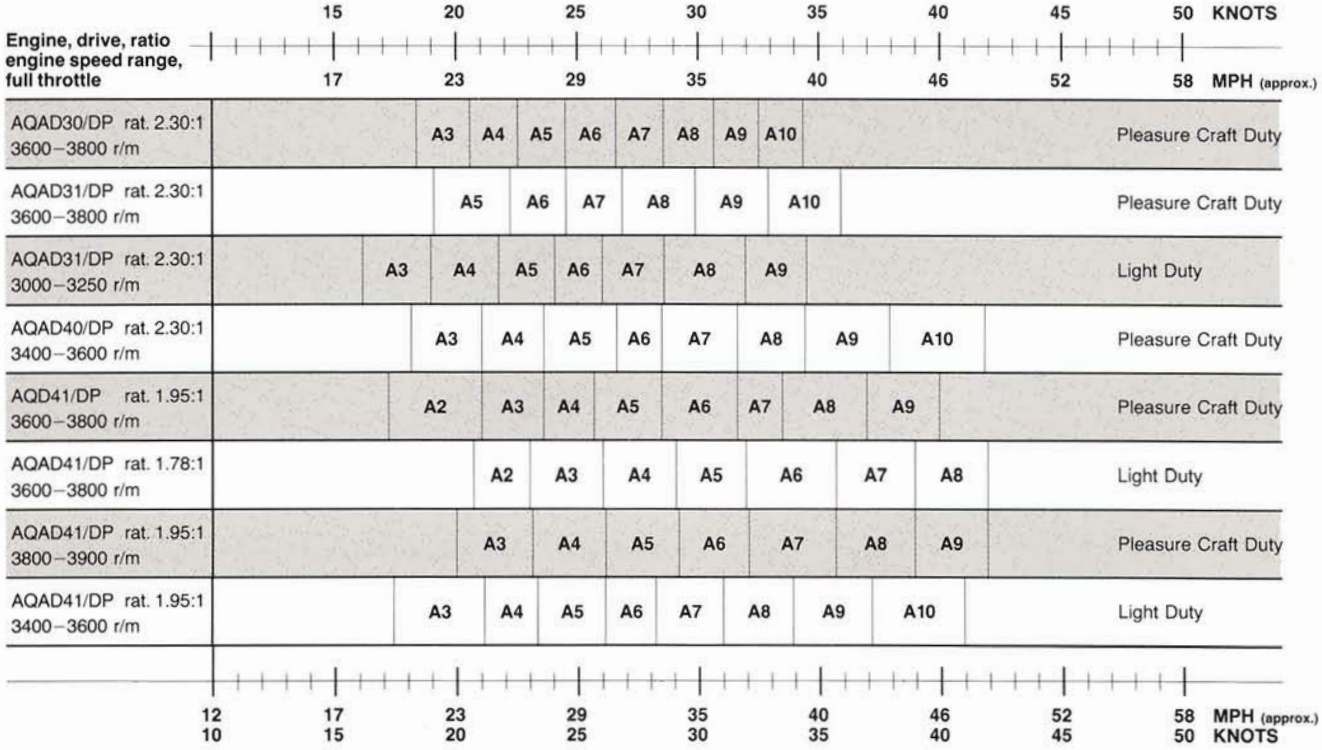
These tables are intended for **general guidance only.** Your Volvo Penta dealer has a detailed table of recommendations – and the professional know-how needed. He will be pleased to help you.

Engine speed range, full throttle

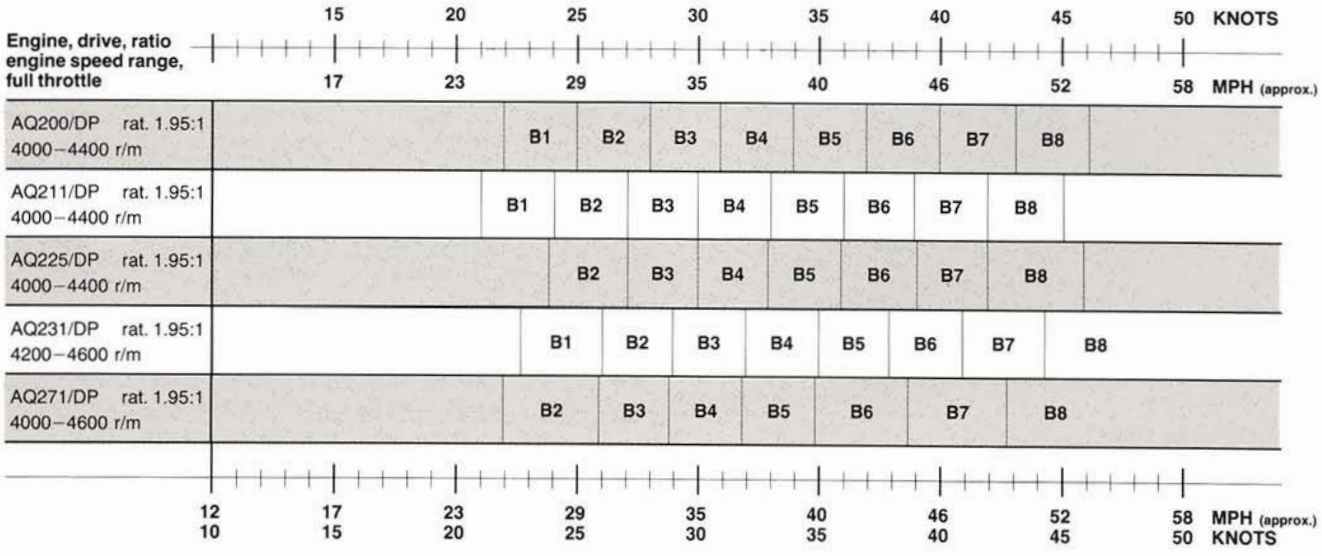
When choosing a propeller it is sometimes difficult to select a size that will always give the recommended full throttle engine speed, irrespective of load and whatever the weather conditions.

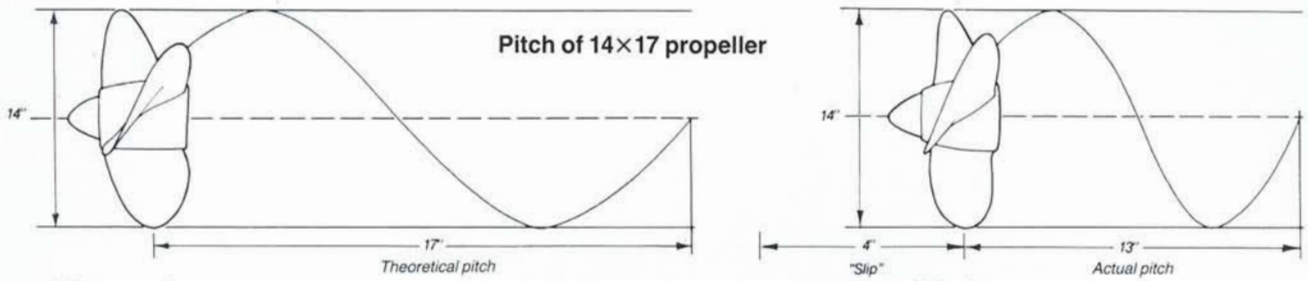
With some boats it may be better to use a lower full throttle engine speed than the recommended maximum to reduce fuel consumption, reduce the levels of noise and vibration, or give a higher degree of propeller efficiency, etc. For this reason we have compiled a list of "Engine speed range, full throttle"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

Propeller recommendations for Duoprop with diesel engines



Propeller recommendations for Duoprop with gas engines





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.

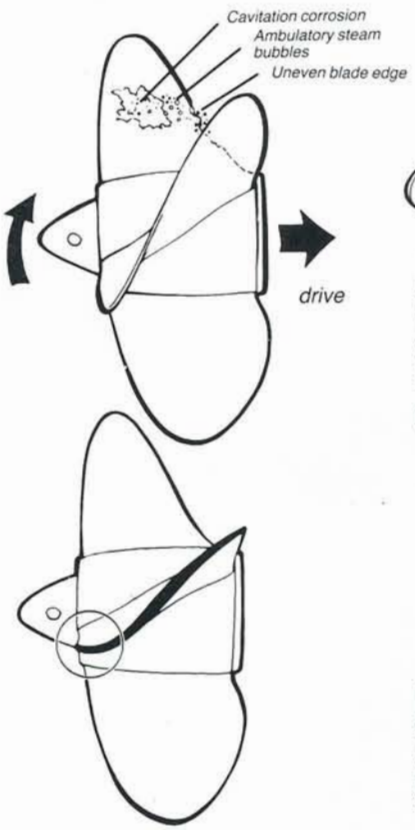
The effects of cavitation make themselves felt in terms of a boat's performance. By clinging to the propeller blades, the bubbles make the blades thicker, and increase their resistance through the water. As a result, the propeller becomes less efficient.

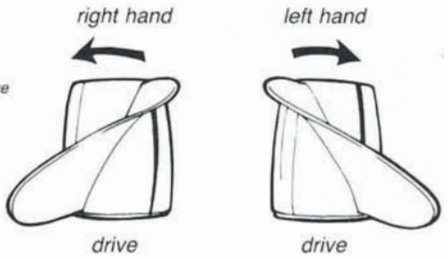
The bubbles now migrate along the blades. When a bubble reaches an area where the water pressure is higher, it implodes. The energy released generates a hammering action, gouging into the blade and flaking away its surface. The result is cavitation erosion.

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 on the blade surface.

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.

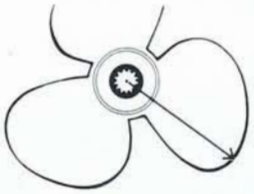




Right-hand or left-hand?

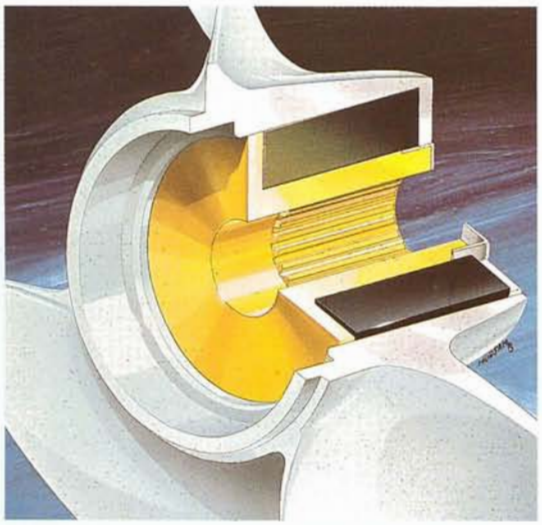
When you are changing propellers it is absolutely essential that the new one you select is the correct type. The first point to decide is, do you need a right-hand or a left-hand propeller?

The diagram above shows how to tell which is which.



How to measure the diameter

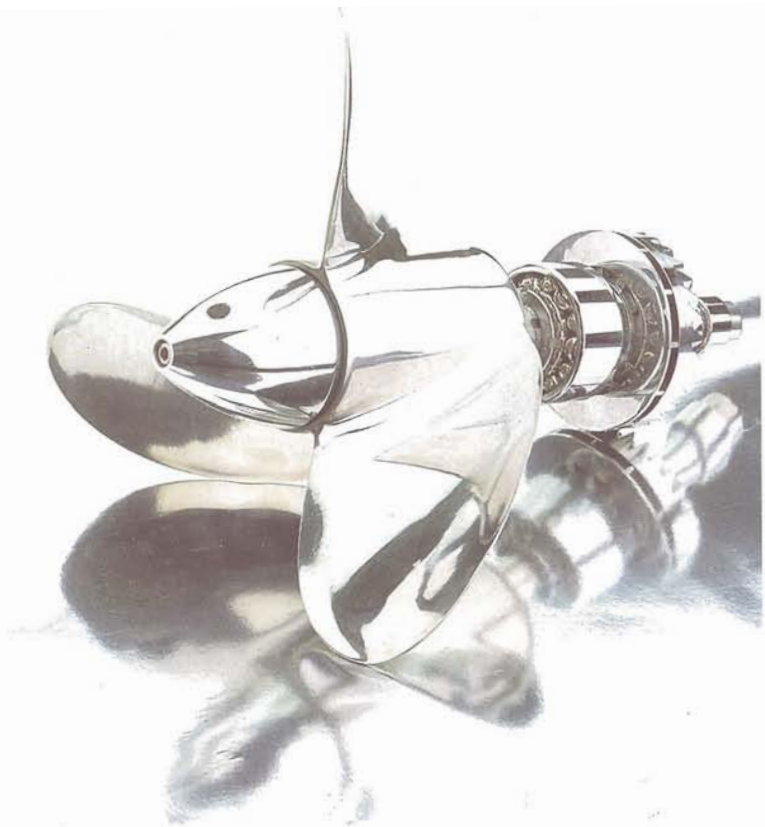
It's sometimes difficult to find the size marking on a propeller. If this is the case, measure it from the center of the hub to the tip on one of the blades, and then multiply by two.



***All** Volvo Penta Aquamatic propellers feature a special rubber bush in the hub. This reduces the stresses acting on the gear wheels of the drive and engine when changing quickly from ahead to astern, and also dampens excessive loading on the propeller in the event of the boat leaving the water in high seas.*

Don't forget your spare propeller!

It is just as important to have a spare propeller in your boat as it is to have a spare tire in your car. When you change a propeller, we suggest you keep the old one as a spare.



Ultra

Volvo Penta's new stainless steel "Ultra" series propeller is the last word in precision and strength. It has been specially designed to give the maximum degree of propeller efficiency in the higher speed registers.

The use of stainless steel makes it possible to use thinner blades, thus transmitting the force more efficiently.

The Volvo Penta High Speed propeller, with its highly polished finish, gives a drive a tougher and more powerful profile. But there is more to it than high performance and an attractive appearance.

Stainless steel gives a propeller blade greater torsional strength, more resistance to cavitation damage, and generally allows for longer prop life.

In the event the propeller is damaged, there is the additional advantage that, because it's stainless steel, it can usually be repaired.

Diam×Pitch	Left-hand	Right-hand
14×22	853789-6	853788-8
14×24	853791-2	853790-4
14×26	853793-8	853792-0

A stainless steel propeller should always be combined with propeller cone, **Order No. 853783-9.**

Propeller recommendations — Ultra propellers

This Table is intended for general guidance, to help you choose the correct propeller. For more information about engine speed range, full throttle and what is meant by the correct propeller, please see page 6.

Engine, drive, ratio engine speed range, full throttle	35 KNOTS / 40 MPH (approx.)	40 / 46	45 / 52	50 / 58	55 / 64
AQ131 gear ratio 2.15:1 4400–4800 r/m	14×22	14×24	14×26		
AQ151 gear ratio 2.15:1 5000–5500 r/m		14×22	14×24	14×26	
AQ171 gear ratio 2.15:1 5000–5700 r/m		14×22	14×24	14×26	
AQ200 gear ratio 1.61:1 4000–4400 r/m		14×22	14×24	14×26	
AQ211 gear ratio 1.61:1 4000–4400 r/m		14×22	14×24	14×26	
AQ225 gear ratio 1.61:1 4000–4400 r/m		14×22	14×24	14×26	
AQ231 gear ratio 1.61:1 4000–4400 r/m		14×22	14×24	14×26	
AQ260 gear ratio 1.61:1 4000–4400 r/m		14×22	14×24	14×26	
AQ271 gear ratio 1.61:1 4100–4600 r/m		14×22	14×24	14×26	
AQ290 gear ratio 1.61:1 4700–5200 r/m		14×22	14×24	14×26	
AQ311 gear ratio 1.61:1 4700–5200 r/m		14×22	14×24	14×26	
	40 / 35	46 / 40	52 / 45	58 / 50	64 / 55 MPH (approx.) / KNOTS

High Speed

Our tried and tested High Speed propeller was developed from the standard type – but both the blade area and the propeller's profile have been modified.

The increased blade area means that the High Speed propeller is better suited to high engine power outputs and high rpm. In a fast boat, that means increased speed, but with a heavily laden boat this propeller will allow quicker planing, increase cruising speed, and improve the fuel consumption. The better forward/reverse performance of the High Speed propeller also means that you can maneuver with greater speed and safety.

Most of our High Speed propellers are suitable for use with Aquamatic 200, 250, 270, 275, 280 and 290 drives, but the extra-large diameter propeller (16'') is not suitable for use with 200, 250 and 270 drives.

Only propellers with long hubs should be fitted to drives used with V8s, or with AQAD31, AQD40, AQAD40, or AQAD41 diesel engines.

L = Long hub for 290 drives and 280 drives with threaded hole in the shaft. Propeller cone Order No. 850785-7 required.

HS = High Speed propeller

Std = Standard propeller

Propellers for type 200, 250, 270, 275, 280 and 290 drives

3-bladed Diam×Pitch	Left-hand	Right-hand
14×10	813279-7 Std	813280-5 Std
14×11	897626-8 Std	
14×13	813284-7 Std	813285-4 Std
14×15	814626-8 HS	814631-8 HS
14×17	814627-6 HS	814632-6 HS
14×19	854147-6 HS	854146-8 HS
14×19.6		853445-5 HS
14×21	851138-8 HS-L	851139-6 HS-L
14×23	851141-2 HS-L	851142-0 HS-L
15×11	813296-1 Std	813297-9 Std
15×13	813316-7 Std	813317-5 Std
15×15	814611-0 HS	814615-1 HS
15×17	814612-8 HS	814616-9 HS
15×17	851124-8 HS-L	851125-5 HS-L
15×19	850864-0 HS-L	850865-7 HS-L
15×21	850866-5 HS-L	850867-3 HS-L
16× 9	853770-6 HS-L	
16×13	851035-6 HS-L	851036-4 HS-L
16×15	851037-2 HS-L	851038-0 HS-L
16×17	851039-8 HS-L	851040-6 HS-L
16×19	852612-1 HS-L	852613-9 HS-L
16×21	852633-7 HS-L	852634-5 HS-L
16×23	852490-2 HS-L	852491-0 HS-L

propellers

Standard

Choosing the correct propeller is vital to your boat's performance. The design and manufacture of Volvo Penta sterndrive propellers takes place under the most stringent standards and quality control to help eliminate variations in material and specification. The propeller is manufactured in an aluminium alloy specially formulated to withstand the stresses involved and the corrosive action of salt water. This type of alloy is both malleable and extremely strong to reduce the extent of damage in the event of grounding or striking a submerged object.

All genuine Volvo Penta propellers make full utilization of engine output combining high thrust and performance with maximum fuel economy.

Propellers for type 750 drives

3-bladed Diam×Pitch	Left-hand	Right-hand
23×31	839119-5	839095-7
24×21	839120-3	839096-5
24×23	839121-1	839097-3
24×25	839122-9	939098-0
24×27	839123-7	839099-9
24×29	839124-5	839100-5

Propellers for type 100 drives with cylindrical shafts and drive pins

3-bladed Diam×Pitch	Left-hand	Right-hand
13×10	813242-5	813244-1
13×11	813243-3	
13×13	813224-3	813233-4
13×15	839186-4 HS	813235-9
14×11	813227-6	813238-3
14×13	813229-2	813240-9
14×15	832992-2	832993-0

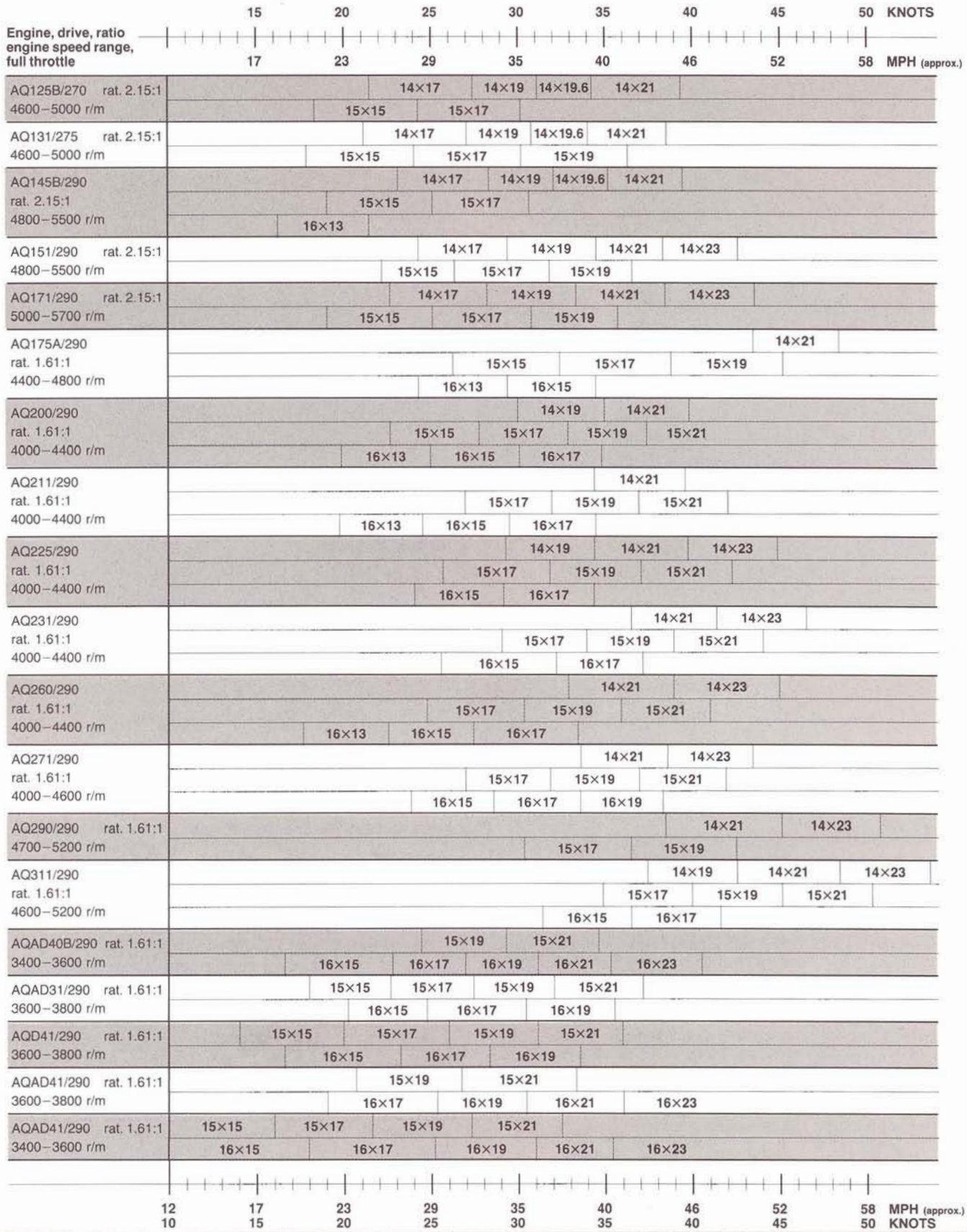
HS = High Speed-propellers

Propellers for type 100 drives with splines (13/16")

3-bladed Diam×Pitch	Left-hand	Right-hand
12½×13	804448-9	
12½×14	804447-1	
12½×15	804446-3	
14 × 9	804460-4	
14 ×11	804449-7	
14 ×13	806602-9	
14 ×14	806603-7	806678-9

Propeller recommendations – aluminium propellers

This Table is intended for general guidance, to help you choose the correct propeller. For more information about engine speed range, full throttle and what is meant by the "correct" propeller, please see page 6.



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Volvo Penta of America,
a Division of Volvo North America Corporation,
Rockleigh, New Jersey 07647