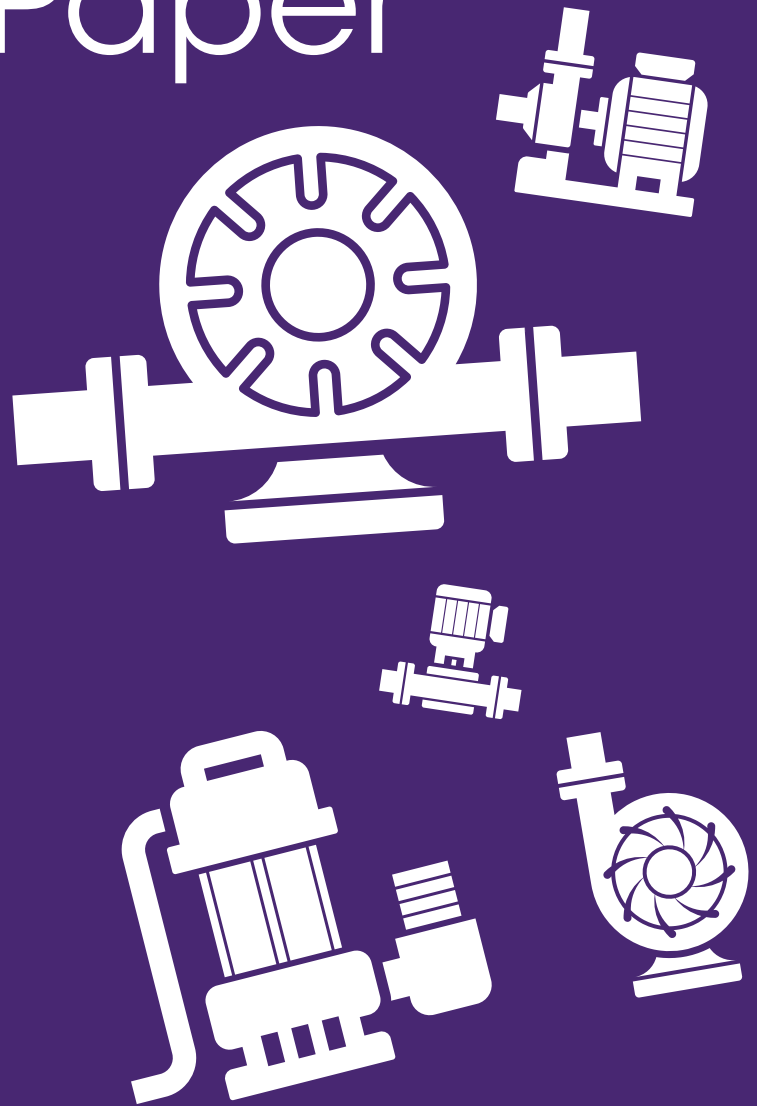


# Briefing Paper

Welcome to the latest in the current series of briefing papers from Marine Trader, offering guidance on products, services and strategy that are essential to the marine purchaser.

These guides are created as reference tools and are intended to supplement your learning on the job and through more traditional educational pathways, such as the IMPA PG Cert in Supply Chain Management. Suggestions for future topics are always welcome, so please contact [editorial@readmt.com](mailto:editorial@readmt.com)

Our thanks for this paper goes to Castle Pumps, who outline the essentials of selecting marine pumps for a variety of applications.



## MARINE PUMPS – A PROCUREMENT GUIDE

## Considering reliability and total cost of ownership

Pumps are an essential part of vessel operation. Used in a wide variety of applications onboard, some of which are critical to operation, it is crucial that these pumps are high performing and specified correctly. With seldom service available at open sea, pump downtime could be costly and may even result in the vessel needing to dock unexpectedly. Vessels experience extreme forces of nature with changeable conditions, and it is imperative that the pumps onboard are built to withstand these and continue to operate in demanding situations. Reliability isn't a possible outcome at this level; it is a product feature.

To ensure that pumps are suitable for onboard use there is a type approval process followed by the International Association of Classification Societies (IACS). Consisting of 12 members that check pumps comply with the relevant specifications, rules and international standards for class-approved vessels, type approval verifies the strength, reliability, suitability and functionality of pumps. With the manufacturing process being independently verified and pumps individually witness tested, the aim is to make sure a vessel meets class society rules. This information is of great importance to insurers, charterers, ship brokers and flag administrators, making it significant that pumps are type approved for vessel services.

The specification and choice of pumps begins at the vessel purchase stage. Often ship owners may be given a shortlist of suppliers by the vessel builders with extra payment required for a change to an alternative. This effectively means that the decision on choice is made by the shipyard and not the buyer; a decision which may not be in the buyer's best interest if it is based on the initial outlay rather than the overall lifetime cost.

The total cost of ownership is what matters considering that a vessel is used between 25-40 years. Considerations need to be made as to the quality of construction, the

availability and accessibility of spare parts and the lead time. The interchangeability of spare parts is also important to limit the stock holding required on board.

With the above in mind, Castle Pumps have put together a guide that explores the contributing factors to the purchasing process of a new or replacement marine pump, with the ultimate goal of getting the right pump for the right application at the lowest total cost of ownership.

## The right pump, for the right application

With a vast range of pump types, material options and performance specifications, sourcing a pump requires experienced technical knowledge. Some procurers know exactly the pump they want; some know the performance requirements and others may solely know the application for which they need a pump. When you are unsure of exactly the pump you require, Castle Pumps understand that you need to be able to rely on an experienced supplier who can take the information you have and specify a solution that precisely meets the requirements.

The below information is typically required to ensure that a technical solution can be specified that matches your individual application and performance requirements.

### Application

The application that the pump will be used for will determine the pump type, material and impellers required. The more detail that the application can be described in, the better informed the decision will be as to selected material, design features as well as the rpm of the motor. For example, a pump that is designed to run 24/7 for engine cooling will typically run slower, have additional bearings and need to be easier to maintain in situ than a pump that is required to operate less infrequently for example for seawater transfer.



Reliability isn't a possible outcome at this level; it is a product feature."

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The ultimate goal is the right pump for the right application at the lowest total cost of ownership."

## Fluid

Full disclosure of the liquid is needed to ensure its chemical compatibility with the pump wetted parts, including the casing, impeller, wear rings and any elastomers fitted. The fluid will, therefore, have a direct influence over the materials selected. Typically, cast iron is used for fresh water and bronze/aluminium for seawater; however pumps can also be supplied in stainless steel and duplex stainless steel.

The viscosity and temperature may also be required to determine the power absorbed by the pump, as well as any impellers required to provide the specified duty. The viscosity of Heavy Fuel Oil (HFO) for example can vary greatly with temperature, which in turn impacts upon the pump requirements. For example with a viscosity of 20cSt, if a flow rate of 98M<sup>3</sup>H is required at 2.5 bar, a 12kw motor is required. With the same flow rate requirements, a viscosity of 1500cSt will require a motor of 28kw.

## Flow Rate

Typically measured in L/min or M<sup>3</sup>H although other units are acceptable.

## Pressure

Usually measured in bar or M. For centrifugal pumps, at certain pressures a multistage pump may be required and depending on the pressure the pump may need to be manufactured in a different material. If the pump is a positive displacement type, relief valves would need setting to the correct pressure.

## Voltage and Frequency

The voltage and frequency have a direct influence over the pump chosen, as at 60hz there is a 20% increase in flow and pressure over the same pump in 50hz. Often vessels may be operating on single or three phase, and it is important this information is made clear at the outset.

## Specific Dimensions

If there are any specific dimensions or existing pipework requirements for a particular installation, this will also help determine the pumping solution most suitable. For example, if space is an issue a vertical pump may be more suitable than a horizontally orientated option. If an existing pump needs replacing on board, the replacement may need to be specific dimensions to fit within the pipework. Azcue Pumps can be constructed to match existing pump and pipework specifications, and DIN 24255 pumps are also available that can be interchanged with other DIN 24255 pumps.

Pumps are available with JIS, DIN and ANSI flanges depending upon the rest of the pipework installed on the vessel. Commonly European ships require DIN; American-built vessels use ANSI, and JIS flanges are often on Asian vessels.

## Certification

Certification such as a witness performance test is another important part of satisfying class requirements.



## Technical considerations

There are other technical considerations, which should be given during the procurement process. There are various low maintenance options of pumps that may be desirable depending on the liquid being pumped and the individual servicing requirements.

### Spacer Coupling

A spacer coupling can be fitted to vertical pumps to ensure that the inner parts such as impellers, seals, and wear rings can be replaced without having to remove the motor.

### Back Pull-Out-Design

Back pull-out design enables the motor to be removed without disconnecting the pump from the pipework.

### Magnetic Coupling

Magnetic couplings remove the need for a mechanical seal as being driven by a magnet means that the pump head is seal-less. This eliminates the chance of leakage and reduces service intervals.

### Priming Pump

In situations where a short priming time is required, or where it is not possible to keep the suction flooded with the use on a non-return valve, pumps can be fitted with a priming pump.

### Gauges

Manometers and vacuumeters are a valuable addition to any pump. They determine the inlet and discharge pressure to check the pump is working as per the curve. By measuring the differential pressure between the inlet and outlet pressure, we can determine the pressure being

produced by the pump. If there is only a pressure gauge on the pipework, then this only confirms the system pressure. Without both gauges, it is difficult to know where the pump is working against its curve.

### Control Panel

The use of a control panel with Amp meters will confirm the power being drawn, meaning again that a check can be performed to ensure that the pump is performing on curve. Fitting a control panel with an hour meter confirms how long the pump has been in operation, therefore helping to determine service intervals such as bearing greasing and inspection.

### Performance-related Energy Costs

It is reported that energy output works out at approximately 45% of a pump's total cost of ownership. Typically engine cooling pumps are sized according to the warmest seawater conditions a vessel may face which are in the red sea. Normally vessels operate in waters far cooler than this and engine cooling pumps may still be operated at full speed despite the cooling requirement being much less. The energy consumed whilst operating the pump at full duty is far more expensive in not only power consumption but in spare parts. Azcue offer seawater cooling pump systems complete with frequency inverters, which regulate the speed of the pump's motor based on the temperature of the water. This system can provide savings of up to 80%, with a typical payback period of one year.

### Replacing Pumps

It is imperative when replacing pumps that both the full model and serial number are provided. Pumps can be manufactured to a variety of specifications including wetted part material choices, mechanical seal, motor size, frequency, rpm and any additional accessories. The serial number is, therefore, essential to guarantee an exact replacement is supplied, as the model number alone may not indicate the unique pump specification. The serial number is usually indicated below the pump model on the nameplate and some pumps also engraved on the discharge flange.

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# Pump Specification Form

To make it as easy as possible for the customer, Castle Pumps have devised a pump specification form that prompts the user for the information required to specify a pumping solution that matches their requirements. Upon receipt of the form, Castle Pumps would make a selection

concerning the previous Azcuc pump applications from which expertise has been gathered over 100 years, in over 10,000 worldwide vessel builds. A technical selection would then be provided for verification, and the pump manufactured and shipped in ISPM15 packaging directly to the vessel without further delay.

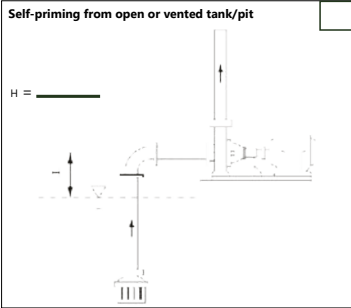
“Castle Pumps understand that you need to be able to rely on a supplier who can take the information you have and specify a solution.”

### 1. Suction Conditions -

Mark box with an **X** to indicate type of application, and please specify **dimension H** & **tank pressure** (where applicable) on the lines provided.

**Self-priming from open or vented tank/pit**

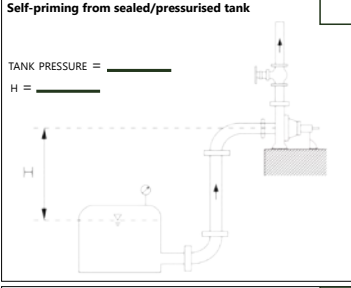
H = \_\_\_\_\_



**Self-priming from sealed/pressurised tank**

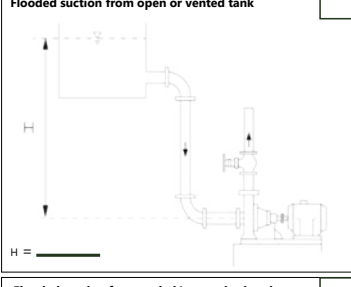
TANK PRESSURE = \_\_\_\_\_

H = \_\_\_\_\_



**Flooded suction from open or vented tank**

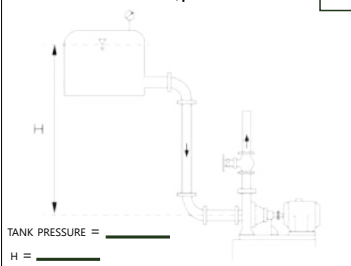
H = \_\_\_\_\_



**Flooded suction from sealed/pressurised tank**

TANK PRESSURE = \_\_\_\_\_

H = \_\_\_\_\_



### PUMP SPECIFICATION FORM

return to: sales@castlepumps.com

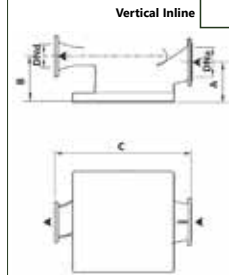
**2. Please fill in the table to the best of your knowledge.**

Application:			
Liquid:			
Pump Orientation:	Horizontal <input type="checkbox"/>	Vertical <input type="checkbox"/>	Immersed <input type="checkbox"/>
Flow Rate:	Viscosity:		
Inlet Pressure:	Temperature:		
Outlet Pressure:	Voltage:		
Head/Pressure:	Frequency:		
Specific Gravity:	IP Protection:		

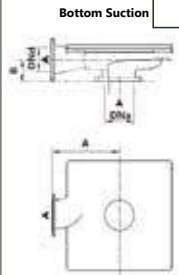
**3. Installation Type -**  
Mark box with an **X** to indicate installation type, and please fill in the table referring to the diagrams where necessary.

Dimension A:	
Dimension B:	
Dimension C:	
DNa Suction Diameter:	
DNd Discharge Diameter:	
Flange Type:	
Flange Rating:	

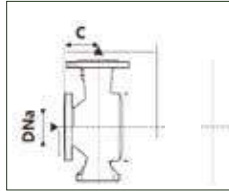
**Vertical Inline**



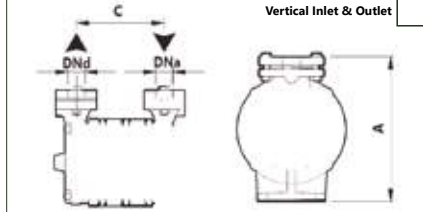
**Bottom Suction**



**End Suction**



**Vertical Inlet & Outlet**





With a vast range of options, sourcing a pump requires experienced technical knowledge.”

### Buy with confidence

Azcue Pumps have over 100 years' experience in the manufacturing and design of marine pumping solutions, all of which are marine type approved and have been subject to a 100% pump testing regime. With pumps installed in over 10,000 vessel builds, you have the confidence that your requirements are likely to have been solved before. Azcue is also in complete control of production thanks to their metal foundry, and selected models are available via a fast-track schedule should a vessel be waiting on a quick turnover.

### Single source supplier of marine pumps

Azcue Pumps offer a complete range of marine pump solutions, with pumps not just for seawater, but for fuel, lubricating oils, black/grey water and fish waste. Complete pump packages are available from one manufacturer fulfilling applications from engine cooling to bilge pumping to fuel transfer. They are also able to match existing pump and pipework specifications, making replacing alternatives with an Azcue model a simple process.



### Availability and accessibility of spare parts

Azcue guarantees a supply of spare parts for a minimum of 15 years after the pump has left production, ensuring that wearing parts can be replaced for the entire lifespan of the pump. The range also benefits from interchangeable spare parts, which allows a reduced stockholding of spares to be required on board. For added convenience and quicker lead times, Azcue spares are available through a network of worldwide distributors.

### Castle Pumps as UK agents

Azcue Pumps are distributed in the UK by agents Castle Pumps. As a single source supplier of all Azcue marine pumps and genuine spare parts, Castle Pumps have built over many years the technical knowledge and expertise in specifying the best solution for the application at hand. Castle Pumps receive weekly shipments direct from the Azcue plant in Spain and offer worldwide delivery of goods packed to ISPM15 as standard.

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