

Water Awareness and Charge Certificate Manual

Module 12: Power & Keel Yacht Seaworthiness

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Outcomes

After completing this module, the certificate holder will:

- Be able to explain the concept of seaworthiness
- Be able to assess a keel yacht to determine its seaworthiness
- Be able to assess a power vessel to determine its seaworthiness
- Be able to correctly maintain and store a vessel and associated equipment

1 INTRODUCTION

Before the charge holder allows the use of boats of any description for water activities, he or she must ensure that such boats are in a seaworthy condition, and therefore does not form part of the "pre accident" set of parameters which usually are the cause of "accidents". Basically, any well designed vessel will be seaworthy as built, and will remain seaworthy if properly maintained and not overloaded with gear and extras to such an extent that the loading compromises sea-keeping ability. The rules are broadly similar to those you would have learnt on your basic Sailing and Boats under Oars charge certificates, but the scope for error is much greater due to:

- Increased size and weight of the vessel
- Increased speed of the vessel
- Increased complexity of the vessel
- Vessels often remain in the water for extended periods
- Greater operational distance from shore

Seaworthiness of a boat is a direct result of the quality of SEAMANSHIP practiced by person responsible for the boat.

Boats should be inspected before being allowed on the water and the following items are a basic guide to what to look for.

2 KEEL YACHTS

Of all the vessels you are likely to use, keel yachts are the most likely to suffer environmental damage. Due to their size and weight, keel yachts are almost always stored outside, either on trailers or moored in the water. This leaves the vessel exposed to the elements and so it is especially important to check the vessel before embarking on a voyage.

2.1 Hull Integrity

Over time, the sun and water will degrade the integrity of the hull, regardless of the hull construction. Since large yachts generally do not have secondary buoyancy chambers, it is vitally important to verify the integrity of the hull.

If the yacht is out of the water, it is possible to do a visual inspection. Look out for crack, splits, deformation, bubbles (fibreglass) and delamination (fibreglass). Particular attention should be paid to the points where the hull rests on the trailer and mounting points for the rudder keel and prop (if the yacht has an inboard engine). After launching check the bilge for any sign of water ingress.

If the yacht is moored in the water, visually check for crack, splits, deformation, bubbles (fibreglass) and delamination (fibreglass) above the water line from outside. As far as possible check the hull below the water line from inside. Check the amount of water in the bilge and empty it as far as possible.

2.2 Standing Rigging

All spars must be secure to the boat. This includes, but is not limited to, mast, boom, poles and bowsprit.

All components which keep stayed masts up need to be checked for wear, damage and fitting. These items include hounds band rivets, swaged eyes, stranded stay

wire, kinked stay wire, pin cir-clips, shackles, and chain plate fastenings. The screws must be tight, and the heads must be snug and level in their holes.

2.3 Running Rigging

Halyards need to be free of wear, damage and corrosion. The cord or cable must be flexible and easy to secure to the sail head and to the yacht once the sail is hoisted. Downhauls and outhauls need to be free of wear, damage and corrosion. The sheets must be in good condition and of suitable diameter for the sail it controls. Ensure the length is appropriate.

2.4 Fittings

Cleats must be in good condition, secured to the deck and suitable for the function. For traditional cleats, the horns need to be strong and long enough for the purpose. Cam cleats must be of a size suitable for the line and the cams must rotate freely before returning on springs. Jam cleats must be of a size suitable for the thickness of line rove through it. The line must be trivial to release in an emergency.

Blocks. The sheaves must rotate freely and be free from damage.

Sail locks, if fitted, need to operate smoothly without jamming.

Winches are vital on large yachts. Each winch should be of appropriate size for the purpose and needs to be serviced to ensure they work when needed. If the winch is self-tailing, ensure the line can be released quickly. Ensure the winch handles are accessible and actually fit the winch. Winch handles should be stowed in pockets near the winch. Do not leave winch handles in the winches as they can get caught in bights of rope and be thrown overboard.

2.5 Sails

All sails must be free of damage. Where fitted, battens need to be of the correct length and secured within the batten pockets. A broken batten in a sail will very quickly damage the batten pocket and sail, so they must be removed from the pocket.

2.6 Foils

Foils are seldom removed from large yachts, so the risk of damage is less than on a dinghy. However, it should be checked that the foils are securely attached whenever possible

2.7 Engine and Fuel supply

All large yachts should have an engine for inshore maneuvering. This can take the form of an outboard secured to the transom, or an inboard engine with fixed drive. The engine must be in good working order and available whenever necessary. See section 3.2 below for more on engines

2.8 Electrical

Large yachts can have a variety of electrical systems, from lights to winches to entertainment. Ensure that you have sufficient battery power or generator fuel for

the voyage and that electrical winches (if fitted) and lighting systems (if overnighing) are in full working order

2.9 Buoyancy

Dinghy yachts typically have an airtight compartment or compartments, formed either as integral components of the structure of the boat or as inflatable bags fitted in the relevant locations. These are designed to keep the vessel afloat in the event of swamping or capsizing.

For larger vessels this form of buoyancy becomes impractical. In order to support engines, tanks, ballast, batteries, generators, and other items that have virtually no flotation value, or negative flotation value, it is easy to see that it will take a lot of flotation volume to support these items in the event that our hull is flooded. If one were to add enough flotation material to do the job, there could be a substantial loss of accommodation and storage space, perhaps even making the boat impractical to use.

Thus, in the larger boat, especially those having many items of dense, heavy materials, other approaches to preventing sinking are resorted to. These may include the use of watertight doors that subdivide the vessel into watertight compartments, more-than-adequate bilge pumping systems, and proper equipment to deal with abandon-ship conditions such as life rafts, emergency provisions, etc. In other words, as the vessel grows in size, the approach changes from preventing flooding to controlling it and coping with the possible loss of the vessel.

2.10 Safety Equipment

The list of safety equipment can vary, depending on your location. The following is the list of equipment required on the Vaal dam (category R)

Yachts shall carry the following:

- One buoyancy aid of appropriate size to be provided for the skipper and each member of the crew
- Waterproof torch including full set of spare batteries and a spare bulb (if operating at night)
- One suitable extinguisher per engine and, in decked vessels of 9 m or more in overall length, one in each of the following compartments where formed by complete transverse bulkheads: sleeping accommodation, galley and wheelhouse.
- Full set of sails, including suitable storm sails
- Anchor of required size for the yacht, with 25 metres of suitable warp and a minimum of 3 meters x 75mm or larger chain between the anchor and the warp. As a guide, a Danforth anchor should weigh about 0.7% of the yacht mass.
- Tools and spares adequate for the purpose of carrying out emergency repairs to machinery and essential equipment on board.
- Adequate First Aid Equipment and Instructions
- All keelboats entering a race shall carry an auxiliary motor in working order, capable of propelling the yacht at a speed of 3 knots under calm conditions for 10 sea miles, including the necessary fuel and fittings.
- A bailing bucket of at least 9-litre capacity with lanyard must be carried, whether the yacht is fitted with a bilge pump or not. In addition, yachts of

9m length and over shall carry at least one bilge pump operable from the cockpit.

- A lifebuoy, of suitable size, with a whistle and a drogue attached, is to be carried on deck or readily accessible to the helmsman. A simple floating light shall be attached by means of a lanyard during night racing.

You can review the Vaal Dam requirements at
http://www.sailrsa.org.za/Services/vaal_dam_safety_requirements.htm

3 POWER BOATS

Power boating is one of the most exhilarating water sports so long as your boat is seaworthy and ready to launch. Simple checks can help make sure that it's both. As one of the more powerful crafts on the water, you need to be absolutely sure that everything will function safely.

3.1 Hull Integrity

Look out for crack, splits, deformation, bubbles (fibre glass) and delamination (fibre glass). Particular attention should be paid to the points where the hull rests on the trailer and mounting points for the engine (in the case of outboard or Z-drive engines). After launching check the bilge for any sign of water ingress

3.2 Electricals

- Check the wiring for damaged insulation and signs of burning / overloading
- Check water levels in the battery and look for electrolytic corrosion around the terminals. Coating the terminals with Vaseline will prevent corrosion on the terminals.
- Ensure all earth bondings are solid

3.3 Engine, Steering and Propulsion

- Grease all moving components regularly to prevent rust and corrosion.
- Have the motor and steering mechanism serviced by a competent person at least every 100 hours, or as per the manufacturer's instructions. This must include engine (where applicable) and gearbox oil change. New engines must be serviced more regularly until they are properly run-in
- Remove the propeller occasionally and lubricate the threads to ensure the prop can be easily removed when required.
- If your vessel is fitted with a shear pin, replace it periodically as it will corrode and may fail at the worst possible moment. Carry a spare shear pin or two, they have a habit of dropping into the water when being replaced in an emergency afloat.
- Check the propeller for damage to the blades. A damaged propeller will cause excessive vibration, which may lead to damage in the gearbox and bearings
- Check for corrosion around the water intake and outlet
- Replace anti-corrosion anodes when they are about 50% worn
- Regularly check the exhaust system for rust and leaks
- Check the gearbox seal for damage, usually caused by fishing line.

3.4 Fuel system

- Check all tanks, lines, valves and connections for chaffing, looseness and corrosion.
- Leaks caused by corrosion should be repaired by replacing the corroded part and not by repairing it.
- Ensure that the breather on the tank is not blocked
- The filling cap must prevent the ingress of dirt and water into the fuel
- Synthetic rudder fuel pump bulbs should not be degraded, cracked or leaking.

3.5 Stern Gland

For vessels fitted with an inboard engine, but not using a Z drive, a stern gland or "stuffing box" is fitted where the drive shaft from the engine passes through the hull. The gland must be regularly checked for leaks and serviced.

3.6 Weigh the Vessel

It is a good idea to weigh your vessel at least once a year to determine if the vessel is shipping water in the buoyancy. The older the vessel, the more important this becomes.

3.7 Safety Equipment

In the "Merchant Shipping Act, 1951 (Act No. 57 Of 1951) - Merchant Shipping (National Small Vessel Safety) Amendment Regulations 2011 lists the minimum safety equipment to be carried. See Module 9 Section 2 for the complete list

3.8 Spares and Tools

A selection of tools and spares should be carried onboard at all times. This list is a recommendation and is by no means exhaustive.

Tools:

- Pliers, adjustable wrench and vice grips
- Selection of screw drivers
- Selection of open ended spanners between 8mm and 18mm
- Plug spanner
- Aerosol water repellent
- A tube of clear grease
- Fine emery cloth
- Emergency starter cord
- Epoxy resin
- Duct tape
- Tow rope
- Starter cord

Spares

- Always carry a spare prop if surf launching or heading out to sea
- Shear pin or lock nut (as applicable)
- A full set of spare spark plugs with gaps correctly set
- Spare belts (inboard engines)

- Spare fuel and oil filters (inboard engines)