

## PM FOR HEELING TEST

The test is preferably carried out on a fairly calm day at a jetty where a strong point of attachment for the "heeling wire" can be found.

1. Check that all outlet valves are closed. Secure loose items.
2. Check that the mast is properly tuned.
3. Fit a large bow shackle around the forestay. If the stay is fitted with a head foil, wrap the shackle with tape, so that it will not damage the foil when sliding up and down. On **masthead** rigs, the shackle can be fitted on the backstay as an alternative.
4. Attach the genoa (main) halyard to the top of the shackle and the "heeling wire"(see item 5) to the bottom of the shackle. Make sure that the halyard (snap)shackle is strong enough (see item 5, last paragraph). If in doubt, connect with a bar shackle. Secure the halyard carefully. Attach a measuring tape (length not less than the height of the mast) to the bottom of the shackle.
5. Depending on the righting moment of the boat, the "heeling wire" could be:
  - a) an ordinary 4:1 purchase rope tackle (boat displ.< 2 ton)
  - b) a 4:1 tackle tensioning one end of a 2:1 tackle giving a 8:1 purchase (boat displ.< approx 4 ton) See fig. Test Repot form.
  - c) A wire tensioned by some kind of mechanical device. (boat displ.< approx. 10 tons)

For yachts above 10 tons displacement, use the "Boom method instructions 595-577B-E. If found convenient, the tail of the tackle can be pulled by a vehicle (car, lift-truck etc). **NB.** When reading the balance (item 12) the rope tail must be relieved to get a correct value of the force P.

The tension in the "heeling wire" can approximately be calculated as:

Displacement divided by fore triangle height.(Newton, meter)

Allow an extra 20%, as the initial tension is greater than the tension at 30 degrees of heel.

6. Attach another measuring tape to the point where the mast "meets" the deck ("deck measuring tape").
7. Hoist the shackle with the measuring tape and "heeling wire" until the shackle is positioned approximately 10 cm below the wire terminal. Be careful not to damage the head foil, especially when the shackle passes the end fitting of the foil. The shackle must not rest on the foil during the test. Alternatively the "heeling wire" can be attached to the mast by tiring it with a rope just above the cap shroud attachment (to prevent it from sliding downwards when loaded). The "heeling wire" can be secured with another halyard.

8. Measure the distance from the top of the "heeling wire" to the point of attachment of the "deck measuring tape" ( $H_m$ ).
9. Fit a tension gauge (spring balance) between the "heeling wire" between "heeling wire" and jetty (see Test Report form).
10. Bring the free end of the "deck measuring tape" to this point at the jetty.
11. Heel the boat by tensioning the "heeling wire". The initial tension can be reduced by pushing the boat away from the jetty, so that the "heeling wire" to mast angle is increased (see item 5, last paragraph) People operating the tensioning device should be wearing hard hats.
12. For each set of values to be entered in the report: - check that the "heeling wire" is vertical:
  - check that the boat floats freely not restrained by its mooring ropes.
  - record horizontal distance ( $M_{bm}$ ) from mast to "heeling wire"
  - record the tension of the "heeling wire" ( $P$ ).

The boat should be heeled to both starboard and port to  $\sim 0$  degrees. 30 degrees of heel corresponds to  $M_{bm} = 0.5 \times H_m$  (since  $\sin 30^\circ = 0.5$ )

13. Measure the vertical distance from the attachment of the "deck measuring tape" to the water level ( $h_2$ ). The spinnaker pole or a string suspended between the lifelines helps to measure the distance correctly.
14. After the test is complete, allow the boat to slowly return to its upright position. When the boat is nearly upright, release the "heeling wire" quickly, to avoid pulling the boat against the jetty (compare item 11, 2nd sentence)
15. Make a rough estimation of fuel and water volumes carried on board as well as other equipment. See Test Report form
16. Measure location of chainplates.
17. Complete the report by carrying out the calculations of the righting moments.

### **List of equipment**

1. "Heeling wire", tackles or wire+tensioning device
2. Spring balance
3. Shackles
4. Some pieces of strong rope
5. Two measuring tapes (20m)
6. Adjustable spanners pair of pliers
7. Hard hats
8. Bosun's chair
9. Adhesive tape
10. Form and pencil