



Mast Maintenance, Inspection and Setup Guidance for Owners

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Background and status of this document:

Following concerns expressed by Class Insurers after a number of mast breakages, the Class Directors issue this guidance to Owners to assist them to ensure an adequate maintenance and inspection regime for their rig, and appropriate setup in their boat

This guidance is based on generally available information and practical experience within the Class. The Directors take no responsibility for any omissions or for incidents or damage.

The Directors note that repeated instances of mast failures could result in Insurers refusing to insure Victory rigs, to the detriment of the class overall.

Maintenance of Masts

In general wooden masts have a risk of failure over time due to their construction and the loads applied to them.

A Victory mast is likely to consist of a minimum of 4 separate pieces of timber to build up both length and diameter. Some constructions will use more. Scarf joints to join the sections will typically be in the order of 1:12 as a width to length ratio and will be glued and tapered. Over time repairs may add further glued joints. Joints are particularly at risk of opening under twisting loads and are susceptible to failure if water penetrates the glue line over a period of time.

ROUTINE ACTIONS TO ADDRESS:

- Regular sanding and varnishing: Masts should be sanded and varnished **annually** to ensure joints and glue lines remain sealed. 2 coats would be appropriate. Over time buildup of old varnish can lose adhesion to the wood and trap water, typically showing as darker stains.
- Masts should periodically (5-10 years assuming annual varnishing, earlier if not) be stripped of fittings, scraped back to bare wood, inspected for damage to scarf joints, and revarnished with several coats of marine varnish.

Failure Points

Several typical Victory mast fittings rely on bolts through the mast, and other fittings are screwed to the mast, in some cases with significant sized woodscrews. The fixing varies depending on the source of the fitting. These items weaken the mast, allow for water ingress, and concentrate loads at particular points.

A typical example of failure at a through bolt, and water penetration, is shown below.



In particular risk points include:

- Jumper Strut – through bolt(s) and screws
- Spreader Fitting – through bolt and screws
- Gooseneck fittings – multiple screws
- The fitting of chafe protection at deck level by screws or tacks
- Other smaller fittings such as spinnaker eyes and tracks which will be screwed to the mast.

ACTIONS TO ADDRESS:

- Avoid through bolts where possible – for example connect kickers to mast foot tracks rather than put additional eyebolts through the lower mast.
- Insert all bolts and screws with generous amounts of grease or tallow to help seal out water
- Remove and inspect fittings, removing bolts and screws, every 2- 3 years. Check for movement and water ingress, ensure varnish under the fitting is sound and revarnish.
- Epoxy moulded fittings remove the need for fastenings penetrating the mast and should be considered as alternatives. Ensure that moisture cannot penetrate at the edges of the moulding. Such fittings also strengthen the mast at the appropriate point but also produce a ‘hard spot’ where the mast may fail above or below the moulding.

There is little history of long term usage of this approach in the class and expert advice should be taken before usage.

Masts that are raked significantly forward or backwards can impact the fore or aft edge of the deck. This creates a 'hard spot' where the mast is effectively bent over the deck edge, with an increased loading and risk of breakage.

ACTIONS TO ADDRESS:

- Ensure maximum slot length allowed for by the class rules.
- Consider changing a round mast deck hole to a slot
- Set up mast foot, rigging and forestay/backstay adjustment to prevent the mast reaching the deck edge at deck level.

Rigging has a limited lifespan and should be replaced regardless of external appearance after an appropriate period. Stainless steel rigging is susceptible to failure at 'hard points', eg spreader ends, 'Talurit' splices etc. Dyneema rigging is susceptible to UV damage.

ACTIONS TO ADDRESS:

- Replace Stainless rigging after 10 years.
- Replace Dyneema rigging after 5 years.

Storage out of season

Storing masts horizontally outside uncovered increases the risk of water laying on the surface and penetrating the joints and varnish. In hot weather masts stored outside may warp if not under normal rig tension. If slinging the mast or resting on trestles, internally or externally, the mast may not be under its normal loading or bend compared to when fitted in the boat.

ACTIONS TO ADDRESS:

- Store masts under cover protected from water and heat. Masts are better left vertical and rigged with tension in the boat if they cannot be placed undercover.
- When slinging or resting masts on trestles, ensure they are always 'track up' or 'track down'. Do not rest on their side.
- Take time to ensure equal and appropriate tension at at least 3 points when slinging masts for winter storage.

Rigging and set up.

There is general practice within the class to sail with loose lowers, to allow masts to rake forward downwind, and in some cases to sail with relatively loose main rigging (shrouds, uppers etc). In some cases these approaches may put additional strain on the mast itself and consideration should be given to this when setting up the rig. Use of kicking strap and centre main upwind to control leech and rig tension upwind varies across the class.

CONSIDERATIONS:

- Loose main rigging allows the mast to twist and this puts strain on scarf joints and fittings with through bolts. If there is movement allowed, the dynamic loads on the mast may be significantly more than the static loading if the rig is tight.
- If the backstay is normally released to allow the mast forward downwind there should be 'stops' to ensure a minimum level of tension is maintained, loading from the spinnaker halyard at the jumpers in particular can be significant.
- The lower shrouds help hold the lower mast section in column athwartships upwind. When setting lower shroud tension the upwind mast bend athwartships should be reviewed
- Spreader position should be set to ensure the mast cannot 'invert' (ie spreaders should be at 90 degrees to the mast and should not be able to angle forwards at any time.
- Upwind a certain amount of rig tension comes from leech tension on the mainsail. If kicking strap tension is not maintained upwind, and leech tension is maintained solely by centre mainsheet tension, then easing the main, especially in a gust to maintain control, can result in significant loss of rig tension. This can cause dynamic loading on the mast, twisting etc etc. It is recommended that a certain level of kicking strap tension is maintained upwind to allow easing of the mainsail without significant loss of rig tension.
- Securing pins, shackles and other connecting devices should always be protected where possible from coming loose if the prime securing mechanism fails. e.g Pins and split rings should also be taped up, shackles should have the pins held in place by wire or cable ties, rigging screws should be taped/wired/cable tied, lock nuts should also be taped etc etc.
- Care should be taken to ensure that appropriate rig tension is left on the rig when the boat is unattended on moorings. Once sails are dropped the rig should be tensioned enough to prevent movement of the rig in the boat, but equally should not be left with excessive 'racing' tension. Backstay tension in particular is likely to be the most easily adjusted mechanism to ensure the rig is secure and unable to move fore and aft (without applying excessive mast bend). If main shrouds are set loose, owners should consider if they are set tight enough on moorings to prevent movement that may cause damage in extreme conditions.

Appendix A:

SUMMARY OF KEY POINTS TO MAINTAIN MASTS

- **Regular Varnishing, prevention of water ingress at fittings, screws, bolts.**
- **Regular inspection of fittings for movement and adjacent water penetration**
- **Consider use of Epoxy fittings to reduce need for through bolts etc – seek expert advice.**
- **Maintain awareness of ‘hard spots’ and loading points on masts – check regularly**
- **Maintain record of rigging and replace at appropriate intervals**
- **Store appropriately – keep dry, out of direct heat, prevent twisting, maintain bend characteristics as when rigged in boat**
- **Check setup in boat to minimize dynamic loading, twisting, point loading, chafe and wear, inappropriate bending.**

Appendix B:

Inspection and Maintenance regime.

During the season:

- Review rigging for potential failure, material damage etc
- Review fittings for movement
- Review mast for cracks, blackening of varnish indicating water penetration, scarf joint integrity.

Annually:

As per during the season and...

- Sand and Varnish annually

On 2 – 3 year cycle:

- Remove fittings and inspect mast beneath. Varnish as appropriate.

At 5 years:

- Replace Dyneema rigging

At 10 years:

- Replace Stainless Steel rigging
- Strip mast to bare wood, inspect, revarnish

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