



It is VERY common for Lido 14 shrouds to fail. The typical sailor, seeing or hearing of a such a failure, might suggest that stronger shrouds are called for. The reality is that most sailors and Lido 14 owners are not aware of the unique problems associated that lead to Lido 14 rigging failures - or the common solutions - which generally don't involve using stronger/thicker wire.

It is the purpose of this memorandum to overview Lido 14 shrouds, their failures, and how to guard against their failure.

Standing Rigging Tension

Historically the Lido 14 standing rigging is "tuned" to be loose (i.e. slack when not sailing). Though loose rigging evolved from racers looking to improve performance of the boat, it is common for recreational sailors to rig their boat loosely too. The racing benefits are:

- The mast is able to lean forward when sailing down wind. This is a generally accepted technique in many sailboats to improve downwind performance, not just in the Lido 14.
- The Lido 14 Class Assn. Racing rules require routing the jib sheets outside of the shrouds, which are quite widely spaced. With loose shrouds, the mast leans to leeward when sailing upwind, placing virtually all of the mast's lateral (sideways) loads on the windward shroud. At the same time, the leeward shroud will go completely slack which will allow tighter (more inboard) sheeting of the jib - thereby improving upwind performance.

The problems associated with loose rigging are:

- Most boats are rigged so that side loads are distributed to both shrouds. With loose rigging, the sideways loads are placed on the windward shroud, making for a single point of failure.
- With looseness in the rigging, the mast is free to move about. It will pitch fore/aft or side-to-side when the boat encounters choppy conditions, during tacks, gybes, and will bob fore and aft repeatedly when close reaching. This independent motion of the mast leads to poor performance because of disturbed airflow, lost or misdirected energy, irregular boat motion, etc.
- The standing rigging (forestay, shrouds) is subjected to enormous dynamic (i.e. shock) loads each time the mast moves about. This also unduly stresses the chain plate and surrounding portions of the boat. **Repetitive dynamic stresses are the leading cause of Lido 14 rigging failure.** The typical Lido 14 is decades old and is owned by a novice sailor, making the other leading causes of rigging failure easy to understand: unnoticed damage, poor maintenance, and deterioration from old age.

Factory Standard Shrouds

The original factory designed shrouds, still in production, are constructed using 3/32" diameter stainless steel wire in a 1x19 configuration with a plastic (typically Vinyl) coating. The finished outside diameter can be as small as 1/8" but has, over the years, been thicker due to differing coating thicknesses. The ends are fitted with stainless steel aircraft eye fittings appropriate for 3/32" wire and the #10 shroud bolt (technically a machine screw) and 3/16" clevis pin that fasten the shroud to the mast and chain plate respectively.

For decades (production started in 1958) the factory standard rigging consisted of bending the flat portion of the Aircraft Eye fitting about 10 degrees to match the angle that the shroud will depart from the mast and then thru-bolting the shrouds to the mast using a stainless steel #10 bolt with a standard hex nut peened onto the bolt. It was common for the bolt to be tightened so that the fittings will not rotate around the bolt. It is also common for corrosion to build up between the mast and the Aircraft Eye fitting, causing the fitting to freeze in place too. When the mast pitches, the fitting tends to stay put and the wire ends up flexing at the point where it enters the fitting. Flexing of any rigging causes premature failure. Repeated flexing at the mast end fitting is the primary cause of Lido 14 shroud failures. Solutions include:

- Using a locknut (e.g. Nylock) and tightening it so that the fittings can still swivel around the bolt.
- Install a plastic washer between the shroud fitting and the mast to eliminate metal to metal corrosion and to reduce friction to allow the fitting to swivel
- Install a tang with a clevis pin, such as the RF43A and mount the shroud to the tang. This greatly improves the freedom of the fitting to move about so that nothing binds during the mast pitching.
- Use a shroud with an Eye Strap fitting to further improve the degrees of freedom available to the shroud. The Eye Strap allows swiveling motion similar to a ball and socket joint AND it allows the shroud to spin too.
- Recreational sailors should tighten up the rigging so that the mast doesn't move much. This will dramatically reduce the shock loads and correspondingly lengthen the lifespan of the shrouds. Tighter rigging will have greatly improved life span.

It is common for shrouds “unimproved” shrouds/rigging to fail after only 1 year of very active use. Racers typically replace their shrouds every 2 years whether they find a pending problem or not.

As an aside, W.D. Schock Corp. equips new Lido 14s with the same design shrouds (Aircraft Eye fittings on each end, bending one end to mate to the mast) but the now include #10 stainless steel fender washers between the shroud fittings and mast and a Nylock locknut on the shroud bolt.

DoubleWave Shrouds

DoubleWave offers both several variations of Lido 14 shrouds:

- **DoubleWave’s “Standard” Shrouds.** 3/32” wire with a minimum thickness “thin” coating with an Aircraft Eye (aka Air Eye) fitting on the chain plate end and an Eye End Strap on the mast end. The Eye End Strap is bent to match the angle of departure of the shroud wire away from the mast. Typically sold as a kit with a new shroud bolt and (for Classic Lido 14s) add on shroud protectors for where the shrouds pass thru the deck of the boat.
- **Aircraft Eye to Aircraft Eye Shroud - Thin:** 3/32” wire with a minimum thickness “thin” coating with an Aircraft Eye fitting on both ends, matching the design of the factory standard shrouds. For boats without clevis pin tangs, the mast end fitting is bent to match the angle of departure of the shroud wire away from the mast. Aircraft Eye fittings initially have stronger connections (swages) to the wire than Eye Straps offer however they are more susceptible to corrosion and failure due to wire flexing.
- **Aircraft Eye to Aircraft Eye Shroud - Thick:** Same as “Aircraft Eye to Aircraft Eye Shroud - Thin” but includes a thicker coating, bringing the shroud diameter to approximately 3/16”. Used for those that prefer extra abrasion resistance in their shrouds.

Upgrading to thicker wire?

Upgrading wire thickness (e.g. from 3/32” to 1/8” or even 5/32”) does not necessarily improve reliability of the shroud system on a Lido 14. Trying to increase wire size, the following benefits and problems will likely occur:

- Decreased availability of coated wire and matching fittings – fittings should have a 3/16” diameter hole for mounting the mast and chain plate.
- Increase in the shroud's tensile strength, which is good.
- Increase in the size of the fittings at the ends of the wire. This leads to fitting complications.
- May force use of clevis pin tangs (as described in this memo) because bending larger size Aircraft Eye fittings also increases the failure rate of the fittings.

Recommendations

Do rig your boat according to its use. A majority of racers use DoubleWave’s “standard” shrouds with the rigging set per their sail maker’s recommendations. Recreational sailors can use any variant of DoubleWave shrouds but should sail with taut rigging to minimize the wear and tear of dynamic loads.



Selecting Lido 14 Shrouds
by
John Papadopoulos

Boats sailed in areas of high wind, rough waters, or when self-rescuing is difficult or impossible should be equipped for maximum strength and reliability by using clevis pin tangs on the mast and Aircraft Eye to Aircraft Eye style shrouds.

Do keep your rigging healthy by performing regular inspections of the wires, end fittings, and fasteners. Look for corrosion, kinks, and broken wire strands – especially where the wire enters the fitting (check by bending the wire.)

Keep your rigging clean and free of corrosive materials (salt, industrial pollution, etc.). Avoid long term exposure to moisture and rinse the lower ends of the standing rigging with fresh water if sail in salt water.

Secure all rigging for trailering so that the mast-end of the wires and the end fittings don't shake about. The most popular solution is to tape or tie the wires to the mast near the fittings. For long journeys, consider removing the rigging from the boat – be very careful to not lose the pieces!

Do keep your boat rigged with standard equipment so you can get replacements quickly and affordably. Custom parts are more expensive, harder to specify correctly, and (on average) lower in quality because of low production volume and lack of product testing associated with custom part orders.

All DoubleWave products are in house designed, professionally fabricated, quality inspected, and competitively priced. Contact DoubleWave at (949) 466-0888 or jakp@mindspring.com to discuss your Lido 14 rigging needs.