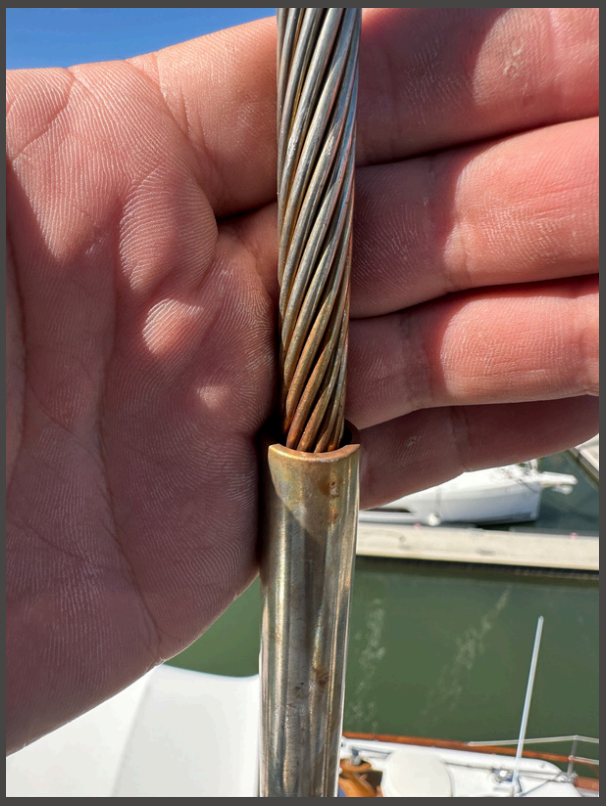
PERFORMANCE BY DESIGN

Lightning Strikes and Stainless Steel Rigging: The Case for Replacement



INTRODUCTION

When it comes to the safety and integrity of yacht rigging, there is one event that stands out as particularly catastrophic: a lightning strike. Unlike other forms of wear and tear, lightning strikes can cause both visible and hidden damage to stainless steel rigging, compromising its structural integrity and putting both the vessel and its occupants at risk. At hamma®, we firmly believe that any rigging exposed to a lightning strike should be replaced. This recommendation is not just about precaution - it's about ensuring long-term safety and compliance with industry best practices.

WHY LIGHTNING IS SO DAMAGING TO STAINLESS STEEL

Stainless steel, whilst known for its strength and corrosion resistance, is not a particularly efficient conductor of electricity. When lightning strikes, the enormous electrical current can reach temperatures exceeding 30,000°C. For comparison, the surface of the sun is approximately 5,500°C. This rapid surge of heat and electrical energy can result in immediate and severe impacts:

- Thermal Expansion and Warping: The intense heat can cause stainless steel rigging to expand and contract rapidly, leading to warping or microscopic cracks that are invisible to the naked eye.
- Welding and Fusing: Sections of cable or fittings may weld or fuse together under the extreme temperatures, weakening load-bearing capabilities.
- Barber Pole Tea Staining and White Powder Residue: Whilst Barber Pole staining (circular discolouration along the cable) is sometimes seen on rigging due to environmental factors, when found in conjunction with burn marks, melting, or white powder residue, it can be an indicator of electrical arcing. White powder or burn marks, specifically, are strong signs of surface breakdown and oxidation due to extreme heat.

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INDUSTRY RECOMMENDATIONS AND BEST PRACTICES

It is widely accepted within the marine industry that rigging exposed to a lightning strike should be carefully inspected by qualified riggers. However, inspection alone is often insufficient. Stainless steel's properties mean that internal fractures and weakened molecular structures are not always visible during inspections. This is why replacement is the safest course of action.

According to the American Boat and Yacht Council (ABYC), the International Marine Certification Institute (IMCI), and the Australian Stainless Steel Development Association (ASSDA), rigging that shows signs of arcing or heat stress should be replaced to avoid catastrophic failure during use. The IMCI stipulates that any critical load-bearing structures that have been exposed to electrical discharge should be deemed compromised unless proven otherwise through rigorous testing - testing that often exceeds the cost of replacement.

ASSDA further supports this by highlighting that Grade 316 stainless steel, while highly resistant to corrosion, is susceptible to thermal expansion, warping, and microstructural changes when exposed to extreme temperatures such as those produced by lightning strikes. ASSDA documentation notes that thermal conductivity of 316 stainless is approximately 16.2 W/m·K at 100°C and rises to 21.5 W/m·K at 500°C, meaning that the material rapidly conducts heat when struck, potentially causing microscopic fissures and structural weaknesses (assda.asn.au).

EVIDENCE OF DAMAGE: WHAT TO LOOK FOR

Qualified riggers should look for the following signs post-lightning strike:

- Barber Pole Staining: Whilst common in marine environments, when combined with other indicators such as burn marks or powder residue, it can be evidence of electrical damage.
- White Powder Residue: This is typically a sign of surface breakdown, where heat and electrical energy have corroded the steel's surface layer.
- Burn Marks or Melting: Visible scorching or melted fittings are clear indicators of excessive heat and potential molecular damage.
- Heat Tinting (Blue Discolouration): This indicates exposure to extreme temperatures and should be considered a sign of compromised integrity.
- Electrical Component Damage: If electrical systems on the yacht are found to be fried or malfunctioning post-strike, this is strong evidence that current travelled through the carbon or aluminium mast and stainless rigging to reach the vessel's electrical components. This path of travel is indicative of the rigging carrying high voltage during the event, further supporting the need for replacement.

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THE HAMMA® STANDARD

As the manufacturer of hamma® stainless steel products, we stand firmly behind our commitment to safety and quality. Our recommendation is clear: if rigging has been exposed to a lightning strike, it should be replaced. The risk of latent structural damage that could lead to failure under load is too high to ignore. This is not about insurance disputes - it's about safety and best practice within the marine industry.

CONCLUSION

Lightning strikes are unpredictable, violent, and capable of causing significant hidden damage to yacht rigging. At hamma®, we advocate for complete replacement of rigging after such events - not as a precaution, but as a necessity. We encourage riggers to use this technical guidance as support for their recommendations when assessing post-strike damage. This is about ensuring the safety of all on board and maintaining the vessel's integrity for years to come.

For further information on proper inspection techniques or to consult with a qualified rigging specialist, contact your local hamma® distributor or email info@hammaglobal.com

DISCLAIMER

The rigging shown in these images is slightly over 12 months old and is European-made, not branded as hamma®. These photos are provided purely as evidence to support the technical information presented in this article and are not indicative of hamma® product performance.