

Plasma[®] Rope “Quick” Q & A

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This brief guide is designed as a quick reference guide to basic questions on Cortland's Plasma® 12 Strand and 12x12 construction synthetic ropes. For additional information please contact Cortland at 360 293 8488, toll-free at 888 525 8488 or at cortlandcompany.com.

Q: How does Plasma® HMPE (High Modulus Polyethylene) fiber rope compare with conventional synthetic fiber ropes such as nylon, polyester, polyester/polypro combo and polypropylene ropes?

A: Plasma® fiber is an HMPE fiber rope which is produced in a specialized process, and in rope form represents the best strength/weight ratio of most popular high modulus synthetic ropes.

- They have similar strength, weight, elongation and abrasion/cut resistant properties to ropes manufactured from Dyneema® HMPE fibers.
- Plasma® ropes are more cut and abrasion resistant than conventional synthetic fiber ropes.
- They are much lighter and stronger than nylon and polyester.
- They have similar elongation properties to wire rope; they are not good for applications needing elastic elongation.
- They have superior bend, flex fatigue and repeat loading characteristics to wire rope and most conventional synthetics.
- Plasma® ropes are more expensive than wire or conventional synthetics but offer longer service life and safety through ease of handling flexibility and weight.

Q: Can a Plasma® 12 Strand or 12x12 rope replace an equal size wire rope with the same strength?

A: Yes almost – but it really depends on a few factors

- Size of the Plasma® rope
- Quality and strength rating of the particular wire rope being compared against
 - Plasma® torque-free braided ropes are typically “over-sized” when new and in a relaxed state. Once loaded, or proof-loading takes place, construction elongation and splice setting is reduced and the final O.D. of the Plasma® rope can be compared to the wire.

Q: How do Plasma® torque-free braided ropes compare against other popular high modulus synthetic fiber ropes?

A: Plasma® HMPE ropes are more popular than Aramids, (e.g. Kevlar® and Technora®) and LCP ropes (Liquid Crystal Polymer).

- Lighter weight; they float
- Similar elongation properties; except Aramids and LCP have zero creep
- Superior UV and abrasion/cut resistance

Q: Does the Cortland Plasma® process for HMPE fiber result in a shorter service life than other HMPE ropes?

A: Simply not true. The Plasma® process enhances the base HMPE fiber by further aligning its molecules; effectively increasing fiber strength efficiency. Plasma® ropes when used at typical application WLL, handled correctly and maintained, will provide equal or better performance and service life to competing HMPE braided ropes. Cut resistance, elongation and fiber flex fatigue is sufficient to successfully compete against competitive yarns and ropes. This has been proven multiple times for many years now.

Q: What is the proper Work Load Limit (WLL) for a Plasma® rope application?

- A:** A WLL is a designated MBL rating capacity limit for a rope or rope sling which is determined by many dynamic factors and ultimately determined by the responsible qualified person supervising the use or handling the rope in the application. Determination of WLL and Design Factor (DF) must always have safety as its primary consideration.
- Cortland recommends a standard 5:1 WLL on most of its rope products however, we know that many end users are applying WLLs lower than this.
 - Plasma® sling Hitch Configurations will alter the vertical leg published MBL.

Q: How does Plasma® 12 Strand or 12x12 work on a winch?

- A:** These ropes are very popular on winches providing far longer service life and better performance than wire rope. Given the willingness to change shape or slightly flatten from Plasma® ropes, it is important that several steps are taken to ensure excellent winch performance.
- Make sure the winch surfaces, e.g. flanges and barrels, are clean and not rust-corroded. We do not want to abrade the Plasma® on the winch during deployment or retrieval.
 - Installing the Plasma® braided rope on the winch under tension is key to preventing rope “diving” between layers, which can retard or inhibit rope deployment and retrieval.
 - On single drum winches, a layered “crossover” installation may be preferable.
 - On a split-drum winch, make sure there are enough wraps of Plasma® to grip the working side of the drum without slipping; general recommendation is five or more wraps.
 - On a traction winch, careful consideration must be given to potential friction heat damage. Plasma® does work on traction winches.

Q: How do Plasma® ropes perform in water?

- A:** They float and do not absorb water like nylon, polyester and other conventional fibers.
- Salt or seawater do not affect HMPE fiber ropes.
 - Ropes can be washed with low PH or mild detergents; goal is to remove sharp particulate or grit without damaging Plasma® coating and construction.

Q: Does sunlight (UV) damage Plasma® fibers as it does to conventional synthetic ropes?

- A:** Plasma® HMPE fiber has the best UV resistance of any popular synthetic fiber used in rope.

Q: How does temperature affect Plasma® ropes?

- A:** Plasma®, as a polyethylene fiber, has a relatively low softening and melting point. It should not be used in applications in which high ambient, reflected or friction-manufactured heat is anticipated or prevalent.
- High sustained loads on HMPE ropes under approximate temperatures of 65°C or 150°F may cause creep and strength loss.
 - Careful consideration of WLL, loading timing, and other factors allow HMPE ropes to be used in multiple marine and land-based applications in hot environments; including ME mooring.
 - In cold applications, Plasma® HMPE does not lose any strength.

Q: What splice terminations are best to use on a Plasma® rope?

- A:** There are many splices applicable to Plasma® and HMPE braided ropes. Plasma® 12 strand or 12x12 strand construction ropes do not have a jacket; Cortland does offer Plasma® products with jackets also. The correct splice depends on the application.

Q: How is the coefficient of friction (COF) or grip of Plasma®?

- A:** All synthetic ropes using standard HMPE have a somewhat low COF. They are typically very “slippery”; far more than conventional fiber ropes. Therefore their ability to grip a surface, when new, is poor. As the external fibers wear and abrade, the fuzzy exterior of these ropes increases COF.
- The polyurethane coating applied to Plasma® does raise the COF slightly. There are also new coatings available which can increase COF on new ropes.
 - The proper splice terminations for Plasma® and HMPE ropes takes into account this low COF.

Q: What knot is best used on a Plasma® rope?

A: None. Cortland does not recommend the use of knots on its Plasma® ropes because of strength efficiency loss and the slippery surface of the rope. We always recommend a synthetic rope being properly splice terminated to achieve full strength.

Q: What thimble termination hardware should be used with a Plasma® rope?

A: Various types of thimble hardware works with Plasma® rope however, the compressive forces of the rope require a thimble to be properly forged or supported with gussets; heavy duty thimbles are recommended.

- Make sure the thimble hardware has correct D:d ratio to the rope and is free from burrs and rough surfaces.
- When connecting a Plasma® rope to a metal shackle, we recommend that the Plasma® eye is protected by chafe gear.
- A wire rope clip is NEVER acceptable to terminate a Cortland rope.

Q: Can the “non-thimble” eye termination be spliced into another “non-thimble” Plasma® eye?

A: Yes. This is a popular method of connecting two working ropes together in the tug ship-assist application; named a “spectacle splice”.

- The connection, if using similar or close to equal size Plasma® ropes, provides 100% efficiency. If dissimilar sizes are being connected, care must be taken that the difference in size does not result in the smaller rope cutting into the larger rope. In this case we suggest 85% efficiency and usually recommend that one or both of the eyes have chafing gear on it.

Q: Can twist adversely affect the strength and performance of a torque-free braided Plasma® rope?

A: Yes. Plasma® 12 strand ropes are braided from alternative left and right hand twist “lays”. Inducing twist into the braided rope will both lower the strength (reducing the balanced construction), and also make the “opened” twist strands more susceptible to abrasion and cutting.

- It is always recommended that twist and rotation attempt to be taken out of a Cortland braided rope or sling before application.

- Q: Assuming that Plasma® rope is properly selected for the application in the correct size, construction and strength, with correct splice terminations, what are the most threatening application factors to a Plasma® rope's performance and service life?**
- A:** Careful consideration of the application and the dynamics involved. Cutting and abrasion represent the fastest path to strength loss and low service life. Users must carefully consider "path of rope" during use:
- Is it rubbing against rough surfaces; e.g. chocks, sheaves, etc?
 - Is heat generated which will affect the rope; Plasma® is typically not selected for use on capstan winches.
 - Should chafing gear be employed?
- Q: If the Plasma® rope changes shape from original new rope construction, is this bad?**
- A:** Braided synthetic ropes such as Plasma®, which have a hollow core construction, tend to conform to whatever surface they encounter. The rope may compress or flatten against the surface, thereby widening from its original nominal size. This is typical and not a problem unless the edges of the flattened rope are abrading or wearing against a rough surface.
- Q: If the Plasma® rope exterior becomes worn and fuzzy looking, is this a cause for concern?**
- A:** HMPE fiber ropes build a protective wearing surface as their external micro fibers cut and abrade; this is normal wear. However, if a significant portion of the total volume of strands or rope is worn away, this is an indicator of need to repair or retire the line.
- Q: How should I store Plasma® ropes when not in use?**
- A:** It is recommended that Plasma® ropes be inspected for possible damage (or rope or in splice areas) before they are stored.
- Storage on reel under low tension is acceptable. Tarps can be put over rope to help prevent environment damage.
 - Storage should not be under other heavy equipment which might cut or distort the rope. Storage in plastic totes is very popular.
- Q: How do I learn how to inspect, repair or retire my Plasma® ropes?**
- A:** Please refer to the Cortland Plasma® Rope Sling Inspection Guidelines.

Cortland is a global designer, manufacturer, and supplier of technologically advanced ropes, slings, and strength members. Collaborating with customers, our team uses its experience in high performance materials and market knowledge to transform ideas into proven products.

For more than 35 years, our custom-built solutions have been developed for work in the toughest environments and to overcome some of the world's greatest challenges. They consistently enable our customers to meet the demands of the aerospace, defense, research, subsea, marine, and energy industries.

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