

# Cortland Vehicle Recovery / Tow Cable Usage Guidelines

## Overview

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This document provides information intended for the proper use of Cortland's Vehicle Recovery / Tow Cables. These cables are designed to meet the strength and durability needs of recovering stuck equipment and vehicles in mining operations.

To ensure the safety of all personnel using these cables or in the immediate area of their use, please thoroughly read these instructions.

Note – each individual mining company may have different procedures and guidelines regarding vehicle recovery and towing. The following information is general in nature and not designed as standards for every company.



## Important Safety Instructions

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and/or damage to other property. Cortland Company [Cortland] cannot be responsible for any damage or injury from unsafe use, lack of maintenance or incorrect operation. Do not remove warning labels, tags, or decals. In the event any questions or concerns arise, contact Cortland or a local Cortland distributor for clarification.

All products supplied and manufactured by Cortland are sold with the express understanding that the purchaser and user are thoroughly familiar with the proper use and application of the product. The qualified person<sup>[1]</sup> and Vehicle Recovery / Tow Cable user has the responsibility for use and application, and must have sufficient training and knowledge of all applicable standards to responsibly use our products.

This manual follows a system of safety alert symbols, signal words and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.



The **Safety Alert Symbol** appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious personal injury. Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are DANGER, WARNING, CAUTION and NOTICE.



**DANGER** Indicates a hazardous situation that, if not avoided, **will** result in death or serious personal injury.



**WARNING** Indicates a hazardous situation that, if not avoided, **could** result in death or serious personal injury.



**CAUTION** Indicates a hazardous situation that, if not avoided, **could** result in minor or moderate personal injury.



**NOTICE** Indicates information considered important, but not hazard related (e.g. messages relating to property damage). Please note that the Safety Alert Symbol will **not** be used with this signal word.

[1] Qualified person: A person who, by possession of a recognized degree or certificate of professional standing in an applicable field, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

### General Safety Precautions



**Failure to observe and comply with the following precautions will result in SERIOUS PERSONAL INJURY or DEATH. Property damage could also occur.**

- Vehicle Recovery / Tow Cable, hardware and/or wear protection may fail if damaged, abused, misused, overloaded or improperly maintained resulting in SERIOUS PERSONAL INJURY or DEATH.
- All personnel must stand clear of lifted loads and never be under, on, or near recovery / tow operation. Personnel must not stand in-line with or next to rigging under tension. An unplanned release of tension could strike personnel with deadly recoil force. Do not stand within recoil (snapback) area. Personnel must be alert to the potential for the cable and/or load to become snagged or hung-up.

## Important Safety Instructions *Cont.*

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### **WARNING**

**Failure to observe and comply with the following precautions could result in SERIOUS PERSONAL INJURY or DEATH. Property damage could also occur.**

- It is recommended that Cortland Vehicle Recovery / Tow Cable users are properly trained in the inspection and proper use of the products. Failure to follow proper use, care and inspection criteria for Vehicle Recovery / Tow Cables could result in SEVERE PERSONAL INJURY or DEATH.
- Wear personal protective gear when handling Vehicle Recovery / Tow Cables. Safety equipment such as gloves, eye protection, non-skid safety shoes, hard hat, or hearing protection (used as appropriate) will reduce personal injuries.
- Do not drive or walk over Vehicle Recovery / Tow Cables.
- A Cortland Vehicle Recovery / Tow Cable must not be used if the original rated capacity tag is missing or is unreadable.
- The cable must be identified or labeled with the following information:
  - name of manufacturer
  - code or stock number
  - rated load
  - type of fiber material
- Ensure that the Vehicle Recovery / Tow Cable has suitable characteristics for the type of operation and environment in which they will be used and that they are not used with loads in excess of the rated load capacities. Do not exceed the working load limit (WLL) rated capacity or shock load the cable.
- Do not expose Cortland Vehicle Recovery / Tow Cables to temperatures above 75°C (167° F).
- Ensure that fittings are compatible with the mechanical and environmental requirements of the cable, have a rated load at least the same as the cable, have sufficient strength to sustain twice the rated load of the cable without visible permanent deformation, and have clean surfaces with no damaging edges.
- Thimbles shall have a minimum diameter at the bearing surface of at least two times the rope diameter. Use sheaves with a minimum of 8 times the rope diameter.
- A qualified person must be designated for every recovery or tow operation. It is the responsibility of this person to ensure that proper rigging practices are followed.
- Cortland Vehicle Recovery / Tow Cables must not be used for any fall prevention purpose. Only approved fall prevention products which are specifically rated and labeled for fall prevention must be used for fall arrest and/or fall prevention.

## Important Safety Instructions *Cont.*

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**Failure to observe and comply with the following precautions could result in minor or moderate personal injury. Property damage could also occur.**

- Inspect Vehicle Recovery / Tow Cables for damage before each use. Inspections must cover the entire length of the assembly, including tag, eye terminations, protective sleeve(s), and interior rope strength component; and include those components that come into contact with the cable or have direct influence on the condition and overall cable performance. A system of inspection procedures and recordkeeping is recommended.
- Use only Vehicle Recovery / Tow Cables in acceptable condition without cuts, pulled strands, or other damage. Do not use cables if there are areas of heat or compression damage, braid diameter size inconsistencies, stiff and flat areas on rope unable to be worked back into shape, glazed or melted fibers, or discoloration caused by unknown sources.
- Residual strength in a rope is subject to many considerations and a visual inspection can only provide a subjective estimate on retained strength.
- Twist and rotation should be taken out of a Vehicle Recovery / Tow Cable before application.
- Vehicle Recovery / Tow Cables should be stored in a clean, dry area, out of direct sunlight and/or any source of ultraviolet light and away from sources of extreme temperatures. The storage location should also be free of environmental and mechanical damage, corrosion, dirt, and grit. If on a pallet, make sure other items which can damage or cut the Vehicle Recovery / Tow Cable are not stacked on top of them. Do not use or store near damaging chemicals.

### **NOTICE**

- Cortland Vehicle Recovery / Tow Cables can be washed in warm or cold water to remove particulate matter without damage or loss of strength. It is recommended that only fresh water and mild detergents like dish soap be used. Washed cables should be air dried prior to storage. Cables must not be pressure-washed.

## Choosing the Correct Size & Strength of Cable

Lightweight Vehicle Recovery / Tow Cables from Cortland are manufactured using a specialized UHMWPE (Ultra High Molecular Weight Polyethylene) synthetic fiber manufacturing process and under ISO-9001 quality production standards.

The MBL (Minimum Break Load) values published for Cortland's Vehicle Recovery / Tow Cables are calculated using Cordage Institute 1500-02 standards and require no further reduction in published strength for eye splice terminations. Determination of the appropriate size and strength of a Cortland Vehicle Recovery / Tow Cable to conduct the vehicle recovery or tow is the responsibility of the user. Although we do recommend an MBL strength and WLL (Work Load Limit) on each cable based on vehicle drawbar-pull or rim-pull "pulling power", every recovery is different and may vary in degrees of difficulty.

### Determining the correct size / strength cable

To determine the appropriate size cable for the application, consider two factors:

- The pulling power of the recovery vehicle
  - either drawbar-pull for dozers, or rim-pull for trucks
  - this is more important than the dead-weight of the disabled machine
- SWL (Safe Work Load) factor
  - Cortland recommends a minimum SWL of 2.3 or higher for vehicle recovery or tow

Other factors to consider when choosing the right sized cable:

- Depth of mud or dirt where stalled vehicle is situated
- Degree of slope of incline which can increase the strength needed on the cable
- Angles increasing force needed during recovery
- Hard point or towing connections on vehicles
- Age and condition of vehicle recovery / tow cable
- Correctly sized attachment hardware on both the disabled tow vehicle and recovery vehicle

### Pulling-Power of Cat® Mine Vehicles

	Dozers	Mine Haul Trucks	
<b>D-8</b>	139,000 lbs	785D	187,393 lbs
<b>D-9</b>	161,000 lbs	793F	230,000 lbs
<b>D-10</b>	225,000 lbs	795F	295,693 lbs
<b>D-11</b>	330,693 lbs	797F	340,000 lbs



\* UHMWPE tubular wear protection add-on option

## Guidance for Proper Use

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1. Ensure the proper size and strength of the Vehicle Recovery / Tow Cable is being used for the application.
2. Before beginning the recovery operation, ensure that the area has been isolated or access restricted if necessary.
3. A qualified person must supervise the recovery / tow operations.
4. Before starting the recovery / tow process, make certain that there cannot be an uncontrolled movement of the equipment or vehicle. This includes provisions for stopping any movement once the equipment has been freed.
5. Items to look for before entering the area may include, but not be limited to:
  - a. Live power
  - b. Fuel leaks
  - c. Is the equipment/vehicle secure from further movement? (e.g.)
    - i. Movement of ground
    - ii. Water, mud, slip, trip or fall hazards
    - iii. Other equipment working in the vicinity
    - iv. Potential of falling objects
6. Make sure the area of the recovery is secured.
7. Ensure that the hard point or tow hitch on the recovery vehicle securely fits the eye of the cable and can handle the strength forces imparted on it during the recovery or tow. Check with company policies on these ratings.
  - a. If connecting the Vehicle Recovery / Tow Cable to the towing hard point or hitch requires a shackle, please refer to shackle manufacturer's specification charts with device WLL for correct shackle sizing. Cortland recommends the use of wide body shackles with these cables. Shackle must have minimum strength rating stamped on it. Make sure condition of shackle is good and that it is not abnormally wearing against or cutting the eye of the Vehicle Recovery / Tow Cable.
8. Before use of a Cortland Vehicle Tow/Recovery Cable, a qualified person should always inspect the cable, shackles and connection point of the cable to the vehicle. Please refer to the Inspection Procedures beginning on page 9.
9. After the attachment of Vehicle Recovery / Tow Cable and before pulling forces are conducted—all personnel must be removed away from the operation. If the cable should rupture or break, there is no guarantee that it will not rapidly recoil in a straight or wide pattern.
10. Cortland Vehicle Recovery / Tow Cables, though extremely light weight, have similar elastic elongation properties to steel wire rope. **Unlike polyester or nylon fiber, Cortland cables will have less than 1% elongation when used at WLL.** When new, Cortland Vehicle Recovery / Tow Cables will have approximately 4–10% elongation growth caused by “setting” the splice terminations and compaction on the assembly construction. After the first loading, this construction elongation should not occur again.
11. Cortland Vehicle Recovery / Tow Cables are FOR USE ONLY in straight-line loading. Angles and bends on cable can increase the stress on the cable and lower the rated WLL.
12. Twist and rotation should be taken out of a recovery or tow cable before use.
13. NEVER connect two or more cables together. This lowers the rated MBL and WLL of the cable from 15-50%, depending on the connection.
14. NEVER use Cortland Vehicle Recovery / Tow Cables in a choker hitch configuration or double-back.
15. Use edge protectors when necessary to prevent cutting and abrasion damage to the cable.
16. Before and after every use inspect the cable, shackle and connection hard point for possible damage needing repair or requiring retirement.

## Guidance for Proper Use *Cont.*

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### 17. Handling:

- a. Avoid dragging recovery / tow cables on the ground
- b. Avoid pulling on recovery / tow cables from single strands. Always handle the cable as a unit, not individual strands.
- c. Avoid pulling on recovery / tow cables by the tails of the splice if the tails are exposed
- d. Avoid exposing recovery / tow cables with abrasive surfaces
- e. Do not weld, grind or cut metal in areas where recovery / tow cables are stored. Welding slag or sparks may damage the cable.
- f. Do not use or store near harsh or damaging chemicals.

### 18. Cleaning:

- a. Cortland Vehicle Recovery / Tow Cables can be washed in hot or cold water to remove particulate matter without damage or loss of strength. It is recommended that only fresh water be used.
- b. Use of harsh or damaging cleansers must be avoided.
- c. Washed recovery or tow cables must be air-dried before storage or used immediately.
- d. Recovery / tow cables must NOT be pressure-washed.

### 19. Storage:

- a. Vehicle Recovery / Tow Cables and rigging hardware and protection should be stored in a clean, dry area, out of direct sunlight and/or any source of ultraviolet light and away from sources of extreme temperatures.
- b. The storage location should also be free of environmental and mechanical damage, corrosion, dirt and grit.
- c. If stored on a pallet, make sure other items which may damage or cut the recovery or tow cable are not stacked on top of them.

### 20. Service life:

- a. Cortland Vehicle Recovery / Tow Cables, if worked at or below recommended WLL and properly maintained, should provide very long and safe service life. The UHMWPE synthetic fiber has far superior tension-tension loading fatigue performance to steel wire rope and other fibers. Therefore, the continued loading and unloading at or below WLL should not be cause for cable retirement.
- b. The protective sleeves on the cable eyes and body may deteriorate and wear faster than the interior strength-member rope. However, the wear of the sleeves can be extended through care of use against sharp edges and through tape-repair.
- c. Cortland Vehicle Recovery / Tow Cables can be repaired at factory or factory-authorized distribution centers. Repair requires inspection of rope and fiber integrity, possible re-splice terminations and replacement of protective sleeves. A program of repair can be set up if needed between Cortland and the end-user.



Cortland offers optional weather-proof storage totes to protect and store cables

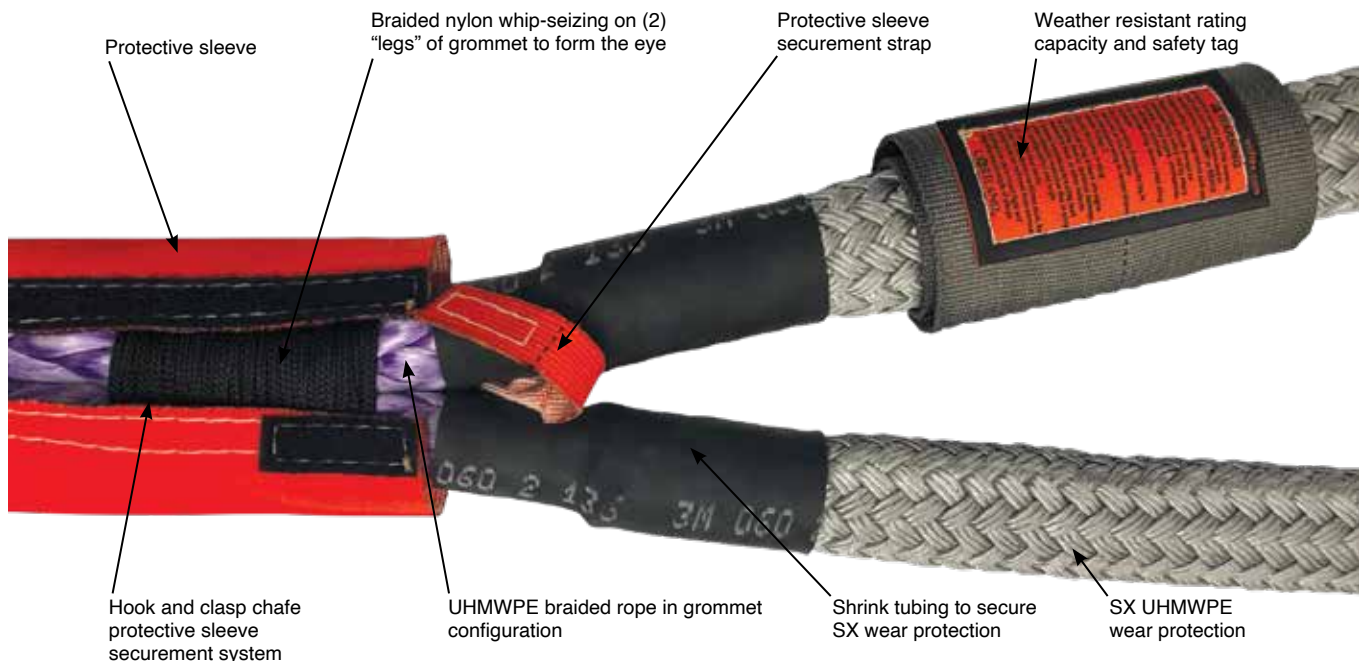


## Inspection points

Properly installed and used, Cortland Recovery / Tow Cables should provide many jobs with safety and high performance. However, the key to long service life is constant visual inspection of the cable and related hardware components and connections.

It is important to inspect all components before and after every use. Please follow these guidelines below; more in-depth details of each step follows on the next page.

Steps	Description
#1	<p><b>Tag</b> Verify the tagged rating on the Vehicle Recovery / Tow Cable is the proper size cable for recovery or tow operation. <b>A cable missing its certification rating tag, or with a tag so damaged the printed information on it cannot be easily read, must not be used.</b></p>
#2	<p><b>Eyes</b> Inspect eye terminations at each end of cable for distortion or cut/abrasion damage, damage or wear deemed beyond normal. The gray SX wear protection should be intact and protecting the core rope.</p>
#3	<p><b>Protective Sleeve on Body</b> Careful inspection to make sure the possibly exposed rope core is not cut or damaged is important. The orange woven sleeve is designed to protect the core rope component, however the cut and abrasion resistance of the braided UHMWPE rope is far greater than the protective sleeve. The protective sleeve can be tape-repaired for a quick fix until new wear protection is procured.</p>
#4	<p><b>Synthetic Fiber Rope Component</b> Inspect for broken or excessively damaged rope inside protective sleeve. Size and outside diameter of the cable should be oval-round and consistent. If there is an obvious "gap" in the body core rope—where it is possible the core rope has been severed or broken—the cable must not be used.</p> <p>a. Complete cuts through (1) or more strands—remove cable from service</p> <p>b. Excessive abrasion on strands or whole cable assembly; shape deterioration—remove cable from service</p> <p>c. Excessive heat or environmental damage—remove cable from service</p>



## Inspection steps

### Step 1 – Inspect the tag

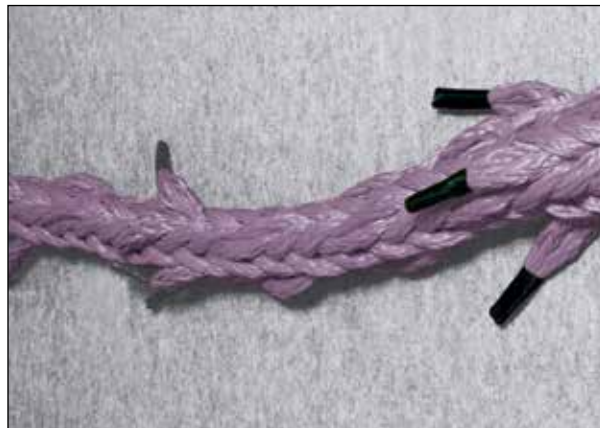
Verify the tagged rating is the proper cable for the recovery operation. **If a tag is missing, the Vehicle Recovery / Tow Cable must not be used.**

### Step 2 – Inspect eye terminations

The eye splice termination area from the base of the eye creates a larger outside diameter (O.D.) than the braided rope; approximately 1.5 times the rope O.D. This is standard in all synthetic rope splices.



Braided UHMWPE wear protection



Close up of synthetic rope splice tails. Braided synthetic rope component in cable may have eye terminations with 'exposed tails' protruding. This is normal and correct. Make sure tails are not becoming untucked; if un-tucked, replace component.



Excessive cutting or wear on braided UHMWPE wear protection. **If synthetic rope is visible through cut protective sleeve, inspect rope component also.**

## Inspection steps *Cont.*

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### Step 3 – Inspect protective sleeve on body

To help protect against abrasion wear and cutting, new Cortland Vehicle Recovery / Tow Cables feature either a black or orange nylon protective sleeve as an additional line of defense for the braided synthetic rope strength member inside.

Three types of wear protection are offered:

- Replaceable—hook-and-loop closure nylon sleeves—typically black or orange
- Fixed in place—braided UHMWPE wear protection, on body or in eye terminations—typically gray
- Fixed in place—tubular nylon body wear protection—typically black

Ensure that the wear protection is in place and in good condition. The cut and abrasion resistance of the braided UHMWPE rope strength member is far greater than the protective sleeve. A ripped or cut protective sleeve will not affect the performance of the cable unless the braided UHMWPE rope core inside the protective sleeve is damaged. If the nylon or UHMWPE wear protection is cut or damaged, repair or replace. Immediately follow with careful inspection of the internal rope component (refer to Step 4).



Black nylon wear protection has hook-and-loop clasps allowing both internal synthetic rope component inspection, and replacement

### Step 4 – Inspect synthetic rope component

To properly inspect the UHMWPE synthetic rope component in the cable, it is important to understand the rope construction. The synthetic rope component is manufactured in a braided and balanced torque-free construction. Each rope is made up of yarns twisted and braided into strands and then finished into a round rope construction: either 12-strand or 12x12 strand.



UHMWPE 12-Strand, manufactured up to 1-1/2" (36mm)



UHMWPE 12x12 Strand, manufactured 1-1/2" (36mm) and above

While an UHMWPE braided rope is one of the most wear-resistant synthetic fiber ropes available, it can be degraded in long-term abrasion against metal. Careful visual inspection of the rope component in each assembly is critical. Signs of excess abrasion include:

- Heavy “fuzzing” or broken surface synthetic fibers on the exterior of the rope
- Synthetic yarn or strand “pull-outs” or snags; distorting the construction of the braid
- Cut strands in a single or multiple area and
- Overall rope size and construction distortion

#### Notes:

- Broken exterior and interior yarns are caused by normal abrasion, wear against rough or angled surfaces, and environmental exposure to caustic chemicals or sunlight (UV).
- All UHMWPE synthetic ropes experience and exhibit “fuzzing” or broken surface fibers during use. The key to inspection and use or removal from service of these ropes showing this wear is the extent of wear. If the original size or volume of a braided rope strand or entire rope appears to be reduced by 25% or more, either locally or over its entire length, the rope component must be removed from service.

### Step 4 – Continued

Primary inspection methods of the rope strength member are visual and “by hand”. When the rope components are not under tension-load, and when you see an area on the ropes which concerns you or does not look like the new version of the rope, the primary inspection method is:

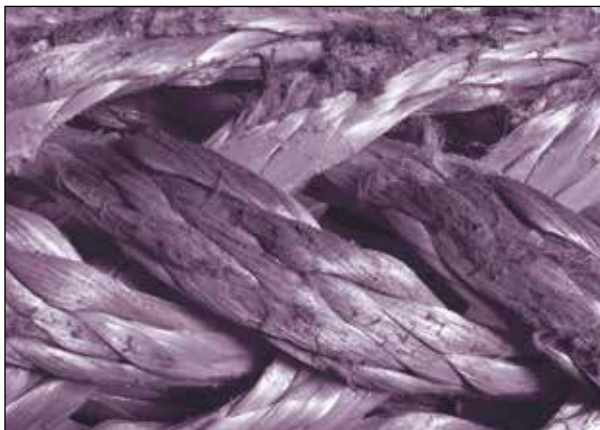
- “Hand-compress” the braid at the affected area to open up the construction. By compressing the braided rope area of concern, both strand and internal wear/damage can be assessed (e.g. mass volume loss to abrasion, cutting or heat damage). This “flexing” of the rope at the affected area does not damage the strength-integrity of the cable.
- Note: if you cannot “hand-compress” or flex the rope at the area of concern—the cable must be removed from service.



“Hand-compress” the braid at the affected area to open up the construction.



New braided synthetic rope component. No external rope strand or rope core wear or damage.



Inspect for excess surface wear on rope component.

## Abrasion

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Abrasion is the wearing of fiber from frictional contact, resulting in a loss of load-bearing material. Abrasion is readily identified by the fuzzy appearance of the damaged fiber (i.e., broken filaments).











There are two primary types of abrasion which happen to a synthetic fiber rope component when used:

1. External abrasion
2. Internal abrasion

External abrasion is the most common type of damage. External abrasion is caused by movement of the cable against another object. This type of abrasion is typically localized and not consistent through the entire length of the cable.

Internal abrasion is caused from movement between rope strands—also referred to as strand-on-strand abrasion. This type of abrasion is typically more indicative of a synthetic fiber rope component which has been heavily used and is normally consistent throughout the length of the cable.

Visual inspection chart on Cortland UHMWPE rope component

Rating	External Abrasion	Internal Abrasion
<b>1</b> Like new (good to use)		
<b>2</b> Light to moderate abrasion (good to use)		
<b>3</b> Moderate abrasion (remove from service)		
<b>4</b> Moderate to severe abrasion (remove from service)		
<b>5</b> Severe abrasion (remove from service)		

## Cuts

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Cuts represent a significant potential hazard to user safety and overall fiber rope component performance. Cuts may be identified by the even, squared-off ends at the point of damage.

While broken filaments have very little effect, partial cutting of strands and/or primary braids can create an imbalance in load-sharing, leading to significantly lower strength.

As a general rule of thumb during inspection:

1. For a 12x12 rope component, cut primary braid strands do not have as much impact on strength as cut primary braids. However, all cuts should be thoroughly inspected to determine the severity of the cut.
2. One cut of 50% or more of a 12x1 strand, or a 12x12 primary braid, is cause for immediate removal from service.

For more information, see removal from service criteria on page 39.



The image above shows a cut primary braid. The cut can be readily identified by the squared off ends of the cut material. In this example 12 primary braid strands were severed.



## Pulled Primary Braids or Primary Strands

A pulled primary braid or primary braid strand occurs when one of the rope components is snagged by, or becomes caught on, some external projection and is partially pulled out of the rope structure, forming a loop.

Generally, when the rope is under tension it is very difficult to pull a loop of material. Most pulled braids or strands occur when the rope is relaxed. **⚠ WARNING** In addition to unbalancing the rope structure, pulled braids or strands can create a dangerous situation if the loop becomes entangled on an object while the rope is being handled.

A pulled primary braid strand or primary braid is not cause to remove the sling from service unless the affected strand cannot be “worked” back into the rope construction by hand flexing and compressing the rope. If it cannot be worked back into the rope structure, the damaged section should be removed and the rope re-spliced or removed from service. **⚠ WARNING** A pulled primary braid should never be cut.



Pulled primary braid



Pulled primary braid strand

## Burns

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Virtually all synthetic fibers can be melted or charred due to exposure to elevated temperatures. This can be caused by excessive heat due to high frictional contact between the rope and a fixed surface or through exposure to some heat source such as a welding, open flame, etc.

Burns can be identified by a glassy fused area on the surface of the rope and a black color.



Example of burned and excessively melted fiber



Example of burned and partially melted fiber

## Structural Deformation

The surface of the rope component must be checked for any change in the shape of the rope or variations in the cycle length or diameter.

### Change in shape

Although very rare, it is possible for one or more of the primary strands to partially or totally fail inside the rope component, with the broken ends remaining trapped inside the structure of the final braid. When this happens, the diameter of the cable at the point of failure will reduce, producing an hourglass shape along the surface of the cable. If this happens the Vehicle Recovery / Tow Cable must be removed from service.

### Cycle length and diameter

Cycle length and diameter of the final braid must be measured at periodic intervals along the length of the rope component to make sure that there are no irregularities in the construction. The cycle length is determined by measuring the length of six consecutive picks along the longitudinal axis of the rope component. Pronounced differences in either measurement (cycle length or diameter) at some location indicate a structural abnormality. The fiber rope component must be inspected thoroughly, including inside the final braid structure, if any variations in these measurements are found.

The diameter (or circumference) can be measured with a diameter tape, standard tape measure or by wrapping a piece of twine around the rope and then measuring the length of twine. It must be noted that as the cable is used, the diameter will decrease slightly, and the cycle length will increase uniformly. But if an isolated location of the fiber rope component is drastically different, it must be investigated further.

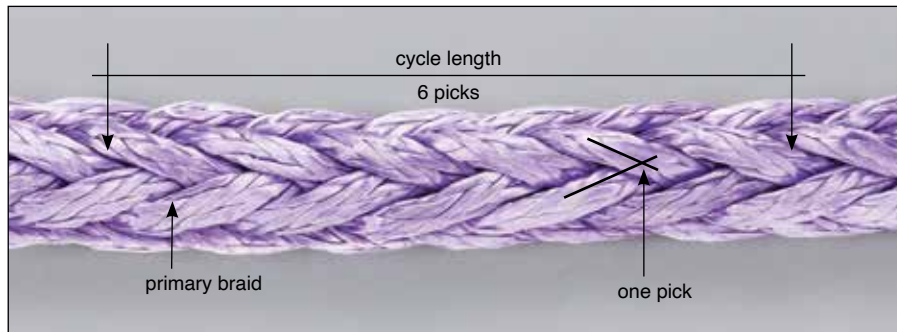
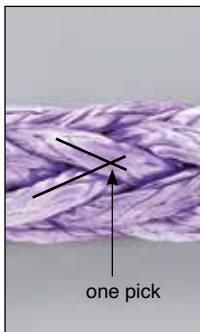


Example of structural deformation

### Picks and cycle lengths:

Picks refers to the point at which one strand running in one direction, crosses over or under a strand running in the opposite direction. Pick density is expressed as picks per unit length.

The cycle length is the distance along the axis of the rope in which one strand makes one complete revolution around the circumference of the rope component. A length of six consecutive picks running along the longitudinal axis of the final braid is the cycle length for a 12-strand rope component.



## Removal from Service

The following is an inspection guideline, and conditions that dictate that the cable be removed from service.

	Type	Condition	Action
1	<b>Tagging</b>	Tag is illegible or missing	Remove from service
<b>Synthetic Rope Component including Eyes</b>			
2	<b>External abrasion</b>	Moderate and above	Remove from service
3	<b>Internal abrasion</b>	Melted or fused braids and strands; powdery or brittle fibers; moderate abrasion and above	Remove from service
4	<b>Cuts</b>	12x12 construction: three (3) or more cut primary braid strands within a primary strand cycle length, OR six (6) or more cut primary braid strands within a secondary braid cycle length, OR two (2) or more adjacent primary braid strands in a primary braid, OR 1/2-cut primary braid	Remove from service
		12x1 construction: 1/2-cut strand or more	Remove from service
5	<b>Pulls</b>	<b>Primary braid strand:</b> 3 or less strands per primary braid per 3 cycle lengths	Work back into rope component if possible. If not, then remove from service.
		More than 3 strands per primary braid per 3 cycle lengths	Remove from service
		<b>Primary braid:</b> 1 primary braid per 3 cycle lengths	Work back into rope component if possible. If not then remove from service.
		More than 1 primary braid	Remove from service
6	<b>Burns or heat damage</b>	Localized areas of fused and melted fibers	Remove from service
7	<b>Structural deformation and/or distortion</b>	Temporary compression	Work out compression
		Localized diameter area reduction, stiff and flat areas on rope unable to be flexed back into shape; any other permanent deformation	Remove from service
8	<b>Splices</b>	Exposed tucking tails	Re-tuck tails in body of rope component
		Loose tucks	Repair splice if possible. If not, re-splice immediately or remove from service.
9	<b>Contamination</b>	Dirt or grit	If moderately or heavily contaminated externally, wash material off of rope. If moderately or heavily contaminated internally, repair or remove from service.
		Chemicals	If any suspicion of chemical contamination then consult Cortland.
		Oil or grease	If moderate to heavy then wash rope component surface with mild detergent or liquid soap. If it cannot be washed then remove from service.
10	<b>Discoloration</b>	Discoloration caused by unknown source	Remove from service
11	<b>Wear Protection</b>	Damaged/cut wear protection	Replace protection and inspect rope component for associated damage

Notes

Lined area for taking notes, consisting of multiple horizontal lines.





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, medical, research, subsea, marine, and energy industries.

Cortland is a part of the Enerpac Tool Group (NYSE: EPAC), a diversified industrial company with operations in more than 30 countries. [cortlandcompany.com](http://cortlandcompany.com)