



HELICOPTER
RIGGING



Longline User Manual

Lift-It® Manufacturing Co., Inc.


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WARNING TO THE USERS OF UHMPE AND LCP LONGLINES

Please note:

The  **WARNING** icon is used to alert sling users to potentially hazardous conditions and situations. “Must” denotes a mandatory requirement and is synonymous with the use of the term “shall”. Longlines, slings, fittings, rigging hardware and sling protection devices may be referred to collectively as “rigging”.

 **WARNING** This bulletin contains important safety information about the use of Lift-It UHMPE, LCP longlines for external load and and Human External applications. However, it DOES NOT provide you with all the information you need to know in order to be considered trained and knowledgeable in load handling activities. The proper use of Longlines, slings, rigging hardware and sling protection are only some of the many necessary components of a complete and successful load handling system. You must be properly trained and it is your responsibility to consider all risk factors prior to all load handling activities. Improper use and lack of proper training may result in severe INJURY or DEATH due to longline or rigging failure and/or loss of load control.

All Lift-It® Manufacturing Co. Inc. products are sold with the express understanding that all parties are thoroughly knowledgeable with safe and proper product usage. The manufacturer does not have complete knowledge or insight into the specific details and potential hazards associated with your load handling activities. Sling users have the ultimate responsibility for proper usage as specified in the applicable warnings, standards, regulations and laws.


Read and understand all product and warning information provided in this bulletin, included with products, contained in our catalog, available at www.lift-it.com and always follow OSHA, ASME, federal, state, provincial and/or industry, association, corporate, insurance and/or manufacturer guidelines. Use by untrained persons is hazardous. Please contact us if you have questions at 800.377.5438 or info@lift-it.com and NEVER TAKE CHANCES!

Product warnings which accompany our products, made available on our website and included in our publications cost more than our products liability insurance premiums. Please read and understand the warnings made available to you. Help us, your family and your co-workers realize a return on the investment we’ve made by following the important information that is provided for you at great expense.

The American Society of Mechanical Engineers in the ASME B30.9 Sling Safety Standard, Section 9-X.1 clearly states the requirement for training. “Sling users shall be trained in the selection, inspection, cautions to personnel, effects of the environment and rigging practices, covered by this chapter.”

Rigging practices would include the use of sling protection as it is a mandatory requirement for all synthetic slings and a recommended practice for wire rope, chain and metal mesh slings. Wire rope, chain and metal mesh slings are also susceptible to damage from cutting and abrasion.

The user must have sufficient training and knowledge of all applicable standards to responsibly use our products. If you are unsure whether you are properly trained and knowledgeable or if you are unsure of what the standards and regulations require of you, ask your employer for information and/or training.

 **WARNING** DO NOT use Longlines, slings, rigging hardware, and or/sling protection until you are absolutely sure of what you are doing. Remember, failure to follow proper use, care and inspection criteria and/or the lack of skill, knowledge and care can result in severe INJURY or DEATH. Longlines, slings, rigging hardware and sling protection will fail if damaged, abused, misused, overused or improperly maintained.

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LONGLINES

Long before training was in demand, Lift-It safety professionals traveled at their own expense with a simple message to anyone willing to listen; “Rig right to go home at night”. Over the past thirty-nine years, the “Four Rules of Successful Rigging” were developed as an integral part of the Lift-It Sling Safety Program and when combined with other necessary considerations contribute to the successful execution of load handling activities.

Rule One: Stay out of the Kill Zone

Rule Three: Don’t overload the rigging.

Rule Two: Do not use damaged rigging.

Rule Four: You must control the load.

A properly trained workforce is necessary for the successful application of the “Four Rules of Successful Rigging”. It is extremely important that you are trained in the usage and inspection of the Longlines, slings, rigging hardware and sling protection you use and only use the equipment you have been trained to use.

Consider how important your decisions and actions are. The way you do anything is the way you’ll do everything. If you rig right, each and every time, your chances of going home, safe and sound to loved ones is dramatically increased. When haste and production schedules take precedence over safety, lives are lost, injuries occur and property is destroyed. Make smart and informed decisions or regret poor choices for the rest of your life.

Even when you take into account all necessary factors, things can still go wrong. One thing is certain; ALL “Four Rules of Successful Rigging” must be present, simultaneously, all day long, all day strong.

Leave any one of the “Four Rules of Successful Rigging” out of your load handling activities and you relinquish control to your destiny with profound consequences for your family and co-workers.

Rule One: Stay out of the Kill Zone.

⚠️ WARNING Sling, rigging hardware and/or sling protection failure may result in INJURY or DEATH.

Gravity ALWAYS works and when rigging failure occurs, personnel under, on, near or next to load handling activities are in grave danger from falling objects. This area is sometimes referred to as the “fall zone”. Personnel shall never stand or pass under a suspended load.

⚠️ WARNING Personnel must not stand in line with or next to rigging under tension. Sling users must know and understand that the potential danger from the unplanned release of tension and deadly recoil force can result in INJURY or DEATH. This “danger zone” is sometimes referred to as “working in the bight” or the “strike zone”.

⚠️ WARNING Never use slings for pulling against stuck, snagged or restrained objects IF LOADING CONDITIONS ARE UNKNOWN. Load measuring devices and/or methods must always be used to ensure that OVERLOADING DOES NOT OCCUR. Overloaded rigging may fail and the unplanned release of tension and/or deadly recoil force can cause INJURY or DEATH.

Prior to load handling activities sling users must always ensure the load is not held down and/or the sling and/or load will not be snagged or become hung up during load handling.

Once load handling activities begin, sling users must never place any part of the body between the sling and the load and/or between the sling and shackle, hook and/or connection point.

Personnel shall never ride the sling or load.

Slings shall never be used as suspended personnel platform bridles.

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Rule Two: Never use damaged rigging or allow damage to occur.

You can make Rule Two a reality by inspecting and protecting your slings from damage.

⚠ WARNING The use of damaged longlines, slings, rigging hardware and/or sling protection may result in INJURY and DEATH. The strength and performance of longlines, slings, rigging hardware and sling protection is affected by wear and damage. It is critically important that sling users employ a three stage, inspection procedure: initial, frequent and periodic, performed by qualified persons*.

If damage is identified during an inspection, damaged items must be removed from service and not be returned until approved by a qualified person*.

You may have encountered removal from service criteria for specific longline, sling types and rigging hardware permitting continued use at an acceptable level of wear and/or damage that does not exceed specific limits. Quantifying an acceptable level of loss from the original size for synthetic products may be difficult, due to the absorption of fluids or foreign substances resulting in swollen or bloated fibers.

Always consider the cost of failure and determine if the use of any item with “acceptable levels” of damage is worth the risk, given the potentially deadly consequences.

No visual inspection can accurately determine the residual strength of longlines, slings, rigging hardware and/or sling protection devices.

Initial Inspection

Prior to use all new, altered, modified or repaired slings, rigging hardware and/or sling protection must be inspected by a qualified person* to ensure that they comply with the manufacturer’s specifications, as well as the recommended standards and safety practices developed by consensus groups, associations and/or regulatory agencies.

The initial inspection should also verify no damage occurred during transit and that there are no defects in material and/or workmanship. The identification tag information must also be verified to match the manufacturer’s published specifications. ASME and OSHA do not require written inspection records for initial inspections of nylon and polyester rope slings and/or sling protection.

Frequent Inspection

Minimum requirements for frequent inspections are specified by ASME and OSHA. “A visual inspection shall be performed before each day or shift the sling is used.” It would make sense that the same inspection rational for slings be applied to sling protection. Many manufacturers specify that slings, rigging hardware and/or sling protection must be inspected before each use. Sling users must follow the manufacturer’s recommendations and will be held accountable to the highest applicable standard of care. ASME and OSHA do not require written inspection records for frequent inspections.

Periodic Inspection

Periodic inspections shall be performed by qualified persons* who have been specifically trained. The qualified person* must be knowledgeable in regulatory, consensus and association standards, design factors, repair, proof testing and identification (marking or tagging) requirements as well as, removal from service criteria, material components, configurations and fabrication techniques. Time served in a tool room does not alone establish competency or qualification. Experience and training are vital to become a qualified periodic inspector.

Periodic inspections are more extensive than frequent inspections as the entire longline, sling length, splices, fittings and all exposed surfaces are thoroughly examined. It is recommended that periodic inspections be performed by a qualified person* other than the person performing the frequent inspection.

The interval for periodic inspections must never exceed one year and is also based upon: frequency of use, severity of the service conditions and the nature of the load handling activity. Periodic inspectors also compare and evaluate the service life of slings, rigging hardware and/or sling protection used in similar conditions.

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OSHA and ASME have specific definitions and guidelines for service conditions which dictate the intervals for periodic inspections.

Normal service: Annual periodic inspections must be performed.

Severe service: Monthly or quarterly periodic inspections must be performed.

Special service: Periodic inspection must be performed at intervals established by the qualified person*.

OSHA and ASME do not require that inspection records be maintained for Longlines. What is required is that a written record of the most recent periodic inspection shall be maintained. In other words, evidence that the inspection event occurred must be documented, not the condition of individual Longline.

Periodic inspections should provide some means of identifying which items have been inspected. Paint or other potentially damaging identification methods must never be used on Longlines. Contact the professionals at Lift-It for details of post inspection marking which not only provides visual verification, but is non-damaging and cost effective.

Removal from Service Criteria

ASME requires that nylon and polyester rope slings shall be removed from service if any of the following conditions are present. The same removal criteria must be used when inspecting any Longline made with UHMPE, HMPE or LCP.

- a) Missing or illegible sling identification.
The sling must be identified or labelled with the following information:
 - (1) name or trademark of manufacturer, or if repaired, the entity performing repairs
 - (2) manufacturer's code or stock number
 - (3) rated load for at least one hitch type and the angle upon which it is based
 - (4) type of fiber material
 - (5) number of legs, if more than one
- b) Cuts, gouges, areas of extensive fiber breakage along the length and abraded areas on the rope.
- c) Damage that is estimated to have reduced the effective diameter of the rope by more than 10%.
- d) Uniform fiber breakage along the major part of the length of the rope in the sling such that the entire rope appears covered with fuzz or whiskers.
- e) Inside the rope, fiber breakage, fused or melted fiber (observed by prying or twisting to open the strands) involving damage estimated at 10% of the fiber in any strand or the rope as a whole.
- f) Discoloration, brittle fibers and hard or stiff areas that may indicate chemical damage, ultraviolet damage or heat damage.
- g) Dirt and grit in the interior of the rope structure that is deemed excessive.
- h) Foreign matter that has permeated the rope and makes it difficult to handle and may attract and hold grit.
- i) Kinks or distortion in the rope structure, particularly if caused by forcibly pulling on loops (known as hockles).
- j) Melted, hard, or charred areas that affect more than 10% of the diameter of the rope or affect several adjacent strands along the length that affect more than 10% of strand diameters.
- k) Poor condition of thimbles or other components manifested by corrosion, cracks, distortion, sharp edges, or localized wear.
- l) For hooks, removal criteria as stated in ASME B30.10
- m) For rigging hardware, removal criteria as stated in ASME B30.26
- n) Other conditions including visible damage that cause doubt as to the continued use of the sling.

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Longline inspections must be thorough, systematic and non-compromising. The inspection process should involve visual and tactile (hand over hand) inspection techniques as some forms of damage are not always visibly apparent. The inspector must always act conservatively as residual rope strength can never be determined by visual or tactile inspection; it can only be determined by destruction testing. Do not use Longlines, Slings, Hardware or Sling Protection Devices that appear to be damaged. If there is any doubt, do not use and remove from service for a manufacturer evaluation.

The user is responsible for establishing an Inspection System that employs three levels of inspection: Initial, Frequent and Periodic. The system should also include a person responsible for the development and perpetuation of the inspection program which would include: Training, Procedures, Recordkeeping, Removal from Service Criteria, Scheduling and Maintenance of the Inspection Records.

Inspect the entire length of all Longlines for damage including splices and end terminations. Ensure Eye Splices securely captivate thimbles and that Lockstitch Thread and Whipping Thread is not damaged or broken. Make sure the Eye Splices are correct, have not slipped and do not display surface abrasion or cuts. Also inspect the Leg Junction to ensure it does not display cut or jagged strands.

Both outer and inner rope fibers contribute to the strength of Long Lines. When either is worn, the rope is weakened. Heavy use will cause the rope to be compacted or hard. This is an indication that rope tensile strength has been reduced.

UV degradation is indicated by discoloration and the presence of splinters and slivers on the rope surface.

ABRASION DAMAGE

Inspect for abrasion, cuts and broken yarns. Longlines and/or Slings may be severely damaged if subjected to rough surfaces or damaging edges. Lifting hardware and attachment points must be maintained in good condition and kept free of burrs and rust. Do not drag Longlines or slings over the floor, ground or rough surfaces. Dirt and grit can work into the rope strands, damaging the internal fibers.

Inspect both the outer fibers and the inner fibers when inspecting 12 strand longlines. When either is worn Longlines are weakened. Open the strands and inspect for internal wear that may appear as: powdered fiber, broken or frayed yarn/fibers and/or fuzzy areas. Be careful not to pull strands excessively and examine any internal wear to estimate total fiber loss by comparing the damaged components to undamaged ones.

Smaller diameter ropes will experience greater strength loss than larger diameter ropes when cut, abraded or exposed to damaging environmental or chemical exposure. Protect all Longline and/or Slings from cutting and abrasion with sling protection that is the correct type and size.

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INSPECTION CONSIDERATIONS

DISCOLORATION

With use, all Longlines and/or slings become dirty. Areas of discoloration may also indicate chemical damage. Determine the cause of the discoloration and if chemical degradation has occurred, remove all damaged items from service. Ultraviolet (UV) exposure will also fade the color of the Long Lines resulting in outer fibers becoming brittle. The result in strength loss can only be determined by destruction testing.

HEAT, CHEMICAL and ENVIRONMENTAL DAMAGE

UHMPE and HMPE Longlines and/or slings have lower tensile strengths and Work Load Limits at elevated temperatures. Continued exposure at elevated levels may melt, part or cause permanent damage.

- **Do not use UHMPE or HMPE Longlines at temperatures above 140°(F)/60°(C) or below -40°(F)/-40°(C).**
- **Do not use LCP Longlines at temperatures above 300°(F)/148°(C) or below -40°(F)/-40°(C).**

Glossy or glazed areas are evidence of heat damage and experience more strength loss than is visibly evident. Fibers adjacent to the heat damaged areas may appear normal, but are not. Shock loading may cause internal melting of fibers and strands.

Chemical damage can masquerade as UV or heat damage as the damaged area may be discolored or brittle. Melting, bonding of fibers, hardening or stickiness may not always be apparent in chemically damaged Longlines or slings. Research into the specific usage and application may confirm exposure.

Nylon ropes, when wet, can be seriously degraded by long term exposure to rust. This can be detected by the brown or reddish appearance of the rust exposure. Store all items properly to obtain a useful service life.

Sea water that has dried and has left salt deposited can cause damage when ropes are used in a dry condition.

INCONSISTENT DIAMETER OR TEXTURE

Measure the rope diameter in several locations and inspect for flat areas, bumps or lumps, as they can indicate core or internal damage from overloading or shock loading. Soft, mushy, uneven, rough or hard spots can also be an indication of rope damage. Inspect for high or low strands and randomly uneven cross sections. Look for variations in lay length for twisted ropes or pick length for braided ropes and note any irregularities. If these forms of damage are evident replace Longlines and do not use damaged items for any purpose.

CREEP

Rope made of materials that creep will be measurably longer after continuous loading for long periods of time. Creep is nonreversible and is based upon: material, usage time, temperature, frequency of use and loading. UHMPE, HMPE and Polypropylene ropes are subject to creep to a greater degree than Nylon ropes. For some synthetic ropes, creep and permanent elongation are mistaken for the same property and are used interchangeably, when in fact creep is only one of many mechanisms that cause permanent elongation. Often ropes that fail due to creep will retain high strength until close to their failure point.



INSPECTION AND REMOVAL FROM SERVICE CRITERIA

Longlines, Slings, Hardware and Sling Protection Devices must be inspected upon receipt, BEFORE EACH USE and periodically by qualified persons who have been trained. Be sure to employ all three levels of inspection: Initial, Frequent and Periodic. No visual inspection can accurately determine the residual strength of Longlines and/or Slings.

Initial Inspection: Longlines, Slings, Hardware and Sling Protection shall be inspected on receipt to ensure:

- No damage has occurred during transit.
- No defective materials or inferior workmanship are present.
- Rated Capacity and Tag information matches the manufacturer's printed specifications.

Frequent Inspection: Longlines, Hardware, Slings and Sling Protection shall be inspected BEFORE EACH USE to determine if damage is present. Inspections done after use can provide valuable information to qualified persons, enabling corrections or modifications for improved safety in subsequent operations.

- Do not use Longlines, Hardware, Slings and/or Sling Protection if damage is present. Damage and wear seriously reduce the strength and capacity of all items. All damaged items shall be removed from service and either destroyed or sent to the original equipment manufacturer for evaluation. Damaged Longlines, Hardware, Slings and/or Sling Protection Devices shall not be used for any purpose.
- Any hazardous condition discovered during an inspection shall require replacement. Temporary repairs are not permitted. Only manufacturers may make repairs and all repaired items must be proof tested and certified. Sling Identification (Tag) and asset/inspection records must be updated to identify the repair activity/entity.

Synthetic Rope is used in many applications other than Longlines. Many rope manufacturers allow a limited amount of abrasion, reduction in diameter based upon a percentage or a maximum number of cut strands for a specific rope material and construction. We recommend rope removal from service criteria, based upon zero tolerance for damage after consulting with flight operation and Longline experts in the utility industry.

Based upon your knowledge, experience and destruction testing to determine residual strength, you may decide to adopt removal criteria that allows for minor damage. Your evaluation process should include consultation with the manufacturers of the rope and the Longline. Your discussions and considerations should also include input from insurance, legal and loss control professionals. Our hope is that you will never be in a position where you realize that minor damage is acceptable.

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INSPECTION AND REMOVAL FROM SERVICE CRITERIA

REFER TO THE LONG LINE INSPECTION FORM HECSHLLIF-Rev. 1 FOR IMPORTANT, ADDITIONAL INSPECTION CRITERIA.

DAMAGE MAY INCLUDE, BUT IS NOT LIMITED TO:

- Illegible, missing identification (tag).
- Metal tags attached with steel cable are not recommended and may damage Longlines.
- Cuts, gouges and/or areas of extensive fiber breakage.
- Abraded areas (internal and external).
- Diameter reduction.
- Uniform fiber breakage along the major part of the rope length, covered entirely by whiskers or fuzz.
- Internal fiber breakage, fused or melted in any strand or the entire rope as a whole.
- Lockstitch Thread and/or Whipping Thread is broken or cut.
- Damaged Eye Splices: Broken Strands at the leg juncture, surface wear in the back of the eye, flattening, and/or splice slippage.
- Discoloration, stiff or brittle fibers or areas on the rope which may indicate chemical, heat or ultraviolet damage.
- Dirt, grit and/or grime in the interior of the rope which is deemed excessive by a qualified person.
- Foreign matter that penetrates the rope making handling difficult and/or attracts and holds grime.
- Kinks or distortion in the rope, particularly if caused by forcibly pulling on loops, known as hockles.
- Melted, hard or charred areas on the rope.
- For Primary, Secondary and Weighted Line Covers: Tears, Cuts, Punctures to Covers or Broken Seams or Zippers. Damaged: Hook and Loop (Velcro®), retaining straps and wraps. Buckles or tightening devices that are damaged or not functioning properly.
- For Weighted Line Covers: Cuts, tears or damage to the cover that exposes Weight Tubes.
- Electrical or Mechanical Components are cut, stripped, have exposed wires or broken plugs.
- Thimble is loose and not captivated by the Eye Splice with Ears, Retaining Ring or Lashing.
- Damaged thimbles and other hardware components, such as thimble covers or spools which show signs of corrosion, cracks, tears, distortion, damaging edges, nicks, burrs, rust, rough surfaces, incorrect shape or localized wear.
- For hooks, removal from service criteria as defined in ASME B30.10 or other applicable regulations.
- For rigging hardware, removal from service criteria as defined in ASME B30.26 or other applicable regulations.
- **Longlines made from UHMPE or HMPE fiber shall be removed after (6) years of service or 2,500 hours of use, irrespective of their condition.**
- **HEC Lines made from LCP (Liquid-Crystal Polymer) shall be removed from service after (4) years of service or 2,000 hours of use irrespective of their condition.**
- Modifications to any item done by someone other than the Original Equipment Manufacturer (OEM) shall not be done.
- Other conditions including visible damage that cause doubt as to the continued use of any component of the Long Line Lift System.
- **Longline and HEC line life limits vary by material make up and construction. Always refer to the identification tag for specific removal from service life limit instruction. Once the life limit has been reached always remove from service irrespective of their condition.**

Periodic Inspection:

Periodic Inspections should be conducted by someone other than the person inspecting before each use.

- **Periodic Inspection – Normal Service:** Longlines, Hardware, Slings and Sling Protection used in normal conditions shall be inspected annually.
- **Periodic Inspection – Severe Service:** Longlines, Hardware, Slings and Sling Protection used in Severe Service (environmental conditions that are harmful, unfavorable and/or detrimental, i.e., extended exposure to upper or lower temperature limits, grit, dust or moisture laden atmospheres, and/or hazardous locations) shall be inspected monthly or quarterly, as defined by a qualified person.
- **Periodic Inspection – Special Use:** Service that is not Normal or Severe and is determined by a qualified person.
- Inspection records documenting the condition of individual Longlines, Hardware, Slings* (Wire Rope, Synthetic Rope, Web and/or Roundslings) and Sling Protection are not required. A record shall be maintained documenting that the most recent periodic inspection occurred.

* Chain and Metal Mesh Sling inspections must note the individual condition of each sling and as such, a unique serial number or other method must be employed to identify and differentiate all Chain and Metal Mesh Slings.

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SINGLE BRAID ROPE INSPECTION





Any rope that has been in use for any period of time will show signs of wear and tear. Some characteristics of a used rope will not reduce strength, while others will. If during inspection you detect any of the following conditions, you must decide your course of action. Abnormalities found during inspection and deciding how much “fuzz” or abrasion is “too much” should never be taken lightly. Longlines, like all rigging must be used responsibly and inspected by a qualified person. Always make your decision for rope retirement based upon the nature of the work being done. Dropping loads or people has no good outcome.

Employing a diligent inspection process and working with the professionals at Lift-It® will assist you in the decision to maintain or retire equipment. Remember, proof testing or destruction testing is readily available to assist you in the evaluation process.

As ropes are used they will undergo normal changes such as constructional elongation and splice setting. Compression and pulled strands are conditions that do not reduce rope strength and can be corrected.

⚠ WARNING If damage such as the following is present, **DO NOT USE** Long Lines. If you identify any of the following damage, **REMOVE DAMAGED ITEMS** from service immediately, even if the damage you see is not as extensive as shown in the following pictures. Do not use damaged items for any purpose. Remember, any doubt, **DON'T!**

VOLUME REDUCTION

	Rope displaying original bulk.		Rope strands showing full volume.
	Rope displaying strand volume reduction from abrasion. Remove rope from service.		Rope strands reduced by abrasion. Remove rope from Service.

CUT STRANDS



Rope displays cut strands. Rope must be retired or the cut section removed and after inspection, the remaining rope re-spliced, proof tested and certified.

PULLED STRANDS



Caused by snagging on equipment or surfaces. Not a permanent condition that can be corrected by working the pulled strand back in to the rope, if the pulled strand is not cut or damaged.

INCONSISTENT DIAMETER



Flat areas or lumps and bumps that may result from shock loading or broken internal strands.

COMPRESSION



Rope exhibits fiber-set from compression. A slight sheen is visible. This is not a permanent condition and can be eliminated by flexing the rope. This condition should not be confused with glazed or melted fiber. (See Melting or Glazing).

MELTING OR GLAZING



Damage depicted is caused by excessive heat which melted and fused the fibers. This area will be extremely stiff. Unlike fiber compression, melting damage cannot be corrected by flexing the rope. Melted areas must be cut out and the rope re-spliced, proof tested and certified or removed from service.

DISCOLORATION



Fused, Brittle, Stiff Fibers which indicate chemical exposure and contamination.

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DOUBLE BRAID ROPE INSPECTION

There are two types of Double Braid ropes. Double Braid which has the cover integrated with the core or Core-Dependent Double Braid which has a cover only for abrasion protection and the core bears the entire weight of the load.

If the cover is damaged on a Double Braid rope which has the cover integrated with the core, rope strength has been compromised.

If the cover of Core-Dependent Double Braid has been damaged, the strength of the rope may not be compromised and close inspection of the line will be necessary to make the determination.

RETIRE THE ROPE WHEN IT'S TIME, BEFORE IT'S TOO LATE.

		
<p>CUT STRANDS Rope displays cut strands, the result of exposure to damaging surfaces or edges, abrasion or cyclic tension wear.</p>	<p>MELTING OR GLAZING Damage depicted is caused by excessive heat which melted and fused the fibers. Damage is manifested by visibly charred and melted fibers, yarns and/or strands. This area will be extremely stiff. Unlike fiber compression, melting damage cannot be corrected by flexing the rope.</p>	
		
<p>DISCOLORATION Fused, brittle, stiff fibers which indicate chemical exposure and/or contamination.</p>	<p>INCONSISTENT DIAMETER Flat areas, lumps and/or bumps that may result from shock loading or broken internal strands.</p>	<p>VOLUME REDUCTION Rope displaying volume reduction from abrasion, exposure to damaging surfaces and/or cyclic tension wear.</p>

Regular inspection will help determine when the rope will need to be removed from service.

Internal abrasion can be determined by pulling one strand away from the others and looking for powdered or broken filaments. (See Figures 1 and 2).

To determine the extent of outer fiber damage from abrasion, a single yarn in all abraded areas should be examined. The diameter of the abraded yarn should then be compared to a portion of the same yarn or an adjacent yarn of the same type that has been protected by strand cross over and is free from abrasion damage. (See Figure 3).



Fig. 1 Inspect for Internal Abrasion.

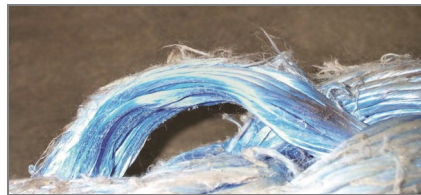


Fig. 2 Inspect for Internal Abrasion.



Fig. 3 Compare Surface Yarns with Internal Yarns.

RESIDUAL STRENGTH TESTING

The strength of a used rope can be determined by testing. We offer our customers residual strength testing of their ropes, which is critical in determining retirement criteria. Periodic testing of samples taken from ropes currently in service ensures that retirement criteria reflects the actual conditions of use.

The ability to determine the retirement point before failure in service without strength testing is essential and is based on a combination of education in rope use and construction, along with good judgment and experience. Remember, if you have any doubt about the condition of a rope, do not use it, until you consult with a qualified person.

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USER QUALIFICATIONS AND RESPONSIBILITIES

- Longline users must read and understand: Title 14, Part 133 Federal Code of Regulations (14CFR 133) Rotorcraft External Load Operations, Specifically part 133.35, Class B for Human External Loads and Flight Standards Information Management System (FSIMS) Chapter 51, Part 133, External Load, Section 1 and other applicable standards and regulations.
- Personnel must be trained in flight and ground operations as well as, sling and rigging hardware selection, inspection, cautions to personnel, effects of the environment, rigging and sling protection practices before using Longlines and/or rigging products. Death and injury can occur from improper use, inspection or maintenance.
- Always use proper rigging practices and understand and follow: NTSB, DOT, FAA, FSIMS, federal, state, industry, manufacturer's instructions and jobsite regulations.

FLIGHT AND GROUND CREW CONSIDERATIONS

- Always read and understand tags, labels and information that accompany all products.
- Preplanning: The location, rigging equipment, ground crew instructions, flight pattern, load placement, contingency planning and other variables must be considered and coordinated with all personnel involved in the lift.
- Pick up point must be clear of buildings and power lines.
- The surrounding area must be clear of debris and in some cases materials may need to be tied down to prevent personnel injury or property damage.
- Pick up and landing areas may need to be watered down to prevent flying dust and any fire or open flame in the area must be extinguished.
- Avoid dragging the load and snagging obstructions by always maintaining sufficient clearance for the line, sling and/or load.
- Do not allow the Longline, Sling, Tagline or any object to rebound into rotors.
- Ensure that all personnel use chin straps on hard hats, gloves and ear protection.
- All Personal Protective Equipment (PPE) including eye protection shall be properly secured.
- Personnel shall not wear loose fitting clothing that could flap and be snagged by the line.
- Tag lines must be of the proper length and shall not be allowed to rebound into the rotor.
- Use Weighted Covers on Longlines when conditions make their use necessary, i.e., longer flights above effective translational lift or airspeeds that would place the line near the tail rotor.
- Do not allow uncontrolled release of the load or failed load release. Inspect all equipment to ensure proper operation.
- Avoid shock loads, rapid acceleration or deceleration. Handle all loads slowly and smoothly.
- Dynamic loading affects Longlines, Hardware and/or Slings with less stretch, to a greater degree, than Longlines and/or Slings that have greater elongation properties. Likewise, a shorter length Longline and/or Sling is more profoundly affected by dynamic loading than a longer length Longline and/or Sling.
- Work Load Limits are based upon: material and component strength, design factor, fabrication efficiency, type of hitch, angle of loading, number of legs, diameter and curvature at connection and contact points and destruction testing in controlled laboratory experiments, which will never be duplicated during actual usage. Work Load Limits are also based upon very moderate, dynamic load handling. Instantaneous changes (rapid acceleration or sudden stop) constitute hazardous shock loading and the WORK LOAD LIMITS AS STATED, DO NOT APPLY.
- Avoid excessive load swing.
- Do not drop slings equipped with metal hardware, components or fittings.
- Synthetic rope slings, web and/or roundslings shall not be used to support suspended personnel or personnel platforms.

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RIGGING CONSIDERATIONS

- All personnel must be alert to dangers of falling and/or uncontrolled loads, line tension and the potential of snagging. Never pull on a stuck object.
- To avoid severe personal injury or death, personnel should be kept away from the load and never be under, on or near or next to the load, while it is being lifted or suspended.
- Personnel shall not stand or pass under a suspended load.
- All personnel including the ground crew should never be next to rigging that is under tension.
- Personnel shall not ride the sling or load.
- All portions of the human body shall be kept from between the load and the sling and from between the sling and the hook, shackle or any other load handling device.
- Long Lines shall never be used as a sling for load handling purposes. Slings shall be used to rig the load, while Longlines are used to lift the load.
- Longlines, Slings, Hardware and Sling Protection shall have suitable characteristics for the application, type of load, hitch and environment.
- Slings, hardware and sling protection devices should be installed and evaluated for suitability by raising the load slightly and then lowering the load for an inspection of the sling and the protection devices. Several “test” lifts, inspections and evaluations may be necessary to determine the proper combination of components for a successful lift.
- You must inspect Longlines, Hardware, Slings and Sling Protection before each use. Damaged or misused items can cause injury, death or destroy property.
- Do not use damaged Longlines, Slings, Hardware or Sling Protection for any purpose.
- The Work Load Limits of damaged Longlines, Slings, Hardware or Sling Protection shall not be “downgraded” to allow further use.
- Load must be rigged in a manner that will provide load control and stability.
- The load must be balanced and secure to prevent slippage.
- Do not allow the Sling and/or Protection Device to slip or slide across load edges or surfaces.
- Longlines and/or Slings must always be protected from cutting, abrasion and other types of damage by materials of sufficient strength, thickness and construction.
- Sling Protection must be the correct type, rating, shape and size to properly perform and protect.
- There are two basic types of sling protection. Sling protection used for cut resistance or sling protection used to prevent abrasion damage. Sling protection is also available in different designs that either place the sling above the surface or provide protection when slings contact damaging surfaces.
- Some sling protection materials like Bulked Nylon or Cordura® are suitable for abrasion resistance, but offer no protection against the effects of cutting. IF USED FOR CUT PROTECTION, ABRASION SLEEVES AND OTHER SLEEVE TYPES WILL NOT PREVENT DAMAGE FROM CUTTING OR SLING FAILURE. ONLY USE PROTECTION DEVICES WHICH HAVE CUT PROTECTION RATED CAPACITY TAGS TO PREVENT DAMAGE FROM CUTTING.
- Only sling protection that has been designed, tested and rated by the manufacturer will be considered adequate to protect slings from cutting.
- “Cut proof” sling protection does not exist and sling protection MAY NOT prevent cutting or other damage if not properly used. Slings and Sling Protection can be sheared at load contact points as tension and compression combine and increase the cutting force. Excessive bearing pressure can damage and destroy any sling or sling protector. All devices must be evaluated and selected based upon the specific application and type of exposure.
- A qualified person must carefully select sling protection appropriate for the types of exposure damage. The protection used should not be makeshift (i.e., selecting and using cardboard, work gloves or other such items that were not designed to serve as protection devices).
- Check Slings and Sling Protection and the sling position on the protection as the load is being applied before lifting. Ensure the sling/protection relationship is correct and that the protection is placed properly to prevent damage to the sling and the sling protection.
- Always refer to the Protection Rated Capacity Tag for cut protection ratings.

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RIGGING CONSIDERATIONS

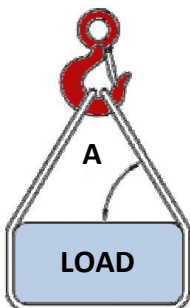
- Never exceed the Work Load Limit or Rated Capacity of the Helicopter, Longline, Hardware, Sling and/or Sling Protection.
- **DO NOT OVERLOAD!**
Longlines, Hardware, Slings and Sling Protection may fail if damaged, misused or overloaded. Injury or death can occur from improper use.
- Always refer to the Longline Tag, Sling Tag, Hardware Markings or Protection Rated Capacity Tag to determine component capacities.
- All components must be compatible and the overall lifting capacity shall be rated at the lower of either the capacity of the Helicopter, Longline, Sling and/or Hardware Work Load Limit and/or Protection Device rating.
- Always take into account sling angles to calculate changes in the sling work load limits when using slings in choker and non-perpendicular vertical, basket or bridle configurations.
- When slings are used in non-perpendicular vertical, basket or bridle configurations, tension increases in slings and all components the farther a sling moves away from vertical or 90 degrees to horizontal, due to the lifting angle. Sling angles less than 60 degrees shall not be used except when approved by a qualified person. You must evaluate and plan for the additional tension.
- When slings are used in choker angles less than 120 degrees, you must evaluate and plan for the loss of sling capacity.

Another important consideration is the sling-to-load angle—the angle formed between a horizontal line and the sling leg or body. This angle is very important and can have a dramatic effect on the rated capacity of the sling. When the sling-to-load angle decreases, the load on each leg increases. This principle applies in a number of conditions, including when one sling is used to lift at an angle and when a basket hitch or multi-legged bridle sling is used. Table 1 provides information about increased tension as a function of sling-to-load angle (assuming equally-loaded sling legs). Sling angles of less than 30 degrees are not recommended. Similarly, when the angle of choke is less than 120 degrees, the sling choker hitch capacity decreases. To determine the actual sling capacity at a given angle of choke, multiply the sling capacity rating (for a choker hitch) by the appropriate reduction factor determined from Table 2.

Table 1

Increased Sling Tension as a Function of the Sling-to-Load Angle.

Multiply the load weight (per leg) by the tension factor to determine the increased tension on the sling leg(s).

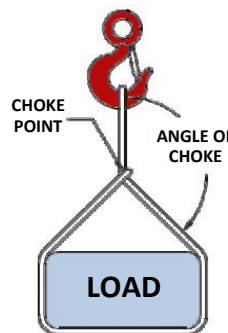


Angle "A" in degrees from horizontal	Tension Multiplier
90	1.000
85	1.004
80	1.015
75	1.035
70	1.064
65	1.104
60	1.155
55	1.221
50	1.305
45	1.414
40	1.555
35	1.742
30	2.000

Table 2

Reduction in the Work Load Limit as a Function of the Angle of Choke.

Actual Sling Capacity =
Rated Capacity x Reduction Factor



Angle of Choke (degrees)		Angle of Choke Reduction Factor
= or >	<	
120	180	1.000
105	120	0.82
90	105	0.71
60	90	0.58
0	60	0.50

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- When slings are used in a choker hitch configuration, the choke action should be on the sling body, not on the load bearing splice, tag, fitting or on the base of the fitting or sling eye.
- Slings used in a choker hitch shall not be forced to tighten by pounding with hammers or other objects.
- A sling rigged in a choker hitch does not make full contact with the load.
A longer sling used in a double wrap, choker hitch will make full load contact with the load.
- Multiple slings are often required to safely and securely handle a load.
Use of a single sling may result in a dangerous situation when the load is not balanced and controlled.
- Do not allow slings to cross over each other.
- When lifting loads with a basket hitch, the legs of the sling should contain or support the load from the sides above the load to ensure load control so the load does not tilt when lifted.
- Basket hitches used at angles less than 60 degrees may result in slings skipping across load edges.
Loads in all hitches must be rigged to ensure positive sling to load engagement.
- Work Load Limits for Basket Hitches and multi-part bridle slings are based upon symmetrical loading of the individual sling legs.
- For multiple leg sling assemblies used with non-symmetrical loads, an analysis should be done by a qualified person to prevent overloading.
- No single leg used in a bridle or multi-sling lift shall be loaded beyond the work load limit of the individual leg.
- Multiple Leg Slings shall be selected and used according to the specific angle as indicated on the sling tag.
The work load for other angles must be determined by a qualified person.
- Sling angles less than 60 degrees shall not be used except when approved by a qualified person.
- Longlines and/or Slings shall only be adjusted or shortened by methods approved by the manufacturer or qualified person.
- Longlines and/or Slings shall not be shortened or lengthened by knotting or twisting.
Sharp bends and knots radically effect the strength of Slings, Longlines.
- Loads shall not be rested on Longlines and/or Slings.
- Slings shall not be pulled out from under the load, while the load is resting on the sling.
- Twisting of the Longline and/or Sling shall be avoided.
- Do not side load or edge load slings.
- Excessive sling angles may result in only a portion of the sling carrying the load.
- Longlines and/or Slings should not be dragged on the ground or over abrasive surfaces.
- Longlines and/or Slings should not be constricted, bunched or pinched by the load, hook or any fitting.
- Loads should be centered and applied in the base (bowl) of the hook to prevent point loading.
- An object in a web or synthetic rope sling eye should not be wider than one third the eye length.
- The connection point diameter for Eye & Eye, synthetic rope slings must be twice the diameter of the synthetic rope to achieve specified Work Load Limits. Larger diameters are required for endless style or high performance synthetic rope slings. Contact the manufacturer.
- Do not use hand-spliced wire rope slings or wire rope slings with wire rope clips in helicopter lifting applications.
Vibration can loosen wire rope clip bolts and hand spliced (tucked) slings unlay and come apart with rotation.

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RIGGING CONSIDERATIONS

- An object in a wire rope sling eye should not be wider than one half the eye length.
- The connection point diameter for standard, single leg wire rope slings must be equal to the diameter of the wire rope to achieve specified Work Load Limits.
- When D/d ratios for wire rope slings used in a basket hitch are less than 25/1, the sling Work Load must be reduced.
- When D/d ratios for synthetic rope slings used in a basket hitch are less than 8/1, the sling Work Load must be reduced.
- Roundslings also have recommended connection point and body diameters. Consult the manufacturer.
- Do not use slings or allow contact at temperatures over 194 degrees (F) or below -40 degrees (F).
- Check with manufacturer prior to use in an active chemical environment and avoid damaging chemical exposure.
- The strength of Longlines, Hardware, Slings and Sling Protection Devices can be affected by chemically active environments and may be susceptible to damage from caustic or acidic substances or fumes. Strong oxidizing elements may damage Longline, Hardware, Slings and/or Sling Protection Devices.
- Absorbed impurities will dramatically increase the conductivity of synthetic materials. During use, consider all Longlines, Hardware, Slings and Sling Protective Devices CONDUCTIVE.
- Any Longline, Hardware and/or Sling incorporating aluminum fittings shall not be used where fumes, sprays, mists, vapors or liquids of alkalis, acids or chlorine are present. Chemical exposure can also damage and degrade materials other than aluminum.
- Nylon slings, while wet lose approximately 15% of their dry strength. The original strength returns when Nylon products dry completely.
- Exposure to sunlight and ultraviolet light will reduce the strength of all synthetic slings, synthetic ropes, Longlines. Polyester Rope and slings lose 30% of their strength after 12 months of constant UV exposure. Nylon Rope and slings lose 40-60% of their strength after a 12-36 months of constant UV exposure.
- When not in use, Longlines, Hardware, Slings, Protection Devices should be stored in a location that is free from mechanical, environmental and ultraviolet or temperature damage.
- Hardware and Protection Devices must be compatible with the Longline and/or Sling.
- Hardware must be free of any damaging edges or surfaces.
- A dangerous situation may occur if Longlines and/or slings are directly connected to each other. The increased tension and frictional heat can damage or completely cut Longlines and/or Slings. Consider using Shackles with Bolt, Nut and Cotter Pin to secure multiple Longlines, or Longlines to slings.
- Vibration in connection or contact points may damage Longlines, Hardware, Slings and Sling Protection Devices. Inspect before each use and replace all damaged items.
- Thimbles should be used whenever possible providing a metal on metal "hinge point" at the connection point.
- Thimbles must be installed in a manner that prevents the thimble from falling out of the eye. If thimbles do not have Ears or Welded Keeper Rings, they must be secured to the rope. Heavy duty, Thimbles should be used as non-metallic thimbles may not be strong enough to exceed the Work Load Limit for the application.
- Synthetic slings should be placed over the bow of the shackle. If the sling is rigged onto the shackle pin, the sling must be protected. Consider using Shackles with Bolt, Nut and Cotter Pin.
- Do not bend hardware or fittings over or across load edges.
- The opening in hardware components or fittings must be of the proper shape and size to ensure that the fitting will seat properly on the point of attachment.

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INSPECTION and RECERTIFICATION SERVICES

Beyond the Initial, Frequent and Periodic levels of inspection, Lift-It Manufacturing offers inspection and certification services for Long Lines and Slings. Contact us for a quotation.

Only items with the following information will be inspected and tested:

- Name or Trademark of the Manufacturer or Repair Entity if repairs were performed
- Stock Number
- Rope Material
- Length
- Rope Diameter
- Date of Manufacture
- Unique Serial Number
- Work Load Limit
- Warning Information
- Inspection Dates

Electrical and Mechanical Wire performance will not be inspected and we accept no liability or responsibility for the effects of testing and/or performance of such cables.

Longlines will be inspected per the information contained in the current version of ASME B30.9-Chapter 4, Cordage Institute, CI 2001-04: Fiber Rope Inspection and Retirement Criteria and information provided by the rope manufacturer.

Metal components will be inspected visually per ASME B30.9, B30.10 and B30.26 as applicable.

All inspected items will be proof tested to twice the work load limit, re-inspected and certified.

Destruction testing for the residual tensile strength of Longlines and Slings will be performed at our facility or by an accredited, independent, third party testing facility. Destruction testing will shorten the original line length by 15 to 25 feet, depending upon the rope type and construction.

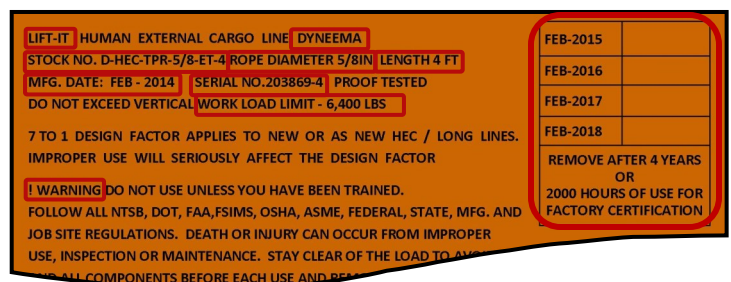
All test equipment is calibrated to ASTM-E4: Specification for Standard Practices for Force Verification of Testing Machines.

HEC/SHORT-HAUL LONG LINE IDENTIFICATION

Longlines with an illegible or missing tag shall not be used and shall be removed from service for evaluation by the original equipment manufacturer.

Longlines shall be marked with the following information:

- Name or Trademark of the Manufacturer or Repair Entity if repairs were performed.
- Rope Material
- Stock Number
- Rope Diameter
- Length
- Date of Manufacture
- Unique Serial Number
- Work Load Limit
- Warning Information
- Inspection Dates denoting Month and Year for four (4) consecutive years.



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DEFINITION OF TERMS

Component: Any load bearing element in a helicopter lifting operation including but not limited to: Longline, Hardware, Rigging and Sling.

Component Strength: The published or industry accepted minimum breaking strength or force of the weakest component in the Longline, Hardware or Sling.

D/d Ratio: The ratio between the diameter of the object (D) and the diameter of the wire rope or synthetic rope sling (d).

Design Factor: The ratio between the designed breaking load and the Work Load Limit. Depending upon the application, a minimum design factor of 7 may be appropriate for normal applications, but must be based upon expert knowledge and a professional estimate of risk.

The Design Factor should be increased for critical applications. Critical applications may include, but are not limited to: severe operating conditions, anticipated shock loads, applied tension over long periods of time, high number of uses or cycles, etc. All Lift-It® HEC Lines feature a 10/1 Design Factor or greater. Higher Design Factors are available. All Lift-It® Longlines feature a 7/1 Design Factor. It is important to evaluate and determine that all components in helicopter lifting operations have adequate strength to justify an overall assembly work load limit based upon the weakest component.

The design factor must be determined by a qualified person. When in doubt use the highest, practical design factor.

Designed Breaking Load: The minimum load at which a newly fabricated Longline, Hardware and/or Sling is calculated to break when pulled to destruction.

Fabrication Efficiency: The ratio between a fabricated item, such as a sling and the material strength prior to fabrication. Fabrication Efficiency is expressed as a percentage.

Overloading: Exceeding the Work Load Limit.

Proof Test: A non-destructive test to a multiple of WLL.

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.

Shock Load: A momentary increase in the force applied to any component during the lifting operation caused by a sudden movement, shifting or arresting of a load. Arresting a falling weight is the most common example of Shock Loading. Loads should be handled slowly and smoothly.

Work Load Limit (WLL): Also referred to as Rated Capacity or Rated Load. The WLL is calculated by dividing the new, minimum break strength by a design factor. The Work Load Limit is the maximum allowable working load established by the manufacturer.

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