



A specific procedure for sling inspection is the best safeguard against injury, death and property damage. It is important that you employ a three stage, level of inspection to ensure that slings are inspected with the appropriate frequency. It is also important that all inspections must be done by trained and qualified personnel.

To detect possible damage, you should perform a visual inspection of the entire sling and also feel along its entire length, as some damage may be felt more than seen. You should look and feel for any of the types of conditions listed in the Removal from Service Criteria, see page 34. Page 35 depicts examples of some of the types of damage, but note that they are relatively extreme examples provided for illustration purposes only.

If you identify ANY of these types of damage in a sling, remove it from service immediately, even if the damage you see or feel is not as extensive as shown on page 35. Slings that are removed from service must be destroyed and rendered completely unusable unless they can be repaired and proof tested by the manufacturer. Never ignore sling damage or attempt to perform temporary field repairs of damaged slings, (i.e., tie knots in the sling, etc.). It is very important that slings are regularly and properly inspected. If you are not sure whether or not a sling is damaged, **DO NOT USE IT.**

## SLING INSPECTION SYSTEMS

### INITIAL INSPECTION

The Web Sling and Tie Down Association defines the initial level of inspection as, "Before any new or repaired sling is placed in service, it shall be inspected by a qualified person to ensure that the correct sling is being used, as well as to determine that the sling meets the applicable requirements".

The American Society of Mechanical Engineers also states in the initial inspection that, "prior to use, all new, altered, modified or repaired slings shall be inspected by a designated person to verify compliance to all applicable standards".

The initial level of inspection is done upon receipt to ensure that no damage has occurred during transit. The products must also be verified to be correct, as ordered and they comply with the manufacturer's specifications. Without printed product specifications this comparison cannot be accomplished. If written records for individual slings are to be maintained, the documentation should be initiated at this level of inspection. Recordkeeping at the initial level of inspection is not required.

### FREQUENT INSPECTION

The Web Sling and Tie Down Association defines the frequent level of inspection as one that is done by the user or other designated person daily or before each shift in NORMAL service conditions. When SEVERE service conditions exist, the sling must be inspected before each use. See page 476, Sling Service for definitions of Normal, Severe and Special Service. The entire sling shall be thoroughly examined and removed from service if damage is detected. OSHA and ASME stipulate that, "before each day or shift, the sling and all fastenings and attachments shall be inspected for damage and defects by a competent person designated by the employer".

If you are unsure if the daily or pre-shift inspection has been done, take the time to inspect the sling before you use it. WSTDA, OSHA and ASME provide minimum guidelines. Never assume that slings have been inspected by others.

A qualified person must also determine that the sling is proper for the intended use, hitch, load and environment. Any condition that may result in a hazard shall cause the sling to be removed from service. Written inspection records are not required for frequent inspections.

### PERIODIC INSPECTION

All slings must be inspected "periodically" by designated personnel at regular intervals. In order to validate the Frequent Level of Inspection, the Periodic Inspection should be done by someone other than the individual(s) who performs the Frequent Inspection. The interval is based upon: the frequency of use, severity of the service conditions, the nature of the work being performed and experience gained during the inspection of slings used in similar circumstances. Recommendations to prevent damage must be evaluated to improve the service life of the replacement slings. Periodic Inspection intervals shall not exceed one year intervals.

ASME stipulates the following time interval guidelines for Periodic Inspections:

Normal Service - Yearly

Severe Service - Monthly to Quarterly

Special Service - As recommended by a Qualified Person

Written records of the most recent periodic inspection shall be maintained. Reference to a unique, sling identification number is not required. If your employer or industry requires recording the condition of individual slings, continue the practice. The important point to realize is the ASME recordkeeping requirement mandates that the event be documented not the condition of individual slings.

Irrespective of the recordkeeping requirements that govern your actions, it is important that slings inspected "periodically" be identified or tracked to validate that the Periodic Inspection occurred. Lift-It® Slings can be equipped with an Inspection Loop™, Inspection Tag or RFID chipped for easy, visual verification of Periodic Inspections (See pages 54 and 55).

Designated Person: Selected or assigned by the employer or employer's representative as being competent to perform specific duties.

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.



## DOL-OSHA 29 CFR 1910.184 AND GUIDANCE ON SAFE SLING USE

Make a thorough inspection of slings and attachments. Items to look for include:

- Missing or illegible sling identification.
- Acid or caustic burns.
- Melting or charring of any part of the sling.
- Holes, tears, cuts or snags.
- Broken or worn stitching in load bearing splices.
- Excessive abrasive wear.
- Knots in any part of the sling.
- Discoloration and brittle or stiff areas on any part of the sling.
- Pitted, corroded, cracked, bent, twisted, gouged or broken fittings.
- Other conditions that cause doubt as to continued use of a sling.

Where any such damage or deterioration is present, remove the sling or attachment from service immediately.

## ASME B30.9 REMOVAL FROM SERVICE CRITERIA

- a) Missing or illegible sling identification.  
Section 9-5.7.1 requires that each sling be marked to show the following:
- 1) name or trademark of the manufacturer
  - 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 synthetic material
  - 5) number of legs, if more than one
- b) Acid or caustic burns.
- c) Melting or charring of any part of the sling.
- d) Holes, tears, cuts or snags.
- e) Broken or worn stitching in the load bearing splices.
- f) Excessive abrasive wear.
- g) Knots in any part of the sling.
- h) Discoloration and brittle or stiff areas on any part of the sling, which may mean chemical or ultraviolet/ sunlight damage.
- i) Fittings that are pitted, corroded, cracked, bent, twisted, gouged or broken.
- j) For hooks, removal criteria as stated in ASME B30.10
- k) For other applicable hardware, removal criteria as stated in ASME B30.26
- l) Other conditions, including visible damage, that cause doubt as to the continued use of the sling.

## WEB SLING AND TIE DOWN ASSOCIATION REMOVAL FROM SERVICE CRITERIA SYNTHETIC WEB SLING SAFETY BULLETIN (WSSB-1) 2010

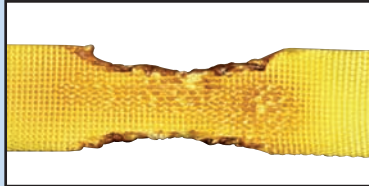
The entire web sling must be inspected regularly and it shall be removed from service if ANY of the following are detected:

- If sling identification tag is missing or not readable.
- Holes, tears, cuts, snags or embedded materials.
- Broken or worn stitches in the load bearing splices.
- Knots in any part of the sling webbing.
- Acid or alkali burns.
- Melting, charring or weld spatter on any part of the web sling.
- Excessive abrasive wear or crushed webbing.
- Signs of ultraviolet (UV) light degradation.
- Distortion, excessive pitting, corrosion or other damage to fitting(s).
- If provided, exposed red core yarn. However, if damage is present and red yarns are not exposed, DO NOT USE the sling.
- Any conditions that cause doubt as to the strength of the web sling.



# Web Sling Inspection

**⚠ WARNING** If any damage such as the following is visible, the sling shall be removed from service immediately. Photos depict examples of sling damage, but note they are extreme examples provided for illustration purposes only.



**ACID OR CAUSTIC BURNS**



**CUT**



**EDGE CUT**



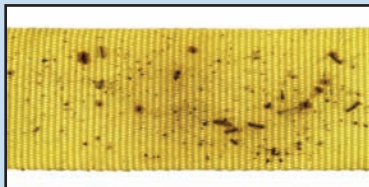
**MELTING OR CHARRING**



**ABRASIONS**



**PUNCTURE**



**WELD SPATTER**



**BROKEN OR WORN STITCHES**



**DAMAGED EYE**



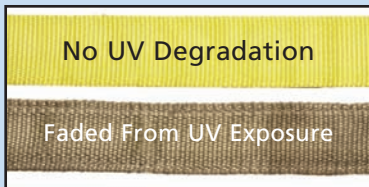
**EMBEDDED MATERIALS**



**TENSILE BREAK**



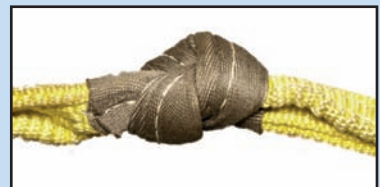
**MISSING OR ILLEGIBLE TAG**



**UV DEGRADATION**



**RED CORE YARN**



**KNOT**



**CRUSHED WEBBING**



**SNAG**



**DAMAGED HARDWARE**





## SLING INSPECTION MADE EASY

Factory trained professionals inspect all types of slings, hoists, below the hook lifting equipment and tie downs. Each item is thoroughly inspected per OSHA and/or ASME criteria, industry standards and/or manufacturer recommendation.

A detailed report identifying each item, the condition and approval or removal from service criteria will be provided. This report will also include recommendations to enhance sling service life and employee safety.

If you wish to repair or replace damaged slings, we will provide replacement costs. Generally if repair activity exceeds 50% of replacement cost, the repair activity is not recommended.

Items that pass visual inspection will be proof tested and certified.



**BEFORE REPAIR**



**INSPECTION**



**PROOF TESTING**



**REPAIRS COMPLETE**



Mr. Welk was born to immigrant parents in a sod farm house near Strasburg, North Dakota on March 11, 1903. He left the farm when he was 21 to pursue his dream, a love for music and a desire to share it with others. During the early years he played at barn dances and weddings. Eventually his band would play to an audience of over 30 million on his weekly television broadcast where adults were entertained and children remained silent. He would become one of the wealthiest men in Hollywood and attributed his success to the opportunities made available to him by the country he so loved, his determination to succeed and his faith in the Dear Lord. Mr. Welk passed peacefully on May 17, 1992 with his loving wife, Fern Renner Welk and his children by his side. [Lawrence Welk is the TRUE American Idol.](#)

As you look down upon us from heaven, Mr. Welk, thank you for the countless hours of entertainment pleasure you provided for millions of us over the years and for the example and quest for excellence you inspired in me.



# Repair • Testing • Certification

Sling repair must be economically feasible and must be done by a recognized sling manufacturer. Tent, awning, shoe and saddle shops are not equipped to test repaired products and generally are not proficient in sling fabrication or repair techniques.

Recycle sling hardware. Generally, the hardware components are reusable and utilization will substantially reduce overall sling costs. When we receive your components they are degreased and carefully inspected.

Repaired items are proof tested to twice the assigned Work Load Limit, per OSHA, ASME and WSTDA requirements. Our test machines are annually certified to ASTM E4 standards and produce a machine generated record for each test. Beware of "testing" facilities that do not have the capabilities to offer a "machine" generated certificate of test.

An additional tag is attached to all repaired items identifying Lift-It® as the repair agent. Test certificates are enclosed with the return shipment and your inspection records must be updated to reflect the repair activity, per OSHA requirement.

Lift-It® will provide certification of conformance for materials, strengths and Work Load Limits for any of our products. A nominal charge will be applied if proof testing and certification are required.



Our 600,000 pound test machine will accommodate sling lengths up to 120 ft.

Lift-It® Manufacturing Co. Inc.							
Certification							
DATE	INVOICE #	PO/CONTRACT #					
04/19/11	185225	125325					
WORK LOAD LIMIT							
QTY.	WIDTH x LENGTH	STOCK NUMBER	Choker			Basket	SERIAL NUMBERS
			Vertical	Horizontal	Vertical		
20ea	4in x 30ft	EE2-904	9,000	11,400	22,800		185225-1 thru 185225-20
20ea	4in x 20ft	EE2-904	9,000	11,400	22,800		185225-21 thru 185225-40
20ea	4in x 12ft	EE2-904	9,000	11,400	22,800		185225-41 thru 185225-60
20ea	4in x 10ft	EE2-904	9,000	11,400	22,800		185225-61 thru 185225-80
10ea	2in x 20ft	EE2-902	5,000	6,400	12,800		185225-81 thru 185225-90
10ea	2in x 12ft	EE2-902	5,000	6,400	12,800		185225-91 thru 185225-100
10ea	2in x 10ft	EE2-902	5,000	6,400	12,800		185225-101 thru 185225-110
10ea	2in x 8ft	EE2-902	5,000	6,400	12,800		185225-111 thru 185225-120

XX Above slings were manufactured to the best commercial standards, ASME B30.9 and CRF OSHA 1910.184

XX Above slings bear a tag showing the manufacture: stock number, length, capacities & material used.

XX Above work load limits predicted upon:  
 1) 5 to 1 design factor  
 2) An ideal set of lifting and environmental conditions  
 3) The slings being in a new and unused state

XX Above slings were load tested to 200% without indication of failure. Proof test complies with best commercial practices including OSHA and ASME sling standards. Test equipment traceable to NIST standards.

*[Signature]*  
QA Department

## Care • Storage • Cleaning

In order to prevent damage to slings, when not in use, we recommend that they be stored in a proper location. Make sure the location is:

- **COOL** To prevent damage resulting from exposure to excessive temperatures.
- **DRY** To prevent the growth of mold and mildew, which can degrade synthetic fibers.
- **DARK** To prevent the deleterious effects of prolonged exposure to sources of ultraviolet light.
- **FREE OF ENVIRONMENTAL/MECHANICAL DAMAGE**  
Ventilated and not exposed to heat and chemical exposure, sunlight, weld spatter or grit and splinters from grinding or machining.

Slings should also be kept clean and free of dirt, grime and foreign material. Mild soap and water can be used for this purpose. Hard bristle brushes damage webbing, consider using a sponge. Soaking slings in mild soap and water for short periods of time is non-damaging. After cleaning, rinse slings thoroughly and allow them to completely dry before returning them to storage. A clean sling, free of dirt and grime is easier to inspect for damage. Consider replacing slings, instead of attempting to clean. The time, energy and resources necessary to be a sling launderer may exceed the purchase price of replacement slings.

**⚠ WARNING** Steam cleaning at temperatures in excess of 194°F/90°C can damage the sling.

Power or pressure washing can force residue inside web and yarn fibers. The foreign material can cause internal yarn and fiber damage.

Web and roundslings are severely damaged by machine washing, resulting in a serious loss of sling strength.





## ENVIRONMENTAL CONSIDERATIONS

### ⚠ WARNING

Avoid environmental degradation. Environmental factors such as an exposure to sunlight, dirt or gritty type matter and cyclical changes in temperature and humidity can result in an accelerated deterioration of synthetic slings. The rate of the deterioration will vary with the level of exposure to these conditions and with the thickness of the sling material. For example, single ply slings will generally degrade more rapidly with this exposure than multiple ply slings.

Visible indications of such deterioration can include the following:

- Fading of webbing color.
- Uneven or distorted surface yarn of the webbing.
- Shortening of the sling length.
- Reduction in elasticity and stretch of the sling material due to exposure to sunlight, often evident by an appearance of an accelerated, abrasive damage to the surface yarn of the sling.
- Breakage or damage to yarn fibers, often evident by a fuzzy appearance of the web.
- Stiffening of the web, which can become particularly evident when web slings are exposed to outdoor conditions without being used or cyclically tensioned.

Web slings that are used outdoors regularly should generally be permanently removed from service within a period of 2 to 4 years. All slings that are exposed to environmental degradation should be highly scrutinized during their inspections.

Slings used in environments where they are subject to continuous exposure to ultraviolet light or excessive environmental degradation, as determined by a qualified person should be proof tested to two times the Work Load Limit, semi-annually or more frequently depending on the severity of exposure.

### TEMPERATURE

Conventional synthetic products should never be used at temperatures above 194°F/90°C or below -40°F/-40°C. Temperature exposure outside the acceptable range must be considered and evaluated by a qualified person.

### ULTRAVIOLET (UV) LIGHT

Continuous exposure to sources of ultraviolet light affect the strength of synthetic products in varying degrees from slight to total degradation. Factors which play a part in the degree of strength loss are length of exposure, sling construction and design. Other environmental factors such as: weather conditions, elevation and geographic location also affect the degree of degradation. (See page 18 for additional information).

### STORAGE

When not in use, store slings in a cool, dry, dark location, free of mechanical and environmental damage. The storage location should be ventilated and not exposed to heat sources, chemical exposure, weld spatter, grit, grime, foreign materials and splinters from grinding or machining.

### CHEMICAL

Chemically active environments can affect the strength of synthetic products in varying degrees ranging from moderate to total degradation. Before slings are used, the chemical compatibility between the sling and the environment must be considered. Aluminum fittings should never be exposed to chlorine environments or cleaned with chlorine based cleaning solutions. Consult the sling manufacturer before purchase to evaluate chemical compatibility between slings, their components and the environment.

### MOISTURE ABSORPTION:

When nylon products are "wet" there is an approximate strength loss of 15%. This loss of strength is documented in the 1988 DuPont Technical Information Multifiber Bulletin X272, page 6. Nylon sling strength returns when the sling dries completely. Polyester and High Performance Fiber strength is unaffected by moisture absorption.



## MECHANICAL CONSIDERATIONS

### ⚠ WARNING

- Synthetic sling users shall be trained in the selection, inspection, cautions to personnel, effects of the environment and rigging practices.
- Select the sling having the most suitable characteristics for the type of load, hitch and environment.
- Slings that are damaged or defective shall not be used. Slings removed from service that are not capable of repair should be destroyed and rendered completely unfit for any future use.
- Slings shall be permanently marked. Slings with missing tags or illegible tag information shall not be used.
- The sling manufacturer shall complete and install the sling tag. The replacement of the sling tag is considered a repair, but will not require proof testing and certification.
- The sling tag should be maintained and kept legible during the life cycle of the sling by the sling user.
- Determine the weight of the load and make sure it does not exceed the sling's Work Load Limit or the capacity of any component in the rigging system.
- Slings shall not be loaded in excess of the Work Load Limits. Consideration should be given to the sling-to-load angle which affects sling Work Load Limits.
- Work Load Limits are based upon: material strength, design factor, type of hitch, angle of loading, the diameter and curvature that the sling contacts, and destruction testing done in laboratory controlled, testing conditions, which will never be duplicated during actual usage. Work Load Limits are also based on a moderately dynamic lifting or pulling operation. Instantaneous changes (rapid acceleration or sudden stopping) constitute hazardous shock loading and **WORK LOAD LIMITS AS STATED, DO NOT APPLY.**
- Work Load Limits for basket hitches and multi-leg bridle slings are based upon symmetrical loading of the individual legs. For non-symmetrical loads an analysis by a qualified person shall be done to avoid overloading any part of the sling system.
- Horizontal angles less than 30 degrees shall not be used, except as recommended and approved by a qualified person.
- The sling shall be securely attached to the load and rigged in a manner to provide load control. The sling must be rigged to prevent slipping and sliding across load edges.
- Basket hitches used at angles less than 60 degrees can cause slings to slip under tension, creating an unbalanced condition. Slings used in any hitch shall have the load balanced to prevent slippage.
- Sling users must determine the load's Center of Gravity (CG) to ensure the rigging system will be able to retain and control the load once lifted. Sling legs should contain or support the load from the sides above the Center of Gravity when using a basket hitch so the load will not tilt when lifted.
- Slings shall not be shortened, lengthened, tied in knots or joined by knotting. Methods not approved by the manufacture or qualified person shall not be used.
- Twisting and kinking the sling legs shall be avoided.
- Slings used in a choker hitch must be of adequate length for the choke action to occur on the sling body. The choke action should not occur on: the fitting or eye, at the base of the fitting or eye, on the load carrying splice or the sling tag.
- Slings used in a choker hitch shall not be forced to tighten around the load by pounding with hammers or other objects. Choker hitches are the least efficient way to use a sling based on Work Load Limit. Two slings should be used to balance the load. One sling used in a choker hitch may result in a situation where an unbalanced load could lead to an accident.
- A sling rigged in a choke hitch (not double wrapped) does not make full contact with the load. Use multiple slings and wrap the load, when practical to ensure full contact. Do not allow the slings to cross over each other.
- Keep the sling tags and labels away from the load, the hook and the choke action of the sling. Do not place the load carrying splice in a connection point to the load or in the lifting mechanism.
- Avoid side loading or edge loading slings. Ensure that both paths are loaded equally for Twin-Path® slings.



## MECHANICAL CONSIDERATIONS

### WARNING

- Slings shall always be protected from being cut or damaged by corners, edges, protrusions or abrasive surfaces by materials of sufficient strength, thickness and construction. Sling protection may not prevent cutting or other forms of sling damage. See pages 43-52 for additional information.
- Synthetic products stretch when the load is applied. Stretching can be reduced by using polyester slings, slings with larger Work Load Limits or by selecting a low elongation, High Performance Fiber, Twin-Path® Extra Sling.
- Do not accelerate or decelerate the load too fast. The “G” force on a dropped load could surpass the ultimate strength of the sling. A load picked up too fast can develop a stretch/friction/surface heat that can surpass the melting temperature of the sling.
- Synthetic slings shall not be constricted or bunched between the ears of a clevis or shackle or in a hook. When synthetic slings are used with a shackle, it is recommended that they be used (rigged) in the bow of the shackle. Placing synthetic slings on the pin should be avoided, unless the sling is protected.
- All hooks, shackles and other fittings must be free of damaging edges that could harm the sling.
- All loads applied to the lifting hook should be centered in the “bowl” of the hook to prevent point or tip loading.
- Avoid contacting and bending sling fittings over or across load edges.
- The opening in fittings should be of the proper shape and size to ensure that the fitting will seat properly in the lifting hook or other points of attachment.
- Fittings used in any sling system must be compatible, i.e., proper shape, size and diameter to prevent damage to the sling. The “sling-fitting” relationship must be proper to ensure that slings will “seat” properly and, in doing so, derive the greatest Work Load Limit. The overall assembly capacity shall be established as the lowest strength of any assembly component (sling, fitting, attachment, etc.)
- The use of improper fittings and/or materials may result in severe personal injury or death.
- Sling hardware or any object in the sling eye should not be wider than one-third the length of the sling eye.
- Slings shall not be dragged on the ground or floor, or drawn over abrasive surfaces.
- Slings shall not be pulled from under loads when the load is resting on the sling. If feasible, place blocks under the load to allow for removal of the sling.
- Loads resting on the sling could damage the sling.
- Synthetic slings should never be used to pull an object in a snagged or constrained condition or used for towing. Synthetic slings are designed to stretch; the recoil caused by any sudden release of a lifting constraint could result in a dangerous projection of the load.
- During the lift, with or without load, personnel shall be alert for possible snagging.
- Do not drop objects on slings or slings equipped with metal fittings.
- Do not run over slings with trucks or other equipment.
- Personnel should stand clear of the load and shall not ride the load.
- Personnel should never be under, next to or on a suspended load. Even if you take in account all factors and issues, things can still go wrong.
- Portions of the human body shall not be placed between the sling and load or between the sling and lifting hook.
- Synthetic slings shall not be used as bridles on suspended personnel platforms.
- Synthetic lifting slings shall not be used for fall prevention applications.





It is important to select slings and components possessing proper chemical characteristics, making them compatible with their environment. Nylon, Polyester, Aramid, Nomex®, Poly-Arylate (Liquid Crystal), Ultra High Molecular Polyethylene (UHMwPE) and K-Spec® fibers are ideal materials for synthetic slings because they offer varying degrees of resistance and compatibility with different chemical agents.

### PERFORMANCE CHARACTERISTICS OF SYNTHETIC FIBERS

#### NYLON

Nylon is popular and general purpose synthetic fiber which is unaffected by common grease and oil. Nylon products have good resistance to aldehydes, hydrocarbons, ethers and some alkalis, while degradation ranging from none to moderate occurs with exposure to certain alkalis. Nylon products are not suitable for use with acids and bleaching agents. Exposure can result in degradation from none to total. Dilute acids, such as, hydrochloric and sulfuric in 10% concentrations at room temperature cause significant strength loss in 10 hours.

Solvents for nylon include: concentrated formic acid, phenolic compounds and calcium chloride in methanol at room temperature, hot solutions of zinc chloride in methanol, benzyl alcohol at the boil, hot solutions of calcium chloride in: glacial acetic acid, ethylene chlorohydrins and ethylene glycol.

Nylon is not significantly affected by compounds of the following classes: alcohols, dry cleaning solvents, halogenated hydrocarbons, ketones, soaps and synthetic detergents or water (including sea water).

Nylon products lose 15% of their Work Load Limit when wet. The acceptable temperature exposure range is -40°F/-40°C to a maximum of 194°F/90°C. Stretch at Work Load Limit is approximately 8-10% for slings with treated webbing.

All webbing will become shorter, over time. Nylon webbing placed on a table, with no use, will shrink up to 5% in length after six months, as a result of the weave configuration. Dense weave webbing shrinks less than loose weave webbing. Nylon webbing will shrink more than polyester webbing. Other factors that affect shrinkage are humidity, temperature and usage.

#### POLYESTER

Polyester is not significantly affected by most compounds of the following classes: alcohols, dry cleaning solvents, halogenated hydrocarbons, ketones, soaps and synthetic detergents or water (including sea water). Polyester also has good to excellent resistance to aqueous solutions of most weak acids at the boil and to most acids at room temperature, but is disintegrated by concentrated sulfuric acid (95%) at room temperature and exposure to alkalis. Polyester products also have some resistance to most aqueous solutions at room temperature, but are degraded by the same solution at the boil. Oxidizing agents and bleaching treatments ordinarily used by the textile industry do not degrade polyester fiber. Stretch at Work Load Limit is approximately 5-7% for slings with treated webbing. Polyester does not lose strength as a result of moisture absorption. The acceptable temperature exposure range is -40°F/-40°C to a maximum of 194°F/90°C.

#### ARAMID

Aramid fibers are resistant to most weak acids, alkalis, ketones, alcohols, hydrocarbons, oils and dry cleaning solvents. Strong acids, bases and sodium hypo-chlorite bleach attack Aramid fibers, particularly at elevated temperatures and/or high concentrations. Stretch at Work Load Limit is approximately 1%.

#### K-SPEC®

K-Spec® is a combination of High Molecular Polyethylene and Aramid fibers. Stretch at Work Load Limit is approximately 1% and the acceptable temperature exposure range is -40°F/-40°C to a maximum of 180°F/82°C. K-Spec® core yarn strength retention is based on test results of components at 150°F/65°C (or less) for 6 months. K-Spec® has a 100% strength retention when exposed to: age, 10% detergent solution, rot and mildew, sunlight and toluene; 99% retention when exposed to: acetic acid, gasoline, hydrochloric acid 1m, hydraulic fluid, kerosene and sea water; 98% retention when exposed to: 25% ammonium hydroxide, 10% hypophosphite solution, and 40% phosphoric acid; 97% retention when exposed to sodium hydroxide 5m; 95% retention when exposed to Portland cement, and 88% retention when exposed to Clorox® bleach and nitric acid.



## PERFORMANCE CHARACTERISTICS OF SYNTHETIC FIBERS

### ULTRA HIGH MOLECULAR POLYETHYLENE (UHMwPE)

Resists many chemical agents and retained 100% of the original fiber strength when immersed for 6 months in the following:

- 1M Hydrochloric acid
- 5M Sodium Hydroxide
- Perchloroethylene
- Glacial acetic acid
- Ammonium Hydroxide (29%)
- Gasoline
- Toluene
- Kerosene
- Hypophosphite solution (10%)
- Sea water
- 10% detergent solution
- Hydraulic fluid

Clorox® degraded UHMwPE by approximately 10% after a 6 month immersion test.

Stretch at Work Load Limit is approximately 1% and maximum temperature exposure is 140°F/60°C.

### NOMEX®

Nomex® is resistant to most ketones, alcohols, dry cleaning solvents and many other organic solvents. Its acid resistance is superior to nylon, but is not as good as polyester. Nomex® shows good resistance to alkalis at room temperature, but is degraded by strong alkalis at higher temperatures.

Nomex® is compatible with fluorine-containing elastomers, resins and refrigerants at high temperatures and is resistant to fluorine compounds in concentrations usually encountered in stack gases from metallurgical and rock-processing operations.

The resistance of Nomex® to oxides of sulfur at temperatures above the acid dew point is superior to polyester. Below the dew point, concentrated sulfuric acid may condense on the fiber and cause a progressive loss of strength.

## FIBER CHARACTERISTICS

	Nylon	Polyester	Aramid	Poly-Arylate	UHMwPE	K-Spec®
<b>Fiber Properties</b>						
Tenacity - Dry G/D	7.5 - 10.5	7.0 - 10.0	28	26 - 29	35 - 40	35
Tensile 000 psi	113 - 158	123 - 176	90	424 - 525	397 - 546	472.5
Elongation at Break %	15 - 28	12 - 18	4.6	3.8	3.5 - 3.8	3.8
Moisture Regain %	4.0 - 6.0	<0.5	2	<0.10	0	0
Specific Gravity	1.14	1.38	1.38	1.41	.97	1.11
Bulk Strength	1.0	0.9	2.7	2.8	2.8	2.8
<b>Chemical Resistance</b>						
Solvents	Good	Good	Excellent	Excellent	Excellent	Excellent
Acids						
Dilute:	Good	Good	Good	Excellent	Excellent	Excellent
Concentrated:	Fair	Fair	Good	<90%	Excellent	Excellent
Alkalis						
Dilute:	Excellent	Good	Good	Excellent	Excellent	Excellent
Concentrated:	Excellent	Fair	Good	<30%	Excellent	Excellent
<b>Temperature Tolerance</b>						
Melt Point	425°F	490°F	900°F	625°F	300°F	320°F
	218°C	254°C	482°C	330°C	149°C	160°C

Please Note: Conventional Synthetics are not to be used at temperatures exceeding 194°F/90°C.

**ALWAYS FOLLOW RECOMMENDATIONS ON SLING WARNING TAG.**