

NYLON WEB SLING ENVIRONMENTAL CONSIDERATIONS & OUTDOOR USE

Exposure to sunlight, and other environmental factors such as dirt or gritty matter and cyclical changes in temperature and humidity, can result in an accelerated deterioration of web slings. The rate of this deterioration varies with the level of exposure and with the thickness of the sling material.

Visible indication of such environmental deterioration can include the following:

- Fading of webbing color
- Uneven or disoriented surface yarn of the webbing
- Shortening of the sling length
- Reduction in elasticity of the sling due to exposure to sunlight, often evident by accelerated abrasive damage to the surface yarns of the sling
- Breakage or damage to yarn fibers, often evident by a fuzzy appearance of the web
- Stiffening of the web, evident when web slings are exposed to outdoor conditions

Sunlight / UV Exposure Service Life Nylon and polyester web slings possess a limited useful outdoor service life due to the degradation caused by exposure to sunlight, or other measurable sources of UV radiation. Web slings that are regularly exposed to outdoor conditions should be identified with the date they are placed into service, and should be proof tested to twice their rated capacity every six months. Nylon and polyester web slings shall be permanently removed from service when the cumulative outdoor exposure has reached these limits:

Temperature

Nylon and polyester are seriously degraded at temperatures above 194°F

Chemical Environment Data Many chemicals have an adverse effect on nylon and polyester.

The Chemical chart below is a general guide only.

Elasticity - The stretch characteristics of web slings depends on the type of yarn and the web finish. Approximate stretch at RATED SLING CAPACITY is:

NYLON		POLYESTER	
Treated	10%	Treated	7%
Untreated	6%	Untreated	3%

Prior to sling selection and use, review and understand the "Help" section.

Sling Length Tolerance for Web Slings

Sling Type	Tolerance *
1 Ply	± (1.5" + 1.5% of sling length)
2 Ply	± (2.0" + 2% of sling length)
3 & 4 Ply	± (3.0" + 3% of sling length)

* For web sling widths wider than 6", add 1/2" to these values. For tighter tolerance or matched set length requirements, please consult with Customer Service.

CHEMICAL	OK NO	
	NYLON	POLYESTER
Acids		*
Alcohols		
Aldehydes		
Alkalis		
Bleaching Agents		
Dry Cleaning Solvents		
Ethers		
Halogenated Hydro-Carbons		
Hydro-Carbons		
Ketones		
Oils Crude		
Oils Lubricating		
Soap & Detergents		
Water & Seawater		
Weak Alkalis		

* Disintegrated by concentrated sulfuric acid.

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 slings 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 a significant loss in strength in 10 hours. Solvents for nylon include: • Concentrated formic acid • Phenolic compounds at room temperature • 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 Chlorohydrin • Ethylene Glycol Nylon is also 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 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 6-8%. 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 webbing shrinks less than a loose weave. Nylon will shrink more than polyester webbing. Other factors that affect shrinkage are humidity, temperature and usage.

OSHA GUIDANCE ON SAFE SLING USE

5) Synthetic Web Slings:

Synthetic web slings offer a number of advantages for rigging purposes. The most commonly used synthetic web slings are made of nylon- or polyester-type yarns ([Fig. 7](#)). They have the following properties in common:

- Strength,
- Convenience,
- Load protection, and
- Economy.

Each synthetic material has its own unique properties.

Certain synthetic materials perform better than others in specific applications and environments. Consult the sling manufacturer or a qualified person for a specific application or before using in and around chemical environments.

Synthetic webbing materials other than nylon and polyester are also used and the manufacturer should be consulted for specific data for proper use.

Identification:

New slings are marked by the manufacture to show:

- The rated load for each type of hitch, and
- The type of synthetic web material.

In addition, slings may be marked to show:

- The manufacturer's code or stock number, and
- The name or trademark of the manufacturer.

Rated loads:

Rated loads (capacities) for single-leg vertical, choker, basket hitches, and two-leg bridle slings are as shown in Tables [21](#) through [25](#).

For angles not shown, use the next lower angle or a qualified person to calculate the rated load. Rated loads are based on:

- Material strength,
- Design factor,
- Type of hitch,
- Angle of loading (see [Fig. 3](#)),
- Diameter of curvature over which the sling is used, and
- Fabrication efficiency.

Do not use horizontal angles less than 30 degrees except as recommended by the sling manufacturer or a qualified person.

The rated load for a sling in a choker hitch is the value in Tables [21](#) through [25](#), provided that the angle of the choke is 120 degrees or more (see [Fig. 2](#)). For angles of choke less than 120 degrees, use the reduced rated load values provided by the sling manufacturer or a qualified person. For other synthetic webbing materials and for configurations not shown, use the rated loads provided by the sling manufacturer or a qualified person.

Fittings:

Ensure that mechanical fittings used as part of a synthetic web sling meet the following:

- Materials are compatible with the mechanical and environmental requirements of the sling,
- Fittings have a rated load at least the same as the synthetic webbing sling,
- Fittings have sufficient strength to sustain twice the rated load of the sling without visible permanent deformation, and
- Surfaces are clean, and sharp edges are removed.

Inspections:

Designate a qualified person^[1] to inspect slings each day before use for damage or defects.

This qualified person also performs additional periodic inspections where service conditions warrant, as determined on the basis of:

- Frequency of sling use,
- Severity of service conditions,
- Nature of lifts being made, and
- Experience gained during the service life of slings used in similar circumstances.

Make periodic inspections of synthetic web slings at intervals no greater than 12 months. A good guide to follow includes:

- Yearly for normal service use,
- Monthly to quarterly for severe service use, and
- As recommended by a qualified person for special and infrequent service use.

Although OSHA's sling standard does not require you to make and maintain records of inspections, the ASME standard contains provisions on inspection records.^[3]

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, and
- 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.

Repairing/Reconditioning:

Do not use worn or damaged slings or attachments. Discard or repair them. Use damaged slings only after they are repaired, reconditioned, and proof tested by the sling manufacturer or a qualified person using the following criteria:

- Ensure that the manufacturer or a qualified person performs repairs,
- Ensure that repairs of hooks and fittings meet ASME B30.10 and B30.26,
- Do not repair cracked, broken, melted, or damaged webbing material,
- Do not repair load-bearing splices,
- Do not make any temporary repairs of synthetic webbings or fittings, and
- Mark repaired slings to identify who made the repairs.

Retain the certificates of proof test and make them available for examination.^[2]

Operating practices:

Do not use synthetic web slings with loads in excess of the rated load capacities described in the appropriate tables. Ensure that synthetic web slings have suitable characteristics for the type of load, hitch, and environment in which they will be used and that they are not used with loads in excess of the rated load capacities described in the appropriate tables. Consult the sling manufacturer or a qualified person for synthetic web slings not included in the tables. Follow other safe operating practices, including:

Sling Selection

- For multiple-leg slings used with nonsymmetrical loads, ensure that an analysis by a qualified person is performed to prevent overloading of any leg,
- Ensure that multiple-leg slings are selected according to Tables [21](#) through [25](#) when used at the specific angles given in the table. Ensure that operations at other angles are limited to rated loads of the next lower angle given in the table or calculated by a qualified person, and
- Ensure that the fitting is the proper shape and size to ensure that it is seated properly in the hook or lifting device.

Cautions to Personnel

- Ensure that all portions of the human body are kept away from the areas between the sling and the load and between the sling and the crane or hoist hook,
- Ensure that personnel never stand in line with or next to the legs of a sling that is under tension,
- Ensure that personnel do not stand or pass under a suspended load,
- Ensure that personnel do not ride the sling or the load, unless the load is specifically designed and tested for carrying personnel, and
- Do not use synthetic webbing slings as bridles on suspended personnel platforms.

Effects of Environment

- Store slings in an area where they will not be subjected to mechanical, chemical, or ultraviolet damage, or to extreme temperatures,
- When slings are exposed to extreme temperatures, follow the guidance provided by the sling manufacturer or qualified person.
- Consult the sling manufacturer for recommended inspection procedures when nylon or polyester webbing slings are extensively exposed to sunlight or ultraviolet light.

Rigging Practices

- Ensure that slings are hitched in a manner providing control of the load,
- Ensure that sharp edges in contact with slings are padded with material of sufficient strength to protect the sling,
- Ensure that slings are shortened or adjusted only by methods approved by the sling manufacturer or a qualified person,
- Ensure that, during lifting with or without a load, personnel are alert for possible snagging,
- Ensure that, in a basket hitch, the load is balanced to prevent slippage,
- When using a basket hitch, ensure that the legs of the sling contain or support the load from the sides, above the center of gravity, so that the load remains under control,
- Do not drag slings on the floor or over abrasive surfaces,
- Ensure that, in a choker hitch, the choke point is only on the sling body, never on a splice or fitting,
- Ensure that, in a choker hitch, an angle of choke less than 120 degrees is not used without reducing the rated load,
- Ensure that slings are not constricted, bunched, or pinched by the load, hook, or any fitting,
- Ensure that the load applied to the hook is centered in the base (bowl) of the hook to prevent point loading on the hook, unless the hook is designed for point loading,
- Ensure that an object in the eye of a sling is not wider than one-third the length of the eye,
- Do not shorten or lengthen a sling by knotting or twisting,
- Do not rest loads on the sling,
- Do not pull a sling from under a load when the load is resting on the sling,
- Do not allow shock loading, and
- Avoid twisting and kinking.

Proof testing:

Before initial use, ensure that all synthetic webbing slings incorporating previously used or welded fittings and all repaired slings are proof tested by the manufacturer or a qualified person.

Other new synthetic webbing slings and fittings need not to be proof tested, although the employer may require proof testing in purchasing specifications.

Environmental effects:

Temperature

Do not allow nylon and polyester slings to be used in contact with objects or at temperatures in excess of 194 degrees F (90 degrees C), or below minus 40 degrees F (minus 40 degrees C).

Sunlight & Ultraviolet

Long-term exposure to sunlight or ultraviolet radiation can affect the strength of synthetic webbing slings. Consult the sling manufacturer for proper retirement criteria for synthetic webbing slings subjected to long-term storage or use in sunlight.

Chemical

The strength of synthetic webbing slings can be degraded by chemically active environments. This includes exposure to chemicals in the form of solids, liquids, vapors or fumes. Consult the sling manufacturer before using slings in chemically active environments.