CONNECTICUT DEPARTMENT OF LABOR
Partner of the American Job Center Network

# CONN-OSHA QUARTERLY

February 2018

## *Slings and Wire Rope*

The ability to handle materials and move them from one location to another-is vital to all segments of industry. The handling and mishandling of these "materials" is perhaps, the single largest cause of accidents and injuries in the workplace. Whenever possible, mechanical means should be used to move materials to avoid employee injuries.

Slings are generally one of six types: chain, wire rope, metal mesh, natural fiber rope, synthetic fiber rope, or synthetic web. In general, use and inspection procedures tend to place these slings into three groups: chain, wire rope and mesh, and fiber rope web. Each type has its own particular advantages and disadvantages. Factors to consider when choosing the best sling for the job include the size, weight, shape, temperature, sensitivity of the material to be moved, as well as the environmental conditions under which the
sling will be used.

**Chains** are commonly used because of their strength and ability to adapt to the shape of the load. Care should be taken, however, when using alloy chain slings because sudden shocks will damage them. Misuse of chain slings could cause damage resulting in sling failure and possible injury to an employee. All sling types must be visually inspected prior to use. When inspecting alloy steel chain slings; pay special attention to any stretching, wear in excess of the allowances made by the manufacturer, nicks and gouges. These signs indicate that the sling may be unsafe and must be removed from service.

**Wire Rope** is composed of individual wires that have been twisted to form strands which are then twisted to form a wire rope. Some wire rope has a fiber core, making it more flexible but is less resistant to environmental damage. Conversely, a core that is made of a wire rope strand tends to have greater strength and is more resistant to heat damage.

When selecting a wire rope sling to give the best service, there are four characteristics to consider: strength, ability to bend without distortion, ability to withstand abrasive wear, and ability to withstand abuse.

1. The strength of a wire rope is a function of its size, grade, and construction. It must be sufficient to accommodate the applied maximum load.

2. Fatigue (Bending without Failure)- A wire rope must have the ability to withstand repeated bending without the wires failing from fatigue

3. Abrasive Wear-The ability of a wire rope to withstand abrasion is determined by the size, number of wires, and construction of the rope.

4. Abuse-All other factors being equal, misuse or abuse of wire rope will cause a wire rope sling to become unsafe long before any other factor. Abusing a wire rope sling can cause serious structural damage such as kinking or bird caging, which reduces the strength of the wire rope

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## The Impact of Opioid Abuse on Employers

Approximately 21.7 million adults received substance abuse treatment in 2015, and many of those were workers struggling to maintain their livelihoods as a functional part of the workforce. Data from the National Safety Council reveal that, while 70% of employers report being impacted by prescription drug misuse, approximately 80% of employers lack a comprehensive drug-free workplace policy and/or training on identifying substance abuse in the workplace.


The Connecticut Department of Public Health Occupational Health Program organized two conferences in 2017 with 250 stakeholders with addiction specializations that included worker injury prevention, treatment/recovery, pain management/alternative strategies, human resources, Workers' Compensation, medical insurance providers, and Employee Assistance Programs to highlight the issues around opioid misuse and other substance abuse in Connecticut workplaces.

Findings from these symposiums will be summarized in a white paper and made available to CT Employers this spring. The overarching theme of the white paper was the rethinking of employer strategies for dealing with substance use/abuse issues in their workplaces.

For more information contact Deborah Pease at Deborah.pease@ct.gov or visit the Occupational Health Program at http://www.ct.gov/dph/occupationalhealth.

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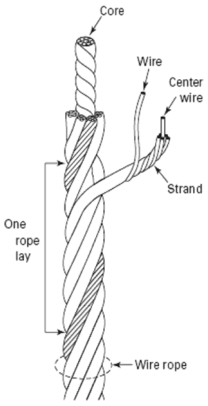
**Wire Rope Sling Inspection** Wire rope slings must be visually inspected before each day's use. The operator should check the twists or lay of the sling. If ten randomly distributed wires in one lay are broken, or five wires in one strand of a rope lay are damaged, the sling must not be used. It is not sufficient, however, to check only the condition of the wire rope. End fittings and other components should also be inspected for any damage that could make the sling unsafe.

To ensure safe sling usage between scheduled inspections, all workers should participate in a safety awareness program. Each operator should keep a close watch on those slings he or she is using. If any accident occurs, the operator should immediately shut down the equipment and report the accident to a supervisor. The cause of the accident should be determined and corrected before resuming operations.

**Importance of the Operator** The operator must exercise intelligence, care, and common sense when selecting and using slings. Slings must be selected in accordance with their intended use, based upon the size and type of load, and the environmental conditions of the workplace. All slings must be visually inspected before use to ensure their effectiveness.




**Field Lubrication and Storage** Although every rope sling is lubricated when manufactured, it also must be lubricated "in the field" to increase the sling's useful service life. Wire rope slings should be stored in a well-ventilated, dry building or shed. To avoid corrosion and rust, never store wire rope slings on the ground or allow them to be continuously exposed to the elements.

Note: Using the sling several times a week, even with light loads, is a good practice. Records show that frequently or continuously used slings give useful service far longer than idle ones.

**Discarding Slings** Here are some factors that indicate when a wire sling needs to be discarded:

- Severe corrosion,
- Localized wear (shiny worn spots) on the outside,
- A one-third reduction in outer wire diameter,
- Damage or displacement of end-fittings-hooks, rings, links, or collars-by overload or misapplication,
- Distortion, kinking, bird caging, or other evidence of damage to the wire rope structure, or
- Excessive broken wires.

**Fiber Rope and Synthetic Web** slings are used primarily for temporary work, such as construction and painting jobs, and in marine operations. They also are the best choice for use on expensive loads, highly finished parts, fragile parts, and delicate equipment. Fiber Rope Slings begin to deteriorate on contact with acids and caustics. Fiber ropes slings, therefore, must not be used around these substances unless the manufacturer recommends them for that use.

**Fiber Rope Sling Inspection** When inspecting a fiber rope sling, look first at its surface. Look for cuts, gouges, or worn surface areas; dry, brittle, scorched, or discolored fibers; or melting or charring of any part of the sling. If any of these conditions are found, the supervisor must be notified and a determination made regarding the safety of the sling. If the sling is found to be unsafe, it must be discarded. Next, check the sling's interior. It should be as clean as when the rope was new. A buildup of powder like sawdust on the inside of the fiber rope indicates excessive internal wear and that the sling is unsafe. Finally, scratch the fibers with a fingernail. If the fibers separate easily, the fiber sling has suffered some kind of chemical damage and must be discarded.

**Synthetic Rope and Web Slings** The most commonly used synthetic web slings are made of nylon, polypropylene, and polyester. They have the following properties in common:

- Strength--can handle a load of up to 300,000 pounds.
- Convenience-can conform to any shape.
- Safety-will adjust to the load contour and hold it with a tight, non-slip grip.
- Load protection-will not mar, deface, or scratch highly polished or delicate surfaces.
- Long life-are unaffected by mildew, rot, or bacteria; resist some chemical action; and have excellent abrasion resistance.
- Economy-have a low initial cost plus a long service life.
- Shock absorbency--can absorb heavy shocks without damage.
- Temperature resistance-are unaffected by temperatures up to 180° Fahrenheit.

Because each synthetic material has unique properties, it should be used according to the manufacturer's instructions, especially when dealing with chemically active environments.

**Possible Defects** Synthetic web slings must be removed from service if any of the following defects exist:

- Acid or caustic burns,
- Melting or charring of any part of the surface,
- Snags, punctures, tears, or cuts,
- Broken or worn stitches,
- Wear or elongation exceeding the amount recommended by the manufacturer, or distortion of fittings.

**Safe Lifting Practices** Once a sling has been selected and inspected prior to use, the next step is learning how to use it safely. There are four primary factors to consider when safely lifting a load. They are (1) the size, weight, and center of gravity of the load; (2) the number of legs and the angle the sling makes with the horizontal line; (3) the rated capacity of the sling; and (4) the history of the care and usage of the sling.

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1. The size, weight, and center of gravity of an object is that point at which the entire weight may be considered as concentrated. To make a level lift, the crane hook must be directly above this point. While slight variations are usually permissible, if the crane hook is too far to one side of the center of gravity, dangerous tilting will result causing unequal stresses in the different sling legs. This imbalance must be compensated for at once.

2. Number of Legs and Angle with the Horizontal; As the angle formed by the sling leg and the horizontal line decreases, the rated capacity of the sling also decreases. In other words, the smaller the angle between the sling leg and the horizontal, the greater the stress on the sling leg and the smaller (lighter) the load the sling can safely support. Larger (heavier) loads can be safely moved if the weight of the load is distributed among more sling legs.

3. Rated Capacity of the Sling The rated capacity of a sling varies depending upon the type of sling, the size of the sling, and the type of hitch. Operators must know the capacity of the sling. Charts or tables that contain this information generally are available from sling manufacturers. The values given are for new slings. Older slings must be used with additional caution. Under no circumstances shall a sling's rated capacity be exceeded.

4. History of Care and Usage The mishandling and misuse of slings are the leading cause of sling-related accidents. The majority of injuries and accidents, however, can be avoided by becoming familiar with the essentials of proper sling care and use. Proper care and use are essential for maximum service and safety. Slings must be protected with cover saddles, burlap padding, or wood blocking as well as from unsafe lifting procedures such as overloading to prevent sharp bends and cutting edges.

**Maintenance of Sling Chains** Chain slings must be cleaned prior to each inspection, as dirt or oil may hide damage. The operator must be certain to inspect the total length of the sling, periodically looking for stretching, binding, wear, or nicks and gouges. If a sling has stretched so that it is now more than three percent longer than when it was new, it is unsafe and must be discarded.

Binding is the term used to describe the condition that exists when a sling has become deformed to the extent that its individual links cannot move within each other freely. It indicates that the sling is unsafe. Generally, wear occurs on the load-bearing inside ends of the links. Pushing links together so that the inside surface becomes clearly visible is the best way to check for this type of wear. Wear may also occur, however, on the outside of links when the chain is dragged along abrasive surfaces or pulled out from under heavy loads. Either type of wear weakens slings and makes accidents more likely.

Heavy nicks and/or gouges must be filed smoothly, measured with calipers, and then compared with the manufacturer's minimum allowable safe dimensions. When in doubt, or in borderline situations, do not use the sling. In addition, never attempt to repair the welded components on a sling. If the sling needs repair of this nature, the supervisor must be notified.

**Wire Rope** Wire rope slings, like chain slings, must be cleaned prior to each inspection because they are subject to damage hidden by dirt or oil. In addition, they must be lubricated according to manufacturer's instructions. Lubrication prevents or reduces corrosion and wear due to friction and abrasion. Before applying any lubricant, however, the sling user should make certain that the sling is dry. Applying lubricant to a wet or damp sling traps moisture against the metal and hastens corrosion.

Corrosion deteriorates wire rope. It may be indicated by pitting, but it is sometimes hard to detect. If a wire rope sling shows any sign of significant deterioration, that sling must be removed until can be examined by a person who is qualified to determine the extent of the damage.

By following the above guidelines to proper sling use and maintenance, and by the avoidance of kinking, it is possible to greatly extend the useful service life of a wire rope sling.

**Fiber and Synthetic Ropes** Fiber ropes and synthetic webs are generally discarded rather than serviced or repaired. Operators must always follow the manufacturer's recommendations.

There are good practices to follow to protect yourself while using slings to move materials. First, accept the responsibility for your own actions. Become a competent and careful employee. Your own life or that of your fellow workers or others may depend on it. Second, learn as much as you can about the materials with which you will be working. Slings come in many different types, one of which is right for your purpose. Third, analyze the load to be moved-in terms of size, weight, shape, temperature, and sensitivity then choose the sling which best meets those needs. Fourth, always inspect all the equipment before and after a move. Always be sure to give equipment whatever "in service" maintenance it may need. Fifth, use safe lifting practices. Use the proper lifting technique for the type of sling and load.

The information for this article has been taken from the OSHA publication entitled Sling Safety OSHA 3072 1996 (Revised). To view the publication in its entirety:
https://www.osha.gov/Publications/osha3072.html

***Fatality & Casualty Reporting***

**State & Town:** CONN-OSHA (860) 263-6946 (local) or 1-866-241-4060 (toll-free)
**Private Employers:** Report to Federal OSHA at 1-800-321-OSHA(6742)

## *Hazard Corner...*

A construction worker was crushed by a load of steel beams that fell from a crane hook when the nylon slings to which they were rigged failed. The decedent was following the load after rigging it to the hook of a 450-ton crane.

The site was in the early stages of construction and work had just been completed on the earth excavation for the basement portion of the building. Because of limited space, staging of construction material was minimal and had to be strategically placed so as not to interfere with work progression. An empty lot several blocks away was used as the major staging area. The major pieces of equipment on the construction site at the time of the incident were a 450-ton crawler crane with a 160-foot lattice boom, and a smaller mobile crane with a telescopic boom.

On the day of the incident, two trucks loaded with steel arrived at the construction site. One truck was sent to the staging area and the other truck went into the construction site to be unloaded. Two construction workers, employed by a sub-contractor were assigned the task of unloading the truck of structural steel by rigging it to the hook of the 450-ton crane.

A senior supervisor for the sub-contractor advised the construction workers of the lifting and rigging plan. Five separate picks of steel, using nylon slings to choke the load, were to be made. The crane, operated by an employee of the crane company, was to pick the load up and over the mobile crane and place the load in the staging area directly on the west side of the mobile crane. The rigging consisted of two wire rope slings already attached to the cranes load block. These wire rope slings were 15 to 20 feet long. Shackled in series to the wire rope slings were two 30 feet long, four inch wide, double eye type nylon slings. The load was choked by encircling the load of steel with the free end of the nylon slings, then threading a shackle through the vertical and free end of the sling. The load rating on the slings indicate that they had a capacity of 6,900 pounds rigged as a choker hitch. The screw pin anchor shackles used as part of the choker hitch were both rated for 17,000 pounds. A visual inspection of the slings prior to use by one of the construction workers found them to be in near new condition. The first load of steel was approximately 8,777 pounds. The second load weighed approximately 8,000 pounds. These loads were well within the rigging capacity. The employees then rigged the remaining steel as one load instead of three separate loads. This load weighed approximately 24,480 pounds. The pull angle on the slings was also increased due to the longer base of the channels. As this lift progressed, nothing appeared wrong to those involved. The lift was near its maximum radius when a "panging" noise was heard. At this point, one of the slings failed. The load dropped and buried the decedent, who was beneath the load, as he followed its descent to the staging area.

- Ensure that nylon slings are not overloaded.
- Ensure chafing material is used to protect nylon slings from sharp edges.
- Ensure that all elevated loads are controlled with tag lines.
- Ensure crane operators making lifts are aware of the rating capacity of the rigging devices used to lift the load.

## *Electronic submission of Injury and Illness Records*

All Public employers and Private employers who are covered by this requirement can now begin to electronically report their Calendar Year (CY) 2017 Form 300A data to OSHA; this data must be submitted by July 1, 2018. Employers can view their submitted CY 2016 Form 300A summary information, but they cannot edit or submit additional 2016 data on this website. OSHA is not accepting Form 300 and 301 information at this time.

The posting period of Form 300A began on February 1 and will continue until April 30th.

## *CONN-OSHA~ Training Update...*

OSHA Recordkeeping March 6, 2018 from 9:00 a.m. to noon This interactive session will discuss the rules and ensure confidence that you have properly recorded and reported occupational injuries and illnesses, including how to fill out the OSHA 300 Log of Work-Related Injuries and Illnesses accurately and correctly. The new electronic reporting requirements will also be discussed.

Construction Site Safety April 12, 2018 from 9:00 a.m. to noon Construction managers, first line supervisors, and construction employees will be provided with an overview of four areas of concern on the construction site: fall protection, scaffolding and ladders, electrical hazards and trenching safety.

Work Zone Safety May 1, 2018, from 10:00 a.m. to noon Basic guidelines for work zone traffic control and the requirements of Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) with particular emphasis on short term work sites on roads and streets in rural and small urban areas will be presented.

Breakfast Roundtable This discussion group meets the third Tuesday of every month from 8:15 am to 9:45 am. Pre-registration is required. Visit our web page for more information: http://www.ctdol.state.ct.us/osha/Breakfast/index.htm To be placed on the e-mail distribution list, contact John Able at John.able@ct.gov

Classes are free and are held at 200 Folly Brook Boulevard, Wethersfield, CT in Conference Room A/B (unless otherwise noted). To register, contact Catherine Zinsser at catherine.zinsser@ct.gov Pre-registration is required. A Photo I.D. is also required to allow entry into a public building. For more training information, visit the CONN-OSHA web site www.ConnOsha.com