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SLING SAFETY GUIDELINES

1.0 Introduction

1.1 Purpose

The purpose of these guidelines is to establish safe work practices to protect all Emory employees, students, visitors, and contractors from workplace hazards associated with the use of slings as prescribed in the Occupational Safety and Health Administration (OSHA) Standard - 29 CFR 1910.184 Slings. While some entities and/or divisions of Emory may have additional or more stringent guidelines, the guidelines outlined in this document shall serve as the minimum requirements for all.

1.2 Scope

These guidelines are inclusive of Emory employees, including Emory Healthcare (EHC), faculty, staff, students, contractors, and other people who work with or in close proximity to slings. A sling is an assembly that connects the load to the material handling equipment. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope, and synthetic web.

1.3 Definitions

Basket Hitch. A sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes, or handles on the hook or a single master link.

Braided wire rope. A wire rope formed by plaiting component wire ropes.

Competent 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

Equivalent Entity. A person or organization which, by possession of equipment, technical knowledge, and skills, can perform with equal competence the same repairs and tests as the person or organization with which it is equaled.

Hitch. A sling configuration whereby the sling is fastened to an object or load, either directly to it or around it.

Proof Load. The load applied in performance of a proof test

Proof Test. a nondestructive tension test performed by the sling manufacturer or equivalent entity to verify construction and workmanship of a sling.

Rated capacity or working load limit. The maximum working load permitted.

Selvage edge. The finished edge of synthetic webbing designed to prevent unraveling.

Shock loading. Sudden application of the weight of the load.

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Only designated and properly trained personnel are permitted to operate a sling. Training includes a review of the following information, as well as any manufacturer information or required training related to the equipment being used.

1.5 Person Protective Equipment (PPE) Requirements

Personnel operating slings should wear the appropriate personal protective equipment.

- Head protection – hard hats.
- Foot protection – safety shoes with metatarsal protection.
- Hand protection – work gloves.
- Eye protection – safety glasses.
- Any other PPE deemed necessary for the area and work conditions.

2.0 General Requirements

- Select the appropriate sling for its intended use, based on the size of the load and workplace environment.
- Do not use worn or damaged slings until repaired and sufficiently proof tested by the manufacturer.
- Do not shorten slings with knots, bolts, or other makeshift equipment.
- Ensure sling legs are free of any kinks.
- Ensure that the rated load of the sling is clearly marked and/or labeled.
- Do not load slings in excess of the rated capacity.
- Securely attach slings to their loads.
- Balance loads in slings used in a basket hitch to prevent slippage.
- Pad or protect slings from any sharp edges within the load.
- Keep suspended loads clear of obstructions.
- Keep all personnel clear of suspended loads and loads about to be lifted.
- Shock loading is prohibited.
- Keep hands and fingers safely free of the sling while being tightened around a load.
- Do not pull a sling from under a load while the load is resting on the sling.

3.0 Inspections

- Inspections must be conducted by a competent person designated by the supervisor.
- Ensure that slings are cleaned prior to each inspection, as dirt or oil may hide damage.
- Prior to each use of a sling, conduct a visual inspection of the sling and all fastenings and attachments. The visual inspection checks the entire length of the sling for signs of damage and/or defects that could interfere with proper operation.
- Conduct additional inspections during sling use as needed.
- Immediately remove damaged or defective slings from service.

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4.0 Alloy Steel Chain Slings

Chains are commonly used because of their strength and ability to adapt to the shape of the load and are the best choice for lifting materials that are very hot. Exercise caution when using alloy chain slings because they are subject to damage by sudden shocks. Improper use of chain slings could damage the sling, resulting in sling failure and potential injury.

- Permanently remove alloy steel chain slings from service if heated above 1000 °F. When exposed to temperatures above 600 °F, reduce the maximum load limits according to manufacturer's recommendations.
- Affix identification on alloy steel chain slings stating the size, grade, rated capacity, and reach.
- Ensure that all attachments, including hooks, rings, links, or other attachments, have a rated capacity at least equal to that of the sling on which they are being used. Makeshift attachments are not permitted.
- Thoroughly inspect alloy steel chain slings at least every 12 months.
- The frequency of this inspection is determined based on the frequency of use, severity of service conditions, nature of lifts, and experience with the life of other slings used under similar circumstances.
- This inspection must be conducted by a designated competent person.
- Thoroughly examine the equipment for signs of wear, defective welds, deformation, and increase in length.
- Maintain a record of inspections and keep records readily available.
- If any deterioration or defect is found, immediately remove the sling from service.
- Before using a sling that is new, repaired, or reconditioned the sling must be proof tested by the manufacturer or equivalent identity. Maintain a certificate of the proof test.

5.0 Wire Rope Slings

Wire rope is composed of individual wires that have been twisted to form strands, which are then twisted to form a wire rope. Wire rope with a fiber core is usually more flexible but susceptible to environmental damage. Wire rope with a core made of a wire rope strand has greater strength and is more resistant to heat damage. When selecting the proper wire rope sling, consider the strength, ability to withstand repeated bending, ability to withstand abrasive wear, and ability to withstand misuse.

- Permanently remove fiber core slings from service if heated above 200 °F. When nonfiber core slings are used at temperatures above 400 °F or below -60 °F, follow manufacturer's recommendations for use at that temperature.
- Store in a well-ventilated, dry area. Wire rope slings are susceptible to rust and corrosion and must be protected from the elements.
- Lubricate wire rope slings periodically to prevent corrosion and wear due to friction.
- Perform welding of end attachments prior to sling assembly.
- Do not use welded end attachments unless proof tested at twice their rated capacity. Maintain a record of the proof test.
- Immediately remove wire rope slings from service if any of the following conditions are present:

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- Ten randomly distributed broken wires are present in one rope lay, or five broken wires in one strand in one rope lay.
- Wear or scraping of one-third the original diameter of outside individual wires.
- Kinking, crushing, bird caging, or any other damage resulting in distortion of the wire rope structure.
- Evidence of heat damage.
- End attachments are worn, cracked, deformed, or damaged.
- Hooks have been opened more than 15 percent of the normal throat opening measured at the narrowest point.
- Corrosion of the rope or end attachments.

6.0 Metal Mesh Slings

Metal mesh slings are widely used in metalworking and in other industries where loads are abrasive, hot, or will tend to cut web slings. Unlike nylon and wire rope slings, metal mesh slings resist abrasion and cutting. These slings grip the load firmly without extensive stretching, easily maintaining balanced loads. However, they are susceptible to rust, corrosion, and chemical exposure. Metal mesh slings can also damage the surface of the load.

- Only use metal mesh slings not impregnated with elastomers in a temperature range from -20 °F to 550 °F. Only use metal mesh slings impregnated with polyvinyl chloride or neoprene in a temperature range from 0 °F to 200 °F.
- Ensure handles have a rated capacity at least equal to the metal fabric and show no deformation after proof testing.
- Join fabric and handles so that the rated capacity is not reduced, the load is evenly distributed across the fabric, and sharp edges will not damage the fabric.
- Do not use coatings that may diminish the rated capacity.
- Ensure that all new and repaired slings are proof tested by the manufacturer to a minimum of 1 ½ times their rated capacity. Maintain a record of the proof test.
- Repairs must be made by the manufacturer or equivalent identity. Maintain records of all repairs.
- Immediately remove metal mesh slings from service if any of the following conditions are present:
 - A broken weld or broken brazed joint along the sling edge.
 - Reduction of wire diameter of 25% due to abrasion or corrosion.
 - Lack of flexibility.
 - Any damage or distortion of the sling or handles.

7.0 Natural and Synthetic Fiber Rope Slings

Natural and synthetic fiber rope slings are used primarily for temporary work, such as construction and painting jobs. Fiber rope slings are pliant, grip loads well, and do not mar the surface of the load. However, they can be susceptible to damage from chemicals and prolonged exposure to sunlight.

- Use natural and synthetic fiber rope slings in a temperature range from -20 °F to 180 °F, except for wet or frozen slings. Follow manufacturer's

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recommendations for use outside of this range.

- Only use spliced slings if they have been spliced in accordance with the following minimum requirements as well as any manufacturer recommendations:
 - In manila rope, eye splices shall consist of at least three full tucks and with short splices at least six full tucks.
 - In synthetic fiber rope, eye splices shall consist of at least four full tucks and with short splices at least eight full tucks.
 - Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. The tails shall extend a minimum of six inches beyond the last full tuck.
 - Fiber rope slings shall have a minimum clear length of rope between eye splices equal to ten times the rope diameter.
 - Do not use knots in lieu of splices.
 - Only use clamps designated for fiber ropes.
 - For all eye splices, the eye shall be of such size to provide an included angle no greater than 60 degrees at the splice.
 - Ensure that end attachments with sharp edges or projections are not in contact with the rope.
 - Only use fiber rope slings made from new rope.
 - Immediately remove fiber rope slings from service if any of the following conditions are present:
 - Abnormal wear.
 - Powdered fiber between strands.
 - Broken or cut fibers.
 - Variations in the size or roundness of strands.
 - Discoloration or rotting.
 - Distortion of hardware.

8.0 Synthetic Web Slings

The most commonly used synthetic web slings are made of nylon, Dacron®, and polyester. Synthetic web slings are versatile because of their strength, ability to conform to any shape, non-slip grip, resistance to corrosion and abrasion, shock absorbency, and temperature resistance.

- Do not use synthetic web slings of polyester and nylon in temperatures above 180 °F. Do not use polypropylene web slings at temperatures above 200 °F.
- Ensure that synthetic webbing is of uniform thickness and width.
- Ensure that fittings are of a minimum breaking strength equal to that of the sling and free of sharp edges.
- Only attach end fittings and form eyes by stitching. Ensure that the thread contains a sufficient number of stitches to develop the full breaking strength of the sling.
- Do not use synthetic web slings in areas where fumes, vapors, sprays, mists or liquids of acids, caustics, or phenolics are present.
- Repairs must be made by the manufacturer or equivalent identity. Maintain a record of all repairs.
- Ensure that repaired slings are proof tested by the manufacturer to twice the

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rated capacity before returning to service. Maintain a record of the proof testing.

- Immediately remove synthetic rope slings from service if any of the following conditions are present:
 - Acid or caustic burns.
 - Melting or charring of any part of the sling surface.
 - Snags, punctures, tears, or cuts.
 - Broken or worn stitches.
 - Distortion of fittings.

9.0 References

- [Occupational Health and Safety Administration \(OSHA\) Slings - 29 CFR 1910.184.](#)
- [OSHA Personal Protective Equipment - 29 CFR 1910.132-138.](#)
- American National Standard for Occupational and Educational Personal Eye and Face Protection Devices ANSI Z87.1 (current).
- Standard Specification for Performance Requirements for Foot Protection ASTM F2413-05 (current).
- American National Standard for Industrial Head Protection ANSI/ISEA Z89.1 (current).