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SAFETY POLICY & PROCEDURE

Slings

SPP#1910.184

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1.0 Purpose

The purpose of this safety policy and procedure is to establish the methods and guidelines for the safe use of slings throughout the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Slings, a component of hoisting and rigging systems, are used to lift and move loads. In NCDOT, alloy steel chain, wire rope, metal mesh, natural and synthetic fiber rope, and synthetic web slings are typically used.

This safety policy and procedure provides guidelines for implementing an effective safe sling use program. It includes provisions for training, recognizing the types of slings used in NCDOT, understanding the attachments used with slings, and inspecting slings. Additionally, it presents information on sling repair requirements and subsequent removal from service.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who uses slings and sling products to lift, secure, and move loads.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.184).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public.

Therefore, to minimize and eliminate material lifting hazards, properly rated slings that are not damaged or defective will be used in NCDOT. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Slings will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Scaffolds. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to their supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Slings.

6.1 Definitions

Angle of Loading

The acute angle between the sling leg and the plane perpendicular to the direction of applied force.

Basket Hitch

A method of rigging a sling in which the sling is passed around the load, and both eye openings or end fittings are attached to a hook or load handling device..

Braided Wire Rope

A wire rope formed by plaiting component wire ropes.

Bridle Wire Rope Slings

A sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook.

Cable-Laid Rope

A wire rope composed of six wire ropes wrapped around a fiber or wire rope core.

Cable-Laid Rope Sling - Mechanical Joint

A wire rope sling made from a cable laid rope with eyes fabricated by pressing or swagging one or more metal sleeves over the rope junction.

Choker Hitch

A sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling attached to a hook or load handling device.

Hitch

A method of rigging (attaching) a sling temporarily to a load or object for the purpose of load handling.

Master Coupling Link

An alloy steel welded coupling link used ~~as an intermediate link~~ to join alloy steel chain to master link.

Master Link

A forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling.

Proof Load

The specific load applied in the performance of a proof test.

Proof Test

A nondestructive tension test of the sling or components.

Rated Capacity

The working load limit or the maximum load to which equipment will be subjected.

Reach

The effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component.

Selvage Edge

The finished edge of synthetic webbing designed to prevent unraveling.

Sling

An assembly which connects the load to the material handling equipment.

Sling Manufacturer

A person or organization that assembles sling components into their final form for sale to users.

Strand-Laid Rope

A wire rope made with six or eight strands wrapped around a fiber core, wire strand core, or independent wire rope core.

Vertical Hitch

A method of supporting a load by a single vertical part or leg of the sling.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Slings
- Attachments
- Inspections
- Repairs
- Removal from Service

6.2.1 Training

Employees who use slings will be trained in:

- Types of slings
- Applications and limitations of the various types of slings
- Inspection procedures for slings
- Removal of slings from service

These employees will be trained upon initial employment or upon new job assignment. Subsequent training will be determined by the employee's supervisor.

6.2.2 Slings

All slings must have legible labels or tags indicating the manufacturer's name, rated capacity, identification number, size, reach and number of legs if more than one. If label or tags become illegible labels can be replaced if feasible or sling should be replaced. Unlabeled slings must be removed from service and replaced.

Several types of slings are used throughout NCDOT and include:

- Alloy Steel Chain Slings
- Wire Rope Slings
- Natural and Synthetic Fiber Rope Slings
- Synthetic Web Slings

Sling selection for a particular task is based on:

- Rated capacity of the sling
- Nature of the task
- Amount of weight required to be lifted, hoisted or moved

The user should determine that the sling is being used in accordance with rated capacity as listed in the manufacturer's catalog. See Appendix A for slings' safe operating practices.

The alloy steel chain, wire rope and fiber rope slings are typically used where sling damage to a load is not critical. Synthetic web slings are ideal where sling damage to a load is not acceptable.

Wire rope slings applications are illustrated in Figure 1.

They must be proof-tested by the manufacturer to ensure quality. Wire rope slings must have tag or label listing load capacity, manufacture name, length and identification number.

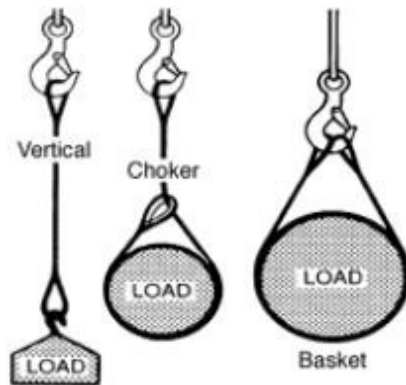


Figure 1

Synthetic fiber rope slings are other alternative materials that combine strength with ease of handling in Figure 2.



Figure 2

Synthetic web slings are illustrated in Figure 3. They must be marked or coded to show the rated capacities for each type of hitch, type of web material and manufacturer. Additionally, synthetic web slings must not be exposed to fumes, acids, phenolics or caustics.

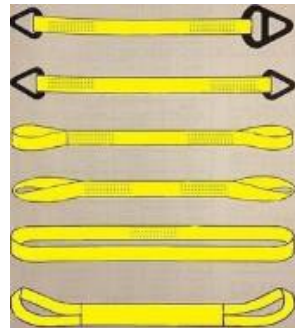


Figure 3

6.2.3 Attachments

All attachments including hooks, rings, oblong links, pear shaped links, and welded link components will be rated at least at the capacity of the sling itself. All hoist hooks shall have operable latches for securing slings to the hook.

Makeshift links or other shop fabricated attachments will not be used. Slings twisted more than 10 degrees from the plane of the unbent hook will not be used.

6.2.4 Inspections

Slings will be inspected each day prior to use. If any damage or defects are found, the sling shall be removed from service and replaced.

Alloy chain slings will be inspected every six months by a supervisor or designated employee for wear and defects in composition and welds. This inspection will consider not only the physical aspects, but also the total service life of the slings. This inspection will be recorded and maintained on file with the date of the inspection and the name and signature of the employee performing the inspection.

Appendices C through F present inspection procedures and forms for wire rope, wire rope slings, chains, and chain slings. These detailed procedures and forms provide an effective way to inspect and document the condition of slings in your facilities.

6.2.5 Sling Repair

If the slings are believed to be repairable, then those slings will be returned to the sling manufacturer for repairs. The manufacturer must proof- test all repaired slings before they are accepted for reuse. Under no circumstances will employees attempt to repair slings for reuse.

Broken links or attachments on steel alloy chain slings will not be repaired using mechanical coupling links. Additionally, any sling with temporary repairs will not be used.

6.2.6 Removal from Service

If slings are damaged or defective, they shall not be used and removed from service. Slings that are repairable shall be sent to sling manufacture for repair and proof tested. If these slings are not repairable, they will be permanently removed from service and replaced. Appendix G lists the conditions that must be present to remove any sling from service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring adequate funds are available for the purchase of slings for their areas.

They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also audit their safe sling use program to ensure effective implementation with this safety policy and procedure.

6.3.2 Supervisors

Supervisors or a designated employee will inspect and document all slings in their work area for wear and for defects in composition and welds every 12 month. Supervisors will ensure that defective or damaged slings are removed from service and replaced.

Supervisors will also ensure that employees are provided with the appropriate Personal Protective Equipment (PPE) as necessary for their job (e.g., foot, hand, or eye protection as necessary).

Employees

Employees shall be trained in proper use and inspection of slings. Additionally, employees shall report all damaged slings and/or unsafe conditions to their supervisors.

Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Additionally, Safety and Risk Management will assist in developing or securing the required training.

Division Safety Staff will provide training and audit assistance to ensure the safe use of slings. If needed, Safety & Risk Management will provide consultative support.

APPENDIX A: Safe Sling Operating Practices

The following safe operating practice will be followed when using Slings:

- Slings damaged or defective shall not be used and will be removed from service.
- Slings will not be shortened with knots or bolts or other makeshift devices.
- Sling legs will not be kinked.
- Slings will not be loaded beyond their rated capacity.
- Slings used in a basket hitch will have the loads balanced to prevent slippage.
- Slings will be securely attached to their loads.
- Slings will be padded or protected from the sharp edges of loads.
- Suspended loads will be kept clear of obstructions.
- All employees will be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers will be kept clear of loads and not placed between the load and the strap.
- Shock loading is prohibited. Slings should be raised and lowered slowing to avoid shock loading.
- Slings will not be pulled from under the load while load is resting on the sling.
- Never load a sling in excess of the load rating marked on the sling identification tag.
- Remove slings without legible identification markings from service and replace.

APPENDIX B: Wire Rope and Wire Rope Slings Inspection Procedure

The following information is to be used as a guide for inspecting wire rope and wire rope slings. Inspection frequency should be based on safety factors, property damage, and the cost of replacing destroyed or damaged goods and material dropped due to the use or misuse of improper or damaged wire rope and slings. Additionally, slings should be inspected at regular intervals. This interval should be determined by the user and is dependent upon the particular use of the sling and NCDOT safety requirements.

A sling should be inspected after any unusual situation that may have damaged it, such as overload, accident, or fire. It should not be returned in service until continued safe operation has been verified.

Each sling should have a serial number. If no number is available, a tag should be attached at the time of inspection. This number should be listed on the inspection report.

Inspection should be performed only by persons with sufficient experience and knowledge to properly apply the criteria for rejection.

The following should be considered criteria for rejection:

- **Randomly Distributed Broken Wires in One Rope Lay:** There should be no more than 10 broken wires in one lay for the entire length of the sling.
- **Broken Wires in One Strand of One Rope Lay:** There should be no more than five broken wires in any one strand (single wire) of any one rope lay.
- **Abrasion:** There should be no wearing, scrubbing, or preening of any outside wire causing the reduction of the diameter of a single wire by more than 1/3.
- **Kinking and/or Crushing:** There should be no kinking, crushing, or other damage that results in detrimental distortion of the rope structure.
- **Bird Caging:** There should be no opening or unlaying of the rope lays nor should the fiber core of the rope be exposed.
- **Heat Damage:** There should be no evidence of heat damage including bare electrical conductor, grounding, or welding arc.
- **Corrosion:** There should be no evidence of pitting or heavy coating of rust due to corrosion.
- **Reduced Diameter:** There should not be any reduction of the diameter of the rope along the main length or of any section (overloading or contact with sharp edges of load without permission).
- **End Attachments:** There should be no evidence of cracks, deformity, excessive corrosion, or excessive wear of the fittings forming the splice or socket.
- **Hooks and Rings:** Check for throat opening (no more than 15% stretch), cracks (none), and corrosion.

APPENDIX C: Wire Rope Sling Inspection Form

WIRE ROPE	
Randomly distributed broken wires in one rope lay (10)	
Broken wires in one strand of one rope lay (5)	
Wear or scraping of outside individual wires (one-third of original diameter)	
Kinking	
Crushing	
Bird Caging	
Heat Damage	
Corrosion	
END ATTACHMENTS	
Cracked	
Deformed	
Worn	
Corrosion	
SLING HOOKS	
Check throat opening (less than 15%)	
Check for cracks	
Check hook latch in place and functioning properly	

A check mark indicates
no fault An "x" indicates
damage

Overall condition: New: _____ Satisfactory: _____ Poor: _____ Remove: _____

Date of Inspection: _____

Name of Inspector: _____