Hard copy of this document, if not marked "CONTROLLED" in red,
is by definition uncontrolled and may be out of date.

General Guidelines
for

Use of Overhead and Gantry Cranes, Hoists, Lifts and Slings

REVISION

Rev No.	DCN No.	Change Summary	Release Date	DCN Initiator	Document Owner
1	DCN0688	Initial release.	8-10-11	T. Dobbs	R. Segura

Prior revision history, if applicable, is available from the Document Control Office.

1. PURPOSE AND SCOPE

1.1 Purpose

This document outlines the general procedure for the safe practice and use of overhead and gantry cranes, hoists, lifts and slings at the College of Nanoscale Science and Engineering (CNSE) to comply with OSHA and ANSI standards.

1.2 Scope

This program applies to all CNSE employees, tenants, students and contractors that use and operate overhead and gantry cranes, hoists, lifts and slings. For the use of outdoor cranes please refer to EHS-00040 “CNSE Crane Work Permits.”

2. RESPONSIBILITIES

2.1 Environmental, Health and Safety (EHS) Department

2.1.1 The EHS Department is responsible for the implementation, enforcement and maintenance of the provisions outlined in this program and as specified below:

- Oversee the polices and procedures of the program,
- Provide guidance on the requirements of the program,
- Ensure inspections are performed and accurate,
- Maintain an inventory of all CNSE owned overhead and gantry cranes, hoists, lift and slings.

2.2 Operators and Users

2.2.1 All persons who operate and use overhead and gantry cranes, hoists, lifts and slings shall:

- Perform a visual inspection prior to each use,
- Perform a monthly inspection as required by this document,
- Ensure the equipment is in good condition,
- Report and take all damaged equipment out of use,

- Understand the limitations and proper use of equipment,
- Be properly trained on how to use and operate the equipment,
- Read and understand this document.

2.3 **All Employees, Students, Tenants and Contractors**

2.3.1 Employees, Students, Tenants and Contractors are responsible for: understanding the hazards associated with working around or with overhead and gantry cranes, hoists, lifts and slings; and following the safety policies and procedures identified in this document.

3. ASSOCIATED DOCUMENTS

3.1 **EHS-00067-F1** – Crane, Hoist and Lift Inspection Checklist

3.2 **EHS-00067-F2** – Sling Inspection Checklist

3.3 **EHS-00067-F3** – Crane, Hoist, Lift and Sling Inventory

3.4 **EHS-00008** – Lockout/ Tagout (LOTO) Procedure

3.5 OSHA 29 CFR 1910.179

3.6 OSHA 29 CFR 1910.184

4. DEFINITIONS

4.1 **Crane** – A machine for lifting, lowering and/or moving a load horizontally with the hoisting mechanism (an integral part of the machine). Cranes whether fixed or mobile are driven manually or by power.

4.2 **Automatic Crane** – A crane, when activated goes through a pre-set cycle or cycles.

4.3 **Floor-Operated Crane** – A crane, which is pendant or non-conductive rope, controlled by an operator on the floor or an independent platform.

4.4 **Power-Operated Crane** – A crane whose mechanism is driven by electric, air, hydraulic or internal combustion.

4.5 **Remote-Operated Crane** – A crane controlled: by an operator not in a pulpit or cab attached to the crane; by any method other then pendant or rope control.

4.6 **Wall Crane** – A crane having a jib with or without trolley and supported from a side wall or line of columns of a building. It is a traveling type and operates and operates on a runway attached to the side wall or columns.

4.7 **Brake** – A device used for retarding or stopping motion by friction or power means.

4.8 **Bridge** – Part of a crane consisting of girders, trucks, end ties, foot walks, and drive mechanism which carries the trolley or trolleys.

4.9 **Bumper** – An energy absorbing device for reducing impact: when a moving crane or trolley reaches the end of its permitted travel; or when two cranes or trolleys come in contact.

4.10 **Clearance** – The distance from any part of the crane to the nearest obstruction.

4.11 **Hoist** – An apparatus which may be part of a crane, exerting a force for lifting or lowering.

4.12 **Hoist Chain** - The load bearing chain in a hoist.

4.13 **Rated Load** – The maximum load for which for which a crane, individual hoist, sling or attachment is designed and built by the manufacturer and is shown on the equipment nameplate.

4.14 **Rope** – Refers to wire rope unless otherwise specified.

4.15 **Emergency Stop Switch** – A manually or automatically operated electric switch to cut off power independent of the regular operating controls.

4.16 **Lift** – A mechanical device for lifting or lowering loads that may be manual or electrically powered. A lift is typically mounted on the floor or is mobile.

4.17 **Overhead Crane** – A crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure.

4.18 **Gantry Crane** – Similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported by two or more legs running on fixed rails or another runway.

4.19 **Sling** – An assembly which connects the load to the material handling device, which can be made of the following materials;

a. Alloy steel chains

b. Wire ropes

c. Metal mesh

d. Natural or synthetic fiber rope

e. Synthetic web (nylon, polyester, polypropylene)

4.20 **Basket hitch** – A sling configuration where the sling is passed under the load and has both ends, or the end attachments on a hook or a single master link.

5. CRANES

5.1 General Requirements

5.1.1 This section applies to overhead and gantry cranes, automatic cranes, floor-operated cranes, power-operated cranes, remote-operated cranes and wall cranes.

5.1.2 All new overhead and gantry cranes constructed or installed after August 31st, 1971 shall meet the design specifications of the American National Standard Safety Code for Overhead and Gantry cranes, ASNI B30.2.0-1967.

5.1.3 The rated load of the crane shall be clearly marked on each side of the crane. If the crane has multiple hoisting units each one shall be clearly marked.

5.1.4 A minimum clearance of 3 inches overhead and 2 inches laterally shall be provided and maintained between the crane and any obstruction.

5.1.5 Safety of any personnel shall not be jeopardized by the movement of the crane at any time. Sufficient barriers shall be positioned to keep unauthorized personnel away from the crane.

5.1.6 Trolley stops shall be provided at the limit of travel of the trolley. The shops shall be fastened to resist forces applied when contacted. A stop engaging the tread of the wheel shall be of a height at least equal to the radius of the wheel.

5.1.7 If the runways of two cranes are parallel, and there are no intervening walls or structure, there shall be adequate clearance provided and maintained between the two bridges.

5.1.8 All moving parts that may present a hazard under normal operating conditions shall be equipped with guards to prevent injury. All guards shall be securely fastened.

5.1.9 If hoisting ropes run close enough to other parts to cause possible breakage or damage, guards shall be installed to prevent this condition. A guard shall be provided to prevent contact between bridge conductors and hoisting ropes.

5.2 Load Handling

5.2.1 Size of the Load:

- The crane shall not be loaded beyond its rated capacity except for test purposes.

5.2.2 Attaching the Load:

- The ropes and or chains used to attach the load shall be free from kinks and twists and shall not be wrapped around the load.
- The load shall be attached to the load block hook by means of slings or other approved devices.
- Care shall be taken that the slings and load clears all obstacles.
- The load shall be properly balanced prior to lifting more than a few inches.
- Multiple lines shall not be twisted around each other.
- The load shall be attached in a manner that prevents swinging.

5.2.3 During the Lift:

- There shall be no sudden acceleration or deceleration of the load once the lift is in progress.
- No load should ever be carried over people.
- If a person is on the load it should never be moved.
- The operator shall not leave the controls while the load is suspended and the lift is in progress.

5.3 Brakes

5.3.1 Each independent hoisting unit of a crane shall be equipped with at least one self-setting brake, referred to as a holding brake, applied directly to the motor shaft or some part of the gear train.

5.3.2 With the exception of worm-geared hoists where the angle of the worm prevents the load from accelerating in the lowering direction; in addition to the holding brake, each independent hoisting unit shall be equipped with a control braking method to prevent over speeding.

5.3.3 Holding brakes shall be applied automatically when power is removed.

5.3.4 Holding brakes shall have ample thermal capacity for the frequency of operation required by the service.

5.3.5 Where necessary, holding brakes shall be provided with an adjustment method to compensate for wear.

5.3.6 The wearing surface of all holding brake drums or discs shall be smooth.

5.3.7 A power control braking method such as regenerative, dynamic, or counter torque braking or a mechanically controlled braking method shall be capable ~~or~~ of maintaining safe lowering speeds of rated loads.

5.3.8 Foot operated brakes shall not require more than 70 pounds of force to develop the manufacturer's rated brake torque.

5.3.9 All foot brake pedals shall be constructed so the operator's foot will not easily slip off the pedal.

- Foot operated brakes shall be equipped with automatic means for positive release, when pressure is released from the pedal.
- Brakes may be applied by mechanical, electrical, pneumatic, and hydraulic or gravity means.
- Brakes for stopping the motion of the trolley or bridge shall be of sufficient size to stop the trolley or bridge within a distance in feet equal to 10 percent of full load speed in feet per minute when traveling at full speed with full load.
- A drag brake may be applied to hold the trolley in a desired position on the bridge and to eliminate creep with the power off.
- On all floor, remote and pulpit operated crane bridge drives, a brake of non-coasting mechanical drive shall be provided.

5.4 Electrical Equipment

5.4.1 The control circuit voltage shall not exceed 600 volts AC or DC.

5.4.2 The voltage at pendant push buttons shall not exceed 150 volts AC and 300 volts DC.

5.4.3 For suspended push button stations, the station must be supported in a manner to protect the electrical wiring from strain.

5.4.4 Pendant control boxes shall be constructed to prevent electrical shock and shall have the functions clearly marked.

5.4.5 Electrical equipment shall be located or enclosed such that live parts will not be exposed to accidental contact under normal operating conditions.

5.4.6 Electrical equipment shall be protected from dirt, grease, oil and moisture.

5.4.7 Guards for live parts shall be substantial and located so they cannot be accidentally deformed and subsequently make contact with live electrical parts.

5.4.8 The controller operating handle shall be located within convenient reach of the operator.

5.4.9 The control for the bridge and trolley shall be located so the operator can face the direction of travel.

5.4.10 For floor operated cranes, the controller shall automatically return to the off position when released.

5.4.11 Push buttons in pendant stations shall return to the off position when released.

5.4.12 Automatic cranes shall be designed so that all motions fail safe if any malfunction of operation occurs.

5.4.13 Remote operated cranes shall function so that if the control signal for any crane motion becomes ineffective the crane motion shall stop.

5.4.14 The power supply to the runway conductors shall be controlled by a switch or circuit breaker located on a fixed structure, accessible from the floor and arranged to be locked in the open position.

5.4.15 The hoisting motion of all electrical traveling cranes shall be provided with an over travel limit switch in the hoisting direction.

5.5 Hoisting Equipment

5.5.1 Sheave grooves shall be smooth and free from surface defects that could cause rope damage.

5.5.2 Sheaves which can be momentarily unloaded shall have guards to guide the rope back into the groove when the load is applied. This also applies to the

bottom block to prevent the rope from being fouled when the block is lying on the ground with the ropes loose.

5.5.3 Pockets and flanges of sheaves used with hoist chains shall be of such dimensions that the chain does not catch or bind during operation.

5.5.4 All running sheaves shall be equipped with means for lubrication.

5.5.5 In using hoisting ropes, the crane manufacturer's recommendations shall be followed. The rated load divided by the number of parts of rope shall not exceed 20 percent of the nominal breaking strength of the rope.

5.5.6 Socketing shall be done in the manner specified by the manufacturer of the assembly.

5.5.7 No less than two wraps of rope shall remain on the drum when the hook is in its extreme low position. Rope ends shall be securely attached to the drum, or by a socket approved by the manufacturer.

5.5.8 Replacement rope shall be the same size, grade and construction as the original rope furnished by the crane manufacturer.

5.5.9 If a load is supported by more than one part of a rope, the tension in the parts shall be equalized.

5.5.10 Hooks shall meet the manufacturer's recommendations and shall not be overloaded.

5.5.11 Except for floor operated cranes, a warning signal shall be provided for each crane equipped with a power traveling mechanism.

5.6 Training

5.6.1 Only designated personnel shall operate a crane.

5.6.2 Initial training for designated personnel shall include a review of this program, as well as any manufacturer information or required training related to the equipment that will be used.

5.7 Inspection

5.7.1 Prior to initial use, all new and altered cranes shall be inspected to ensure compliance with OSHA 29 CFR 1910.179 and this document.

5.7.2 Prior to Each Use Visual Inspections shall be performed to check for proper functionality of the crane. This includes but is not limited to:

- Excessive wear of all components

- Cracks
- Deformation
- Leaks in air or hydraulic systems/lines
- Broken, frayed, stretched or damaged chains or cables
- Hooks with deformations or cracks
- Hoist chains and end attachments: with excessive wear, or twist, distortion; for proper function and stretch
- Proper function of all operating mechanisms

5.7.3 Monthly Inspections shall be performed with a certification record that includes the date of inspection, signature of a qualified inspector, serial number or identifier of the equipment and any noted deficiencies.

Items to be inspected include:

- Deformed, cracked or corroded members.
- Loose bolts of rivets.
- Cracked or worm sheaves and drums.
- Any worn, cracked, corroded or distorted parts such as clips, hooks, snaps, bearings, gears, shafts, rollers, sprockets etc.
- Brakes: operational and in good condition; and for excessive wear.
- Load rating present.
- All electrical apparatus in good condition.
- Ropes and / or chains in good condition with no excessive wear, stretch twist, distortion, kinking, cuts, corrosion etc.
- All guards securely fastened.
- Clearance from obstruction.
- Remote control operational.
- Control box labeled.
- Free from excessive dirt, grime, grease, oil and moisture.

- Load, wind and other indicators over their full range or any significant inaccuracies.
- Gasoline, diesel, electric or other power plants for improper performance or noncompliance with safety requirements.

5.7.4 Cranes Not in Regular Use

- A crane that has been idle for longer than six (6) months shall be given a full monthly inspection prior to use.
- Standby cranes shall be inspected at least semi-annually in accordance with this policy.

5.8 Operational Testing

5.8.1 Prior to initial use and in addition to inspecting the crane, all new and altered cranes shall be tested to ensure compliance with section 5.2 of this policy as well and the following functions:

- Hoisting and lowering.
- Trolley travel.
- Bridge travel.
- Locking, braking and safety devices functional.
- Limit switches, locking and safety devices.
- The trip setting of hoist limit switches shall be determined by tests with an empty hook traveling in increasing speeds up to the maximum speed. The actuating mechanism of the limit switch shall be located so that it will trip the switch, under all conditions, in sufficient time to prevent contact of the hook or hook block with any part of the trolley.

5.9 Rated Load Test

5.9.1 Test load shall not be more than 125 percent of the rated load, unless otherwise recommended by the manufacturer. The test reports shall be kept on file and readily available to appropriate personnel and forwarded to EHS.

5.10 Maintenance

5.10.1 A preventative maintenance program based on the manufacturer's recommendations shall be established for each piece of equipment.

5.10.2 Prior to maintenance on any equipment the following precautions shall be taken:

- The equipment shall be placed in a safe location where repairs/ maintenance will not interfere with other operations.
- All controls shall be in the off position.
- Warning and "Out of Order" notices shall be placed on the crane.
- All electrical and mechanical sources of energy shall be locked and tagged out in accordance with EHS-00008 "Lockout/ Tagout (LOTO) Procedure."
- Where other cranes are in operation in the same area, suitable means shall be provided to prevent interference with the idle crane.
- Any unsafe condition or deficiency as indicated by the form EHS-00067-F1 Crane, Hoist and Lift Inspection Checklist shall be corrected before operation of the crane is resumed.

6. HOISTS AND LIFTS

6.1 General Requirements

6.1.1 This section applies to all hoists and lifts.

- All hoists and lifts shall be clearly marked with the rated load capacity.
- All moving parts shall be equipped with guards.
- Sufficient clearance shall be given so that nothing interferes with the lift while in progress.
- Barriers shall be erected, when required, so that personnel are kept a safe distance away from the lift.

6.2 Load Handling

6.2.1 Size of the Load

- The hoist or lift shall not be loaded beyond its rated capacity except for test purposes.

6.2.2 Attaching the Load

- The ropes and / or chains used to attach the load shall be free from kinks and twists, and shall not be wrapped around the load.
- The load shall be attached to the load block hook by means of slings or other approved devices.
- Care shall be taken that the slings and load clears all obstacles.
- The load shall be properly balanced prior to lifting more than a few inches.
- Multiple lines shall not be twisted around each other.
- The load shall be attached in a manner that prevents swinging.

6.2.3 During the Lift

- There shall be no sudden acceleration or deceleration of the load once the lift is in progress.
- No load should ever be carried over people.
- The operator shall not leave the controls while the load is suspended and the lift is in progress.

6.3 Training

6.3.1 Only designated personnel shall operate a hoist or lift.

6.3.2 Initial training for designated personnel shall include a review of this program, as well as any manufacturer information or required training related to the equipment that will be used.

6.4 Inspections

6.4.1 Prior to initial use all new and altered hoists and lifts shall be inspected to ensure compliance with OSHA 29 CFR 1910.179 and this document.

6.4.2 Prior to Each Use Visual Inspections shall be performed to check for proper functionality of the crane. This includes but is not limited to:

- Excessive wear of all components
- Cracks
- Deformation
- Leaks in air or hydraulic systems/lines
- Broken, frayed, stretched or damaged chains or cables
- Hooks with deformations or cracks
- Hoist chains and end attachments: with excessive wear, or twist, distortion; and for proper function and stretch
- Proper function of all operating mechanisms

6.4.3 Monthly inspections shall be performed with a certification record that includes the date of inspection, signature of a qualified inspector, serial number or identifier of the equipment and any noted deficiencies.

Items to be inspected include:

- Deformed, cracked or corroded members.
- Loose bolts of rivets.
- Cracked or worm sheaves and drums.
- Any worn, cracked, corroded or distorted parts such as clips, hooks, snaps, bearings, gears, shafts, rollers, sprockets etc.
- Brakes: operational and in good condition; and for excessive wear.
- Load rating present.
- All electrical apparatus in good condition.
- Ropes and or chains in good condition with no excessive wear, stretch twist, distortion, kinking, cuts, corrosion etc.
- All guards securely fastened.
- Clearance from obstruction.

- Remote control operational.
- Control box labeled.
- Free from excessive dirt, grime, grease, oil and moisture.
- Load, wind and other indicators over their full range or any significant inaccuracies.
- Gasoline, diesel, electric or other power plants for improper performance or noncompliance with safety requirements.

6.5 Operational Testing

6.5.1 Prior to initial use all new and altered hoists and lifts shall be tested to ensure compliance with section 6.4 of this policy as well as the following functions:

- Hoisting and lowering
- Locking, braking and safety devices functional.

6.6 Rated Load Test

6.6.1 Test load shall not be more than 125 percent of the rated load, unless otherwise recommended by the manufacturer. The test reports shall be kept on file and readily available to appropriate personnel and EHS.

6.7 Maintenance

6.7.1 A preventative maintenance program based on the manufacturer's recommendations shall be established for each piece of equipment.

6.7.2 Prior to maintenance on any equipment the following precautions shall be taken:

- The equipment shall be placed in a safe location where repairs/ maintenance will not interfere with other operations.
- All controls shall be in the off position.
- Warning and "Out of Order" notices shall be placed on the crane.
- All electrical and mechanical sources of energy shall be locked and tagged out in accordance with EHS-00008 "Lockout/ Tagout (LOTO) Procedure."

- Any unsafe condition or deficiency as indicated by the form EHS-00067-F1 Crane, Hoist and Lift Inspection Checklist shall be corrected before operation of the crane is resumed.

7. SLINGS

7.1 Scope

7.1.1 This section applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this part. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction) and synthetic web (nylon, polyester and polypropylene).

7.2 General Requirements

7.2.1 All slings in use shall meet the requirements of OSHA 29 CFR 1910.184 as well as those in this document.

7.2.2 Slings that are damaged or defective shall not be used.

7.2.3 Slings shall not be shortened with knots, bolts or any other makeshift device.

7.2.4 Sling legs shall not be kinked.

7.2.5 Slings shall not be loaded beyond their rated capacity.

7.2.6 All slings shall have the rated capacity clearly marked and / or labeled.

7.2.7 Slings shall be securely attached to their loads.

7.2.8 Slings used in a basket hitch shall have the loads balanced to prevent slippage.

7.2.9 Slings shall be padded or protected from sharp edges of their loads.

7.2.10 Suspended loads shall be kept clear of all obstructions.

7.2.11 All personnel shall be kept clear of suspended loads or loads about to be lifted. Barriers shall be placed if necessary.

7.2.12 Shock loading is prohibited.

7.2.13 Hands of fingers shall not be placed between the sling and the load while the sling is being tightened around the load.

7.2.14 A sling shall not be pulled from under a load while the load is resting on the sling.

7.3 Specific Requirements

7.3.1 Alloy Steel Chain Slings

- All attachments shall have a rated capacity at least equal to that of the sling on which they are being used.
- If the sling is heated above 1000 degrees Fahrenheit (F) it shall be permanently removed from service. When heated above 600 degrees F the capacity shall be reduced based on the manufacturer's recommendations.
- Slings with cracked, deformed, worn or otherwise damaged links, hooks or components shall be removed from service.
- Worn or damaged slings shall not be used until repaired and sufficiently proof tested by the manufacturer or an equivalent entity.
    - Mechanical coupling links or low carbon steel links shall not be used for repairs.

7.3.2 Wire Rope Slings

- Welding of end attachments must be preformed prior to the assembly of the sling.
- All welded end attachments shall not be used unless proof tested at twice their rated capacity. Their rated capacity shall be at least equal to that of the sling in use.
- Fiber core slings shall not be used when temperatures are above 200 degrees F and non-fiber core slings shall not be used when temperatures are above 400 degrees F.
- Slings shall be immediately removed from use if any of the following conditions are present:
    - Five broken individual wires,
    - Kinking, crushing, bird caging or any other damage or distortion of the wire rope structure,
    - Evidence of heat damage,

- End attachments or hooks that are worn, cracked, deformed or damaged,
- Any corrosion present on the wire rope or attachments.

7.3.3 Metal Mesh Slings

- Each sling shall have the stated capacity for various configurations clearly marked.
- The fabric and handles shall be joined so that; the rated capacity is not reduced, the load is evenly distributed across the fabric and that sharp edges will not damage the fabric.
- Coatings which diminish the rated capacity of the sling shall not be applied.
- All new and repaired slings shall be proof tested to a minimum of 1 ½ times their rated capacity.
- Sling without elastomers shall only be used in a temperature range of minus 20 degrees F to 550 degrees F. Slings with elastomers shall only be used in a range of zero (0) degrees F to 200 degrees F.
- All repairs shall be made by the manufacturer or an equivalent entity. All records of repairs shall be kept on file and made available upon request.
- Slings shall be immediately removed from service if any of the following conditions exist:
  - A broken weld or brazed joint along the sling edge,
  - A reduction in wire diameter due to abrasion or corrosion,
  - Lack of flexibility,
  - Any damage or distortion of the sling or handles.

7.3.4 Natural and Synthetic Fiber Rope Slings

- Slings shall be used in the temperature range of minus 20 degrees F to 180 degrees F, except for wet or frozen slings. For use outside of this temperate range follow the manufacturer's recommendations.
- Spliced slings shall not be used unless they have been spliced by following these minimum requirements as well as any manufacturer's 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 rope. This applies for all types, natural and synthetic. The tails shall extend a minimum of 6 inches.
- Knots shall not be used in lieu of splices.
- Clamps not designed specifically for fiber ropes shall not be used for splicing.
- For all eye splices, the eye shall be of such size to provide an included angle of not greater than 60 degrees.
- Fiber rope slings shall have a minimum clear length of rope between eye splices equal to 10 times the rope diameter.

- No end attachments shall have sharp edges or projections.
- Slings shall be removed from service if any of the following conditions exist:
  - Abnormal or excessive wear.
  - Powdered fiber between strands.
  - Broken or cut fibers.
  - Discoloration or rotting.
  - Distortion or damage of hardware on the sling.
  - Any damage that will reduce the rated capacity of the sling.
- Only new slings shall be used. The use of repaired or reconditioned slings is prohibited. Wouldn't a spliced sling be repaired???

7.3.5 Synthetic Web Slings

- Each sling shall be marked to show the different rated capacities for each type of hitch and sling material.
- Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbings width.

- Fittings shall be of equal rated capacity to that of the sling and be free of any sharp edges that could in any way damage the sling.
- Stitching shall be the only method used to attach end fittings and to form eyes. The stitching shall be sufficient to develop the full breaking strength of the sling.
- Slings shall not be used where: fumes, vapors, sprays, mists or liquids of acids, caustics or phenolics are present.
- Slings shall not be used in temperatures exceeding 180 degrees F.
- Slings which are repaired shall not be used unless repaired by the sling manufacturer or an equivalent entity. Temporary repairs are strictly prohibited.
- Each repaired sling shall be proof tested to twice the rated capacity prior to its return to service. A certificate of the proof test shall be kept on file and made available upon request.
- Slings shall be removed from service if any of the following conditions are present:
    - Acid or caustic burns,
    - Melting or charring of any part of the sling,
    - Snags, punctures, cuts, tears or any damage,
    - Broken or work stitches,
    - Distortion or damage of fittings.

7.4 Inspection

7.4.1 Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer. Additional inspections shall be performed during sling use where service conditions warrant. Damaged or defective slings shall be immediately removed from service.

7.4.2 All slings shall be inspected once per month while in service. A certification record shall be kept that includes the date of inspection, signature of a qualified inspector, serial number or identifier of the sling and any noted deficiencies.

7.4.3 Items to check may include:

- Excessive wear and tear,
- Cracked or corroded parts of metal slings,
- Damage of any kind,
- Rips or tears in fabric slings,
- Deformed or misshapen parts of a sling,
- Damaged end attachments,
- Proper labeling with rated load capacity,
- Discolored or deformed parts,
- All sewn seams in good condition,
- Evidence of heat damage.

7.5 Proof Testing

7.5.1 All new and repaired slings shall be accompanied with a proof test certification for the rated load capacity or greater as recommended by the manufacturer. All proof tests shall be kept on file and be made available and forwarded to EHS.

7.5.2 No sling shall be used if it is not accompanied by a proof test certification.