

Basic Inspection Criteria For Wire Rope Slings

The goal of a sling inspection is to evaluate remaining strength in a sling which has been used previously to determine if it is suitable for continued use.

Specific inspection intervals and procedures are required by the Occupational Safety and Health Act (OSHA) and by ASME B30.9 Regulations, and the responsibility for performance of inspections is placed squarely upon the sling user by Federal Legislation.

As a starting point, the same work practices which apply to all "Working" wire rope apply to wire rope which has been fabricated into a sling. Therefore, a good working knowledge of wire rope design and construction will be not only useful but essential in conducting a wire rope sling inspection.

But because wire rope is a rather complex machine, no precise rules can be given to determine exactly when a wire rope sling should be replaced. There are many variables, and all must be considered.

OSHA standards specify that a wire rope sling shall be removed from service immediately if ANY of the following conditions are present:

1. **Broken Wires:** For strand laid grommets and single part slings, ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay. For cable laid, cable laid grommets and multi-part slings, use the following:

Sling body	Allowable broken wires	
	per lay	per braid
cable laid	20	
less than 8 part braid		20
8 part braid or more		40

2. **Metal Loss:** Wear or scraping of one-third the original diameter of outside individual wires. This is quite difficult to determine on slings and experience should be gained by the inspector by taking apart old slings and actually measuring wire diameters.

3. **Distortion:** Kinking, crushing, birdcaging or other damage which distorts the rope structure. The main thing to look for is wires or strands that are pushed out of their original positions in the rope. Slight bends in a rope where wires or strands are still relatively in their original positions would not be considered serious damage. But good judgment is indicated.

4. **Heat Damage:** Any metallic discoloration or loss of internal lubricant caused by exposure to heat.

5. **Bad End Attachments:** Cracked, bent or broken end fittings caused by abuse, wear or accident.

6. **Bent Hooks:** No more than 15 percent over the normal throat openings, measured at the narrowest point, or twisting of more than 10 degrees is permissible.

7. **Metal Corrosion:** Severe corrosion of the rope or end attachments which has caused pitting or binding of wires should be cause for replacing the sling. Light rusting usually does not affect strength of a sling, however.

In addition to these seven conditions specified by OSHA, the following are also important:

8. **Pulled Eye Splices:** Any evidence that eye splices have slipped, tucked strands have moved, or pressed sleeves show serious damage may be sufficient cause to reject a sling.

9. **Unbalance:** A very common cause of damage is the kink which results from pulling through a loop while using a sling, thus causing wires and strands to be deformed and pushed out of their original position. This unbalances the sling, reducing its strength.

10. **Disposition of Retired Slings:** The best inspection program available is of no value if slings which are worn out and have been retired are not disposed of properly. When it is determined

by the inspector that a sling is worn out or damaged beyond use, it should be tagged immediately DO NOT USE. This sling should then be destroyed as soon as possible by cutting the eye and fittings from the rope with a torch. This will help assure that an employee will not mistakenly use a sling which has been retired from service.

It should also be obvious that a good inspection program will not only provide safer lifting conditions, but will also extend the life of slings and thereby reduce lifting costs.

Federal Work Rules Require Specific Inspection Intervals

Government regulations are also specific on WHEN to inspect.

Both ANSI Standard B30.9 and OSHA require that wire rope slings receive two types of inspections: a DAILY visual inspection and additional inspections where service conditions warrant.

Daily visual inspections are intended to detect serious damage or deterioration which would weaken the sling. This inspection is usually performed by the person using the sling in a day-to-day job. He should look for obvious things, such as broken wires, kinks, crushing, broken attachments, severe corrosion, etc.

Additional inspections should be performed at regular intervals based on, (1) frequency of sling use, (2) severity of service conditions, (3) nature of lifts, and (4) prior experience based on service life of slings used in similar circumstances.

It is required that these additional inspections be carried out by a designated person who must have good knowledge of wire rope. An accurate WRITTEN and dated record of all conditions observed should be kept. Any deterioration of the sling which could result in appreciable loss of original strength should be carefully noted, and determination made on whether further use would constitute a safety hazard.

How to Inspect

Precisely how to make proper, adequate inspections is not detailed by OSHA - yet it is in the HOW of inspection that the big difference between a good inspection and something less become apparent.

Inspection should follow a systematic procedure:

(1) First, it is necessary that all parts of the sling are readily visible. The sling should be laid out so every part is accessible.

(2) Next, the sling should be sufficiently cleaned of dirt and grease so wires and fittings are easily seen. This can usually be accomplished with a wire brush or rags.

(3) The sling should then be given a thorough, systematic examination throughout its entire length, paying particular attention to sections showing the most wear.

(4) Special attention should also be paid to fittings and end attachments, and areas of the sling adjacent to these fittings.

(5) When the worst section of a sling has been located, this area should then be carefully checked against the OSHA criteria.

(6) Label or identify slings that are inspected.

(7) Keep records of inspections that include dates and corresponding conditions of slings.

(8) Dispose immediately of slings that are rejected.

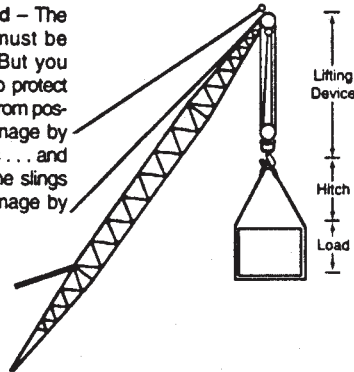
A knowledgeable inspector will also insist on proper storage for out-of-use slings - to make his job easier if not for the good of the slings. Inspections are much easier - and probably more thorough - when slings are available for inspection in an orderly arrangement, out of the weather, away from heat and dirt.

Some Useful Guidelines For the Rigger

On the following pages are some useful tips to help the rigger do his job more efficiently and safely. Prevailing work rules and government regulations place full responsibility for proper performance upon the rigger, so it is his duty to be familiar with the condition and capability of all tools and equipment used, as well as techniques employed. One basic rule always applies: Always know . . . never guess.

Each lift may be divided into three parts, providing a convenient plan for proceeding:

1. **The Lifting Device** – Know its capacity and limitations, and its condition. When was it last inspected? If in doubt about capacity, check the placard.
2. **The Hitch** – Here is where the rigger can exercise ingenuity . . . but it's also the easiest place to make a mistake. This book can help you decide which sling to use, and how to rig it properly.
3. **The Load** – The weight must be known. But you must also protect the load from possible damage by the slings . . . and protect the slings from damage by the load.



Is the lifting device adequate?

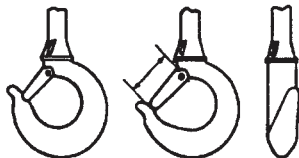
Check the placard on the crane or hoist, and then answer three questions:

1. Is capacity adequate for this lift?
2. Will it lift high enough?
3. Is horizontal reach adequate?

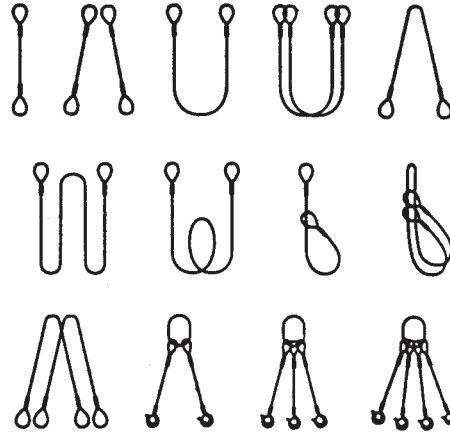


Check the hook and reeving.

1. Are sheaves properly rigged? If multi-part reeving, will it support the load?
2. Is the hook the right size so sling eye won't be distorted when put over the hook?
3. Check for cracks in bowl of the hook, and for evidence of point loading or bending to one side of 15% or more.



Type of Hitch Determines Choice of Sling

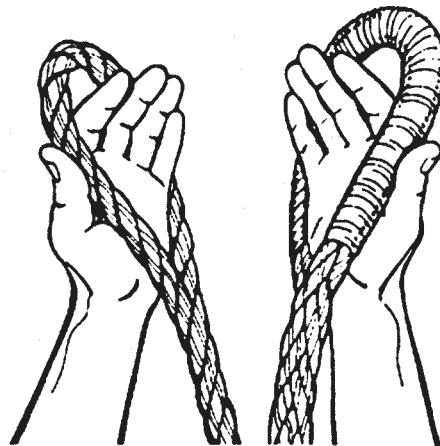


Before you select a sling for a specific lift, determine the most effective hitch to do the job, protect the load, and protect the sling. One of three basic hitches will usually do the job.

The type of hitch you select may determine the type of sling body that will best do the job, as well as the length of sling that will be needed. Lifting height, overhead clearance and hook travel will affect choice of hitch and length of sling.

Choose a sling body type which will best support the load while providing adequate rated capacity. The proper choice will provide:

1. Lifting capacity needed.
2. Proper D/d Ratio.
3. Handling characteristics needed for rigging.
4. Minimal damage to the sling.
5. Minimal damage to the load.



Protect the sling during the lift with blocking or padding at sharp corners or where the sling body would be bent severely.

