

	AI TAKAMUL COMPANY FOR ENGINEERING TESTS AND PROFESSIONAL SAFETY LIMITED Lifting Inspection	Doc No: QC-LIF-P-006
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Title: Inspection Procedure of Wire Rope Slings		Rev: 2
Established By: Ashraf Elsaid	Position: Lifting Supervisor	Date: JULY-2022
Approved By: Ahmed Mohamed	Position: Operation Manager	

Inspection procedure of Wire Rope Slings

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1. YOUR SAFETY IS FIRST:

Your safety wear is mandatory at job sites including in general: suit, shoes, helmet, gloves, ear plugs, glasses, and mask.

2. SCOPE:

This procedure covers the inspection and testing of steel wire rope slings for general lifting service. Single-, two-, three- and four-leg slings, with ferrule-secured or spliced eye terminations and spliced or ferrule-secured endless slings made from 8 mm to 60 mm diameter 6 strand ordinary lay steel wire rope with fibre or steel core and 8 strand ordinary lay steel wire rope with a steel core conforming to EN 12385-4.

The working coefficient (factor of safety) = five.

3. PRODUCT/ MANUFACTURE STANDARDS:

BS EN 13414-1:2003+A2:2008	Steel wire rope slings. Safety - Slings for general lifting service
BS EN 13414-3:2003+A1:2008	Steel wire rope slings. Safety - Slings for general lifting service
ISO 7531:1987	Wire rope slings for general purposes
ISO 3108:2017	<i>Code of Practice for the Safe Use of Lifting Equipment</i>
ISO 8793:1986	Steel wire ropes — Ferrule-secured eye terminations
ISO 8794:2020	Steel wire ropes — Spliced eye terminations for slings

4. THOROUGH EXAMINATION:

The sling should be inspected for any obvious signs of deterioration before each use.

If, at any time there is reason to doubt the safe condition of the sling, it should be withdrawn from service and subjected to a thorough examination

If the tag or label identifying the sling and its working load limit becomes detached and the necessary information is not marked on the master link, or by some other means, the sling should be withdrawn from service.

• Pre-Use Inspection:

An inspection is a visual check on the condition of the sling to identify any obvious damage or deterioration that might affect its fitness for use.

The sling should be withdrawn from service and referred to a competent person for thorough examination if any of the following is observed before each use:

- Illegible sling markings, i.e. sling identification and/or working load limit.
- Wear, distortion and/or cracking of the upper or lower terminals and/or ferrules.
- Concentration(s) of broken wires.

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- d) Severe rope distortion, such as kinks or protrusion of the core.
- e) Significant rope wear.
- f) Corrosion.
- g) Heat damage.

- **Thorough examination and discard criteria:**

A thorough examination should be carried out at intervals not exceeding **6 months**, this interval should be less where deemed necessary in the light of service conditions.

To facilitate examination, slings may need to be cleaned so as to be free from oil, dirt and rust prior to examination. This can usually be accomplished by using a wire brush. Other methods may be used providing that the parent metal is not damaged. Methods to avoid are those using acids, overheating or removal of metal.

Records of such examinations should be maintained.

The sling should be withdrawn from service if any of the conditions listed below, **a** to **h**, are present, reached or exceeded:

- a) Sling markings:**

The sling markings, i.e. information on the sling identification and /or the working load limit, are illegible.

- b) Damaged upper and lower terminals:**

Wear (8% max.), distortion or cracking of the upper or lower terminals.

Particular attention should be paid to signs of opening up, distortion or cracking of the hook, distortion and wear of links or the closing of the thimble, indications that the sling may have been overloaded.

- c) Damaged rope terminations:**

Wear, distortion or cracking of ferrules or the pulling out of a splice.

- d) Broken wires:**

- General:

The appearance of well distributed broken wires may have no marked effect on the strength of the sling but the discard criteria listed below shall be adopted for randomly distributed broken wires and concentrated broken wires respectively.

NOTE: To prevent injury to the user's hands, protruding broken wires can be broken off in the valleys between the strands by reverse bending the wire, with the help of pliers, until fracture occurs. Such actions should be recorded.

- Randomly distributed broken wires

6 randomly distributed broken outer wires in a length of 6d but no more than 14 randomly distributed broken wires in a length of 30d, where d is the nominal rope diameter.

- Concentrated broken wires:

3 adjacent broken outer wires in one strand.

- e) Rope distortion:**

Kinking, crushing, birdcaging or core protrusion or other damage which distorts the rope structure.

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NOTE: 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.

f) Rope wear:

10% of the nominal rope diameter (d).

g) Corrosion:

Pitting of the wires or loss of flexibility of the rope due to severe internal corrosion.

The effect is readily identified through the loss of flexibility and roughness to the touch. While light surface rusting is unlikely to affect the rope strength, it may be indicative of internal corrosion, the effect of which is not predictable.

h) Heat damage:

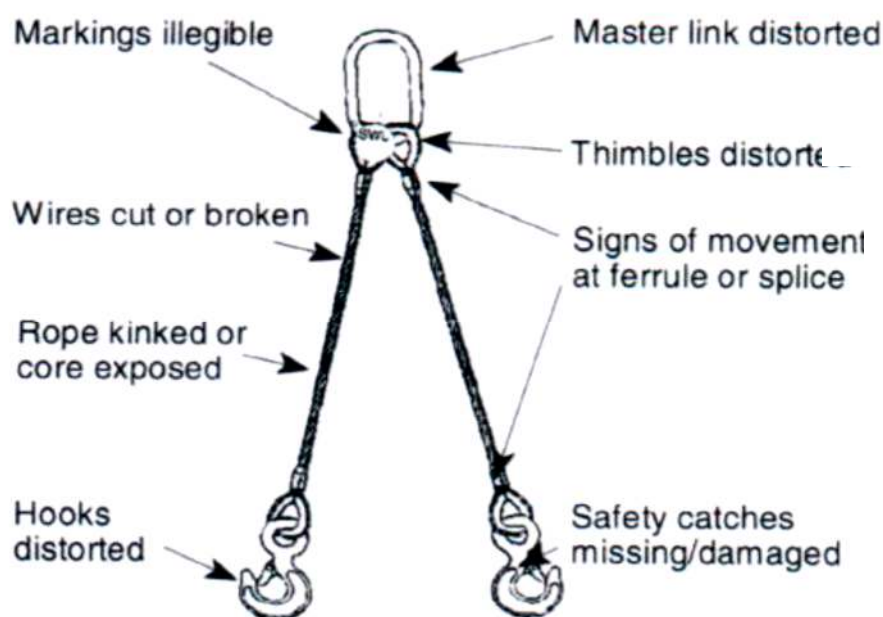
Heat damage as evidenced by discoloration of the wires, loss of lubrication or pitting of the wires caused by electric arcing.

• Repair:

Components that are cracked, visibly distorted or twisted, severely corroded or have deposits that cannot be removed should be discarded and replaced.

Minor damage such as nicks and gouges to terminal fittings may be removed by careful grinding or filing. The surface should blend smoothly into adjacent material without abrupt change of section. The complete removal of the damage should not reduce the thickness of the section at that point to less than the manufacturer's specified minimum dimensions or by more than 10% of nominal thickness of the section.

The following figures show inspection points of wire rope slings with possible defects:



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The following figures show examples of defects requiring discarding of wire rope slings:

Outer strands take the place of the fiber core, which has disintegrated (discard immediately)



Severe bend (discard immediately)



Extrusion of steel core (discard immediately)



Severe kink & extrusion of fiber core (discard immediately)



Basket (Bird cage) deformation (discard immediately)



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5. PROOF LOAD TEST:

Prior to initial use, all wire rope slings shall be proof load tested by the sling manufacturer with written records kept of such testing. If the record of test by the manufacturer is not available, then wire rope slings shall be proof load tested as per the following procedure prior to initial use and the user shall maintain the record.

- A thorough examination of the wire rope slings conducted, if no faults are found which would affect the WLL of the wire rope, then a proof load test may be applied.
- A proof load equal to WLL of the piece if single sling leg or wire rope termination + 100% is applied slowly, and checks made to ensure correct alignment and orientation of sling eyes to prevent damage or distortion.
- After releasing the proof load, the wire rope sling is thoroughly examined, if no signs of damage or distortion appear, the wire rope sling is considered acceptable.

6. MARKING:

Each sling shall be legibly and durably marked with the information listed below.

NOTE If the marking is on a load-bearing ferrule or the master link, care should be taken to ensure that the mechanical properties of the ferrule or link are not impaired.

- **For Single-leg sling (single part or endless):**

- The sling manufacturer's identifying mark;
- Numbers and/or letters identifying the sling with the certificate
- WLL
- Any legal marking.

- **For Multi-leg sling:**

- The sling manufacturer's identifying mark;
- Number and/or letters identifying the sling with the certificate
- The working load limits and the angles applicable, i.e. the WLL 0° to 45° to vertical and, additionally, the WLL 45° to 60° to the vertical if applicable;
- Any legal marking.

If the item is not already marked, it shall be clearly stamped or marked with an identification number and if the test is satisfactory, the WLL and date of the test.

7. REPORTING AND CERTIFICATION:

A certificate of test and thorough examination will be issued upon the satisfactory completion of the examination, i.e. the lifting equipment is safe to operate

A defect report will be issued if the lifting equipment fails to meet the requirements.

8. Inspector Competency and Qualification:

Inspector shall have minimum qualification of LEEA Foundation – LEEA Lifting Equipment General