

GENERAL INSTRUCTION MANUALG. I. Number **7.029** Approved

ISSUING ORG. *TRANSPORTATION & EQUIPMENT SERVICES DEPARTMENT

ISSUE DATE
07/03/2011REPLACES
07/14/2007

SUBJECT RIGGING HARDWARE REQUIREMENTS

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1 of 8**1.0 PURPOSE**

This General Instruction (GI):

- 1.1 Defines the requirements for carrying out the inspections, testing, and recordkeeping of slings and other commonly used rigging hardware; and
- 1.2 Improves Saudi Aramco and contractor safety performance when using slings and other rigging hardware.

2.0 REFERENCES

It shall be the responsibility of Saudi Aramco USERS and contractors to be familiar with the current version of the publications referenced below.

ASME: American Society of Mechanical Engineers

SAES: Saudi Aramco Engineering Standard

- A) ASME B18.15 Forged Eyebolts
- B) ASME B30.9 Slings
- C) ASME B30.10 Hooks
- D) ASME B30.20 Below-the-Hook Lifting Devices
- E) GI 7.030 Inspection and Testing Requirements for Elevating/Lifting Equipment
- F) IPT's Crane and Rigging Handbook
- G) W.G. (Bill) Newberry's Handbook for Riggers
- H) Wire Rope Technical Board Wire Rope Users Manual

3.0 SCOPE

This GI covers all rigging hardware used within Saudi Aramco facilities, on Saudi Aramco jobsites outside of operating facilities, off Saudi Aramco property under a Saudi Aramco contract, and in applicable Saudi Aramco domestic joint venture companies.

4.0 DEFINITIONS

- 4.1 CERTIFIED INSPECTOR – A person certified by the Saudi Aramco Inspection Department to perform inspections and certifications on elevating/lifting equipment (For additional information, refer to Inspection Department definition in GI 7.030).
- 4.2 D/d RATIO - The mathematical formula used to determine the rated load of each side of a sling bent over a support (shackle pin, hook, etc.). The D/d Ratio is calculated by dividing the diameter of curvature around which the body of the sling is bent (D) by the diameter of the sling (d).
- 4.3 RIGGING HARDWARE – The items used to rig, lift, secure, and/or support a load. Examples include, but are not limited to, slings, shackles, eyebolts, master links, etc.
- 4.4 SAFE WORKING LOAD (SWL) – The maximum load which can be applied under general conditions of use to a crane, hoist, rope, chain, sling, or other rigging hardware. The component with the lowest SWL limits the system Safe Working Load capacity. SWL is also called Work Load Limit (WLL) or Recommended Working Load (RWL).

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- 4.5 USER – The Saudi Aramco proponent department or other organization authorized to act on behalf of the Saudi Aramco proponent department.

5.0 GENERAL

- 5.1 All sling types shall have identification information permanently affixed with durable identification tags or wire rope swages (See Section 6 for specific sling type identification tag requirements) and shall be maintained by the USER so as to be legible during the life of the sling.
- 5.2 Sling proof-load test certificates shall be properly filed by the USER.
- 5.3 Slings shall be shortened, or otherwise adjusted, only by methods approved by the sling manufacturer.
- 5.4 Slings shall not be shortened or lengthened by knotting, by re-splicing, or by wire rope clips.
- 5.5 Use of slings that have been repaired shall be prohibited.
- 5.6 Slings shall be hitched in a manner that provides the best control of the load.
- 5.7 Slings or other rigging hardware in contact with sharp corners shall be padded with material of sufficient strength to minimize damage to the sling, other rigging hardware, and/or the load being lifted.
- 5.8 Working conditions that may affect slings and other rigging hardware shall be considered, with special attention to temperatures, chemicals, abrasions, etc.
- 5.9 The rigging hardware manufacturer's rated SWL capacity shall not be exceeded.
- 5.10 When not in immediate use, slings and other rigging hardware shall be stored in an area where they will not be subjected to mechanical damage, corrosive action, direct sunlight, abrasives, moisture, extreme heat, and/or kinking.
- 5.11 All attaching devices (i.e., rings, links, coupling pins, etc.) shall be selected to provide capacities equal to, or greater than, the slings used.
- 5.12 Fasteners manufactured in-house from bolts, rods, pins, hooks, etc. **shall not** be used.
- 5.13 Approved, self-closing safety latches shall be used on all hooks designed for safety latches.
- 5.14 Horizontal sling angles less than thirty degrees (30°) shall not be used.
- 5.15 The USER may request that a certified inspector (See Paragraph 4.1; also refer to GI 7.030) perform assessments of slings and other rigging hardware. Such assessments shall be in accordance with ASME B30.9, B30.20, and this GI. It is recommended that the USER perform assessments of slings and other rigging hardware during their regular safety inspections.
- NOTE:** Only technical clarification on issues related to slings and rigging hardware shall be provided by T&ESD.
- 5.16 Defective or damaged rigging hardware, or rigging hardware that does not comply with Saudi Aramco requirements, shall be immediately removed from service and shall be destroyed to prevent further use. Slings removed from service shall be recorded in the sling inspection log maintained by the USER.

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- 5.17 Alloy steel chain slings shall not be used in temperatures greater than 316 degrees C (600 degrees F) or less than -40 degrees C (-40 degrees F).
- 5.18 Alloy steel chain sling links shall be measured by the USER prior to use to verify that they have not stretched beyond the manufacturer's acceptable limits.
- 5.19 Eyes in wire rope slings shall not be formed using knots.
- 5.20 When the D/d ratio for using wire rope slings is less than 25, the rated load (or SWL) of the sling shall be decreased accordingly. Consult the sling manufacturer for specific data or refer to the Wire Rope Sling Users Manual.
- 5.21 All wire rope slings shall be the Flemish eye type with swaged endings. Fold back eyes for wire rope slings is prohibited.
- 5.22 Aluminum is prohibited as a material for use as wire rope sling ferrules.

6.0. PURCHASING SLINGS**6.1 Slings - General**

The USER purchasing department shall verify that:

- 6.1.1 All purchased slings conform to ASME B30.9 as a minimum.
- 6.1.2 Natural and synthetic fiber rope slings have been tested to a minimum design safety factor in accordance with ASME B30.9.
- 6.1.3 All other slings meet the minimum design safety factor of 5:1.
- 6.1.4 All slings have been proof-tested by the manufacturer at 200% of the rated capacity. The USER shall provide, upon request, a copy of the proof-load test certificate. Proof-load test certificates for slings purchased by contractors shall be maintained by the contractor and be available for review by Saudi Aramco representatives upon request.
- 6.1.5 Unique slings required for heavy lift rigging or other special applications meet the ASME B30.9 standard as a minimum. In cases where the load charts of ASME B30.9 do not cover the material, type, or size of the sling to be used, the manufacturer's recommendations shall apply.

6.2 Alloy Steel Chain Slings

- 6.2.1 Alloy steel chain sling identification tags shall state:
 - a. Manufacturer
 - b. Grade of steel
 - c. Reach
 - d. Number of legs
 - e. SWL and angle upon which the rating is based
 - f. Identification number (ID #) which links to the certificate of proof-load test.

6.3 Metal Mesh Slings

- 6.3.1 Metal mesh sling identification tags shall state:
 - a. Manufacturer

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- b. SWL rating for a basket hitch
- c. SWL rating for a choker hitch
- d. Identification number (ID #) which links to the certificate of proof-load test.

6.4 Natural and Synthetic Fiber Rope Slings

6.4.1 Natural and synthetic fiber rope sling identification tags shall state:

- a. Manufacturer
- b. Date of manufacture
- c. Type of material used
- d. Manufacturer's code or stock number
- e. SWL ratings for approved hitches used
- f. Identification number (ID #) which links to the certificate of proof-load test.

6.4.2 Coated slings shall be proof-load tested before coating.

6.5 Synthetic Webbed Slings

6.5.1 Stitching shall be the only method used to fabricate synthetic webbed slings.

6.5.2 Synthetic webbed slings identification tags shall state:

- a. Manufacturer
- b. Date of manufacture
- c. Type of material used
- d. Manufacturer's code or stock number
- e. SWL ratings for approved hitches used
- f. Identification number (ID #) which links to the certificate of proof-load test.

6.6 Wire Rope Slings

6.6.1 Wire rope sling identification tags shall state:

- a. Manufacturer
- b. SWL rating
- c. Identification number (ID #) which links to certificate of proof-load test.

7.0 RIGGING HARDWARE

7.1 All rigging hardware shall meet the minimum design safety factor of 5:1.

7.2 Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments shall have a rated load capacity equal to, or greater than, that of the alloy steel chain with which they are used.

*7.3 All rigging hardware shall have been proof load tested by the manufacturer at 200% of the rated capacity. All rigging hardware certificates shall show individual rigging hardware serial numbers, a minimum 5:1 design safety factor, and a minimum of 200% proof load test.

7.4 The general construction, required information markings, inspection requirements, testing, maintenance, and utilization of rigging hardware shall be as specified in ASME B30.20 and this GI.

8.0 INSPECTION

8.1 Inspection of slings and rigging hardware shall be of two (2) types:

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- 8.1.1 Frequent inspection - Visual examination by a Saudi Aramco certified rigger (See GI 7.028) prior to use. Records are not required.
- 8.1.2 Periodic inspection - Detailed visual inspection by a Saudi Aramco certified rigger performed within a maximum of six (6) month intervals. The inspection is recorded in the Sling Inspection Log (SA 9657) [See Attachment #1], listing any deficiencies found. Records shall be maintained by the USER.
- 8.2 All rigging hardware shall be inspected in accordance with ASME B30.20 standards and this GI.
- 8.3 Periodic inspection records (See Paragraph 8.1.2) shall be kept for the life of the sling and, as a minimum, include the following information:
- 8.3.1 Frequency of sling use
- 8.3.2 Severity of service conditions
- 8.3.3 Nature of lifts being made
- 8.3.4 Experience gained on the service life of slings used in similar circumstances.
- 8.4 All frequent and periodic sling inspections shall be performed by a Saudi Aramco certified rigger.
- 8.5 All slings, upon arrival from the manufacturer, shall be inspected by the USER and the following information, as a minimum, entered into the Sling Inspection Log. Additional information shall also be logged in prior to initial use and during all periodic inspections. Each sling shall have its own Sling Inspection Log page.
- 8.5.1 Serial number (ID #)
- 9.5.2 Sling type
- 8.5.3 Sling description (including length and width or diameter)
- 8.5.4 Safe working load (SWL)
- 8.5.5 In-service date
- 8.5.6 Out-of-service date
- 8.5.7 Rigger name and Saudi Aramco rigger certificate number/rigging competent person Saudi Aramco badge #
- 8.5.8 Inspection date
- 9.5.9 Remarks (results of inspection).
- 8.6 Sling inspection logs and rigging hardware shall be assessment items in safety inspections conducted by USERS.
- 8.7 Rigging hardware that does not comply with Saudi Aramco requirements shall be immediately removed from service and shall be destroyed to prevent further use.

SAUDI ARABIAN OIL COMPANY (Saudi Aramco)

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9.0 ATTACHMENTS

9.1 Attachment #1 – Sling Inspection Log (SA 9657)

* CHANGE

** ADDITION

NEW INSTRUCTION ☐

COMPLETE REVISION ☐

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Recommended by:

Manager
Transportation & Equipment Services Department

Concurred by:

Manager
Inspection Department

Concurred by:

Manager
Loss Prevention Department

Concurred by:

Executive Director
Industrial Services

Approved by:

Senior Vice President
Operations Services

SA 9657 (07/07)

Saudi Aramco GI 7.029

Attachment #1

SLING INSPECTION LOG*

***NOTE: EACH SLING SHALL HAVE A SEPARATE SLING INSPECTION LOG PAGE**

SLING TYPE: _____

SLING SERIAL #: _____

SAFE WORKING LOAD (SWL): _____

SLING DESCRIPTION: _____

SLING IN-SERVICE DATE: _____

SLING OUT-OF-SERVICE DATE: _____

[illegible]