Petroleum Development Oman L.L.C.

# SP-2275: Specification for Lifting and Hoisting Equipment Inspection and Testing Requirements

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## i Document Authorisation

Authorised for Issue

| Document authorization | | |
|---|---|---|
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## ii Revision History

The following is a brief summary of the four most recent revisions to this document. Details of all revisions prior to these are held on file by the issuing department.

| Version No. | Date | Author | Scope / Remarks |
|---|---|---|---|
| Version 0 | 1.9.07 | Hugo den Boogert, UEC/14 | New Procedure – Initial Issue |
| Version 1 | 1.9.11 | Hugo den Boogert UEQ/3 | Update to reflect user's comments |
| Version 2 | 1.3.16 | Hugo den Boogert UEQ31 | Update to reflect new developments and user's comments |
| Version 0 | 1.10.18 | Habsi, Haitham UEQ32 | Revised entirely to SP (previously, it was PR-1708) |
| Version 1 | June-2019 | Rabani, Fahad UEQ3 | Added six SOPs |
| Version 2 | April-2021 | Chari.CS.S.V.Subrahmany UEQ31x | Version 2 issued, reflecting users input and business need |

### iii Related Business Processes

| Code | Business Process (EPBM 4.0) |
|---|---|
| | |

### iv Related Corporate Management Framework (CMS) Documents

The related CMS Documents can be retrieved from the Corporate Business Control Documentation Register *TAXI*.

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|---|---|
| Design: | CP-117 Project Engineering |
| Procurement: | CP-129 Contracting and Procurement CoP |
| | PR-1233 Contracting and Procurement Procedures |
| Lifting and Hoisting: | SP-2273 Lift Planning/-Execution |
| Maintenance: | CP-114 Maintenance Code of Practice |
| | SP-2274 Lifting Equipment Numbering Procedure |
| HSE: | PL-04 HSE Policy |
| | CP-122 Health, Safety and Environment Mgmt. System |
| | SP-2000 HSE Specification - Road Transport |
| | SP-1143 Specification for Earthmoving and Construction Equipment |
| | SP-1257 HSE Specification - Scaffolding, Working at Heights or Over Water, and Earthworks |
| | PR-1172 Permit to Work Procedure |
| Well Engineering: | SP-2234 Equipment Inspection and Certification Procedure |

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# 1 Introduction

## 1.1 Purpose

Lifting operations have always been identified as a main or frequent contributor to potential loss of life, personnel injuries and asset damages in the Oil, Gas & Petroleum industry. It is therefore necessary for all lifting equipment to be appropriately inspected and certified and in full adherence to the COMPANY specifications and industry best practices such as International oil and gas producer recommended practices

## 1.2 Scope

This SP shall apply to all inspection activities involving lifting equipment such as mobile, crawler, tower, overhead travelling, portal, jib cranes and lorry crane/ loader, etc.

## 1.3 Exclusions

The following items are specifically excluded from the definition of this specification:

- Mooring lines of floating units such as barges, boats, ships, and dedicated associated items used on mooring devices or buoys
- Guy and stay wires and other items subject to static loading conditions only.
- Safety harness and fall arrestors and escape and rescue from height devices.
- Crown block, travelling block and top drive systems. Inspection criteria are covered by SP-2234 for well operations.
- Specialised lifting operations on offshore
- Earth moving machineries

## 1.4 Changes to the Specification

Responsibility for the upkeep of the Document shall be with the Functional Manager UEQ, the Owner. Changes to this document shall only be authorised and approved by the Owner.

Users of the Document who identify inaccuracy or ambiguity can notify the Custodian or his/her delegate and request changes be initiated. The Requests shall be forwarded to the Custodian.

The Document Custodian on behalf of the Document Owner shall ensure review and re-verification of this procedure every 3 years.

## 2 Abbreviation and Definition

### 2.1 Abbreviation

| | | |
|---|---|---|
| LEC | : | Lifting Equipment Controller |
| MEWP | : | Mobile Elevated Work platform |
| ALARP | : | As Low As Reasonably Practicable |
| RCI | : | Rated Capacity Indicator |
| RCL | : | Rated Capacity Limiter |
| PTW | : | Permit to Work |
| SOP | : | Standard Operating Procedure |
| WLL | : | Working Load Limit |
| LEEA | : | Lifting Equipment Engineers Association |
| ID | : | Identification number |
| UNF | : | Unified National Fine thread |
| NDT | : | Non-Destructive Test |
| daN | : | decanewtons |
| MPI | : | Magnetic Particle Inspection |

### 2.2 Definition

| | | |
|---|---|---|
| Company | : | Petroleum Development Oman LLC (PDO) |
| Contractor | : | Company direct contractor. |
| Shall | : | The word ‘shall’ used throughout this document indicates a mandatory requirement. |
| Should | : | The word ‘should’ used throughout this document indicates a strong recommendation |

### 2.3 Fundamentals

The guiding principle upon which the Specification is based on Omani Law, Ministerial Decree 286/2008, issued 22/6/2008 and effective as of 1/7/2008, Chapter 4, Section 3, Article 34. It takes precedence over all other documents.

The documents which specifically relate to this Specification in the standards hierarchy are presented below:

| |
|---|
| Applicable Law |
| Policies |
| Code of Practice |
| Specifications |
| Procedures |
| Guidelines |
| International Standards |
| Industry accepted Best Practices |

## 3 Roles & Responsibilities & Competence Assurance

A summary of the roles and responsibilities and competency that are required to both implement and manage the specification and its associated documents are given in App 2.

## 4 Lifting Equipment

Work equipment for lifting or lowering loads including its attachments (used for anchoring, fixing or supporting the load). It includes of lifting accessories or loose gears, lifting appliances and lifted equipment (load). Refer to Table 1: Classification of Lifting Equipment for lifting equipment classification.
Lifting Equipment shall only be used if:

- It has adequate strength for its intended use
- A suitable margin of safety is applied, based on the accuracy of quantifiable data, lift characteristics and environmental conditions.
- It meets relevant legal requirements and is designed in accordance with a recognised industry standard and/or code applicable to its intended use and environment where the task will be performed.
- Has valid thorough examination certificate.

### 4.1 Lifting Appliances

Any mechanical device capable of raising or lowering a load, e.g. cranes, forklift trucks, powered hoists, manual hoists, lever hoists, beam trolleys, winches, runway beams, and mono-rail hoist.

Lifting appliances such as trucks with self-loading crane, forklifts and mobile cranes used at COMPANY worksites shall comply with the requirements included in the Road Transport Specification SP-2000.

### 4.2 Lifting accessories

Lifting accessories means a component or equipment are attached to the lifting machinery, allowing the load to be held, which is placed between the machinery and the load or on the load itself. These accessories include amongst other chains, ropes, slings, shackles, eyebolts and open wedges, etc.

### 4.3 Lifted equipment / load

The load includes any material or people (or any combination of these) that is lifted by the lifting equipment. Loads are often provided with permanent or semi-permanent fixed or attached points for lifting. In most cases, these are part of the load. Examples of loads include:

- Loose bulk materials.
- Basket.
- Sacks, bags, pallets and stillages.
- Discrete items (such as a large concrete block).
- Machinery and any permanently attached lifting eyes.
- Containers and skids

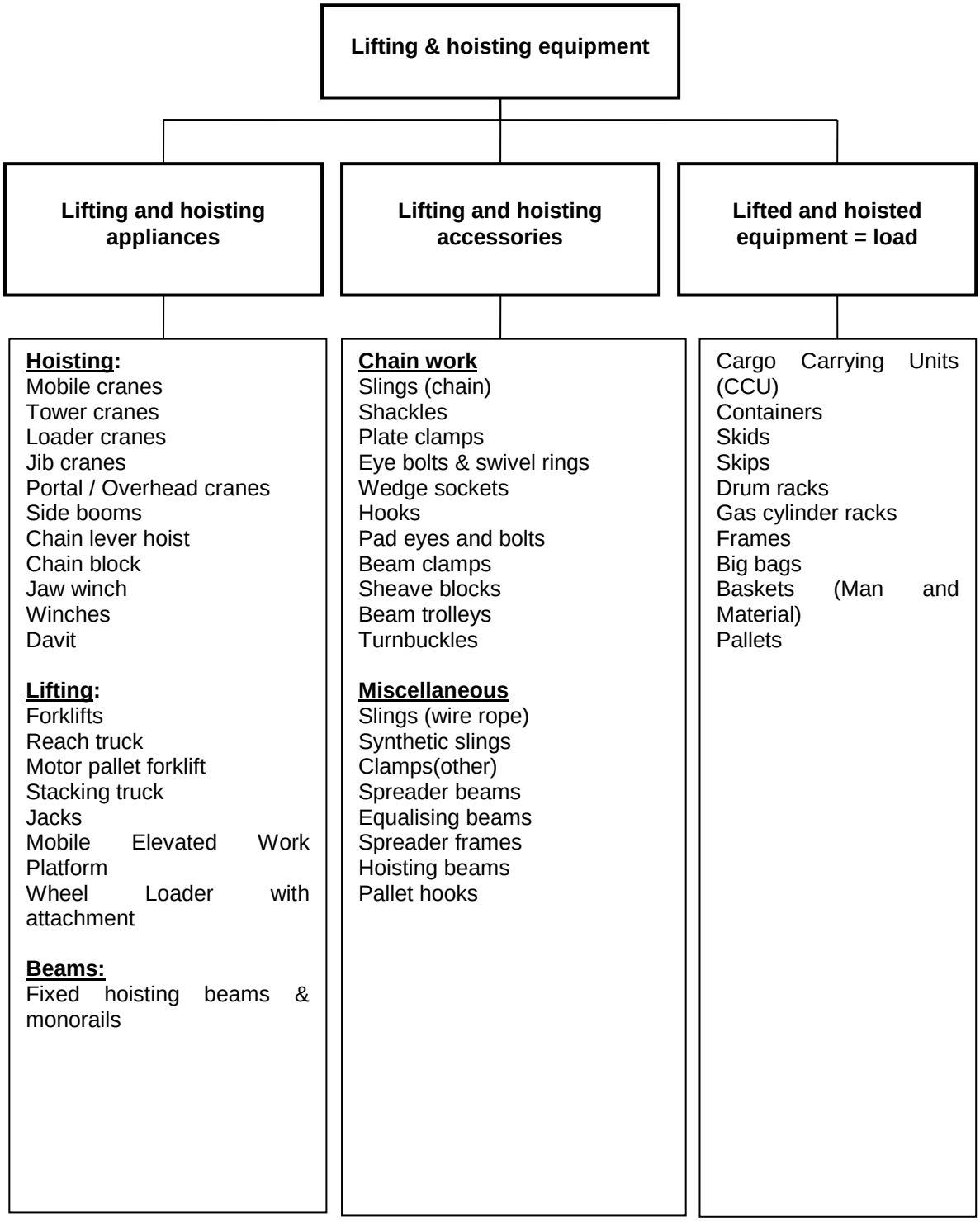


***Table 1: Classification of Lifting Equipment***

## 5 General Requirement

All lifting equipment, new and existing, used within the Company and its Contractors shall undergo initial and periodic testing, inspection and certification by Company approved LIA (lifting inspection agency). For inspection frequency refers Appendix 4 and section 6 for lifting gear rejection criteria.

During constructions phase, lifting equipment supplied by the vendor shall be certified by Company approved third party inspection agency.

Site Acceptance Test (SAT) shall be witnessed by the Company lifting engineer/ inspector.

Thorough examination shall be carried out on all lifting equipment that underwent repairs or any changes to the load carrying component. Risk assessment shall be carried out by lifting inspector prior to any test/inspection.

Company Lifting Authority shall approve any deviations to this requirement and documented in respective equipment records.

Inspection Intervals shall not exceed Appendix 4. However, the lifting inspector has authority to reduce the interval if required.

All lifting equipment shall be prepared by the asset holder/custodian prior to periodic inspection. It is the responsibility of the asset holder/custodian to provide any required documents i.e. previous inspection certificates, manuals and maintenance records including arrangement of test loads etc.

The user shall be visually inspected / function tested of all lifting equipment prior to use to ensure they are safe to use.

### 5.1 Inspection body

The Inspection body shall comply with the following requirements;

- The Inspection body shall have government license to conduct inspection.
- The Inspection body shall be certified to ISO/IEC 17020 type ‘A’ inspection body.
- The Inspection body agency shall comply with Company specification.
- Competency requirements as per Appendix 2.
- The final decision of approval is upon the Company Lifting Authority.

### 5.2 Lifting Equipment Register

The details of all existing and new lifting equipment and accessories shall be recorded in a lifting equipment register established for each location. The Lifting Equipment Controller (LEC) is responsible for maintaining master list and issue/receive registers at each location. The Company Contractors shall maintain a similar system.
The following minimum information shall be recorded in the register:

- Manufacturer and description
- Identification number
- SWL
- Dates of inspection and next due date
- Date of issuing, receiving and condition

### 5.3 Storage (Loft)

It is the responsibility of the asset holder/custodian or the Contractor to appoint a LEC to ensure proper storage of loose lifting equipment to avoid mechanical damage, corrosion, chemical exposure, etc. Lifting equipment register shall be maintained by LEC to ensure traceability of issues / return and to quarantine rejected items.

### 5.4 Document Retention

All new lifting equipment and equipment that have undergone major repairs shall be accompanied by manufacturing records, certificate of conformity, 3rd party certificate etc. depending on the type of equipment. All these records shall be provided in soft copy and retained during the life span of the equipment. Records of periodic inspection shall be retained for a minimum of 4 years.

## 6 Lifting Accessories

### 6.1 Inspection Frequency

Any lifting accessories before being put into service shall be certified by Company approved inspector.

All lifting accessories shall be thoroughly inspected in accordance with this specification at time intervals not exceeding 6 months.

Defects observed resulting in the item being unserviceable and not repairable, shall be painted red, placed in a quarantine area, and disposed of immediately after the inspection has been completed. If it can be repaired, it shall be painted black.

Test certificates and associated documents shall be issued by the Manufacturer's/ Authorized representative. They shall be reviewed and verified at the time of initial inspection by the Lifting Inspector including relevant valid design standards. All records of OEM certificates, test, examination and maintenance shall be retained.

Failure to provide the original Manufacturer's Test Certificates for new equipment will result in the equipment being rejected.

### 6.2 Repairs

Any loose lifting equipment such as chain block, lever hoist, etc. shall be repaired only as per manufacturer recommendation followed by proof load test before being reinstated into service.

***Note:*** *No repairs are allowed for slings, shackles, rings & links or eyebolts.*

### 6.3 Service Life of Lifting Accessories

Manufacturer recommendations shall be followed to determine the safe life of any lifting accessories.

### 6.4 Marking of Lifting Accessories

All lifting accessories shall have as a minimum a unique ID number and their safe working load (SWL). Marking type and methodology shall be as per manufacture recommendation.

If the hook is an integral part of the lifting equipment, no separate identification marking is required.

Sheave and Snatch blocks including attachments (hook or shackle) shall be marked with rope size.

***Note:*** *No direct marking shall be applied on synthetic webbing slings.*

6.5 General Requirements of Chain slings

- Only short links chain shall be used for lifting.
- A medium tolerance chain shall be used in chain slings and for general lifting services.
- Wrought iron chain or fittings shall not be allowed.
- Mechanical assembled chain slings: Shall be examined visually to ensure free from defects. Each component of assembly shall have the manufacturing test certificates.
- All chain sling and its components shall be minimum grade 8.

6.6 General Requirements of Flat and Round Synthetic Webbing Slings

- Webbing sling safety factor shall not be less than 7:1.
- Webbing sling eyes shall have protective reinforcement (sleeve of suitable material).
- Single ply webbing sling thickness shall be minimum of 2mm thickness.
- Effective Working Length (EWL of a flat woven webbing sling shall not differ from the nominal length by more than 3 % of the nominal length, in case of round slings 2% of the nominal length.
- Information label shall contain, WLL, reference standard number (EN 1492-1 & 2 or equivalent), the material used, mode factors of straight, basket & choked hitches and serial number/identification number, manufacturer name.
- Synthetic slings shall be free from solar degradation (due to sunlight or other sources of Ultraviolet rays)

6.7 General Requirements of Wire Rope Slings

- Wire rope sling safety factor shall not be less than 5:1
- The minimum length of plain rope between the inside ends of ferrules terminating a sling leg shall be 20 times the nominal rope diameter.
- In case of Turn back loop method, the protruded tail length of end termination shall not be more than one half of the rope diameter.
- All terminal fittings minimum shall be grade 8.
- The measured individual leg lengths shall not differ from the nominal length of the sling by more than two rope diameters or 1 % of the nominal length, whichever is the greater.
- Certificate of multi-leg wire rope sling shall provide details of master link and other terminal fittings for verification; master link assembly shall be used for above two legs.
- Synthetic fiber core wire rope slings shall not be used on rig sites due to risk exposure.
- Wire rope slings terminated with clips (Bulldog clamps) are prohibited for lifting.

***Note:*** *The usage of braided wire rope, hand splice and metal mesh slings subject to approval of Company lifting authority.*

6.8 General Requirements of Eye bolts

- The minimum safety factor for eye bolts shall be minimum 4:1.
- Nonstandard eyebolts shall be designed as per ISO 3266.
- For metric threaded eye bolts shall be marked with symbol of 'M'
- NDT test of eyebolts shall be at the discretion of the lifting inspector.

6.9 General Requirements of Shackles

- Minimum grade shall be 6 and safety factor shall be 5:1.
- No welding shall be carried out on any part of the shackle body or pin.
- Pins below 13 mm diameter shall have as a minimum grade number or the traceability code.
- NDT of shackles shall be at the discretion of the lifting inspector.

6.10 General Requirements of Hooks

- Shall have minimum safety factor of 4:1.
- All types of hooks shall have a safety latch unless; it is being manufactured without a safety latch for specific purposes.
- Hooks is an integral part of another lifting Equipment/accessory.
- Shall not be hand forged.
- Shall be machined to a smooth finish to avoid stress raisers.
- Shall not be welded at any stage of manufacturing.

6.11 General Requirements of Swivels

- The minimum design safety factor shall be 5:1.
- Bail of the swivel hoisting ring shall have free movement and the bail should pivot 180 degrees and swivel 360 degrees.
- Nondestructive test of swivels shall be at the discretion of the lifting inspector.

6.12 General Requirements of Plate Clamps

- Safety factor to prevent the load from slipping shall be at least 2.
- Shall be equipped with locking mechanism.
- The minimum plate thickness shall be considered for testing 10% less of that of the rated plate thickness.
- NDT of plate clamps shall be at the discretion of the lifting inspector.

6.13 General Requirements Fixed and Adjustable Beam Clamps

- Minimum safety factor of the beam clamps shall be 5:1.
- Manufacturer instructions for inspection and testing shall be followed.
- NDT of Beam clamps shall be at the discretion of the lifting inspector.

6.14 General Requirements of Lifting Caps and Stubs

- Welding shall not be allowed.
- NDT of caps and stubs shall be as required.

6.15 General Requirements of Rigging Screws/Turnbuckles

- A minimum length of at least 1.6 times of thread diameter shall be maintained within the body at each end.

***Note:*** *NDT of rigging screws/Turnbuckles shall be at the discretion of the lifting inspector.*

6.16 General Requirements of Master Links and other Rings & Hammer Locks/Connectors

- Loose master link shall be tested individually.
- Master link attached with sub /intermediate links shall be tested as a set.
- The working load limit of any intermediate links fitted with three-leg or four-leg sling shall be at least equal to 1.6 times the WLL of one of the legs suspended from it.
- Intermediate and master links shall not be connected more than two slings.
- Hammerlocks/connector size shall be matched with chain size.
- Hammerlocks/connectors shall be not connected with more than one chain sling.
- NDT of master links and other Rings & hammer locks/connectors shall be at the discretion of the lifting inspector.

6.17 General Requirements of Sheave and Snatch blocks

- Safety factor shall not be less than 4:1
- Sheave block groove depth shall be at least 1.5times of the nominal diameter.
- The radius of the groove shall be within 5% to 10% more of half the diameter.
- Cheek plates should be provided as additional.
- Sheave block opening system shall be captive and prevent inadvertent opening.

6.18 Rejection Criteria’s

The table below shows the most common rejection criteria, but not limited. For specific acceptance criteria of item shall be at the discretion of the lifting inspector and standard requirements. The following criteria need to be considered for rejection. For more details in rejection criteria refer to Table 2:Rejection criteria for lifting accessories.

| Item Description | Missing SWL & ID | Wear[1] | Elongation[2] | Bend | Twist & Knotted | Nicks &Gouges | Kink | Cracks | Loss of diameter[3] | Heat damage | Chemical exposure | others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chain sling | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Wire rope sling | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | Broken wires[4] |
| Webbing Sling | ✓ | | ✓ | | ✓ | | | | | ✓ | ✓ | Cuts & stitch damage |
| Shackles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Eye bolts | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Master links | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Swivels | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Plate clamps | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | | ✓ | ✓ | |
| Beam clamps | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | | ✓ | ✓ | |
| Turnbuckles | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Lifting Caps | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | | ✓ | ✓ | |
| Hooks | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | Opening[5] |

***Table 2*:Rejection criteria for lifting accessories**

Note:

1. Hard stamping with sharp edged stamps or hard stamps in low stress area.
2. Wear and Elongation in excess of 5% of the Original dimension. In case of wire rope slings maximum elongation is 4% allowed.
3. @Loss of diameter exceeds 10% of the Original diameter.
4. 6 randomly distributed broken outer wires in a length of 6d but no more than 14 randomly distributed broken wires in a length of 30 d where d is the nominal rope diameter or 3 adjacent broken outer wires in one strand.
5. Increase of hooks throat opening distance in excess of 10%.

***Note:*** *For inspection guidance refer to Appendix 6 section-1, SOP for Lifting Accessories Inspection*

# 7 Cranes

## 7.1 Definition of crane

A device or mechanism that used to suspend a load includes below listed categories:

- All Terrain
- Rough terrain & Truck mounted
- Crawler, - Lorry loading cranes
- All types of Jib cranes
- Overhead travelling cranes (Electrical & Manual)
- All types of Gantry cranes
- Pedestal cranes
- Tower cranes
- Side booms.

## 7.2 Initial Inspection

At time of initial inspection, the Manufacturer's Certificate shall be produced by the asset custodian / owner for review by the Lifting Engineer/inspector to verify compliance to the design standard and Equipment details.

## 7.3 Thorough Examination

The thorough examination of the crane shall be at intervals not exceeding 12 months. However, in some conditions such as initial inspection, major repair or any shock load additional thorough examination shall be performed to Appendix 4 for inspection frequency.

## 7.4 Mobile & Crawler, Lorry Loading Cranes

- Where applicable Mill test certificate of wire ropes shall be verified at the time of inspection.
- Hook safety latches shall be available all the times and hook block shall have manufacturer test certificates.
- Overload protection shall be available. Lorry loading cranes shall have either electrical cut off or hydraulic relief protection.
- Shall be equipped with boom angle indicator where applicable.
- Cranes shall be thoroughly examined, and performance tested with SWL and at least for 3 configurations as per applicable load chart (Minimum, intermediate, Maximum).
- Thorough examination shall be carried out after assembly of the boom or fly jib of the crane,
- Cranes shall be fitted with a hoist lowering limiter. As a minimum the lowering limiter shall ensure three (3) turns of rope on the drum.
- All ropes shall be replaced as per manufacturer recommendation or at the discretion of the lifting inspector. The replacement is subjected to thorough examination.

- Hook is integral part of crane, NDT of hook at the discretion of the lifting inspector. Unless proof load test is required, then shall undergo NDT.
- Slew ring bearing clearance measurement shall be taken and recorded annually by the Owner and made to be available at the time of inspection.
- Slew ring maintenance report shall be attached to the inspection certificate in every 10 years
- Safe egress and access shall be available to the crane operator cabin in every operating position of the crane. For more details refer to EN13586.
- Automatic Safe Load Indicators (ASLI)/Rated capacity indicators of the crane shall be verified according to BS 7262/7121.
- Inspection and discard of wire ropes shall be in accordance with ISO 4309.
- SWL and inspection dates shall be legibly marked in characters of a contrasting color not less than 75mm high, on the boom of the crane.
- Crane operation manual, load chart and maintenance records shall be available in operator cab.
- No obstacles shall be in the swing path. Toolbox shall not be fitted on the chassis
- Crane used for personnel lifting shall comply with the BS7121-2-1 sec 12 requirements and refer SP-2273 sec 6.4.4
- Hook block Reeving shall be verified as per the manufacturer recommendations.
- End termination of wire rope shall be verified, e.g. Align live end of rope with center line of pin (wedge socket) and shall not attach deadline to live line

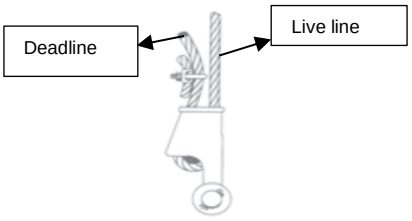


***Figure 1: live line vs deadline fitting***

***Note:*** *For inspection guidance refer to Appendix 6 section -1* SOP for Mobile Crane

7.5 Side Boom

- The minimum safety factor of the wire rope shall be 5:1.
- Wherever applicable rated capacity indicator or load monitoring system is recommended.
- If equipped with boom angle or load overhang indicator shall be functional tested and verified.
- Always shall ensure not less than three full wraps (as a minimum) of rope remaining on the drum during operation.
- Load chart and operation manual shall be available in the operator cab.
- Anti -two-block systems or equivalent devices shall be available.
- Emergency free fall function should be on load winch.

- End termination of wire rope shall be verified, e.g. align live end of rope with center line of pin (wedge socket) and do not attach deadline to live line.

7.6 Overhead, Gantry, Pedestal & Jib Cranes

- Shall comply with the requirements specifications SP-2202.
- Shall have positive end stops with resilient buffers to end carriages.
- Jib crane with electric hoist shall have hoist limit switches where applicable.
- Gantry rail tolerances shall be as per ISO12488-1 or manufacturer recommendation.
- Maximum deflection of structures (gantry beams) built in accordance to EN-1993-6 should not exceed 1/600 of the span (where the distance between two columns)
- The vertical deflection at center of the bridge shall not exceed 1/750 of the span (where the span is the distance between center of two rails).
- The deflection of post-mounted jib cranes shall not exceed (R+UA)/250, where R is the effective radius and UA is height to underside of jib arm.
- Overload protection is Company requirement. If, provided, it needs to be verified.
- All bolts shall be of high tensile steel minimum grade 8.8.
- ‘A ‘frame mobile gantry deflection shall not exceed 1/500 of the span.
- Parking jacks should be fitted to ‘A’ frame mobile gantries.
- Ensure that at least three full turns of wire rope remain on the drum, when the bottom limit is activated.
- Adjustable gantries shall be tested in its full extended position.
- Ensure the unique identification number and SWL is legibly marked in characters of a contrasting color not less than 75mm high, on the structure of the crane.
- For inspection and discard of wire ropes shall be in accordance with ISO 4309.
- Crane used in explosive area shall comply with EX requirements.

- Pedestal crane load chart shall be available and legible.

  ***Note:*** *For inspection guidance refer to Appendix 6 sec-3, SOP for Electrical Overhead Crane Inspection*

7.7 Tower cranes:

- Construction of the base shall be in accordance to the design specification of the manufacturer. This shall be checked, and results documented.
- It is desirable but not compulsory for a safe load indicator to be fitted to aid the operator
- Device that warns of the approach to overload and prevents the crane from being overloaded in accordance with BS 7262.
- Requirements for safe access in accordance with EN 13586, all access ways should be kept clear of obstructions and other hazards.
- Safe access to and along jibs and counter jibs for inspection and servicing shall be provided.
- Tower cranes shall be fitted with anemometers or other wind-speed monitoring devices.
- If more than one crane is operating in the same location zoning devices shall be fitted to avoid collision.
- Electrical installations should conform to BS 7671. Electrically operated cranes shall have an effective earth connection.
- The lifting points on ballast blocks shall be inspected regularly.
- Rail mounted tower cranes are recommended to be fitted with an audible travel alarm.
- Rated capacity charts applicable to the various specified operating conditions of the crane and shall be prominently displayed to the operator.
- Tower crane ties shall be verified in accordance with the manufacturer recommendation.
- Manufacturer recommendation shall be followed for Wind speed limits.
- Overload testing is to be carried out after each erection, and after each reconfiguration.
- Verticality of mast shall be verified after erection prior to slew section being installed and complete installation.
- Climbing frames (not a permanent equipment, but device for lifting persons) shall be thoroughly examined periodically at intervals not exceeding 6 months.
- Thorough examination shall be carried out after load test.
- Inspection of tower cranes shall be in accordance with EN 7121-2-5.

## 8 Chain blocks, lever hoists, all winches, Jaw winch (Tirfors), pad eyes & Monorails/Runway beams and Davits,

### 8.1 Inspection and Testing:

This section covers chain blocks (**as a loose item**), lever hoists, all winches, Jaw winch (Tirfors), pad eyes & Monorails/Runway beams.

All Equipment shall be clearly marked with the following information:

- Identification Number
- Safe Working Load (S.W.L.)
- Date of Inspection
- Next Due Date (of Inspection)

***Note:*** *For lifting equipment load test and thorough examination frequency refer to appendix 4*

### 8.2 Manual Chain Blocks:

- Load chains shall be in accordance with EN 818-7, for fine tolerance short link chains (grade T).
- The connecting links of the hand chain shall resist without permanent deformation a force of at least 120 daN.
- Hooks (Top & Bottom) shall be fitted with safety latches and SWL marking
- The braking function shall be automatic when the operating force ceases, whether the motion is lifting or lowering.
- Hand chains shall be secured against unintentional disconnection from the hand chain wheel.
- Hand chains shall have no sharpness around the welds.
- Overload protection shall be fitted in accordance with EN 13157.
- Chain blocks shall be subjected to light load test with a test load of between 2% and 10% of the rated capacity.
- Marking shall be as per EN 13157.

### 8.3 Lever Hoists:

- Load chains shall be in accordance with EN 818-7, for fine tolerance short link chains (grade T).
- Free end of the chain shall be fitted with end stop and shall be able withstand 2.5 times of tension in the chain when SWL lifted.
- Hooks shall be swivel freely under load and fitted with safety latches.

- The operating effort shall not exceed 55 daN at the end of the lever to lift the rated capacity.
- Lever hoists shall be subjected to light load test with a test load of between 2% and 10% of the rated capacity.
- Marking shall be as per EN 13157.

8.4 Trolleys:

- Trolleys shall have anti-derailment system.
- Anti- fall shall be provided to prevent from falling.
- Anti-tilt device shall be fitted and adjustable (wherever applicable).
- Trolleys shall be fitted with buffers.
- Hand chains shall have no sharpness around the welds.
- The operating effort of each operator shall not exceed 25 daN on the hand chain
- The wheels profile shall be suitable to runway beam.
- Side clearances between the wheel flanges and toes of the beam shall be minimum 1.5mm in each side.
- Maximum longitudinal slope of the travelling surface shall not exceed 0.3%.

8.5 Electrical Chain Hoists with Trolleys:

- Electrical chain hoist shall be as per EN14492-2.
- Hoists shall be provided with an emergency stop function.
- Hooks shall be fitted with safety latches
- Load chains shall be short steel link chains made in accordance with EN 818-7
- Power-driven trolleys shall always be under the control of a braking system.
- Dynamic test shall be with 1.1 x rated capacity of the hoist
- Trolleys shall incorporate features to prevent derailment or fall.
- Hoists for use of in an explosive environment shall comply the Ex requirements.
- Trolley buffers shall be provided with suitable material.
- Overload protection should be provided as per requirement.
- Chain container shall be provided where necessary.

8.5.1 Rejection Criteria for Electrical Chain Hoists with Trolleys

- Load chain wear in excess of 5% of original link dimensions.
- Illegible markings or no markings of identification number and serial number, SWL.
- Missing/ damaged safety latches.
- Slack end anchor/ end stops insecure.
- Hooks shall be verified for damages, distortion and hook opening exceeds 10%.
- The pitch of load chain and its elongation are not as per manufacturer.
- Any cracks, damages nicks, bends, distortion.
- Missing of Anti-tilt device of trolley (trolley guide)

- Loose or distorted side plates, load bar or suspension of trolley.
- Damaged or worn hand chain of gear trolley.
- Hand chain guide is missing or loose.
- Excessive wear of wheels and gears.
- Broken gears and pins.
- Load attachment points (Hook) shall be as per section 6.
- Incorrect wheels tread for example RSJ (Rolled Steel Joists) is not suitable for use on universal beams.

## 8.6 Jacks (Hydraulic or Pneumatic or Mechanical)

- Manual driven jacks shall be provided with self-blocking drives.
- Power driven jacks shall be provided with self-braking drives.
- Non-return valves at supporting cylinder shall be provided.
- Pressure relief valves shall be fitted as security devices against overloading.
- End stops mechanism shall be available for power driven jacks.
- Maximum descend of 5 mm is admissible for hydraulic jacks.
- Stability test shall be carried out for jacks in accordance with EN 1494.

### 8.6.1 Rejection Criteria for Jacks (Hydraulic or Pneumatic or Mechanical)

- Any cracks and damages and excessive corrosion, pitting on cylinders.
- Severe gouging or distortion, excessive corrosion on Rams.
- Ram (piston) seals damage and leaks.
- Pins wear in excess of 10% of original dimensions
- Control and operating lever wear, bents.
- Illegible marking

## 8.7 Tirfors / Jaw Winch

- The maximum force to be applied on the lever to lift the rated capacity shall not exceed 55 daN.
- Wire rope clamping mechanism shall be capable of holding load of 1.1 times of rated capacity. (Wire ropes having 10% reduction of the nominal diameter of wire rope shall also be capable of holding the same load)
- Wire rope discards criteria shall be in according with ISO 4309.
- The coefficient of utilization for load bearing fiber ropes shall be at least 7.
- Rope eyes with wire rope grips shall not be used as rope-end terminations.
- Legible marking with lifting and pulling capacity along with applicable rope diameter

8.7.1 Rejection Criteria for Triffors / Jaw Winch

- Casing damage and cracks.
- Any crack or broken part, of the operating lever.
- Pins wear in excess of 10% of original dimensions and shearing of load pin.
- The rope shall be examined to ensure it is undamaged. No broken wires shall be permitted as these can protrude from the rope and snag between the jaws
- Hooks shall be verified for damages, distortion and hook opening exceeds 10%.

8.8 Winch (Powered, Manual)

- Manual winches shall be as per EN 13157
- Powered (Pneumatic/ Hydraulic /Electrical) winches shall be as per EN 14492-1.
- Powered winches shall be provided with an emergency stop function.
- Hooks shall be fitted with safety latches to prevent unintentional detachment.
- Guide rollers shall be fitted to guide the cable (wire rope) onto the spooling drum.
- If applicable, winch shall be equipped with pressure rollers to presses the wire rope onto the drum to improve winding if applicable.
- Wire ropes shall be in accordance with EN 12385-1 and EN 12385-4.
- The safety factor of wire rope shall be 5 for all winches except manual operated.
- In the case of a load suspended by a single-fall rope drive and not guided, non-rotational ropes shall be used.
- Overload protection shall be provided for electric winches. In case of hydraulic winches relief valves to be provided.
- At least 3 full turns of rope shall remain on the drum all times as a minimum.
- Shall be equipped with manual drum brake.

***Note:*** *Oil field truck winches are excluded from this specification, because it is hauling operation.*

8.8.1 Man-Riding/Stabbing board Winches

- Man-riding winches shall be restricted to capacity /SWL150kg
- Shall be equipped with non-rotating wire rope.
- Shall be equipped with secondary brake system.
- Limit switch shall be available for high and low levels.
- Emergency descending system shall be available.
- Shall be equipped with slack prevention system
- 6 monthly thorough examination
- Load testing to be performed annually at a proof load of 1.25x SWL.

### 8.8.2 Rejection Criteria for Man-riding Winches

Any of the following defects found during inspection shall be cause for rejection: -

- Excessive wear in drive mechanic.
- Brake worn or slipping.
- Any cracks, a loos bolt or covers.
- Corrosion, pitting and damages.
- No excessive wear of wire rope and broken wires at anchorage point. Broken wires in excess of 5% are acceptable in remaining parts.
- Frame is corroded, damaged or distorted.
- Markings are illegible.
- Hooks shall be verified for damages, distortion and hook opening exceeds 10%.

***Note:*** *For inspection guidance refer to Appendix 6 sec-4, SOP for Man Riding Winch Inspection*

## 8.9 Pad eyes

- Pad eye holes shall be machined, flame cut is not allowed.
- Pad eyes shall be welded to the frame with full penetration welds.
- The shape of the pad eye must permit free movement of the shackle through the range required. The orientation of shall be in line with slings.
- Maximum pad eye's hole diameter shall not to exceed 6% of shackles pin nominal diameter.
- Pad eyes welded to containers, baskets etc. shall need to follow the load test requirements of that equipment.
- Note: For concrete blocks with rebar lifting points shall have proper design calculations that indicates enough SWL with minimum safety factor of 2 and shall be reviewed.

### 8.9.1 Rejection criteria

- Pad eye's hole elongation and wear.
- Cracking at weld areas.
- Distortion and damages.
- Flame cut evidence at pad eye hole.

## 8.10 Runway /Cantilever Beams

- For structural design of runways refer EN1991-3 or EN 1993-6
- The maximum measured deflection of a runway beam under the safe working load, relative to its supports, shall not exceed 1/500 of the span.
- End stops shall be provided on the runway to prevent the trolley either falling from the beams.
- Trolleys wheels tread shall be suitable to the Runway beams.
- Cantilever beams the maximum measured deflection under the safe working load shall not exceed 1/250 of the span for cantilever beams. However, if the cantilever deflection

exceeds for continuous beam, the combined deflection shall be considered Figure 1: live line vs deadline fitting

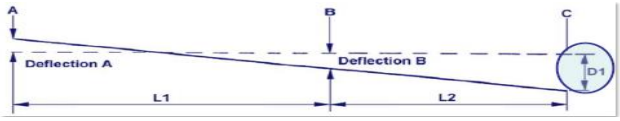


***Figure 2: cantilever deflection***

- Runway beams shear connection (connecting to supporting structure beam web) shall always be fitted with bolts.

8.11 Davits

- Initial load test of davits shall be with 125% of SWL or as per manufacturer.
- Davits connected to vessels (used for manhole cover flanges and others) shall be excluded from periodic inspections. Pre use inspection is mandatory.
- Davits used frequently shall be inspected every six months.

## 9 Inspection and testing requirements of Mechanical Handling Equipment

Mechanical handling equipment is not limited to Forklifts, Tele handlers, Tool carriers, Floor cranes, Pallet stackers / trucks.

This section does not cover earth moving equipment like excavators, wheel loaders, Skip loaders and dumpers, Dozers. Any lifting attachment such as hook or forks to this equipment shall considered as lifting equipment and shall undergo proper thorough examination at intervals not exceeding six months. Any additional test like NDT shall be carried out at discretion of the surveyor or inspector.

9.1 Tool Carriers (wheel loader with forks):

- Fork attachment shall be as per the manufacture recommendation.
- Rated capacity chart shall be available and prominently fixed in the operator cabin.
- SWL and date of inspection and next date of inspection shall be marked on the equipment.
- No modification of forks shall be permitted without approval from the manufacturer.
- Fork arms shall be associated with ID number.

9.2 Forklifts and Tele handlers:

- Load test shall be followed by complete thorough examination of the mast and guide rollers and internal chains and inaccessible welds.
- Load chains shall be replaced as per the manufacturer recommendations and at discretion of the surveyor or inspector.
- Heel, top and bottom hooks of forks to be subjected to NDT at the discretion of the surveyor or lifting inspector.

- Any welding or flame cutting carried out on any part of the fork shall not be permitted.
- Straightness of the forks shall not to exceed 0.5% of the length of the blade.
- Fork tip height differences shall not to exceed 3% of the length of the blade.
- In all cases, fork angle shall not be exceeding 93 degrees.
- Any modification i.e. holes or drilling on the forks shall not be allowed.
- The drop of Hoist rams during the static load test shall not exceed 50mm in 10 minutes the drop of Tilting rams during static load test shall not be exceed 10mm in 10 minutes.
- Lateral and longitudinal stability of forklift shall be carried out as per ISO 22915.
- Only manufacturer recommended attachment shall be used with proper certification. All attachments including fork arms shall be associated with identification numbers.
- Only integrated platforms (controls from platform) approved by manufacturer shall be allowed for man riding.
- Tele handlers shall have a proper load charts for each attachment.
- SWL and date of inspection and next inspection date shall be marked on the equipment.

***Note:*** *For inspection guidance refer to Appendix 6 sec 5, for Forklift Inspection*

9.3 Pallet Stackers / Trucks:

- The minimum safety factor of chain using for pallet stackers shall be 5.
- The actuating force shall not exceed 150 N.
- The descent of a load equal to the rated capacity caused by an internal leakage in the hydraulic system shall not exceed 25 mm during the first 10 min.
- Manually operated lifting trucks shall be equipped with pressure limiting device. In the case of powered pallet stackers/trucks, they shall be equipped with pressure relief valves.
- Lowering speed of powered stackers/trucks shall be limited to 0.2 m/s or otherwise as recommended by manufacturer.
- Fork tip height differences shall not to exceed 3% of the length of the blade.
- Fork angle shall not be exceeding 93 degrees.
- Lateral and longitudinal stability shall be carried out as per ISO 22915.
- Pallet stackers/ trucks shall be equipped with a parking brake.

9.4 Floor Cranes:

- Recommend being equipped with internal load limiting devices and don't not to exceed 125% of rate capacity.
- Load hook shall be equipped with a safety latch.
- The release mechanism shall be operated to control the rate of descent to not more than 76.2 mm/s.

- Stability test shall be carried as per standards or manufacturer recommendations.
- The Mobility test shall be carried out on slope at 15°.
- Rear wheel shall have braking mechanism.

### 9.5 Marking requirements

All the above mechanical handling lifting equipment shall be clearly marked with the following information:

- Identification Number
- Safe Working Load (S.W.L.)
- Date of Inspection
- Next inspection due date

***Note-1:*** *All attachments shall be marked and certified individually.*
*Note-2: All lifting devices on earth moving machines used for object handling shall be provided with the Rated Lifting Load (RLL) and marked as per EN 474-1*

## 10 Passenger and Goods Lifts

Manufacturer's Certificate of Test and commissioning tests shall be made available by asset custodian / owner for review by the surveyor/ inspector to verify Equipment details at the time of initial inspection.

***Note:*** *Inspection frequency and load test as per appendix 4*

### 10.1 Passenger and Goods Lifts:

The below given list of requirements are not limited to:

- Shall be equipped with emergency alarm.
- Fire control switch shall be provided.
- Push buttons shall be clearly marked.
- Buffers shall be provided at the bottom limit of travel for CARs and counterweights.
- Energy accumulation type buffers with buffered return movement shall only be used if the rated speed of the lift does not exceed 1.6 m/s.
- The factor of safety for the suspension ropes shall be not less than 8 in the case of traction drive with three ropes or more.
- Compensation ropes shall be provided and shall comply with EN12385-5 for rated speeds exceeding 3.0 m/s.
- Shall be equipped with manual emergency release lever.
- CAR top shall be equipped with limit switches.
- Shall be equipped with landing door electric safety device to ensure the door closed.

- The braking system shall have an electro-mechanical brake (friction type); band brakes shall not be used.
- The interior clear height of the CAR, i.e. height between the finished floor level and the underside of the false ceiling, shall be not less than 2.4 m.
- Shall be equipped with emergency door in lift well.
- Shall be equipped with door interlock mechanism.
- Where an overload detection device is fitted, a full load calibration test shall be carried out at time of load test.
- Dynamic test, drop test, proof load and over speed governor test shall be as per EN81-1.
- Always follow the manufacturer requirements.

## 11 Mobile Elevating Work Platforms

- Shall comply with EN280.
- The initial test load shall be 125 % of the rated load for power operated MEWPs, and 150 % of the rated load for manually operated MEWPs
- Shall be equipped with tilting and motion alarms.
- Safety features shall be checked at specified intervals including safety devices, load holding actuators, overriding emergency device.
- Shall be equipped with emergency lowering system and emergency stop.
- Shall be equipped with overload warning alarm/ overload cut-off
- Truck mounted boom lifts shall be equipped with level indicators.
- Requirements specified by Manufacturer shall be followed
- If MEWPs is manually operated, the height of MEWP shall not exceed 5m above ground level.

***Note:*** *For inspection guidance refer to Appendix 6 sec 6, SOP for MEWP Inspection.*

## 12 Containers, skids, man baskets and spreader bars

At time of initial inspection, the Manufacturer's Certificate and design calculations including Manufacturing Record Book (MRB) shall be made available by asset custodian / owner for review by the surveyor/ inspector.

All permanently attached lifting accessories shall be inspected along with equipment.

Man riding baskets shall comply with BS EN 14502-1 and thorough examination and load test as per Appendix 4.

***Note:*** *For inspection and testing frequency of the above, refer to appendix 4.*

### 12.1 Containers and Skids:

- The design force on the primary structure shall be calculated to 2.5 Rg. Where R is the rating load, g is the gravitational force.
- Pad eyes shall be designed for a total vertical force of 3 Rg.

- Forklift pockets shall be as per standards 200 mm x 90 mm. Pocket shall be designed to prevent the container toppling from the forks.
- One forklift pocket centre to another pocket centre shall not exceed 2050mm.
- Any difference in the diagonal measurements between lifting point centres shall not exceed 0,2 % of the length of the diagonal, or 5 mm, whichever is the greater
- Clearance between shackle pin and pad eye hole shall not exceed 6 % of the nominal shackle pin diameter
- The tolerance between pad eye thickness and inside width of shackle shall not exceed 25 % of the inside width of the shackle.
- Pad eyes shall be welded to the frame with full penetration welds.
- Load test shall be followed by MPI of pad eyes.
- Pad eyes shall be to permit free movement of the shackle and sling termination without fouling the pad eye.
- The container shall be loaded to a total gross weight of 2.5 MGW-Tare weight and lifted using all the pad eyes.
- The sling set used for test purposes shall have a minimum safe working load rating of 1.3 times the load subjected to the container.
- No deflections during testing shall be greater than 1/300 of the span of the member.
- Container corner castings shall comply with requirements ISO 1161.
- Data plate shall be fixed to the container and information shall be filled.

***Note-1****: If a container is permanently fitted with a sling set, this sling set shall not be used for the load test.*
***Note-2:*** *The inspection frequency of permanently fitted lifting set, shall not exceed 12 months. In case the initial inspection expired, it shall be re certified along with the container.*
***Note-3****: The test load is obtained by putting in or suspending a test mass of 2.5MGW-T.*

12.2 Cargo shipping containers requirements:

- CSC (Convention for Safe Containers) sets forth important standards to ensure the safety of shipping containers through the global supply chain
- CSC, or the International Convention for Safe Containers, incorporates design requirements, minimum functionality requirements and measurements of capacity, weight, and resistance to forces containers are subjected to when they ship by sea or on land within ships, trains, or trucks.
- The first CSC safety examination must occur no more than five years after the date of production, and re-examinations shall occur at least once every 30 months after that.

- Inspectors work to determine whether the container has sustained any damage that places a person in danger.
- Shipping containers shall have CSC approval, if, CSC approval is within one-year, thorough examination or examination of lifting points MPI is exempted.
- If CSC approval and yearly thorough examination of the container is available, then MPI requirement can be exempted.
- Shipping containers with one time lifting provision and having No CSC approval and thorough examination certificates, shall have mandatory visual and MPI examination.

***Note:*** *Refer appendix 4 for offshore containers standards.*

12.3 Lifting Beams, Frames and Spreader Bars:

- For lifting Beams /Frames and Spreader Bars with a safe working load up to 10 tons, initial load test 2XSWL shall be applied and for inspection frequency- refer appendix 4.
- The initial load applied shall be SWLX1.04+9.6t for Lifting Beams /Frames and Spreader Bars with a safe working load greater than 10 tons up to 50 tons.
- For lifting beams/frames and spreader bars with capacities over 50 tonnes the initial load shall be applied @ SWLX 1.1, However, in some conditions load testing may be waived. This waiver shall be approved by Company lifting engineer on condition that:
- Proper design calculations of pad eyes and structure are available for review as per standards.
- Thorough inspection of the structure and welds shall be carried out. All welds shall be subjected to MPI and all full penetration welds to UT (Ultrasonic Test) inspection prior to start of the lift program.
- Dimensional check of the lifting beam/frame or spreader bar shall be undertaken to ensure conformance with material and dimension tolerances.
- Supplementary tests (if any) in addition to the above shall be carried out at the discretion of the surveyor/lifting inspector.
- The load shall be sustained for a minimum of 2 minutes.
- For pad eyes requirement refer sec 9.9
- Load test shall be followed by MPI.

***Note-1:*** *Lifting rods for lifting concrete blocks shall proper design calculations and tested twice the SWL.*
***Note-2****: Modular spreader beams shall be used as per manufacturer recommendations and configurations*

12.3.1 Marking

The following information shall be marked.

- Identification Number.
- Safe Working Load (S.W.L.).
- Date of Inspection.
- Next inspection date.

***Note:*** *The tare weight of spreader beams is known before lifting.*

## 13 Inspection / Weight Verification of Test Weights and Load cell calibration

13.1 Test Weights:

For concrete test weights with lifting points:

- Initial inspection and verification shall be carried and followed by NDT. The verification shall be done by using calibrated load cell.
- All manufacturer documents shall be reviewed before verification.
- Inspection frequency of test weights at intervals shall not exceed 12 months.
- NDT examination and weight verification intervals shall not exceed 60 months.
- All lifting points shall be designed for a total vertical force of three times the gross weight of the test weight.
- Test weights shall be clearly marked with following information and legibly marked with characters of a contrasting color not less than 75mm height that shall include:
  - Weight in kilograms.
  - Date Inspected and Next Due Dates.
  - Unique identification number.

***Note:*** *Lifting points of steel test weights shall be verified by NDT not exceeding 12 months.*

13.2 Load Cell:

Load cells require to be calibrated annually by ISO 17025 Accredited labs. The accuracy shall be ± 1%.

## 14 Colour Coding

Bellow requirement shall be considered: -

- The colour code scheme applicable to lifting accessories only. It indicates to the user that a thorough examination has been carried out and certified.
- Before inspection, the equipment shall be properly cleaned and free from previous colour code.

- Upon satisfactory results of the thorough examination, the Colour Code shall be marked on every piece of lifting accessories.
- If inspection results are unsatisfactory the equipment shall be coloured red and quarantined.
- If equipment is repairable, it shall to be coloured black and locked away to prevent unintended use.
- If the equipment cannot be repaired, it shall be disposed.
- A new colour shall be introduced every six months. The two months overlap is to ensure lifting accessories is always available for use. There are four colours in the sequence and the cycle is repeated every 2 years Figure 3: Lifting Gear Color Code Biannual cycle
- Company practice is to have all available lifting accessories examined and colour coded twice per year in February/March and August/September.
- Any certified lifting accessories that do not have a visible colour band shall be re colour by competent person.
- If the colour is out of date, equipment shall not be used. It shall be returned to the rigging store and quarantined. Such equipment shall not be re-issued or used until after satisfactory thorough examination by a lifting equipment Inspector.
- Preparation prior to inspection (collecting certificates/cleaning etc.) and marking of the color codes after satisfactory results of the inspection shall be the responsibility of the asset custodian or his nominee and shall be witnessed by the lifting equipment Inspector.
- The validity of lifting accessories inspection is 6 months. However, if the next inspection date is still valid, colour code shall be changed by a competent lifting equipment controller.

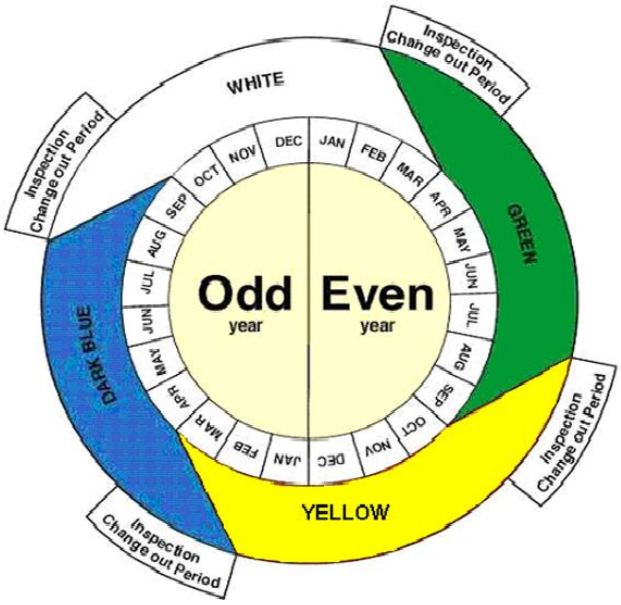


***Figure 3: Lifting Gear Color Code Biannual cycle***

All main work sites shall have a visible Colour Code Identity Board with the current colour codes displayed.
The board shall display both valid colors during “change out period” and the single valid color at other times.

> ***Notes-1:*** *Webbing slings shall not be colour coded with paint directly. Colour code tags or plastic strap as alternative.*
> ***Note-2:*** *Other lifting accessories shall be colour coded at appropriately place.*
> ***Note-3:*** *Crane hook is integral part of the crane, colour code shall not be applied.*

> ***Note:*** *For colour code application refer to Appendix 6-sec 7, SOP for Colour coding*

## 15 Application & Step-Out Approval

### 15.1 Application

This specification is applicable to all lifting equipment in the Company and its Contractors.

### 15.2 Step-out and Approval

Any step-out from this specification shall be addressed to the COMPANY lifting function in writing.

# 16 Appendixes

## Appendix 1: Glossary of Definitions

| | |
|---|---|
| Alpha/numeric | A combination of letters and/or numbers used for identification. |
| Anemometer | Instrument (used on some cranes) for measuring wind speed. |
| Angle Indicator | A device that shows the angle at which the crane boom is operating and the corresponding rated capacity. |
| Asset Owner | Entity that owns lifting equipment. Either COMPANY or Contractor. |
| Automatic Safe Load Indicator (ASLI) or Rated Capacity Indicator | A device that automatically provides, with a specified tolerance, warning for the load is approaching rated capacity and another warning when capacity is exceeded. |
| Auxiliary Hoist | A secondary lifting system usually fitted to cranes, operating from a separate winch drum from the main hoist rope. Usually used on cranes to lift light loads, relative to the crane's capacity, faster than is possible on the main hoist system. |
| Bilingual Text | English and Arabic |
| Block | A hook sheaves and frame assembly attached to a rope used for raising and lowering loads. |
| Boom | A steel lattice or steel box section structure that forms a lifting mast. |
| Cantilever Beam | Section of beam supported at one end only. |
| Centre of Gravity | Point at which the total mass of a body may be regarded as being concentrated, or about which the parts of the body exactly balance each other. |
| Certificate of Test and or Examination | A Test Certificate is issued by the third-party certification lifting engineer on completion of a satisfactory survey. A new Test Certificate is mandatory if the equipment is subject to repair or modification. Where a Test certificate states that it is also a report of thorough inspection/examination it must contain all the information as required by LOLER 98, Schedule 1. |
| Certificate of Compliance | A document in which the manufacturer certifies that the products supplied comply with the requirements of the purchase order, without mentioning of any test results. |
| Certification Company third party | Independent body providing inspection services, upon satisfactory results of which, certificates are issued and conforming to the requirements of BS EN ISO/IEC 17020. Independent body providing inspection services (conforming to the requirements of BS EN ISO/IEC 17020), and issues certificates upon satisfactory results of inspection/ testing. |
| Color Code | A method of marking equipment (normally with paint or plastic cable ties) to give a visual indication of its certification/inspection status. This 'coded' color is changed every six months. |
| Container | Any form of unit or device used for the transportation of cargo. |
| Crane, Truck Loading or Articulating Crane | A crane mounted on a commercial truck chassis that has been specially strengthened to accept the crane. |

| | |
|---|---|
| Crane, Carrier-Mounted or Mobile or Truck Crane | Truck type crane that has been specially designed for crane service and the heavy loads the crane is required to carry. |
| Crane, Crawler-Mounted | Except for the base these cranes are identical to the Carrier-Mounted |
| Crane, Rough Terrain | Short wheel-based cranes with crab steering and fitted with oversized tires to facilitate travel across rough terrain. |
| Effective Span | The distance between the centers of the adjacent supports, after due allowance being made for the end fixing, continuous beams and cantilevers. |
| Effective Working Length (EWL) | The distance between the extreme inside ends of the eyes in a straight sling. |
| Effort | The pull on the hand chain or lever required to lift a specified load (chain blocks and pull lifts). The specified load is usually the working load limit of the block. |
| Equipment Tag Number (ETN) | A unique identification number given to an item of lifting equipment for registration purposes and to facilitate traceability. |
| Extended Dimension | The distance between the suspension level and the bottom hook saddle of a chain block, when the bottom hook is in the extended position. It equals the sum of the drawn-up dimension and the range of lift (or height of lift). |
| Factor of Safety | The ratio of the load that would cause failure of an item of lifting equipment to the load that is imposed upon it in service i.e. SWL (This is to allow for detrimental criteria such as wear and tear, dynamic loadings etc.). |
| Ferrule | A compression fitting used to secure the eye of a wire rope. |
| Ferrule-secure eye termination | A wire rope termination made by forming an eye, which is secured by means of a ferrule, pressed on to a rope. |
| Fit-for-purpose | Equipment free from defect and used only in the manner for which it was designed. |
| Frame | The primary load bearing elements of a container. |
| Free Fall | A boom or hook-block descending under its own weight, or that of the load. |
| Functional Testing | Operation of each motion of the lifting equipment without a load applied in order to determine whether the equipment performs as the manufacturer intended. |
| Gantry | Elevated structure supporting the track of an overhead travelling trolley or crane. |
| Gross Capacity (Cranes) | The gross capacity is the capacity shown in the crane's load or capacity charts. |
| Gross Weight | The maximum allowable weight of a loaded container, at the design sling angle, i.e. the Tare weight (weight of empty container) plus the Pay Load (maximum weight of cargo that can be carried by the container). |

| | |
|---|---|
| Hand Operated Chain Block | A block revved with a load chain and operated by a hand chain to give a mechanical advantage. |
| Lifting engineer (Company) | A person from Company who has the appropriate practical and theoretical knowledge and experience of the lifting equipment.<br>To provide of expert advice and technical solution.<br>Participate in Audits of sites to ensure compliance with legislative and Company Standards. |
| Lifting Inspector/ Surveyor | A person from an approved third-party certification Company who has the appropriate practical and theoretical knowledge and experience of the lifting accessories and equipment to be thoroughly inspected against the applicable lifting equipment standards in relation to the safety and continued use of the lifting accessories and equipment. |
| Lifting Equipment Controller (LEC) | A person who is officially appointed by the operations manager and who controls the lifting equipment at relevant location |
| Lifting Set / Sling Set | Lifting slings and shackles used to connect a container to the lifting equipment. |
| Loose Lifting Equipment | Lifting Equipment that is portable and enough so that it can easily be moved or carried by a person(s) to/from a store / location to a worksite to conduct a lifting operation.<br>This may include Lifting Equipment (e.g. manual lever hoists, chain falls, beam clamps etc.) and Lifting Accessories (e.g. slings, shackles etc.) |
| Luffing | The movement of a crane boom from one angle to another in the vertical plane |
| Measured Deflections | The deflections measured in such a manner that they relate to precisely the same conditions as those covering the calculated deflection. |
| Mobile Lifting Equipment | Lifting equipment that can be transported from one installation to another (e.g. mobile cranes, forklift trucks etc.). This equipment is likely to be owned and used by the Contractor. |
| Mode Factor | A factor, which considers, the geometry of the sling assembly, the number of parts and other constants as specified in the appropriate British Standard. |
| (NDT)-Inspector | Person competent to carry out NDT inspection on lifting equipment. In all cases, the inspector shall have experience and training suitable to the NDT inspection being performed. (min. as per ASNT Tc-1a level 2 or equivalent) |
| Overload Testing | Operation of the lifting equipment with a load exceeding the rated load but without operating the full range of motions of the equipment in order to determine whether the equipment is stable, structurally sound and fit for the use for which it was designed. |
| Overload Testing (Dynamic) | Operation of the lifting equipment with a load that exceeds the rated load applied in order to determine whether the equipment is stable, structurally sound and fit for the use for which it was designed. |

| | |
|---|---|
| Others | Skids, skips, baskets used for load transfer |
| Pay Load | The weight of a load within a container. |
| Permanently Attached Slings Sets | Permanently Attached Slings Sets are used only for transportation of containers. They must not be used for general lifting duties. These slings are additionally color-coded Purple. |
| Performance Testing | Operation of each motion of the lifting equipment with the rated load applied in order to determine whether the equipment performs to the manufacturer's specification. |
| Pre-use Inspection | A visual check and, if necessary, a function check of the Lifting Equipment by a competent person before each use. In determining the suitability and scope of the inspection, reference should be made to information such as manufacturer's instructions and relevant industry standards. |
| Proof Load Test | A test load (mass or force) applied to an item of lifting equipment/accessory to prove its integrity. Proof load tests can be carried out to various standards, but results must be recorded on a Test Certificate. |
| Pulley (or Sheave) | A grooved wheel over which a rope passes. Pulleys are usually shaft mounted and free to rotate in response to movement of the rope. |
| Rated Capacity Limiter | A device that automatically cuts, with a specified tolerance, motions that could increase risks, if the rated capacity is exceeded. |
| Rated Capacity Indicator | See ASLI |
| Reeving | Configuration of the hoisting rope in a winching system. |
| Report of Inspection | A report of inspection is the report issued by the third-party certification lifting engineer on completion of an unsatisfactory survey. The report of inspection shall contain all the information as required by LOLER 98, Schedule 1. |
| Rigging Store or also called Rigging Loft | An ISO container, or similar, modified specifically to suit the storage of lifting equipment. |
| Runway Beam/Monorail | An overhead structural beam certified to a specific SWL and used for the attachment of lifting equipment, such as trolleys, beam clamps, etc. |
| Safe Working Load (SWL) or Rated Capacity | The maximum load (as determined by a competent person) which an item of Lifting Equipment may raise, lower or suspend under service conditions, e.g. the SWL can be lower than, but can never exceed, the WLL.<br>Normally SWL = WLL unless the Lifting Equipment has been de-rated. |
| Slewing | An angular movement of a crane boom or crane jib in a horizontal plane. |
| Sling Assembly | A sling in the form in which it is used. |
| Soft Eye | An unsupported loop formed at the end of a rope to facilitate connection of a lifting device. |

| | |
|---|---|
| Snatch Block | A single pulley with a hinged side plate to allow easy access to the pulley wheel for rope attachment. |
| Structural Integrity | The reliability of the load bearing structure. |
| Tare | The weight of the container without cargo. Tare weight shall include all fixtures normally fixed to the container in service. |
| Lifting Technical Authority | Shall mean the COMPANY person who is legally delegated or invested authority, capacity, or power to perform lifting function duties. |
| Test Certificate of Proof Load | A Test Certificate of Proof Load is the certificate of a proof load test, which would normally be carried out at the completion of manufacture and be supplied with the equipment. A new Test Certificate of proof load will require to be issued if the equipment is subject to repair or modification of any load bearing structure, or if the independent lifting engineer deems it is necessary to ensure continuing integrity. |
| Thorough Inspection or Examination | A visual Inspection by a lifting inspector, carried out carefully and critically, and supplemented by other means, such as measurement and where necessary non-destructive testing, in order to arrive at a reliable conclusion as to the condition and safety of the equipment. If necessary, for the inspection, part of the equipment shall be dismantled. |
| Webbing | A part of a flat lifting sling, comprising a woven narrow fabric, generally of a coarse weave and multiple plies, the prime function of which is load bearing. |
| Working Load Limit (WLL) | The maximum load, determined by the manufacturer, which an item of Lifting Equipment is designed to raise, lower or suspend. Some standards and documents refer to WLL as the ‘maximum SWL’. |

## Appendix 2: Roles and Responsibilities and Competency Requirements

| Position | Responsibilities |
|---|---|
| Lifting Equipment Lead | • Develop and maintain lifting equipment standards and specifications.<br>• Verify that Company and its Contractors are complying with specifications and guidelines for lifting equipment through periodic audits.<br>• Participate in investigations of lifting equipment incidents. |
| Lifting Engineer (Company) | • To raise the awareness of all Lifting equipment custodians of their roles and responsibilities.<br>• Provision of expert advice to personnel at work sites.<br>• Participate in audits of specialist lifting sub-Contractors and specialist rigging suppliers.<br>• Approval authority of lifting inspection. |
| Lifting Competency Assessor<br>(Company) | • To verify the competency of lifting personnel who involved in lifting operations.<br>• Conduct ad hoc visits and audits of company and all contractor's facilities to verify lifting and hoisting compliance.<br>• To provide technical expert advice to ensure for lifting operations. |
| Lifting Inspector/Survey | Undertake inspection and certification of lifting accessories in accordance with this specification |
| NDT Inspector | Undertake all types of NDT as required by this specification or as requested by the surveyor |
| Lifting equipment asset custodian<br>All locations | • Ensure all items of lifting equipment are maintained and certified in accordance with this specification.<br>• Ensuring that the lifting equipment is cleaned prior to the inspection, test weights are available and after satisfactory results of the inspection the lifting equipment is marked/color coded. |
| Lifting Equipment Controller (LEC)<br>All locations | • Control lifting equipment at relevant location.<br>• Ensure that lifting equipment identification is maintained.<br>• Maintain lifting equipment records and advise of any non-conformities.<br>• Monitor the condition of lifting equipment at the relevant location.<br>• Coordinate and organize inspection and certification work at site.<br>• Liaise with lifting engineer. |

## Competency requirements of Lifting engineer and Inspector/Surveyor

| | |
|---|---|
| Lifting Inspector | • Have a Technical Diploma as a minimum.<br>• Have assessed/participated during ISO/IEC 17020 assessment.<br>• Qualified as a competent person by either LEEA or NSL or IPAF (for MEWP's only)<br>• Have a minimum of 3 years' experience in inspection<br>• Be familiar with "Specification SP-2275 for Lifting Testing and Certification"<br>• Be able to speak, read and write in English<br>• Be physically fit to undertake the lifting inspector duties |

## Appendix 3: Service life extension of Mobile cranes

The maximum allowable lifetime limits for mobile cranes from its date of manufacture is 25 years.

The Company lifting engineer may grant an extension for cranes to be used beyond the maximum allowable years of service if they are satisfied. The maximum extension shall not exceed 5 years and depends on the crane history.

The owner of a mobile crane who wishes to extend the service life of his crane may apply for an extension by submitting to Company's Technical Authority a "Proposal for Extension of Service Life of a Crane". This proposal shall comprise:

- Case proposal;
- Inspection and Testing Report;
- Final Assessment and Recommendation Report.

The owner of the mobile crane shall prepare the Case Proposal. The owner shall engage an Independent Third-Party Certification Company to carry out the inspection, testing, assessment and submit recommendations on the estimated remaining service life shall include proposed inspection / maintenance scheme.

The elements of the Assessment Procedures are outlined as follows:

| Elements of the Assessment Procedures<br>for Extension of Service Life of a Crane | To be performed by |
|---|---|
| Case proposal:<br>Part 1 of the Case proposal is a written record of the crane detailing the following:<br>Usage patterns (e.g. number of operating cycles per hour at certain loading condition);<br>Records of any past accidents, failures, defects that could affect the structural integrity of the crane, and replacement carried out;<br>Records of maintenance carried out;<br>Possible modes of failure.<br>Part 2 of the Case Proposal shall detail the proposed scheme to evaluate the remaining service life of the crane and include the following:<br>The methodology and assessment employed including testing and inspection to be carried out to address the potential fatigue stresses experienced by the crane; and the acceptance criteria adopted. The criteria shall be based on an acceptable code and standard such as British Standard 7910; "Guide on the methods of assessing the acceptability of flaws in fusion welded structures" and any other codes / standards acceptable to COMPANY's Technical Authority. | Owner (can be assisted by an Independent Third-Party Certification Authority) |
| Inspection of the mobile crane:<br>The inspection of the mobile crane shall be carried out in a suitable testing environment and shall include but not limited to the following: | Independent Third-Party Certification Authority |

| | |
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| A thorough visual inspection shall be carried out on the mobile crane. Critical load bearing parts such as the boom section and areas that are not accessible during the annual inspection shall be dismantled to facilitate the inspection.<br>Welding at critical load bearing parts (e.g. hinges) shall be inspected and any defects shall be recorded.<br>Direct a Non-Destructive Testing Company to conduct the necessary testing such as NDT and / or mechanical testing. | |
| Non-Destructive Testing and Mechanical Testing:<br>The following load bearing parts shall be tested using an appropriate testing method to ascertain its mechanical integrity:<br>Main Jib/Boom<br>Fly Jib and / or other attachments; and<br>Slew rings<br>Hook Blocks<br>Wire ropes, etc.<br>The Independent Third-Party Certification Authority may specify other parts of the cranes to be tested if it has reason to believe that there are possible defects, which can only be detected by NDT. | Non-Destructive Testing Company |
| Inspection and Testing Report:<br>At the end of the inspection and testing, a report shall be prepared and shall include the following details:<br>General condition of the crane based on the visual inspection;<br>Location where visible defect/s was/were found;<br>Method/s of Non-Destructive Testing used;<br>Description of the types of flaws detected (with photographs attached)<br>Recommend any corrective actions to be carried out on the crane. | Independent Third-Party Certification Authority |
| Assessment<br>The Independent Third Party Certification Authority shall thereafter review the results of the inspection and testing based on the proposed methodology and assessment carried out on the mobile crane and carry out, if his professional experience and judgment think it necessary, a stress analysis on critical locations of the crane. | Independent Third-Party Certification Authority |
| Recommendations<br>The Independent Third-Party Certification Authority shall then recommend an estimated remaining service life for the crane based on his professional experience, and the possible failure mode and mechanism stipulated in the Case Proposal. | Independent Third-Party Certification Authority |

| | |
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| The Independent Third Party Certification Authority shall also propose an inspection / maintenance scheme for the crane for the extended service life, so that any defects or deterioration in the crane can be detected and actions can be taken to remedy any unsafe situation before the mechanical integrity of the crane is affected. | |
| Final Report<br><br>At the end of the assessment, the Independent Third-Party Certification Authority shall furnish a report to COMPANY's Technical Authority, submitted through the owner of the crane. The report shall detail the results of the Assessment and Recommendations as outlined above and shall be duly endorsed by the Independent Third-Party Certification Authority.<br><br>This final report will be used as a supporting document by the owner to apply to COMPANY's Technical Authority for the extension of the service life of the mobile crane. | Independent Third-Party Certification Authority |

***IMPORTANT NOTES***

*The Third-Party Certification Authority and the testing agency appointed under Section III (Appendix 3) Non-Destructive Testing and Mechanical Testing shall be Independent of each other.*

*The crane shall meet the requirements as stipulated in the COMPANY's Lifting and Hoisting specification for Inspection, Testing and Certification.*

## Appendix 4: Design, Test and Inspection Matrix

| Category | | Lifting Equipment | Manufacturing /Inspection Standard | Initial Proof load testing | | | | | | Periodic Examination Required | | | | Documents required | | | | These may dependent on manufacturer | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | % Above SWL | | | | | | Months | | | | | | | | | | | | | |
| | | | | 10 | 25 | 50 | 100 | MGW x2.5 | Sample destruction Test | Pre-use | 6 | 12 | 48 | Certificate of conformity /test | Stress calculation | Full Fabrication Package | Others | 2:1 | 3.5:1 | 4:1 | 5:1 | 7:1 | 10:1 |
| Lifting Appliances and Equipment | 1 | Mobile Cranes | EN13000/BS7121-2-3 | XX | | | | | | V | | VF | | X | | | X | | | | | | |
| | 2 | Lorry loading Cranes | EN13000/BS7121-2-4 | XX | | | | | | V | | VF | | X | | | X | | | | | | |
| | 3 | Pedestal cranes | API SPEC 2C/ASME B30.4 | | X | | | | | V | | VF | | X | | | X | | | X | | | |
| | 4 | Overhead-Gantry Cranes | EN15011/BS 7121-2-7/LEEA | | X | | | | | V | | VF | L | X | | | X | | | | | | |
| | 5 | Tower cranes | BS 7121-2-5 | | X | | | | | V | | VF | L | X | | | X | | | | | | |
| | 6 | Monorails (Runways) | BS EN 1991-3/BS 2853 | | X | | | | | V | | VF | L | X | | X | X | | | | | | |
| | 7 | Jib Cranes | EN 16851 & EN 14985 | | x | | | | | V | | VF | | X | | X | X | | | | | | |
| | 8 | Davits | BSMA41 | | X | | | | | V | V | | | | | X | X | | | | | | |
| | 10 | Mobile gantries (A frame) /Goal post | BS 5744 | | X | | | | | V | | VF | | X | | X | X | | | | | | |
| | 11 | Side boom pipe layers | BS 7121-14/ASME 30.14 | X | | | | | | V | | VF | | X | | | X | | | | | | |
| | 12 | Forklifts / Tele handlers | ISO22915-2 /BS EN 1459 | X | | | | | | V | V | VF | | X | | | X | | | | | | |
| | 13 | Winches Stationary and General | EN 14492-1/EN13157 | | X | | | | | V | V | VF | | X | | | X | | | | X | | |
| | 14 | Winches for man riding /Stabbing board winch | MFG spec ANSI/ASSE A10.4 | | X | | | | | V | V | L | | X | | | X | | | | | | X |
| | 15 | Hydraulic Jacks | EN 1494 | | | X | | | | V | | VF | | X | | | | | | | | | |
| | 16 | Pallet trucks & stackers &Floor cranes | EN ISO 3691-5/ASME PASE | | X | | | | | V | V | VF | | X | | | X | | | | | | |
| | 17 | Mobile Elevated Work Platforms (MEWP) | EN280/ISO18893 | | X | | | | | V | V | VF | | X | | | X | | | | | | |
| | 18 | Lifts (Passenger & goods) | EN 81-20 | | X | | | | | V | V | VF | | X | | | X | | | | | | |
| | 19 | Chain blocks (connected permanently to monorail) | EN 13157 | | X | | | | | V | | VF | | X | | | X | | | | | | |
| | 20 | Electric Hoist (Chain/wire rope) (Loose item) | EN 14492-2 | | X | | | | | V | V | VF | | X | | | | | | | | | |
| | 21 | Chain blocks (Loose) | EN 13157 | | | X | | | | V | V | | | X | | | X | | | X | | | |
| | 22 | Lever hoists | EN 13157 | | | X | | | | V | V | | | X | | | X | | | X | | | |
| | 23 | Jaw winch/ wire rope grip hoist (Tirfors) | EN 13157 | | | X | | | | V | V | | | X | | | | | | | | | |
| | 24 | Push & Gear Trolleys & Beam clamps (connected to Monorail) | EN 13157/13155 | | X | | | | | V | | VF | | X | | | X | | | | X | | |
| | 25 | Pad eyes welded to rig/ hoist structure | API Spec 4F/ LOLER/DNV2.22 | | | | | | | V | | V | V/N | X | X | X | | X | | | | | |
| | 26 | Pad eyes welded to runway beams | LOLER/DNV2.22/MFG SPEC | | X | | | | | V | | V | VF | | X | X | | X | | | | | |
| | 27 | Containers/skids/baskets/Gas cylinder racks | EN ISO 10855- 1,2,3 | | | | | X | | V | | V | VF | X | | X | X | | | | | | |
| | 28 | Man Basket | EN 14502-1/ASME B30.23 | | | X | | | | V | V | L | | X | | X | X | | | | | | X |

| Category | | Lifting Equipment | Manufacturing /Inspection Standard | Initial Proof load testing | | | | | | Periodic Examination Required | | | | Documents required | | | | These may vary slightly dependent on manufacturer | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | % Above SWL | | | | | | Months | | | | | | | | | | | | | |
| | | | | 10 | 25 | 50 | 100 | MGW x2.5 | Sample destruction Test | Pre-use | 6 | 12 | 48 | Certificate of conformity /test | Stress calculation | Full Fabrication Package | Others | 2:1 | 3.5:1 | 4:1 | 5:1 | 7:1 | 10:1 |
| Lifting Accessories | 29 | Crane forks & C- hooks | EN13155 | | | | X | | | V | V | | | X | | X | X | | | | X | | |
| | 30 | Spreader Beam/Lifting Frame | EN 13155/ LOLER/MFG spec | | | | X | | | V | V | | V/N | | | | | X | | | | | |
| | 31 | Hooks (for Sling) | EN 1677-2 | | | | X | | | V | V | | | X | | | X | | | X | | | |
| | 32 | Plate/Pipe clamps | EN 13155 | | | | X | | | V | V | | | X | | | X | | | | X | | |
| | 33 | Push & Gear Trolleys & Beam clamps (loose items) | EN 13157/ 13155 | | | X | | | | V | V | | | X | | | X | | | | X | | |
| | 35 | Wire rope | EN12385 | | | | | | X | V | V | | | | | | | | | | | | |
| | 36 | Wire rope slings | EN 13414 | | | | X | | | V | V | | | X | | | | | | | X | | |
| | 37 | Shackles | EN 13889/BS 3551/USFED RRC | | | | X | | | V | V | | | X | | | | | | | X | | |
| | 38 | Webbing slings | EN 1492 -1&2 | | | | | | X | V | V | | | X | | | | | | | | X | |
| | 39 | Chain | EN818 | | | | | | X | V | V | | | X | | | | | | | | | |
| | 40 | Chain slings | EN 818-4 & 5 | | | | X | | | V | V | | | X | | | | | | X | | | |
| | 41 | Eyebolts/ Eye Nuts | BS 4278/ASME B 30.26 | | | | X | | | V | V | | | X | | | | | | X | | | |
| | 42 | Master links & Rings | EN 1677-4/ ASME 30.26 | | | | X | | | V | V | | | X | | | | | | X | | | |
| | 43 | Swivels / Hoist rings | ASME B30.26 | | | | X | | | V | V | | | X | | | | | | | X | | |
| | 44 | Turnbuckles /Rigging Screw | BS 4429 | | | | X | | | V | V | | | X | | | | | | | X | | |
| | 45 | Sheave /Snatch Blocks | EN 13157/ASME 30.26 | | | | X | | | V | V | | | X | | | | | | | X | | |
| | 46 | Wedge sockets | EN13411-6 &7/ASME B30.26 | | | X | | | | V | | | XX | X | | | | | | | | | |
| | 47 | Barrel/Drum lifters | LOLER /ASME B30.20/MFG SPEC | | | | X | | | V | V/N | | | X | | | | | | | X | | |

V= Thorough visual examination includes functional test (for item numbers 8,21,22,23 functional & light test with load between 2 to 10% of SWL)

V/N= Thorough visual examination and NDT

VF= Visual, functional and Performance test (load to be applied equals to SWL), NDT of pad eyes (for items 26, 27, 28, 30)
L= Proof load test as per standards and load bearing points shall be followed by NDT.

Others= for example MPI report
Wire rope safety factor depends on application (ex: static FS 3:1, dynamic FS 5 :1)
XX= Applicable, if the manufacturer allows to do overload tests (in case of pad eyes welded to rig & hoist structure 1.3XSWL)

Note1. For more information about cargo shipping containers inspection refer section 12.2

Note2: For inspection frequency, lifting sets fixed permanently to the container refer sec 12.1 notes

## Appendix 5: Well engineering requirements

1. Four-part shackles shall be used for permanent installations only.
2. Fiber core wire rope slings shall not be used in Rigs and Hoist areas.
3. Pad eyes fixed to the Rig/hoist structure shall follow the API requirements or initial proof load test for lifting pad eyes shall be tested to 1.3 X SWL and thereafter thorough visual and NDT examination to be carried out.
4. Inspection requirements of BOP (Blowout Pressure) handling systems in accordance with API 7L. Proof load test after initial installation shall be carried out (at least 1.25 times the static weight of the BOP stack and all its attachments). Periodic load test shall be carried out at least to SWL or as per manufacturer recommendation.
5. Wire rope inspection in accordance with API 9B
6. Traveling block inspection requirements in accordance with API RP 8B. Traveling block hood-eye shall be established with minimum safety factor of 2.25.
7. Crown blocks inspection requirements in accordance with API RP 8B.

| Category | Lifting Equipment | Manufacturing /Inspection Standard | Initial Proof load testing | | | | | | Periodic Examination Required | | | | | Documents required | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % Above SWL | | | | | | Months | | | | | | | | | These may vary slightly dependent on manufacturer | | | | | | |
| | | | 10 | 25 | 50 | 100 | MGW x2.5 | Sample | Pre-use | 6 | 12 | 48 | 60 | Certificate of | Stress calculation | Full Fabrication | Others | 2:1 | 3.5:1 | 4:1 | 5:1 | 7:1 | 10:1 |
| Well Engineering | Travelling Blocks | API SPEC 8C/ API RP 8B | | | X | | | | V | V | | V/N | | X | | X | | | X | | | | |
| | Elevators. | API SPEC 8C/ API RP 8B | | | X | | | | V | V | V/N | | | X | | X | | | X | | | | |
| | Elevator links | API SPEC 8C | | | X | | | | V | V | V/N | | | X | | X | | | X | | | | |
| | Crown Block | API SPEC 8C | | | X | | | | V | V | | | V/N | X | | X | | | X | | | | |
| | Drilling Hook | API SPEC 8C | | | X | | | | V | V | | | V/N | X | | X | | | X | | | | |
| | Lifting Bails/caps | MANUFACTURER SPEC | | | X | | | | V | V | | | | X | | X | | | | | | | |
| | Hoisting Sheaves | API SPEC 8C | | | X | | | | V | V | | | | X | | | | | | | | | |
| | BOP Handling systems | API 7K / API 16D / RP 7L | | | | | | | | V | VF | | | | | | | | | | | | |

## Appendix 6: SOPs Hyper links

1. Section: *SOP for lifting gears inspection.*
2. Section: *SOP for Mobile cranes inspection.*
3. Section: *SOP for EOT cranes inspection.*
4. Section: *SOP for Man riding winches inspection.*
5. Section: *SOP for Forklifts inspection.*
6. Section: *SOP for MEWP inspection*.
7. Section: *SOP for Colour code.*

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