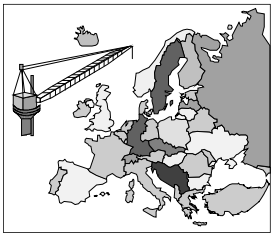
OMHEC Guidance



6. Guidance for lifting and mechanical handling operations in drilling

This document has been developed and issued by the Offshore Mechanical Handling Equipment Committee (OMHEC).

Members: Denmark, the Netherlands, Norway and the United Kingdom.

Approved by OMHEC: 2019

Agreed by the following bodies:

The authorities of the countries operating in the North Sea area:

- DK – Working Environment Authority
- NL – State Supervision of Mines
- NO – Petroleum Safety Authority
- UK – Health & Safety Executive

Developed with the assistance of representatives of the offshore industry of the countries operating in the North Sea area.

Document code	Previous version dated	Current version dated	Drawn up by OMHEC Lifting in drilling area Sub-Committee	Approval by members countries OMHEC	Approval board OMHEC North Sea Europe
OMHEC G06	August 2019	August 2019			April 2019

Revision	Reason	Date
Rev. 0	New ed.	2019

Contents

1 INTRODUCTION

1.1 OMHEC

The Offshore Mechanical Handling Equipment Committee (OMHEC) comprises members from the United Kingdom, Norway, Denmark and the Netherlands, all of whom are involved with the safety of lifting and hoisting equipment and lifting and hoisting operations offshore.

OMHEC is also adviser for the North Sea Offshore Authorities Forum (NSOAF) in matters related to lifting and hoisting offshore, formally stated in an agreement between the two parties and signed in the spring of 2006.

Members represent regulatory authorities, such as from the Danish Energy Agency, the Netherlands State Supervision of Mines, the Petroleum Safety Authority Norway and the UK Health and Safety Executive. OMHEC also includes e.g. industry organisations, independent verifications bodies, classification societies and other relevant organisations.

OMHEC wishes to express its concern with respect to the safety aspects of lifting and hoisting equipment and lifting and hoisting operations offshore.

The potential dangers that arise from the use of lifting and hoisting equipment necessitate the highest standards of safety being applied.

1.2 OMHEC Objectives

OMHEC shall contribute to improved safety in offshore mechanical handling, lifting and hoisting operations and be an arena for work, which will achieve good harmonised practices for these operations. In this respect, the exchange of knowledge and understanding of causation and practical prevention of accidents and incidents plays an important part in the committee's work.

OMHEC has, and will continue to, establish work groups comprising across the board representation from all of the participating countries in order to develop documents that will constitute advisory guidance and good practice relating to lifting and hoisting equipment and their operation.

OMHEC shall also be a centre for information exchange and discussions related to legislative policy, guidance and procedures and other issues associated with offshore lifting and hoisting equipment and their operations on fixed as well as mobile offshore units.

OMHEC shall give advice to the North Sea Offshore Authorities Forum (NSOAF) on issues related to safety in lifting and hoisting equipment and their operations, both on their request, as well as being an independent organisation on its own.

The regulatory authorities mentioned above will accept OMHEC's guidance as being good industry practice.

1.3 OMHEC Lifting in drilling area Sub-Committee

Denmark	Claus Schiller	IADC / Maersk Contractors
Norway	Kjell Gjerdrum Sigmund Andreassen Reidar Sune Bjarte Rødne	NRF/ Transocean PSA PSA PSA
The Netherlands	Patrick Mos	NAM/Shell upstream Europe
United Kingdom	Mark Ford	IMCA

1.4 Objectives and Scope

Guidance for common understanding of standards and good practice in relations to lifting and mechanical handling operations in the drilling area on fixed and offshore mobile drilling units. National regulations need to be followed in addition to this guidance document.

1.5 Target group

The target group for this document is users and responsible leaders of lifting and pipe handling operations in drilling and well.

2 DESCRIPTIONS OF LIFTING OPERATIONS IN DRILLING

General

All use, maintenance, storage and inspection of lifting equipment shall be in accordance with Manufacturer's manual. All lifting equipment must undergo pre- and post-use inspection.

2.1 Lifting on pipe deck

Lifting on pipe deck is carried out using either the offshore crane or specially designed pipe handling cranes. Handling of pipes and tubulars on pipe deck are normally carried out in horizontal position until reaching drill floor where it is lifted in to vertical position by means of various equipment e.g. special designed lifting accessories (SDLA).

2.2 Lifting on drill floor

All lifting activities that are carried out to bring tools in to the drilling operations are considered lifting operation.
Lifting on drill floor is carried out either with SDLA for positioning of pipe. Lifting with winches or lifting with the drilling system.

2.3 Lifting of personnel

Lifting of personnel shall be avoided unless the risk has been demonstrated as being as low as is reasonably practicable.
Lifting of personnel shall be according to a specific personnel lift plan for that lift.
Lifted personnel shall be properly secured with lanyards unless written procedures and risk assessment require otherwise.

Lifting of personnel on the drill floor is normally carried out by using man riding winch or a cherry picker (MEWP).

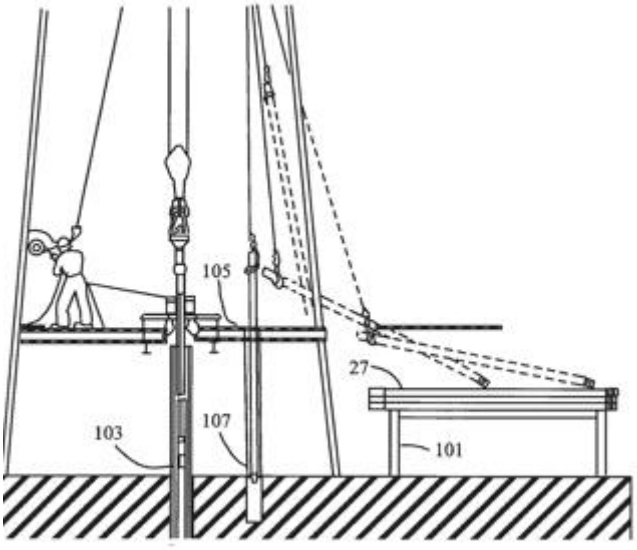
The equipment used for lifting personnel for work and for personnel transfer shall be specifically designed, approved/certified and clearly marked as suitable for personnel lifting. Any equipment not so marked shall not be used for personnel lifting. Lifting accessories and lifted equipment used for lifting people shall not be used for any other purpose. The factor of safety required for lifting people shall be higher than that for lifting normal loads, typically this is double for personnel lifting activities.
References to relevant content in OMHEC guidance no. 05 lifting of personnel offshore.

2.4 Transferring object from vertical to horizontal

Lifting of pipes up to drill floor and on drill floor in the North Sea drilling installations has for many years been a debated topic. Some countries have defined drilling equipment such as lifting nipples and lifting subs as lifting equipment, in order to get more focus on safety in handling of this type of equipment.

120 Experience has shown that lifting from horizontal to vertical position gives the lifted object high stress. Special attention must be made to lifting caps.

Some equipment is not constructed to lift from vertical to horizontal position.



125 Example of lifting nipple used for lifting of pipes from vertical to horizontal positions.

3 DESCRIPTIONS LIFTING EQUIPMENT IN DRILLING

Manufacturers of lifting equipment in drilling shall have in effect a quality assurance system according to a recognised standard, i.e. EN-ISO 9001, so that organisations that purchase and operate lifting equipment in drilling can be assured that necessary quality is achieved. Manufactures must carry out risk assessment in according to EN 12100 on all lifting equipment and lifting accessories.

3.1 Fixed equipment

Examples of fixed equipment:

- Crown block
- Travelling block
- Link adapter
- Drilling hook
- Tubing hook
- Gripping claw Swivel
- Heave compensator
- Deadline anchor
- Draw works
- Top drive rotary system
- Personnel winches
- Work winches
- Pipe handling equipment
- Eagle crane
- Lifting platform
- Cherry picker
- Pipe handling crane

3.2 Lifting accessories

Examples of lifting accessories:

- Lifting nipples and lifting caps
- Shackles
- Wire rope slings
- Fibre rope slings

3.3 Special design lifting accessories (also known as SDLA)

Examples of SDLA:

- Various elevators for tubulars
- Elevator link (Bails)
- Block-to-hook adapter
- Elevator Spiders and FMS
- Power Slips
- Drilling equipment
- Wireline equipment

Examples to visualize the equipment:

10 Examples SDLA and Drilling/Well equipment

TYPE	
SDLA (Lifting Nipples, Caps, Plugs, Riser Running Tool, Elevator, Links (Bails).	
Drilling equipment. (X-overs, Lift Subs, Running-, Retrieving-, Setting-, and Handling tools, Casing Handling Plug)	
Wireline equipment, including Cable Heads	

4 TECHNICAL REQUIREMENTS

4.1 General

Use of lifting equipment in drilling is potentially a high-risk activity and must be risk evaluated.
Lifting equipment must be designed to a recognized standard. All lifting equipment shall be delivered to machinery directive with a CE marking and user manual supplied with a certificate from an EOC.

Instructions for the lifting equipment and the SDLA shall be available to users. Language must be in according to national regulations.

Use and daily check of lifting equipment and SDLA must be in accordance with the manufacturer's operating instructions and requirements in this guidance document. In addition, relevant parts of recognized learning materials might be used.

Requirements for use and maintenance of specially designed lifting accessories in drilling area (SDLA).

- Operationally responsible should verify that all users are familiar with user instructions and operational restrictions;
- Locking mechanisms, fuses and coupling mechanisms must be verified;
- In case of routine change of items in power-operated lifting gear, there must be sufficient barrier to accidental operation. When installing or replacing items, the lifting gear must be located at the correct working height for the user;
- When assembling or replacing items, the correct type of item must be verified by a buddy check

Lifting equipment for use in the drilling area such as SDLA and other specially designed lifting equipment should be stored in a suitable area. The identification of safe working load (SWL), operating mode and configuration for the safe use of equipment, is required to ensure that lifting equipment and accessories are used only within the range of operating parameters appropriate to their safe use.
All equipment and accessories provided should be clearly and permanently marked with their SWL (or WLL) and unique identification markings.
The marking of equipment should not damage it or alter its use. All lifting equipment should be appropriately colour coded. The colour codes scheme should be explained to all personnel who use lifting equipment. The current colour should be displayed in prominent places around the drilling area. The aim is to inform and remind personnel of the prevailing colour during a given period.

Before and after use, the user must inspect lifting equipment and SDLA for proper marking, possible overload, wear or damage. The user is responsible for bringing equipment back to the place of storage after use.

Defective and damaged lifting equipment and SDLA shall be clearly marked and stored in a dedicated area.
Lifting appliances and SDLA that are deemed not fit for use should be stored in a separate quarantine area.
The accessories should be suitably marked as quarantined equipment and appropriately colour coded.
The quarantine area should be clearly identified and be properly secured to prevent unauthorised access to avoid quarantined equipment being used.
Any rigging found to be, or suspected of being, damaged or out of certification, should be placed in the quarantine area and the lifting register updated to show that the item has been quarantined and the reason why it is considered unserviceable.

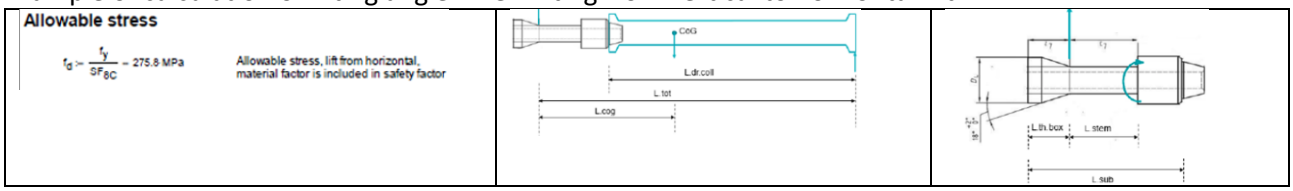
4.2 Floating installations

On floating installations, the movement of the installation must be taken into considerations, both for the operational and technical solutions in selection of lifting equipment and when setting the safety factor for the equipment.

4.3 Calculation of lifting angle

The use of equipment and possible limitations shall be described in the user manual.
When using lifting equipment and SDLA the user must take in to consideration reduction of SWL due to orientation and lifting angles. (As illustrated below.)
If equipment does not have an angle, calculations must be carried out on the equipment before use.

Example of calculation of lifting angle when lifting from vertical to horizontal lift



Examples of load reduction for lifting caps in different orientations.

LIFTING BAIL	MAXIMUM SWL IN DIFFERENT LOAD DIRECTIONS		
6 5/8" REG BOX	6 T	5 T	255 kg
6 5/8" REG PIN	6 T	5.2 T	615 kg
DS-50 BOX	4.3 T	3.6 T	285 kg
DS-50 PIN	3.5 T	2.3 T	140 kg
MT-57 BOX	6 T	5.2 T	520 kg
MT-57 PIN	6 T	5.2 T	520 kg
NC-38 BOX	4.1 T	2.4 T	165 kg
NC-38 PIN	3.5 T	2.2 T	115 kg
7 5/8" REG BOX	6.2 T	5.1 T	260 kg
7 5/8" REG PIN	6.2 T	5.3 T	480 kg

Table 2-2: Maximum SWL for different load directions, calibrated from calculations and resulting utility ratio and

5 RISK ASSESSMENT

Risk assessment to be used during design to avoid failures due to known failure modes and form the basis for risk-based maintenance and risk-based inspection. The failure mode effect analysis (FMEA) should also consider factors that may be present during the unintended use of lifting equipment in drilling.

A suitable documented risk assessment is needed for any lifting operation. However, this may already exist. For example, for a routine lift it may be in the form of a HIRA (*Hazard Identification and Risk Assessment)* document or an operational review document. If a risk assessment already exists, then it should be reviewed for its applicability to the current situation prior to carrying out the lift. The assessment of lifting equipment should also be included in the JRA.
The competent person, together with the lifting team, should carry out a site specific JRA before the work begins. The competent person should ensure that appropriate controls are in place for those hazards identified in the written risk assessment such that the risks are managed as an integral part of the lift plan.

The purpose of risk mapping is to try to identify all potential hazards under all imaginable conditions and initiate measures to reduce or eliminate these.
The different methods of risk mapping can be used for all types of lifting operations. This mapping is particularly relevant

- if available procedures and work descriptions are inadequate,
- if the operation involves new and unpredictable risk elements,
- if it is proposed to alter equipment, develop new equipment, or assess the interaction between new solutions and the equipment already in operation,
- when ensuring that the equipment used is suitable for the purpose, and that the equipment is used correctly,
- when there is an increasing fault frequency or increased risk during certain operations.

With all risk mapping, it is particularly important to involve personnel with operational experience.

6 ROLES AND RESPONSIBILITIES

Only suitably trained and experienced personnel should be selected, that is, those who:

- have had their competence to supervise and/or perform the type of lifts identified as satisfactory for the specific operation;
- have experience of, and demonstrated competency in, the safe use and operation of the equipment and techniques required to perform the subject lift in the prevailing situation and conditions.

If any personnel in a lifting team considers that the operation exceeds their level of competency or experience, they should stop the operation until a suitable person with the required competence and experience is able to assist or take over.

Appropriate personnel in the lifting team should attend and participate in pre-lift meetings, carry out pre-use inspections of lifting equipment and if required, assist with the lifting operation.

Offshore Installation Manager

In charge of the installation and responsible for implementing these lifting procedures.

- Ensure compliance with the standards in his manual
- Establish, implement and maintain rig specific governing documents
- Ensure that there are sufficient and qualified personnel available to carry out lifting operations safely
- Designate technical and operational responsible persons for all lifting appliance and lifting operations on the installation. The responsibility shall be linked to job position (s) on board the installation
- Ensure that the responsible persons have the proper authority

Senior Toolpusher

Exercise overall operational management of the lifting operations on drill floor and moon pool.

- Ensure overall planning and execution of lifting operations on drill floor and moon pool and assess the safety in connection with simultaneous operations.
- Ensure sufficient information exchange between shifts.
- Ensure that the lifting operations are executed with sufficient and qualified personnel on drill floor and moon pool.
- Assess whether a lifting appliance can be classified as a "simple lifting appliance" on drill floor and moon pool
- Is responsible for ensuring these procedures are understood and implemented by the personnel involved in the operation on drill floor and moon pool.
- Is responsible for approving temporary lifting arrangements on drill floor and moon pool.

Crane Operator and Lifting Appliance Operator

In charge of and ensure the safety of each and every lift.

- Plan each lifting operation.
- Select appropriate lifting gear.
- Ensure that the lifting appliance and lifting gear are in good condition for their purpose and in accordance with the manufacturer's instructions for use, specifications and instructions.
- Ensure that the lifting appliance is maintained in accordance with the maintenance program.
- Carry out first line maintenance, or ensure that first line maintenance is carried out, in accordance with the maintenance program.
- Carry out pre-use check of the lifting appliance.
- Ensure necessary announcement of ongoing lifting operations.

- Ensure that necessary communications are established between all personnel involved in the operation.
- Coordinate the lifting operation in relation to other ongoing activities.
- Operate the lifting appliance and lifting gear correctly in accordance with the manufacturer's instructions for use and this procedure.
- Abide instructions and signals from the Banksman and obey stop signal no matter who gives it.
- Operate the equipment in accordance with the capacities and limitations that apply for the lifting appliance.
- Stop a lifting operation if there is doubt about safety. The operation shall not recommence before safety is addressed and re-established.
- Carry out post-use check of the lifting appliance.
- Keep a daily log where this is a requirement.

Banksman

Participate in the planning of each lifting operation.

Clear the travel path and ensure necessary barriers to keep personnel who are not involved in the lifting operation outside the exposed area.

- Ensure that the Slingers is in a safe area when lifting and lowering load.
- Maintain visual and radio contact with the lifting Appliance Operator and with the Slingers at the beginning and end of the lift.
- Give the start signal and direct the safe movement of the lifting appliance and hook load in accordance with this procedure.
- Inform all persons involved in the lifting operation about the identity of the new Banksman when changing over. The new Banksman shall confirm that he is taking over responsibility.
- Participants in lifting operations and their roles can be made known through the wearing of special clothing, such as a reflective vest, hardhat or similar.

Slingers / rigger

Participate in the planning of each lifting operation. Select and use lifting gear in accordance with the manufacturer`s instructions for use and this procedure.

- Carry out pre-use and post-use check of the lifting gear.
- Ensure that load and load carrier are properly prepared and secured before the lifting operation commences.
- Hook on and unhook slings to and from the load and to and from the crane hook or lifting gear.
- Notify the Banksman when the load is ready for lifting and when the hook is released after the load has been landed.

Driller

In charge of and ensure the safety of each and every lift on drill floor.

- Plan each lifting operation on drill floor.
- Select appropriate lifting gear.
- Ensure that the lifting appliance and lifting gear are in good condition for their purpose and in accordance with the manufacturer's instructions for use, specifications and instructions
- Ensure that the lifting appliance is maintained in accordance with the maintenance program.
- Ensure that first line maintenance is carried out, in accordance with the maintenance program.
- Ensure necessary announcement of ongoing lifting operations.
- Ensure that necessary communications are established between all personnel involved in the operation, and ensure that roles and responsibilities are appointed and understood.
- Coordinate the lifting operation in relation to other ongoing activities on drill floor.

- Stop a lifting operation if there is doubt about safety. The operation shall not recommence before safety is addressed and re-established.

Roughneck

Operate the lifting appliance and lifting gear correctly in accordance with the manufacturer's instructions for use and this procedure.

- Ensure that the lifting appliance and lifting gear are in good condition for their purpose and in accordance with the manufacturer's instructions for use, specifications and instructions.
- Follow instructions and signals from the appointed Banksman and obey stop signal no matter who gives it.
- Operate the equipment in accordance with the capacities and limitations that apply for the lifting appliance.
- Stop a lifting operation if there is doubt about safety. The operation shall not recommence before safety is addressed and re-established.
- Carry out post-use check of the lifting appliance.

Subsea Engineer

Operate the lifting appliance and lifting gear in moon pool area correctly in accordance with the manufacturer's instructions for use and this procedure.

- Ensure that the lifting appliance and lifting gear are in good condition for their purpose and in accordance with the manufacturer's instructions for use, specifications and instructions.
- Follow instructions and signals from the appointed Banksman and obey stop signal no matter who gives it.
- Operate the equipment in accordance with the capacities and limitations that apply for the lifting appliance.
- Stop a lifting operation if there is doubt about safety. The operation shall not recommence before safety is addressed and re-established.
- Carry out post-use check of the lifting appliance.

Derrick man

Operate the lifting appliance and lifting gear correctly in accordance with the manufacturer's instructions for use and this procedure.

- Ensure that the lifting appliance and lifting gear are in good condition for their purpose and in accordance with the manufacturer's instructions for use, specifications and instructions.
- Follow instructions and signals from the Banksman and obey stop signal no matter who gives it.
- Operate the equipment in accordance with the capacities and limitations that apply for the lifting appliance.
- Stop a lifting operation if there is doubt about safety. The operation shall not recommence before safety is addressed and re-established.
- Carry out post-use check of the lifting appliance.

7 TRAINING AND COMPETENCE

All persons involved in planning/performing lifting and maintaining lifting equipment shall be trained and competent for their role.

Refresher training and periodic assessment is necessary to assure competence.

Ref. OMHEC guidance no. 03 Training standard of crane operator, rigger and banksman offshore.

8 MAINTENANCE AND VERIFICATION PROGRAM

Maintenance and verification program must at least follow the recommendations from the user manual.

Maintenance and inspection to be carried out in accordance with a plan prepared from background information supplied by the manufacturer, the user of the equipment and relevant to the environment prevailing at the worksite. See OMHEC G02 – Maintenance for lifting equipment and lifting appliances – for further information. And OMHEC G03 - Training standard of crane operator, rigger and banksman offshore.

8.1 Maintenance

The maintenance schedule to be based on manufacturer's recommendations, operating experience, applicable standards and failure modes. The schedule shall integrate preventative and predictive maintenance techniques. Maintenance schedules shall consider the effects of ageing and equipment utilization. Safety critical components and systems shall be identified, and arrangements made to ensure they are adequately maintained. Where third parties provide their own lifting equipment, the Site Manager shall ensure that there is an auditable system that ensures the control, integrity and suitability of the equipment.

To ensure the integrity of lifting equipment, it shall be subject to a detailed/thorough examination by a qualified inspector who has sufficient detailed knowledge of its design, operation and failure modes to recognise significant defects. The scope, methods and standards of that examination, and acceptance/rejection criteria shall be specified for all equipment. All maintenance must be carried out in accordance with manufacture user manual

8.2 EOC

An EOC shall verify that the lifting equipment in drilling has been installed, tested and examined as satisfactory, and issue a certificate to this effect before it is put into operation.

Prior to installation an EOC shall carry out inspection and issue certificate and reports.

Whenever the lifting equipment in drilling has been modified, re-sited or subjected to a major repair, the EOC shall verify that the equipment is fit for use and in accordance with applicable regulations and applied standards.

The owner of the lifting equipment in drilling should, by control of documentation issued by a recognised organisation or certifying or accreditation body, ensure that the EOC has sufficient competence (theoretical knowledge and practical experience) to understand the design, calculations and operation of the lifting equipment and to carry out the necessary examinations and tests.

See OMHEC Guidance 01. Competence and skills requirements for an enterprise of competence (EOC) of offshore cranes.

9 PROCEDURAL CONTROLS

Procedures shall be prepared for each installation covering the following areas:

- Necessary operational limitations for each lifting appliance, weather, boat calls etc.
- Allocation of roles (related to job position).
- Prohibited zones for lifting operations (crane limitation chart).
- Lifting over pressurised area, dangerous goods etc.
- Deck load limitation chart.
- Placement and handling of different types of load, chemicals, radioactive sources, trace elements,
- explosives etc.
- Access to dangerous goods in the event of need to move it because of an emergency, e.g. fire.
- Simultaneous operations.
- Special lifting operations.
- Necessary barring off areas on the travel path.
- Radios and use of correct channel.
- Crane operations in connection with helicopter traffic.
- Maintenance, inspection and control of lifting equipment and lifting gear.
- Lifting operations related emergency situations.
- Storage and follow-up of loose lifting equipment.
- Emergency procedures.
- Plan for bad weather.
- Pipe handling in the drilling area and lifting to and from the drill floor.

Communication

Failures in communications are often root causes of lifting incidents and can also be the most difficult to detect. Good training and adherence to correct procedures are vital but checking the actual situation at the worksite is of utmost importance. For example:

- are the personnel concerned all from the same company?
- do they all understand a common language?
- if not is there an established system of signals in strict use that they all know and understand?
- is it displayed where the lift team will be able to see it?
- what different methods of communication can be used?
- what communication is required between the worksite and the source of any technical assistance elsewhere?

Management of Change

Management of change (MoC) procedures can apply to all aspects of operations. Any member of the lifting team can request a management of change procedure to be invoked and suspend the lift. Assessment should then be undertaken to determine if a MoC is required. If it is required, the lift should not resume until the MoC procedures have been approved and implemented.
For further guidance on MoC refer to IMCA SEL 001 - Guidelines for the Management of Change.

10 TERMS, DEFINITIONS AND ABBREVIATIONS

Man-riding
The action of lifting or lowering a person directly attached to the line from a hoist or winch. Normally associated with drill rig operations.

SDLA
Special designed lifting accessories in the drilling area, comprises, but is not limited to, the equipment listed in chapter 3.

HIRA
Hazard Identification and Risk Assessment

IOGP
International Association of Oil and Gas Producers

11 REFERENCES

- EN-ISO 13534:2000 Petroleum and natural gas industries, drilling and production equipment Inspection, maintenance, repair and remanufacture of hoisting equipment.
- EN- ISO 12100:2010 Safety of machinery, General principles for design, Risk assessment and risk reduction.
- BS 7121-1:2016 Code of practice for safe use of cranes. General
- BS 7121-2:2012 Code of practice for the safe use of cranes. Inspection, maintenance and thorough examination. General
- IOGP, Lifting & hoisting safety recommended practice Report No: 376
- NORSOK R-003:2017 Safe use of lifting equipment
- NORSOK R-002:2017 Lifting equipment
- IMCA LR 006, SEL 019, M 187 – Guidelines for Lifting Operations
- IMCA SEL 001 - Guidelines for the Management of Change