RECOMMENDED PRACTICE & GUIDELINE

OE–GL– 01

EDITION MARCH 2018

PLANNING AND EXECUTION OF WTG LIFTING OPERATIONS

1 CONTENTS

2 PURPOSE

The purpose of this guideline is to establish minimum requirements for wind turbine lifting operations by collating existing and relevant industry guidance.

This document considers various aspects of lifting operations, such as planning, inspection, maintenance, competency, etc. in order to minimize associated risks and to improve health and safety relating to lifting operations.

3 SCOPE

The scope of this guideline is to provide stakeholders within the offshore wind industry with requirements and guidance for planning and undertaking lifting operations related to WTG components.

Local legal requirements must always be considered and should any contradictions occur between this guideline and the applicable local regulations, then local legislation shall take precedence. If, however, the guideline requires a higher standard than local legal requirements, then the guideline should be applied thereby positively contributing to the local requirements.

4 BACKGROUND

The need for a recommended practice on wind turbine lifting operations was discussed and confirmed at a workshop in December 2016. Following this, the idea was included as a project in the wind partnership originally formed by Siemens Wind Power, MHI Vestas Offshore Wind and Vestas Wind Systems, on Offshoreenergy.dk's initiative.

During 2017 and 2018 a project group with below participants prepared this recommended practice based on their accumulated knowledge of the field.

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5 ABBREVIATIONS AND DEFINITIONS

5.1 ABBREVIATIONS

CCTV	Closed circuit television
COA	Certificate of Approval
CoG	Centre of Gravity
CTV	Crew transfer vessel
GWO	Global Wind Organization
ISO	International Standards Organization
MEWP	Mobile Elevated Working Platform
MWS	Marine Warranty Surveyor
PPE	Personal Protective Equipment
RA	Risk Assessment
SWL	Safe Working Load
WAH	Working at Height
WLL	Working Load Limit
WTG	Wind Turbine Generator

5.2 DEFINITIONS

Ballasting	Manual or automatic operation performed during dynamic lifting operations on the installation vessel to keep the vessel stable and level.
Capacity Charts	A set of charts or tables provided by the manufacturer of the lifting appliance / crane detailing lifting capacities in all possible configurations.
Capstan winch	Vertical winch used in conjunction with tag lines to control loads.
CE markings	The CE marking is a mandatory European marking for certain product groups to indicate conformity with the essential health and safety requirements set out in European Directives. To permit the use of a CE mark on a product, proof that the item meets the relevant requirements must be documented.
Certificate of Approval	The Certificate of Approval is issued by the Marine Warranty Surveyor and contains conditions which must normally be complied with to ensure the operation is insured.

Class One Lift	This classification includes lifting operations where load characteristics are recognizable and there are no significant hazards within the working area or on the access route for the crane to the working area.
Class Two Lift	Lifting operation where significant hazards have been identified with the load or with the working area or access route of the crane, and the crane is used to lift complex loads or persons, or where two or more cranes are used to lift the load, or where the lifting operation is carried out at a location with exceptional hazards.
Coefficient factors	Various factors used to calculate wind loading.
Competent Person	Person who plans and manages lifting operations and has training, practical, theoretical knowledge and experience required to plan a lifting operation safely and establish a safe system to work.
Contractor	Individual, organization, or business, that signed a contract to perform a lifting operation.
Crane Supervisor/ Lifting Supervisor	Person who controls the lifting operation, and ensures it is carried out in accordance with the Lift Plan.
Danger Zone	A hazardous area, for example under a suspended load.
Davit Crane	A lifting device consisting of an angled beam which pivots over a vertical axis for example, on a pedestal on the WTG foundations.
Declaration/ Certificate of Conformity	A certificate supplied by the manufacturer with products that demonstrates compliance with essential health and safety design requirements
Dynamic Amplification Factor	A factor accounting for the dynamic effects normally experienced during lifting.
Employing organization	Organization that requires a lifting operation to be carried out.
Gross weight	The calculated or weighed weight of the item to be lifted including a weight contingency factor.
Hazard	A potential source of harm or adverse health effect on a person or persons.
Hook load	Weight of the load plus weight of rigging.
Installation vessel	The installation vessel can be self-propelled or otherwise and can be either a jack-up vessel (self-elevating) or floating. The vessel main crane is used to lift the WTG components onto the

	foundation and the installation vessel will usually also include sea fastening for transporting the components. Auxiliary cranes and other lifting equipment where present may also be used for smaller loads
Knuckle boom crane	Also called an articulating crane as it features hydraulically or electrically powered articulated arm.
Lift Plan	Written procedure establishing a safe system of work for a lifting operation
Lift point	The connection between the rigging and the load to be lifted.
Lifting Accessory	Any component that is not part of the Lifting Appliance, but forms part of the lift, i.e. placed between the Lifting Appliance and the load, also referred to as rigging.
Lifting Appliance	The primary plant used for lifting purposes, for example crane, winch, davit or forklift.
Lifting Appliance /Crane Operator	The person responsible for ensuring the Lifting Appliance / Crane is operated safely and in accordance with the manufacturer's instructions and recommendations
Lifting Equipment	Work equipment for lifting or lowering loads and includes attachments used for supporting, anchoring or fixing it. Lifting Equipment includes both Lifting Accessories and Lifting Appliances.
Lifting operation	Any operation concerned with lifting or lowering of a load
Lifting organization	The lifting team described in this document
Lifting Zone	The area around a lifting operation where if the load fell, shifted, rotated or otherwise moved in an unexpected manner could result in an injury or damage to individuals, equipment or materials in the area.
Load	Any item being lifted or lowered including a person
Main Components	Blade, hub, nacelle, tower sections of a WTG.
Man Basket	A cage certified for the safe lifting of personnel where other safer means of access are not possible
Management of Change	Formal strategy to control deviations and mitigations from the approved Lift Plan.
Marine Warranty Surveyor	An independent third-party organization that provides technical review and issues the COA for selected marine construction and

	transportation project operations on behalf of the employing organization and/or insurance provider.
Mobile work equipment	Any work equipment which carries out work while it is traveling or which travels between different locations to carry out work.
Non-Routine Lift	Lifting operation which requires more than one crane to lift the load, or cranes using load enhancement equipment, lifting of persons or when the lifting operation is at a location with exceptional hazards.
Pad eye	A certified lift point consisting essentially of a plate, reinforced by cheek plates if necessary, with a hole through which a shackle may be connected.
Periodic/Thorough Examination	All lifting equipment must be subject to regular periodic thorough examinations during the service life of the equipment. The frequency of the periodic examinations shall be determined by local legislation & manufacturer's recommendations. All lifting equipment must be periodically inspected by a competent person at least annually.
Permit to Work System	A formal written system used to control certain types of work that are potentially hazardous. A Permit to Work is a document which specifies the work to be done and the precautions to be taken
Pre- and Post-Use Inspection	Visual and functional assessment of the lifting equipment's condition before and after use.
Pre-lift check sheet	Reference document used for controlling the lifting operations completed by the Responsible Person in Class 2 lifting operations.
Pre-task briefing	Briefing meetings between all associated personnel prior to commencing the lifting operation to ensure everyone is aware of their operational responsibilities. This must be documented and recorded.
Responsible person	A responsible person is appointed to control basic lifting operations as defined in Class 1.
Rigging	Same as lifting accessory
Rigging weight	The total weight of rigging, slings, shackles etc. and other devices or items used to connect the load.
Risk	The combination of the likelihood and severity of an incident occurring.

Risk Assessment	A systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking. For lifting operations this is normally carried out by the competent person during the planning phase. In some countries this is a legal requirement
Safe System of Work	A defined procedure resulting from risk assessment & designed to eliminate or reduce risks to an accepted level**.**
Safe Working Load	The maximum load that can be safely applied to a Lifting Appliance or Accessory in accordance with the manufacturer's instructions.
Safe Zone	An area that has been risk assessed and a safe system of work established to minimize the risk to personnel.
Sea fastening	The system used to attach components to a barge or vessel for transportation by sea.
Signaler/Banksman	Person responsible for giving direction and ensuring safe movement of the lifting appliance. Referred to as Signaler in this document.
Slinger/Rigger	Person responsible for attaching and detaching the load and identifying and use of lifting accessories in accordance with the specifications of the Lift plan. Referred to as Slinger in this document.
Suspended Load	A load hanging from a lifting appliance.
Tag Line	A rope of various materials used to control the load during lifting operations.
Tool Box Talk	Same as pre-task briefing
Traverse/Tagline System	A remotely operated load control system and type of work equipment, used for orienting the load horizontally during lifting. Referred to as traverse system in this document.
Trunnion	A lift point consisting of a horizontal tubular cantilever, round which a sling or grommet may be passed. An upending trunnion is used to rotate a structure from horizontal to vertical, or vice versa, and the trunnion forms a bearing around which the sling, grommet or another structure will rotate;
Weather Window	Time frame as per weather forecasts when a lifting operation can be performed within the pre-defined maximum environmental limits.

Working Load Limit	For the avoidance of confusion, the document only refers to Safe Working Limit as the two terms have different meanings.

6 MANAGEMENT OF LIFTING OPERATIONS

A safe system of work shall be established and maintained by the Competent Person The system shall be followed for every lifting operation, whether it is a complex individual lift or repetitive routine operations.

The main principles of the safe system of work is that any lifting operations shall be:

- Properly planned;
- Well organised;
- Appropriately supervised;
- Carried out in a safe manner;
- Closed and reviewed.

The objective of the safe system of work is that all hazards associated with and all factors affecting lifting operations are duly considered, communicated, well understood and controlled by the personnel involved in the lifting operations.

7 PLANNING OF LIFTING OPERATIONS

All lifting operations shall be planned and risk assessed prior to commencement to ensure safe execution. The planning and assessment shall be performed by the Competent Person.

Planning of any lifting operations should at least address the following subjects:

- Objectives of the lifting operation
- Characteristic of the load
- Lifting equipment
- Classification of lifting operation
- Identification of hazards and risk assessment
- Resources
- Preparation of Lift Plan
- Application of Permit-to-Work System

7.1 OBJECTIVES OF THE LIFTING OPERATIONS

Lifting operation objectives will define the amount of planning required, so lifting operations with objectives of turbine component installation will normally require more thorough planning compared to lifting of a pallet for offloading a truck for example.

7.2 CHARACTERISTICS OF THE LOAD

Characteristics of the load to be lifted, such as weight, shape, position of CoG, availability of lifting points, etc. play an important role in the planning of lifting operations.

7.3 LIFTING EQUIPMENT

The correct selection of lifting equipment by the Competent Person will ensure that the equipment is suitable with regards to the objectives of lifting operations, characteristics of the load to be lifted, load travel path, frequency of use and the operational environment.

Lifting accessories must be compatible with the load and lifting appliance and be used in a safe manner.

7.4 LOAD CONTROL AND CLEARANCES

Means for controlling the load in a horizontal direction must be planned as required, such as traverse systems, tag lines with or without capstan winches, guides, bumpers, remote CCTV systems, etc.

When planning lifting operations on an installation jack up vessel attention should be paid to the mode in which she will be operated. In general, when the vessel is used as an elevated platform then smaller clearance may be sufficient between the WTG components. However, if the vessel is operating in dynamic conditions i.e. floating lifting operations then larger clearances between WTG component may be necessary as well as other control measures such as guides, tag lines etc. as detailed by the lift plan and risk assessments.

7.5 CLASSIFICATION OF LIFTING OPERATIONS

Classification of lifting operation will determine the requirements to personnel, procedures and supervision.

7.5.1 CLASS ONE – BASIC ROUTINE, REPETETIVE LIFTS

This classification includes lifting operation where the load characteristics are considered straightforward and there are no significant hazards within the working area or on the access route for the crane to the working area. All personnel involved with repetitive lifting operations should ensure that complacency is not allowed to develop.

Examples of Classification one lifting operations are:

- Lifting of standardized goods; intended and suitable for safe lift (e.g. pallets, containers)
- Lifting of loads with CoG and Gross weight known or easily estimated
- Operations where standard rigging and slinging practices can be applied
- WTG Foundation Davit crane lifts
- Nacelle crane lifts

The Competent Person must:

- Ensure appropriate information for lift planning is available.
- Assess supervision requirements and include supervision role.
- Ensure a clear definition of roles and responsibilities.
- Clarify if dynamic factors will influence the lifting operations.
- Identify hazards and conduct a risk assessment.
- Prepare the Lift Plan.
- Ensure properly managed inspection and maintenance regime for lifting appliances and lifting accessories.
- Issue a Pre-Task Plan in case of variations or changes.
- Review and correct regularly the Lift Plan.
- Ensure complacent attitude towards repetitive lifting operations is not allowed to develop.

In the case of repetitive or routine operations, assessment and planning may only be necessary in the first instance, with periodic reviews to ensure that no critical factors have been changed.

7.5.2 CLASS TWO - INTERMEDIATE, COMPLICATED, COMPLEX LIFTS

Lifting operation where significant hazards have been identified either with the load or with the working area or access route of the crane, and the crane is used to lift complex loads or persons, or where two or more cranes are used to lift a load, or where the lifting operation is carried out at a location with exceptional hazards.

Examples of classification two lifting operations:

- Lifting of loads with unknown Gross weight and CoG. Engineering input required.

- Lifting of complex shape or a load with COG offset or variable lifting point loads.
- Tandem crane lifting.
- Lifting of WTG main components, e.g. hub, generator, nacelle, tower, blade.
- Operations where standard rigging and slinging practices do not apply. Engineering input required.
- Conducted in difficult or restricted areas.

The Competent Person should:

- Ensure appropriate information for lift planning is available.
- Nominate the Lifting Supervisor for the task
- Clarify if and what dynamic factors will influence the lift.
- Identify hazards and conduct risk assessment.
- Prepare the Lift Plan.
- Ensure properly managed inspection and maintenance regime for lifting appliances and lifting accessories.
- Seek out engineering support and specialist knowledge, where necessary.
- Produce detailed planning lifting drawings.
- Ensure rigging instructions are in place.
- Produce appropriate documentation for briefings.
- Carry out audit and review of lifting operations.
- Review and correct the Lift Plan.
- Support the Lifting team when requested

7.6 IDENTIFICATION OF HAZARDS AND RISK ASSESSMENT

A lifting operation may have many hazards associated with it, either due to the load, the direction or path of the load, the lifting appliances and accessories used, the environment in which the lifting operation is being carried out or its proximity to other components, objects or other items or hazards.

Table 1 lists examples of hazards which can be encountered during WTG lifting operations

Load	Environment	Proximity to
Position of CoG, incl. unknown position Location and type of lifting points Complex slinging arrangements Use of load control systems Uncertainty in weight of load Two crane lifting operations Integrity of load Load dynamics, floating, in port or in field High surface area and drag coefficient Weight transfer Arial load transfer Orientation of the load Access to lifting points Sharp edges Protruding load parts	Snow Ice Hail Rain Wind Lightning Sea state Fog Uneven ground Poor ground conditions Poor sea bed conditions	WTG components Adjacent vessels Vessel structures (jack-up legs, masts, accommodation) Roads Rail Passing vessels Adjacent cranes, MEWPS or other plant and equipment Temporary works (e.g. scaffolding) Proximity to quayside Mooring lines Permanent and temporary lighting Power lines Personnel

Table: 1 Hazards

Once the hazards associated with a lifting operation have been identified then a risk assessment should be developed using the hierarchy of risk control. The risk assessment shall define measures to be applied to eliminate or reduce the risks to an acceptable level.

7.7 RESSOURCES

Subject to the classification and nature of the planned lifting operation the Competent Person should decide on the required roles and personnel of the lifting organization.

A lifting organization will generally have the following roles: Competent Person, responsible person or lifting supervisor, crane operator, slinger and signaler. One person can perform more than one role, if it's reasonably to do so, e.g. the signaler and slinger roles can be assigned to one person or a team.

Roles, responsibilities and competence requirement for the necessary skills, experience, knowledge and of the lifting organization personnel are described in Appendix 1 to this recommended practice.

The Contractor organization must provide adequate resources for the Competent Person to carry out their duties.

7.8 LIFT PLAN

The Lift Plan or Lifting Procedure, are written method statements of an individual or repetitive lifting operation. The contents of the Lift Plan will depend on the complexity of the lifting operations, see classification of lifts above. The Lift Plan must detail the requirements to ensure that the lifting operations are carried out in compliance with all relevant local legal legislation.

The Lift Plan shall include details, as a minimum, of the following:

- Description of the operations.
- Organisation and responsibilities
- Communication
- Characteristics of the load.
- Configuration and load charts of the lifting appliances / cranes
- Lifting accessories details
- Rigging instructions
- Limiting environmental criteria for each lift
- Planning drawings (if required)
- Check lists
- Contingency plans

7.9 PERMIT-TO-WORK

Lifting operations usually form part of a transportation, assembly or construction process and therefore it is usually required that they are executed under a Permit-to-Work system. Lift Plans shall clearly state the pre-conditions to be fulfilled for attaining the Permit-to-Work.

8 ORGANIZATION OF LIFTING OPERATIONS

The following shall be considered when organizing a lifting operation:

- Selection and training requirements of personnel
- Drug and alcohol policy
- Proper marking of lifting equipment
- Storage of lifting accessories
- Inspection and maintenance regime of lifting accessories
- Contractual considerations

8.1 SELECTION AND TRAINING REQUIRMENTS OF PERSONNEL

Safe lifting operations depend upon the selection of suitable personnel who are competent to carry out the required duties. Records of training and experience assist in the selection of suitable personnel as responsible person, lifting supervisor, crane / lifting appliance operator, slinger and signaler.

All personnel who are involved in lifting operations, or in the maintenance of lifting equipment, shall be trained and competent to safely carry out their tasks within their area of responsibilities. All personnel who are involved in lifting operations, shall be certified to GWO and ISO standards.

Relevant training can be performed internally or under the direction of an external training provider. The purpose of the training is that defined by the organization requirements are fulfilled, and any applicable local legislative requirements are covered.

The method of teaching should be decided by the training organisation. Methods may include for example, classroom training, simulated practical training or hands-on training.

Where practical training is performed, this shall be performed on lifting appliance that is either the same or a similar type (e.g. mobile, crawler, davit, knuckle boom crane, etc.) to generally used or planned lifting appliance on projects and sites.

Records of competence (e.g. certification) for all personnel, including contracted employees, who have a role in the lifting operation, i.e. lifting appliance / crane operator, slinger, signaler, shall be readily accessible on request to the lifting supervisor at the location where the lifting operation is to be performed.

Personnel under training should only undertake duties within their current level of assessment by the Competent Person and then only under supervision of a qualified person.

Periodic assessment and refresher training shall be conducted at intervals in not exceeding periods stated by the training organization course requirements, to ensure the necessary level and standard of training is maintained.

Cranes should only be operated by personnel with operator's license. For vessel crane operators, training courses for in depth knowledge of the specific type of cranes is required. The training for vessel cranes should include technical rudiments of design sensitivities and limitations including effects of dynamic loading, dual operations of ballasting and operation, crane stiffness effects, protection and safety systems, man baskets, failure sequence of structural and mechanical elements.

Power operated lifting appliances such as davit cranes, nacelle cranes, key side cranes, winches etc. shall only be operated by personnel with operator's license and trained in accordance with manufacturer's recommendation.

Simple lifting appliances like manual and simple power-driven winches and hoists should only be operated by personnel having a qualification as a signaler or slinger with additional suitable training where necessary.

Operators of remote tagline systems shall have in depth knowledge of the system and be adequately trained.

Operators of davits shall be trained in accordance with manufacturer's recommendations and the operating company's internal procedures.

Qualifications for signaler and slinger shall be in accordance with relevant defined standards, requirements of the employing organization and internal requirements of contractor (their employing company). The signaler and slinger shall be trained in inspection, safe use and storage of lifting accessories and operation of signaling systems (visual and radio communications). Proficiency shall be demonstrated by a certificate and the competency periodically assessed.

8.2 DRUG AND ALCOHOL POLICY

Work associated with lifting operations should not be carried out by personnel whose efficiency is impaired by alcohol, drugs or other influences. All personnel in the lifting team should be aware of the policy. Regular unnotified checks of the lifting team may be undertaken by the employing organization or other party, such as vessel operator.

8.3 MARKING OF LIFTING EQUIPMENT

All lifting appliances and lifting accessories shall be clearly and permanently marked on the individual lifting equipment by stamping, metallic plate, tagging or RFID. The marking should not interfere with the SWL or effectiveness of the lifting equipment.

All lifting appliances and lifting accessories must be clearly marked to indicate their SWL - the maximum load the equipment can safely lift.

Where the SWL of any lifting appliance depends on its configuration, the information provided on the SWL must reflect all potential configurations. In some cases, the information should be kept with the lifting appliance, e.g. the rated capacity indicator fitted to a lifting appliance, showing the operator the SWL for any of the lifting appliance permitted lifting configurations.

Lifting accessories must also be marked to show any characteristics that might affect their safe use. This may include the weight of the parts, where their weight is significant.

All lifting equipment shall have its unique identification number robustly attached to the lifting equipment.

Where the unique identification or the SWL cannot be established, the equipment shall not be used for any lifting operation until verified and the requirements of this operations are fulfilled.

Where equipment is specifically designed to be used for lifting people, it must be marked to indicate the number of people that can be lifted in addition to the SWL of the equipment.

8.4 STORAGE OF LIFTING EQUIPMENT

Any lifting appliance when not in use shall be parked, stored and preserved as per manufacturer's instructions. Unauthorized movement or use of lifting appliances shall always be prevented.

When not in use, lifting accessories shall be stored in suitable and sufficient facilities. When practical, lifting accessories shall have dedicated storage areas to prevent damage or deterioration, e.g. storage rack or container.

The storage facility, where practical, should provide:

- Dry atmospheres to prevent rusting, i.e. protection against weather elements.
- Separation of chemicals that could have a corrosive effect.
- Storage of material (fibre) slings out of direct sunlight and away from sources of heat.
- Protection from attack by rodents for fabric items of accessory.

Any specific storage requirements, as defined by the manufacturer or supplier of the lifting accessory must be adhered to.

There may be instances where accessories are stored open to the weather elements for a short period of time. In such cases, suitable cover should be utilized to protect the accessories.

8.5 RECORDS

All records for lifting appliance shall be kept while the equipment is in service and be readily available for the responsible person and other relevant personnel upon request. Lifting equipment must be provided with the following records:

- Test certificates, records of thorough examinations and inspections, including ropes and chains, carried out (whether statutory or not).
- Records of significant repairs and modifications to the cranes, hoists, etc. including renewal of major parts and confirmation of completion including the signatures of responsible persons.

All records for lifting accessories shall be kept in paper or digital format and be readily available for the responsible person and other relevant personnel upon request.

8.6 INSPECTION, EXAMINATION AND TESTING. GENERAL

Prior to first time use on the installation, fixed lifting equipment, e.g. a WTG foundation Davit crane, shall be inspected and examined by a competent person to verify that the lifting equipment is properly mounted, commissioned and prepared before taking into use. These requirements are in addition to any testing undertaken by the manufacturer at the manufacturer's site. It is important to clarify that the competent person referred to in this paragraph is not the Competent Person lifting as per defintion.

Additional non-standard equipment added to crane boom will need approval from the crane manufacture and to be checked by a competent person once fitted. The person carrying out this inspection should not be the same person(s) or organisation that installed it (best practice). They should be sufficiently independent to allow an impartial judgement to be made of the work. If a vessel engineer carries out this task then they should be of sufficient seniority i.e. Chief Engineer to have adequate competence and should not delegate the task to junior personnel.

Prior to operation, the Crane/Lifting Supervisor for Class Two and Slinger for Class One lifts shall check if the lifting equipment is in good condition, properly maintained and document its safe use.

Pending on the type of lifting equipment, exposure of environmental effects and operational modes, all lifting equipment shall be periodically inspected by an independent competent organization using competent persons.

The results of inspections and examinations should be recorded with details of any corrective actions to overcome any defects prior to returning the lifting equipment to service. All documentation verifying the safe use of lifting equipment shall be readily available to the responsible person and other relevant personnel upon request. E.g. cranes on vessels are subject to annual inspection and certification by a Classification Society.

Inspection and examination shall also be performed by a competent organization when lifting equipment is used after long periods of idleness, after major modifications and repair.

Transit lifting equipment and newly bought or hired lifting equipment shall be inspected for compliance with statutory requirements.

Equipment that failed an inspection or examination shall be quarantined by lockable means or appropriately destroyed so that it can no longer be used. Any such equipment stays on the register until the competent person decides that the equipment is no longer fit for service.

8.7 REGULAR CHECKS

Regular checks (less detailed examination) of lifting equipment includes:

- Operational checks of lifting appliance by the Lifting Appliance/Crane Operator, prior to use of the lifting equipment. Check on equipment should be compliant with manufactures recommendations. Environmental conditions may determine more regular inspection regimes or more regular than the manufacturers recommendations.
- Lifting accessories visual checks prior to every use.
- Post-use checks of the lifting appliances and lifting accessories to ensure that accessories and equipment are kept in a safe state.
- Routine checks for loose objects to prevent dropped object risk.

8.8 PERIODICAL INSPECTION

Periodical inspections (detailed examination) includes:

- Periodic inspections as per relevant statutory requirements
- Regular inspection schedules as prescribed by the manufacturer
- Company specific inspection scheme, based on assessment by a competent organisation of critical elements of the lifting equipment, scheduled adjustments and possible overhaul and maintenance of the equipment.

8.9 INSPECTION OF LIFTING EQUIPMENT NOT IN REGULAR USE

Lifting equipment which has been out of operation for six months, and where use may lead to danger for the health and safety shall be controlled by a competent organization before taken into use.

8.10 CONTRACTUAL CONSIDERATIONS

The employing organization must determine whether a contractor has the necessary competence to carry out lifting operations in accordance with the statutory requirements and the recommendations of this guideline. Appointment of the Competent Person and responsible person shall be carried out as agreed in the contract between the employing organization and contractor.

When a lifting operation is contracted as Contracted Lift, the contractor provides the Competent Person, lifting equipment and personnel. The contractor is responsible for operation of a safe system to work – planning, organization and control of the lifting operation.

When the contract is signed for a Hired Lift service, the contractor provides crane that is properly certified, tested and certified and competent and certified crane driver. The employing organization provides the Competent Person and lifting team personnel. The employing organization plans the lifting operation and operates a safe system of work.

Combinations of the above main cases are possible.

9 CONTROL OF THE LIFTING OPERATIONS

To ensure effective implementation of the safe system of work, a responsible person (Class One lifts) or Crane/Lifting Supervisor (Class Two lifts) shall be appointed in writing to control the lifting operations. Under circumstance the role can be performed by the Competent Person.

The appointment of the responsible person or Crane / Lifting Supervisor does not remove the responsibility from the Competent Person. The Competent Person must be regularly present on site to carry out audits of lifting organization. The presence of the Competent Person on site is recommended during execution of the first complex lifting operations in a repetitive sequence, e.g. first load out and installation of WTG components. Once the lifting operations are proven to be undertaken safely they may delegate authority, but not their responsibility.

The responsible person or Crane/Lifting Supervisor shall have adequate training and experience and be competent in administrating duties relating to safe lifting operations including the use, maintenance, repair and renewal of lifting equipment and safety equipment, allocation of responsibilities and instructions to all personnel involved in the lifting operations.

The responsible person is the person who is accountable on site and in charge of the lifting operations. Supervision levels should be defined by the Competent Person, proportionate to the risk and determined by the nature of the work and the competence of the personnel involved.

In lifting operations of Class One the responsible person will usually:

- Conduct a pre-task briefing.
- Verify that Lifting Appliance / Crane operator and all other lifting personnel involved are certified and competent
- Ensure that equipment is only operated within the specifications of the user manual.
- Complete or ensure that the visual pre-lift checks are completed.
- Verify that all lifting equipment (lifting appliances and accessories) is certified for use and within inspection regime.
- Establish control of lifting zones and prevention of unauthorized access.
- Supervise the Slingers/Riggers

In lifting operations of Classification Two a Lift Supervisor will usually:

- Obtain a Permit-to-Work (if required)
- Conduct a pre-task briefing
- Verify the Lifting Appliance operator and all other lifting personnel involved are certified and competent
- Monitor that the Lift Plan is being followed during the complete life cycle of the lifting operation
- Ensure that equipment is operated within the specifications of the user manual.

- Complete and record Pre-lift checklist.
- Complete and record daily lifting log.
- Verify that all lifting equipment is certified for use and within inspection regime.
- Establish control of lifting zones and prevention of unauthorized access.
- Supervise the slingers and signalers

10 EXECUTION OF LIFTING OPERATIONS

10.1 GOOD PRACTICE PRIOR TO LIFTING

Prior to commencement of lifting operation, the personnel in charge shall identify and clarify what dynamic or static factors will influence the lifting operation.

Where appropriate, the WLL of lifting appliance should be reduced to SWL to consider the environment and mode in which it is being used, termed “derating”. Examples include using sling protection and the way a sling is attached to a load, i.e. the angle of legs and bend radii of the sling type.

When multiple lifting operations occur within the same area, the coordination of these lifting operations must be agreed prior to commencement by the Crane/Lift Supervisors and the operations shall be carried out in line with the Lift Plan .

All preparatory work at the location where the lifting operation takes place is to be completed. The safety of personnel not involved in the lifting operation must be ensured.

A pre-task briefing must occur prior to the commencement of any lifting operation. The content of the briefing will be dependent on the lift categorization and must cover the details of the lifting operation, responsibilities, site and operational risks control measures. The limitations of the lifting equipment shall be communicated and well understood by all personnel participating in the execution of the lifting operation.

Lifting zones shall be defined by the Lift supervisor prior to commencement of the lifting operation, as these can vary depending on the load, lifting equipment, other objects, walkways, etc. The responsible person or Lifting Supervisor shall ensure that all unauthorized persons are kept out of the lifting zone, e.g. by means of barriers, fences, warning tape, signs and/or signaler. This also includes removal and prevention of access of non-essential vehicles or plant, both parked and travelling, inside the lifting zones.

Unless unavoidable, persons must not work below suspended loads. Where this is cannot be avoided, there must be a safe system of work to eliminate the risks to persons who need to be below the load.

10.2 PRE-TASK BRIEF

Typical information that should be delivered to the lifting team during a pre-task briefing will include, but should not be limited to:

- Ensuring the lifting team is briefed on the operation and aware of the Lift Plan content.
- Applicable planning drawings for the operation.
- Pick up and lay down positions, travel path and elevation of the load from ground, vessel or structure.
- Rigging arrangement. Rigging drawings (if available) for the load.
- Lifting accessories to be used in the operation.
- Pre- and post-use of lifting accessories and appliances.
- Permit to Work, Certificate of Approval and any conditions imposed by them.

- Lifting zones, areas to be closed off to personnel not associated with the operation.
- Hazards associated with the lifting operation.
- Method of communications during the operation.
- Radio channels to be used, agreed hand signals.
- Weather limits and weather window for the operation, lightning risk.
- Allocation of personnel to a particular task, i.e. Crane Supervisor, Crane operator, Signaller, Riggers.
- PPE requirements.
- Information from previous shifts handover.
- Time out, has anything changed since the lift plan was developed.
- Any other business, i.e. “Does everyone understand the task?”

10.3 COMMUNICATIONS

The common language to be used during the lifting operation will be established during the pre-task briefing. Where non-verbal communication is to be used, relevant hand signals should be clarified.

Where handheld radio communication will be used, the equipment must be checked prior to start of the lifting operation to ensure all equipment is functioning correctly (i.e. batteries, range, channel, frequency etc.) When directing the load, instructions shall be clear and precise. Unnecessary interference or radio activity that could distract members of the lifting team must be avoided. Back up communications must be considered; spare radios and batteries should be available, and back up procedures identified for use in case of radio failure.

If visual signals are used, then hand signals as stated within the Lift Plan shall be observed. It is important that hand signals should be clarified and understood within the pre-task briefing. Video equipment such as CCTV is only to be used as an auxiliary device, and shall not be used as replacement for adequate communication and is not regarded as visual contact between the signaler and the Lifting Appliance / Crane Operator.

Where directing blind lifts, there shall be a designated signaler to ensure that the lifted load will not strike anything or any person(s). The signaler must be in a safe position with clear visibility of the load path and must be in view, or able to communicate effectively, with the Lifting Appliance / Crane Operator. The communication must be appropriate for the operation, either radio or hand signaling. If the signaler is unable to maintain a clear view of the path of the load, then the Crane/Lifting supervisor must appoint assistant(s) for the signaling. All personnel involved shall have the same means of communication that is agreed prior to commencing the lifting operation. While the lift is travelling into blind zones then constant confirmatory communication is required as an If contact is lost, then the lifting operation must cease immediately. There shall be an agreed handover call sign between the crane operator and signalers when control of lifting operation is relayed from one signaler to another.

When performing lifting operations in noisy environments that restrict effective communication, a headset with integrated radio communication or visual signaling must be used. In case of disruption, poor visibility, unclear or failing communication, the lifting operation shall STOP immediately until the communication has

been restored and the proper signal is given and understood. The Lifting Appliance Operator shall obey a STOP signal at all times regardless of whoever gives the signal.

The Crane/Lifting supervisor is obliged to monitor commands given by the Signaller (Signalperson) during lifting operations at all times (verbal and/or visual).

10.4 GOOD PRACTICE DURING LIFTING

The slinger attaching or detaching the load must give their authorization before the lifting equipment is to be operated. Wherever possible, hooks and other similar devices used for lifting to either have safety catches fitted or be shaped to prevent the accidental displacement of the sling.

The load should be lifted along the plumb line to avoid any load swinging motions and shock (side) loading of lifting equipment. Any lifting out of center of gravity must be minimized or avoided where possible.

Lifting equipment must not be used in the open air where weather conditions could affect the integrity of the equipment or expose persons to danger.

All steps described in the Lifting Plan must be taken to minimize risks identified during planning.

Where two or more items of lifting equipment are used, they, or their loads, must be prevented from coming into contact with each other. This will require continuous coordination between the different lifting teams.

The emergency STOP hand signal can be used by any person involved in the lifting operation at any time if they consider the operation unsafe. All persons shall communicate any safety concerns to the person in charge (i.e. Lift Supervisor) onsite, who shall then act accordingly based on his/her understanding of the process. Should responsible person consider there to be any threat to the health or safety of personnel or to the environment or to the integrity of plant or load then a defined local STOP WORK procedure shall be followed.

10.5 ENVIRONMENTAL (WEATHER) CONDITIONS

The executions of lifting operations must take into account the environmental weather conditions. The execution of lifting operations in adverse weather conditions must be avoided as these can impose loads on the crane and load and adversely affect the safety of lifting operations. Careful consideration should be taken to the coefficient factors of the load and suitable limits put in place.

In any lifting operation, the Lifting Appliance Operator and / or the Crane Supervisor shall have the final decision about whether to perform the operation due to environmental conditions, regardless of the maximum limits stated in the Lift Plan.

When lifting equipment is positioned where it could be adversely affected by wind speed, it shall never be operated in wind speeds that are in excess of those specified in the manufacturers operating instruction for the lifting equipment. Where wind factors have the potential for adverse effects on the lifting operation, the

wind speed shall be monitored with an anemometer or LiDAR at a suitable high point throughout the lifting operation and weather forecast (e.g. wind speed, direction, lightening risk etc.) should be available.

Necessary care shall be taken to consider the direction of wind and whether the wind is gusting, as this could place additional loads on the lifting equipment and could potentially cause the lifted load to travel into the lifting appliance or other structures.

In poor visibility including fog and night work, suitable means of communication must be established and applied. Whenever lifting operations are carried out at night, the Crane Supervisor shall ensure that adequate lighting levels can be maintained for the planned lift (i.e. high powered flood lighting). However, in extreme conditions where visibility is reduced significantly and has the potential to cause an incident, the lifting operation shall be stopped until there is sufficient improvement in visibility to enable operations to be resumed safely. As a minimum, the crane supervisor must ensure that clear visibility of the load being lifted during the lifting operation is maintained at all times.

Lifting operations shall not be performed should there be a significant risk of personnel injury or equipment damage resulting from ice or large amount of snow falling from high or rotating structures; or a significant amount of rain that could affect the stability of the load or ground conditions.

Lifting supervisor must assess the associated control measures as stated within the Lift Plan, against the risks in real time because of weather conditions. Under no circumstances shall any external lifting operations be performed in the vicinity of electrical storms (lightning).

The Crane/Lifting Supervisor has the authority to call off a lift if he deems the conditions to be unsafe. However, any person involved in the lift can at any point express their concerns to the Crane/Lifting Supervisor if conditions are thought to be unsafe. No Lifting Operations are to be carried out in wind speeds exceeding those stated in the Lift Plan. Where there is risk of loss of control of the load due to sudden gusts of wind, the operator must not operate the lifting equipment unless he is confident that he can handle the load safely. This may apply more to large, light loads.

A reliable anemometer should be available to those involved in the lifting operation and wind conditions closely monitored. The preferred height for measuring wind speeds for the component is at the lifting height. The identification of the weather window must be based on 10-minute mean in the forecast. The monitoring of the wind speed on site must be based on 3 second gust value. Lifts that can be concluded within half the available weather window and not longer than 6 hours need not include an alpha factor.

The effects on height and mean wind in a period will be affected by wind velocity that varies with time and height above the sea surface or height above ground. For these reasons, the averaging time for wind speeds and the reference height must always be specified.

10.6 PERSONAL PROTECTIVE EQUIPMENT (PPE)

As a minimum, personnel shall wear, climbing helmet (chin strap fastened), approved laced safety boots, task specific work gloves, hi-vis clothing.

For all lifting operations, the Lifting Supervisor and signaler must be clearly identifiable from other personnel. This can be achieved be way of using an alternative color hi-visibility clothing and/or headwear.

Personnel who are required to work at height during lifting operations shall wear personal fall protective equipment. Designated attachment/anchorage points must always be used, unless other sufficient fall protection control measures are implemented. This includes man riding operations.

When working at height next to water in a MEWP or Man basket personnel must not clip on to designated anchor points, however life jackets must be worn at all times. Survival suit required depending on water temperature.

11 SAFE USE OF LIFTING APPLIANCES

Use, maintenance, storage, check, examination and test of lifting appliances shall be according to the manufacturer's instructions and established safe system of work. Following general guidance for safe use should be applied as appropriate. An effective system for storage and use of spare parts shall be established.

11.1 INSTALLATION VESSEL CRANES

Installation vessel cranes shall only be used under the vessel Permit-to-Work system.

Installation vessel crane shall only be used by personnel specially trained and certified. The installation vessel crane shall be used according to the various modes specified by the crane manufacturers, e.g. fixed-to-fixed, fixed-to-floating, floating-to-floating. Each mode has its specific and limitations.

The hoists of the installation vessel cranes should only be used for lifting on/ off loads from a floating vessel if the lifting and lowering speed exceeds the heaving movements of the floating vessel.

11.2 SUPPORT VESSEL CRANES

Cranes installed on the SOVs and CTV shall only be used by personnel specifically trained and certified for the operation. When lifting from the deck, of the SOV or CTV all sea fastening and restraint must be released such that the lift is accomplished safely with the minimum amount of slew and shock loading.

Loads lifted from and to an WTG foundation shall be lifted by lifting accessories designed for offshore dynamic conditions.

11.3 LIFTING EQUIPMENT USED FOR LIFTING PERSONS

Lifting appliances used for raising or lowering people should be specifically designed for the purpose. Such equipment may include lift trucks, MEWPS, scissor lifts, telescopic handlers and cranes. The equipment shall be tested, certified and supplied with relevant documentation. Operational wind limits should be in place and adhered to.

Persons being carried (e.g. in a man riding basket) should be protected from being injured by a hazard outside of it, i.e. fully enclosed when in use. Persons working from a carrier need to be protected by suitable edge protection; floor to be slip resistant; man riding basket to have devices to prevent free-fall, independent of the means of suspension of the man riding basket; where practicable, other carriers to have devices etc. to prevent the carrier falling in the event of the failure of the primary means of support. In the event of malfunction, persons being lifted must not be exposed to danger and a reliable means of rescue must be available (incorporating means to summon assistance, emergency means of lowering the carrier or self-rescue equipment).

11.4 WINCHES

When operating the winch (e.g. capstan) the operator should be positioned behind and to the side of the winch to ensure control of the spooling and horizontal control of the load at the same time.

The operator of the tagline system winches shall control proper spooling such that the wire rope will not be spooled in "piles" in the drum and that kinks are created during spooling.

The operator shall never use his hands to guide the wire rope onto the drum.

The emergency stop shall at all times be in a working condition on both the remote-control unit and on the winch control unit.

11.5 MOBILE CRANES

Mobile lifting appliances shall be positioned or installed in such a way as to minimize risk of a person being struck or the load moving in an uncontrolled manner. Path of travel (where fixed) to be protected by suitable enclosure.

Mobile cranes shall only be used on terrains, ground conditions and in configuration ensuring their tipping stability.

Maintenance, storing, check, inspection, examination of temporary cranes shall be according to the manufacturer's instruction and general standards for safe use of lifting appliances referred to in this instruction.

Mobile cranes shall only be used by personnel particularly trained and certified for the operation of other lifting appliances as stipulated in section Operators of other lifting appliances.

12 REVIEW OF LIFTING OPERATIONS

The Competent Person should ensure that a proper reporting system and culture is in place and all safety observations, lessons learned and near-miss incidents are timely collected, recorded and reported. The Competent Person shall then review the findings, consider necessary changes in the safe system of work and update the Lift Plan as per management of change procedure.

13 APPENDIX 1 – ROLES & RESPONSIBILITIES AND COMPETENCE REQUIREMENTS

Competent Person

RESPONSIBILITY

- Develop a Lift Plan in accordance with Industrial standard and local legislation.
- Establish the correct crane to be used, based upon weight of load, weight of lifting accessories, height of load and radius of lift
- Consider the location of the lifting operation, including ground conditions
- Ensure that the crane is thorough examined (including lifting accessories)
- Ensuring that a system for reporting defects is in place.
- Select appropriate lifting accessories, including their method of attachment to the load, and any protection used to prevent damage
- Conduct a risk assessment for the operation and communicate mitigations to all persons involved in the operation.
- Brief all persons involved in the lifting operation to ensure that the safe system of work described in the Lift Plan is understood.
- Handover of the Lift Plan to the Lift Supervisor
- Ensure that there is a Lift Supervisor designated to direct personnel and to ensure that the operation is carried out in accordance with the Lift Plan.
- Liaise with any other persons or authority, as required to overcome any hazard, by including any necessary corrective action or special measures in the safe system of work.
- Ensure that lifting points provided on the load are adequate for the loads applied.
- For Tandem Lifting, ensure that the cranes are compatible in lifting characteristics, with sufficient margins within the rated capacity of each crane to allow for any additional dynamic loading that could be transferred from one crane to another during movement of the load.
- Ensure that the lifting operation is planned so that there is no possibility of contact between the jibs of the cranes or jibs and/or the load.

COMPETENCE REQUIREMENTS

- Awareness of the requirements of the Industrial standard.
- Competent person qualified and/or certified with practical/theoretical knowledge to the Industrial standard and local requirements.
- Knowledge of the requirements under local legislation, regulations and codes of practice that relate to all types of lifting duties.
- Knowledge of maintenance, inspection, thorough examination and testing requirements of lifting equipment and accessories.
- Understanding of relevant information relating to different types of lifting accessories i.e. markings, certificates, and thorough examination reports, etc.
- 5 years minimum comprehensive experience in Lifting Operations and 2 years of planning lifting operations.

Lift Supervisor

RESPONSIBILITY

- The Lift Supervisor should direct and supervise the lifting operation, ensuring that these are carried out in accordance with the Lift Plan
- Supervisor the interface during all sequential and/or simultaneous lifting operations within the lifting zone to ensure safe execution.
- Ensure all persons involved with the lifting operations are qualified to perform their task i.e. certificated evidence.
- Brief all persons involved in the lifting operation to ensure that the safe system of work described in the Lift Plan is understood
- Perform toolbox talk prior to lifting operation.
- Ensure pre-lift checklist is completed and signed before the lift is initiated
- Give clear, unambiguous instructions to all other members of the lifting team
- Conduct shift handovers
- The Lift Supervisor has sufficient authority and MUST stop the lifting operation if the supervisor considers it dangerous to proceed.
- Liaise with the Competent Person for all matters relating to the Lift Plan – i.e. to request a variation and obtain authorization.
- Sign onto the Lift Plan.

COMPETENCE REQUIREMENTS

- Awareness of the Industrial standard.
- Qualified and certified with practical/theoretical knowledge to the industrial standard and local legislation
- Fully conversant with the duties of all persons involved in the lifting operation;
- Understanding of relevant information relating to different types of lifting accessories i.e. markings, certificates, and thorough examination reports, etc.
- Able to assess danger to the lifting operation from changed circumstances on site.
- Full knowledge and understanding of the SSOW (Lift Plan and/or work instructions).
- To be assessed and approved by the Competent Person.

- Classification 1 requires 1 year comprehensive experience and a minimum of lift Supervisor training.
- Classification 2 requires 4 years minimum comprehensive experience in Lifting Operations.

Classification 1 Competent Person

RESPONSIBILITY

- The Competent Person to be in charge of the execution of lifts in class 1
- The Lift Responsible should direct and supervise the lifting operation, ensuring that these are carried out in accordance with the Lift Plan
- Brief all persons involved in the lifting operation to ensure that the safe system of work de-scribed in the Lift Plan is understood
- Perform toolbox talk prior to lifting operation.
- Ensure visual pre-lift check is completed before the lift is initiated
- Give clear, unambiguous instructions to all other members of the lifting team
- Ensure that the works are completed in timely, safe and controlled manner
- Responsible to the competent person
- To be assessed and approved by the project. Must report to the competent person with any issues related to lifting operation or variations in lifts

COMPETENCE REQUIREMENTS

- Is an appointed technician.
- Executing classification 1 lifts requires 1 year relevant experience in lifting operations or supervision by a Competent Technician.
- Qualified and certified with practical/theoretical knowledge to Offshore Lifting Operations.
- Fully conversant with the duties of all persons involved in the lifting operation
- Understanding of relevant information relating to different types of lifting accessories i.e. markings, certificates, WLL etc.
- Able to assess risks to the lifting operation from changed circumstances on site.
- Full knowledge and understanding of the SSOW (Lift Plan and/or work instructions).

Lift Appliance/crane Operator

RESPONSIBILITY

- Participate in the planning of lifting operations where applicable
- Comply with the manufacturer's instructions for the safe set up, operation and maintenance of the Lifting Appliance/Crane
- Follow instructions and signals given by the nominated Signaller at all times
- Immediately stop the operation when instructed to do so – i.e. When an emergency stop signal is given.
- The Lifting Appliance/Crane shall be attended whilst under load.
- Complete all required "routine" periodic checks and pre & post-use inspections
- Participate in the pre-lift talk of lifting operations.
- Sign onto the "Tool box Talk"

COMPETENCE REQUIREMENTS

- Qualified and certified in the specific type of lifting appliance and/or in accordance with the requirements of local legislation.
- Able to assimilate and apply information contained in reports and duty charts relating to the range of duties and safe use of the Lifting Appliance
- Qualified Slinger/Rigger.
- Full knowledge and understanding of the SSOW (Lift Plan and/or work instructions).
- Relevant training certificates
- Classification 1 requires 1 year relevant experience in lifting operations or supervision by a Competent Technician.
- Classification 2 requires 1 year comprehensive experience in lifting operations.

Slinger/Rigger

RESPONSIBILITY

- Participate in the pre-lift talk of lifting operations.
- Responsible for attaching and detaching the load to and from the Lifting Appliance/Crane attachment.
- Ensure the correct use lifting accessories and other equipment in accordance with relevant manuals, work instructions, SSOW (Lift Plan) and Risk Assessment
- Perform pre & post use checks on lifting accessories
- Ensure equipment found damaged or faulty is reported to the Lift Supervisor, removed from service, tagged and quarantined accordingly
- Sign onto the Pre-lift checklist (where applicable)
- Sign onto the SSOW (Lift Plan) "Tool Box Talk"

COMPETENCE REQUIREMENTS

- Qualified with practical/theoretical knowledge about SSOW (Lift Plan) and/or work instruction.
- Slingers operating specialized equipment, must be trained in accordance with the manufacturers requirements and/or scope of work requirements.
- Able to establish weights and the effect of the centre of gravity, and to balance loads and judge distances and clearances.
- Able to select the appropriate lifting accessories and check that they are in a suitable condition
- Relevant training certificates.
- Classification 1 requires 1 year relevant experience in lifting operations or supervision by a Competent Technician.
- Classification 2 requires 1 year comprehensive experience in lifting operations.

Signaller/Signal Person

RESPONSIBILITY

- Participate in the pre-lift talk of lifting operations.
- Provide distinct, clear and agreed signals (verbal instructions when using audio equipment) to the Lifting Appliance operator in order to direct the lifting movement.
- Request additional personnel to assist, if required when directing blind lifts.
- Direct safe movement of the Lifting Appliance Operator and load
- Sign onto the "Tool Box Talk".

COMPETENCE REQUIREMENTS

- Qualified with practical/theoretical knowledge to the industrial standard and local requirements.
- Agreed Verbal commands (terminology)
- Agreed Hand Signals (recognized signals).
- Knowledge of the SSOW (Lift Plan) and/or work instructions.
- Relevant training certificates.
- Classification 1 lifts requires 1 year relevant experience in lifting operations or supervision by a Competent Technician.
- Classification 2 lifts requires 1 year comprehensive experience in lifting operations.
- As Competent person in Classification 1:
  - Fully conversant with the duties of all persons involved in the lifting operation;
  - Understanding of relevant information relating to different types of lifting accessories i.e. markings, certificates, and thorough examination reports, etc.
  - Able to assess danger to the lifting operation from changed circumstances on site.
  - 1-year minimum comprehensive experience in signalling lifting operations.

14 APPENDIX 2 – REFERENCES

This document is an interpretation of existing standards for the wind industry and setting new guidance where there are none. The following have been used for inspiration and may be consulted for further information.

Reference	**Publisher, *Title*, Year**
LOLER ACOP l113	Health and Safety Executive, *Safe use of lifting equipment*, 2014
ISO 15513:2000	ISO, *Cranes - Competency requirements for crane drivers (operators), slingers, signallers and assessors*, 2000
BS 7121-1:2016	British Standard, *Code of practice for safe use of cranes*. 2016
DNVGL-ST-N001	DNVGL, *Marine operations and marine warranty*, 2016
IMCA M187	IMCA, *Guidelines for lifting operations*, 2007
R-002	Norsok, *Lifting equipment*, 2012