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Cranes — Safe use —

Part 1: General

Appareils de levage à charge suspendue — Sécurité d'emploi —
Partie 1: Généralités

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 5, *Use, operation and maintenance.*

This second edition cancels and replaces the first edition (ISO 12480-1:1997), which has been technically revised.

The main changes are as follows:

— “driver” has been replaced by “operator” throughout the text;

— the requirements related to demolition ball operations have been removed;

— the requirements related to periodic checks have been removed;

— the requirements related to the communication system have been revised and incorporated into the main text (see 5.3);

— the requirements related to crane activities ranging from crane planning, selection, placement, erection and dismantling, operation, etc., have been combined into an independent clause (see Clause 6);

— the requirements related to remote operation have been added (see 6.6);

— the requirements related to lifting and lowering of persons have been made into an informative annex (see Annex A).

A list of all parts in the ISO 12480 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Cranes — Safe use —

Part 1: General

1 Scope

This document establishes required practices for the safe use of cranes through implementing a safe system of work consisting of the task planning, selection, erection and dismantling, operation and maintenance of cranes, and the selection of operators, slingers and signallers.

This document does not cover manually operated (non-powered) cranes, cranes in which at least one of its motions is manually operated and cranes mounted on water-borne vessels, except in those circumstances where a land-based crane is temporarily affixed to a vessel.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4306 (all parts), *Cranes — Vocabulary*

ISO 4309:2017, *Cranes — Wire ropes — Care and maintenance, inspection and discard*

ISO 4310, *Cranes — Test code and procedures*

ISO 9927-1, *Cranes — Inspections — Part 1: General*

ISO 9927-3, *Cranes — Inspections — Part 3: Tower cranes*

ISO 9927-5, *Cranes — Inspections — Part 5: Bridge and gantry cranes, including portal and semi-portal cranes and their supporting structures*

ISO 12482, *Cranes — Monitoring for crane design working period*

ISO 15513, *Cranes — Competency requirements for crane drivers (operators), slingers, signallers and assessors*

ISO 16715, *Cranes — Hand signals used with cranes*

ISO 17096, *Cranes — Safety — Load lifting attachments*

ISO 23813, *Cranes — Training of appointed persons*

ISO 23814, *Cranes — Competency requirements for crane inspectors*

ISO 23815-1, *Cranes — Maintenance — Part 1: General*

IEC 60204-32, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306 (all parts) and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

For the purposes of this document, the following terms and definitions apply.

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
competent person
person who has the necessary practical and theoretical knowledge and the necessary experience of the crane and equipment used in the lifting operation

3.2
crane operator
person who operates a crane

3.3
user
person or organization which has the overall responsibility over the crane

Note 1 to entry: The user is not necessarily the owner of the crane.

3.4
appointed person
competent person who has overall control of crane activity(s)

3.5
remote operation
operation of the crane using an operator interface not located on the crane

4 Safe system of work

A safe system of work shall be established. For repetitive lifting operations, the same principles may be applied, unless conditions affecting lifting operations change.

The same principles shall be applied when crane activities are carried out at a site or when the crane is a permanent fixture, for example in a factory or at a dock.

Crane activities shall include: lifting operations, any necessary preparation of a site, erection, dismantling, maintenance, or preparation of the crane for the out-of-service condition.

Prior to the start of crane activities, the safe system of work shall be effectively communicated to all parties concerned.

An appointed person shall be designated to ensure the implementation of the safe system of work.

NOTE The crane operator can be the appointed person.

The safe system of work shall include the following:

a) planning of crane activities;

b) selection and use of suitable crane(s) and equipment;

c) inspections and maintenance of crane(s) and equipment following the manufacturers' instructions;

d) ensuring that all personnel involved in crane activities are competent and have been made aware of their relevant responsibilities;

e) ensuring that there is adequate supervision by competent personnel;

f) ensuring that the operating instructions and relevant capacity charts are maintained in the crane;

g) ensuring that all other required certificates and documents are available on the crane or at the worksite, as appropriate;

h) ensuring the safety of persons and equipment not involved in the crane activities;

i) ensuring coordination with other applicable parties for appropriate approval compliance or cooperation in avoiding hazards or guarding against hazards including those from other cranes or equipment operating in close proximity;

j) ensuring there are emergency procedures for the evacuation of persons from the crane and the danger zones;

k) ensuring that all personnel can communicate clearly either audibly or visually;

l) establishing a communication system which is understood by the persons involved in the actual lifting operation (see 5.3);

m) prohibiting unauthorized movement or use of the crane;

n) ensuring that environmental conditions are monitored and actions to be taken are determined (see 6.8).

5 Personnel involved with crane activities

5.1 Competency of personnel

Safe operation of cranes depends on the selection of competent personnel. Competency requirements for crane operators, slingers, signallers, maintenance personnel and inspectors shall be in accordance with ISO 15513, ISO 9927-1, ISO 9927-3, ISO 9927-5, ISO 23813, ISO 23814 and ISO 23815-1.

The appointed person shall ensure that crane and rigging personnel are properly qualified and organized as follows:

a) each person shall have training and experience suited to the duties;

b) each person shall have such certifications that are required by a local regulation;

c) responsibilities, decision-making authority and chain of command shall be firmly established and communicated to the team;

d) no person shall participate in the work while impaired by drugs, alcohol or medication, nor by a deficient physical or mental state;

e) trainees shall work under direct supervision at assignments circumscribed by their level of skill and judgment.

NOTE In some circumstances, it can be appropriate for one person to undertake more than one of the duties described in 5.2.

5.2 Duties of personnel

5.2.1 Duties of crane operator

The crane operator is responsible for operation of the crane in accordance with the manufacturer's instruction and within the safe system of work (see Clause 4). The crane operator shall at any one time respond only to the signals from one slinger/signaller who shall be clearly identified (see 5.2.2 and 5.2.3), except when a stop or emergency signal is received.

5.2.2 Duties of slinger

Duties of the slinger shall include the following:

a) attaching and detaching the load to and from the lifting device;

b) determining correct lifting points and that the lifting points are adequate for the rigging forces;

c) ensuring the use of correct lifting gear and equipment in accordance with the planning of the activities for proper control and positioning of the load;

d) providing signals to the signaller when the rigging has been completed and the load is ready to be lifted. If there is more than one slinger, only one shall have this responsibility at any one time, depending on their position relative to the crane;

e) ensuring that shackles and other elements do not bind up as the rigging is tensioned, and to notify the signaller immediately if this occurs;

f) monitoring the load as it is being picked to ensure that the load does not break or excessively deform.

5.2.3 Duties of signaller

Duties of the signaller shall include the following:

a) becoming familiar with the operating characteristics of the specific crane in the configuration that it is being used;

b) directing all movements of the crane and load;

c) ensuring that signals allow the load to remain level, taking into account crane deflection and dynamic movement of the load;

d) ensuring that only one person is responsible for giving signals to the crane operator at any one time and when multiple signallers are required, ensuring the overall crane activities are reviewed among the signallers prior to initiating activities. If, during crane activities, responsibility for directing the crane and load is to be transferred to another person, the signaller shall clearly indicate to the crane operator that this responsibility is being transferred and to whom. Furthermore, the operator and the new person shall clearly indicate that they accept the transfer of responsibility;

e) being easily identifiable to the crane operator by wearing high-visibility clothing or using radio call signs;

f) using the communication system as established in 5.3.

5.3 Communication system

An effective communication system shall be established and consider the following:

a) prior to starting crane activities, confirmation of the communication method between the signaller and operator and the associated signals that are to be used during movement of the crane and/or load;

b) when necessary, using equipment that enables direct communication between the signaller and operator;

c) using a limited number of signals for the purpose of communication;

d) clear differentiation of signals to avoid misunderstanding;

e) using hand signals that meet the requirements given in ISO 16715;

f) using voice signals given in three steps describing: 1) function and direction, 2) distance and speed, 3) function stop;

g) if an operator does not fully understand or receive a signal, crane motion shall be stopped or not initiated;

h) should failure of the communication equipment occur, the ability for an operator(s) to detect the failure and immediately stop crane movements (e.g. a signaller using a radio continuously instructs the operator to lower a load by repeating “Lower-lower-lower …”. If the operator fails to receive this continuous instruction from the signaller, the operator immediately stops all crane movements and a determination is then made as to why the communication failed.).

5.4 Personal protective equipment

The appointed person shall ensure:

a) that personal protective equipment appropriate for the conditions of the location is available and in use, e.g. helmets, safety spectacles, safety harness, safety boots and hearing protection;

b) that the selection, use and maintenance of personal protective equipment shall be in accordance with the instruction manual of the crane and local regulations.

5.5 Crane access and fire prevention

Safe access and means of emergency escape shall be identified and maintained in such a condition that enables safe use. Personnel shall be instructed to use only the proper access and means of emergency escape.

5.5.1 Boarding and leaving the crane

No person(s) shall be permitted to board or leave the crane or enter its physically designated area without obtaining the operator’s permission. The operator shall be aware of and take necessary precautions for personnel boarding and leaving the crane.

5.5.2 Fire prevention

Personnel shall be instructed in the use and care of any fire extinguishers provided. Do not obstruct airflow around high-temperature components, such as engines, radiators and exhaust pipes. Do not place flammable materials on or near any heat sources. Do not operate in environments with heat sources that can cause overheating, fire or explosion.

6 Crane activities

6.1 Planning of crane activities

All crane activities shall be planned and properly supervised to ensure that they are carried out safely and that all identifiable risks have been considered. Planning shall be carried out by personnel who have the appropriate expertise and have been appointed for this purpose. In cases of repetitive or routine operations, this planning may only be necessary in the first instance, with periodic reviews to ensure that no factors have changed.

A correctly planned procedure shall ensure that:

a) crane is correctly selected and configured;

b) crane activities are in accordance with the applicable instructions;

c) crane activities do not commence until an instruction manual is available and clearly understood by personnel;

d) all preparations have been completed and all preoperational requirements have been met;

e) consideration and implementation of additional safety measures to be taken when crane activities occur in the vicinity of overhead electric power lines (see 6.7).

Any deviation from prescribed procedures or specifications shall be approved by the manufacturer or a competent person if the manufacturer no longer exists.

Any restrictions identified during planning shall be reviewed with all personnel involved in the operation and followed during crane activities.

6.2 Crane selection

Cranes are available in a number of forms and the characteristics of the various types of cranes shall be considered in relation to the job requirements.

Points to be considered in making the selection include the following:

a) characteristics of lifted load, such as masses and dimensions;

b) characteristics of required activities, such as lift quantity, frequency, and duration;

c) needed operational requirements for the crane, such as lifting capacity, operating performance, and operating range, e.g. intended use;

d) requirements due to operating environment and possible limitations.

6.3 Crane placement

Placement of the crane shall take into account factors that can affect its safe operation.

a) The appointed person shall ensure that the loads imposed by the crane are assessed by a competent person, such that the crane can operate within the parameters specified by the manufacturer and can be sustained by the ground or any means of support. While operational conditions can produce greater imposed loading, out-of-service and erection/dismantling conditions shall also be taken into consideration.

   The loads imposed by the crane should be obtained from the crane manufacturer or other authority on crane design and construction. The loadings shall include the combined effects of the following:

   1) total mass of the crane (including any counterweight, ballasting or foundation where appropriate);

   2) total mass of the load(s) and any lifting attachment(s);

   3) dynamic forces caused by movements of the crane;

   4) wind loadings, resulting from wind speeds up to the maximum permitted, taking into account the degree of exposure of the site.

b) Consideration shall be given to the presence of proximity hazards for the following:

   1) nearby structures;

   2) other cranes;

   3) vehicles or ships;

   4) stacked goods;

   5) public access areas including highways, railways, airspace, and rivers;

   6) above-ground features such as utilities, trees, street furniture;

   7) overhead electric power lines.

Where any part of the crane or its load cannot be kept clear of such hazards, the appropriate authority shall be consulted.

c) The underground features including utility services, buried tanks, voids, cellars and uncompacted fill.

d) The adequacy of access to allow the placing or erection of the crane and for dismantling and removal of the crane.

e) The adequacy of space for the crane to be placed in an out-of-service condition and to secure the crane for high winds.

f) Changes in site conditions.

6.4 Crane erection and dismantling

6.4.1 Identification of components

All major components that form part of a crane and are dismantled for transportation, particularly those that are load-bearing or ensure the stability of the assembled crane, shall be clearly marked to ensure that they can be identified for inspection and condition monitoring purposes.

If replacement is necessary, only those appropriate parts and components identified shall be used.

6.4.2 Electrical supply

Electrical supply to a crane shall be in accordance with IEC 60204-32.

The points below shall be followed if the crane is electrically operated from a power source external to the crane.

a) Prior to connection, the electrical power supply shall be checked for compatibility and compliance with the specification and approved for connection.

b) Electrical fuses or circuit breakers shall be provided to interrupt the power supply in the event of an electrical overload occurring, such as earth fault or short circuit fault.

c) In addition to any isolator within the crane capable of cutting off the electrical supply to the crane motions, there should be an identified isolator externally located from the crane which can be used to cut off the electrical supply to the crane itself, see IEC 60204-32:2023, Clause 5.

d) Care shall be taken to ensure that any trailing cable is not damaged during operational movement or when the crane is travelling. The travel distance shall be well within the length of the trailing cable.

e) The connection shall be verified by a competent person before and during operations according to the requirements and frequency given by the crane manufacturer.

NOTE Local regulations can stipulate different and/or additional requirements.

6.4.3 Lightning protection

If the crane is to be operated outdoors, lightning protection in accordance with IEC 62305 shall be installed unless otherwise specified by the crane manufacturer.

NOTE Local regulations can stipulate different and/or additional requirements.

6.5 Crane operation

The rated capacity of the crane shall not be exceeded other than for the express purpose of a test of the crane as required by ISO 4310.

Loads shall be lifted carefully, and crane motions shall be operated smoothly to avoid excessive dynamic loading. Lines to steady the load should be used where necessary and where the load presents a wind-catching area.

Care shall be taken to prevent pendulum swinging of the load by careful control of the slewing operation to keep the load under control at all times.

The hoisting, slewing, traversing, luffing or travelling motions of a crane shall not be used to push, pull, or drag any load. Before lifting a load, the hoist line should be plumb. Failure to keep the hoist line plumb can adversely affect the stability of the crane or introduce loadings (stresses) for which it has not been designed.

Prior to the operation, the operator shall:

a) ensure that the crane has been inspected and approved for operation by a competent person;

b) perform a visual inspection of the crane prior to starting operations in accordance with the manufacturer's instructions;

c) check for the presence of lockout and tagout devices installed on the equipment or controls before start of operation;

d) be familiar with the controls and their layout, crane configuration and operational requirements described in the manufacturer’s instructions;

e) develop a situational awareness of the crane in relation to its surroundings and the work to be performed;

f) have a clear and unrestricted view of the load and operational area. If not, the operator shall act under the directions of the signaller who is positioned to have a clear and uninterrupted view. The operator and/or the signaller shall ensure that loads and the crane hoist ropes are well clear of obstructions;

g) when loads have to be handled in the vicinity of persons, extreme care shall be exercised and adequate clearances allowed. Operators and signallers shall pay particular attention to possible danger to persons working out of sight. All persons shall stand clear of the load being lifted. When lifting from a stack, all persons shall stand away from the stack in case adjacent materials or objects are displaced;

h) ensure that all controls, limiters and other devices are properly calibrated and functional. Ensure that gauges for control systems operated by pressure (e.g. hydraulic or air) are functioning and displaying pressure accurately;

i) ensure that each running rope is properly reeved, running smoothly and spooling correctly in the drum;

j) ensure that the crane has the capacity in its configuration to lift the weight of the load throughout the movements of the operation.

When lifting, the hoist rope or hoist chain shall be vertical throughout the crane activity. The load shall initially be lifted just clear of the supporting surface and before proceeding to lifting, consider such factors as checking the slings and balance of the load. Proper care shall be exercised by the operator at all times to avoid shock or side loadings. Care should be taken to avoid the load-lifting attachment coming into contact with the structure. Motion motors should not be reversed before the motor has come to rest, unless the control mechanism is specifically designed to allow this to be done.

The crane safety and limiting devices shall not be used as a routine method of stopping the motion(s).

Travelling cranes which move close to where personnel can be located should be equipped with an appropriate warning device.

Before any crane is moved, a warning should be given to all personnel whose safety is likely to be endangered. A warning bell, horn or other appropriate warning indicator may be fitted for this purpose.

6.6 Remote operation

Prior to remote operation, the operator shall ensure that:

— the remote control device is compatible with the crane control and approved for operation;

— the remote control device is operational;

— the stop function is operational before controlling the crane for the intended movements; and

— all actuators of the remote control device are in neutral positions.

During remote operation, the operator shall ensure that:

— the remote control device is communicating with the intended crane;

— the intended movements of the crane or cranes in operation are controlled by one remote control device;

— the operator operates from a safe position without distractions;

— the operator can directly observe or receive instructions for the intended movements; and

— the remote control device is turned off for any short period of non-use or after the intended operation is completed.

6.7 Operation in the vicinity of overhead electric power lines

When assembling, disassembling, operating, or maintaining a crane in close proximity to electric power lines, the appointed person shall check for the presence of electric power lines and determine any additional measures to be taken. Measures shall take into consideration the following:

a) local regulations, crane manufacturer's guidance and advice from the local power authority;

b) all electric power lines are considered energized unless it is positively known that they have been deenergized and grounded;

c) ensuring that a cabled remote control device is not used;

d) ensuring that persons stay clear of the crane during operation.

6.8 Environmental considerations

Both in-service and out-of-service configurations shall be considered in situations where crane activities are likely to be affected by environmental conditions. Certain weather conditions such as strong wind, heavy rain, ice or snow can impose loads on a crane and adversely affect the safety of crane activities. An appointed person shall monitor weather forecasts and determine actions to be taken in response to both forecast and current weather.

6.8.1 Wind

The crane shall not be operated in wind speeds that are more than those specified in the operating instructions for the crane. Operations shall be suspended, and the crane placed in a safe configuration prior to the wind reaching a critical level.

The limitations on wind speed for erecting, testing, and dismantling the crane can be lower than the limitation for normal operation.

Gusty wind conditions can have an additional adverse effect on the safe handling of the load and the safety of a crane. Even in relatively light wind conditions, extra care shall be taken when handling loads presenting large effective wind areas. The wind profile of the lifted load can constrain the working capacity of the crane or the maximum wind limitation.

Wind forecasts should be consulted to anticipate high winds and to prepare accordingly. For measurement of current wind, an anemometer mounted on a high point of the crane is the preferred means. In the case of cranes in positions where they can be adversely affected by winds, the wind speed shall be readily determined.

The crane manufacturer's instructions regarding the wind conditions and placing the crane out-of-service shall be strictly followed. When manufacturer's instructions and guidance are not available, a competent person shall make these determinations.

6.8.2 Visibility

In poor visibility conditions, a suitable means of communication shall be implemented. In extreme conditions, crane activities shall be stopped until there is sufficient improvement in visibility to enable operations to resume safely.

6.8.3 Rain, snow or ice

During adverse weather conditions, for example, rain, snow or ice, the appointed person shall ensure that adequate precautions are taken to avoid danger when the crane or the load is affected.

7 Maintenance, inspection and condition monitoring

a) Cranes shall be maintained in accordance with ISO 23815-1. The wire ropes shall be maintained in accordance with ISO 4309.

b) Cranes shall be inspected in accordance with ISO 9927-1. The wire ropes shall be inspected in accordance with ISO 4309:2017, Clause 5.

c) When a crane approaches the design working period, a special assessment shall be performed in accordance with ISO 12482.

7.1 Malfunctions, issues and incidents

The appointed person shall ensure that there is a procedure for reporting malfunctions, issues, and incidents.

This procedure should include notification to the appointed person, recording of action taken to rectify any malfunctions and issues and permission for the crane to continue operation.

This procedure shall include the immediate disclosure of:

a) inspection records (see ISO 9927-1:2013, 10.3) and maintenance records (see ISO 23815-1:2007, 4.9);

b) any overload.

7.2 Leaving the crane unattended

The crane operator shall remain at the controls when a load is suspended from a crane.

In no case shall a crane be left unattended even for short periods, unless all loads have been removed from the lifting attachment and the lifting attachment has been left in a safe position, the power supplies to all motions have been switched off or the engine has been stopped, and appropriate motion brakes and locks have been applied to put the machine in a safe condition. The ignition key and any other keys shall be removed from the crane whenever the operator is absent from the machine.

Before the operator leaves the worksite, the crane shall be prepared for the out-of-service condition in accordance with instructions from the manufacturer or a competent person.

For details of methods to safeguard particular types of cranes, reference should be made to the appropriate part of ISO 12480.

8 Other lifting applications

8.1 Lifting with multiple cranes or multiple hoists

Lifting a load with two or more cranes or multiple hoists on a single crane requires greater attention to planning and supervision than lifting with one hoist on one crane. Relative motion between multiple cranes or between the sheaves in the crane's boom head and the lifting points on the load can induce additional loadings on the cranes, hoist ropes, the load and the lifting gear. Because of this and the difficulty in monitoring these additional loads, multiple crane or hoist lifting shall only be used when the physical dimensions, characteristics, mass or required movement of the load prevent the operation being carried out as safely by a single crane or hoist.

Multiple crane or hoist lifting shall be planned with care and shall include an accurate assessment of the proportion of the load to be carried by each crane. It is essential that the planning shall ensure that the hoist ropes remain vertical. The cranes shall not be subjected to forces in excess of those that would occur when handling their rated capacity as single lifts.

At every stage of the operation, each crane shall be monitored to assure that it is carrying its planned load.

NOTE Local regulations can require additional limitations for operation.

8.1.1 Multiple crane lifting

a) The total mass of the load shall be known.

b) The load distribution and centre of gravity shall be known or calculated to ensure that any hazards that can occur due to a change of load distribution are identified and mitigated.

c) Establish distribution and direction of the forces that can occur throughout the range of motion of the lift and ensure the capacity of the lifting gear used meets or exceeds those requirements.

d) The proportion of the load being carried by each crane shall be within each crane's rated capacity throughout the lift.

e) Using cranes with similar characteristics is preferred.

f) An assessment shall be made of the effect of variation in plumb of the hoist ropes (e.g. inequalities of speed or variations in motions). The assessment shall include determination of the means for keeping such inequalities to a minimum.

8.1.2 Multiple hoist lifting

a) The use of multiple hoists on a single crane should only be performed when permitted by the crane manufacturer.

b) The total mass of the load shall be known. The mass of the lifting gear and hook blocks shall be part of the calculated load on the hoists.

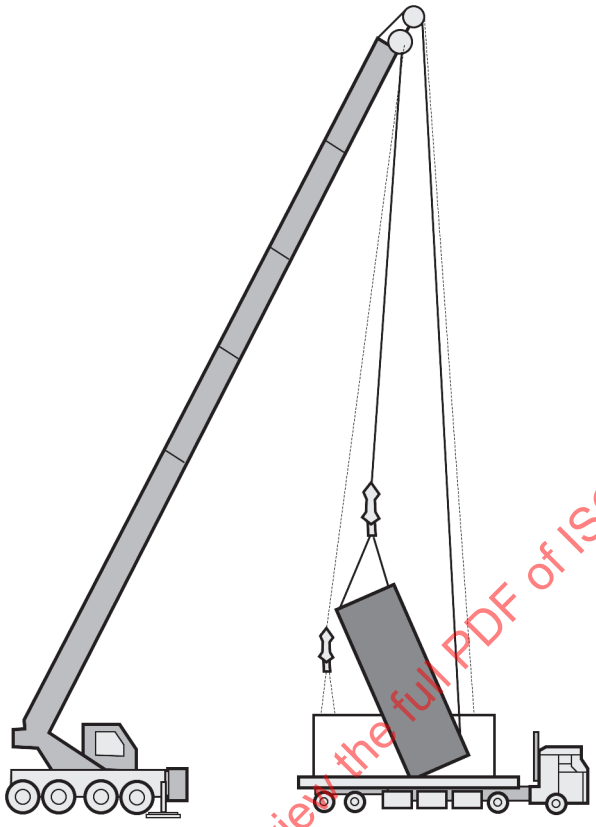
c) The load distribution and centre of gravity shall be known or calculated.

d) Establish distribution and direction of the forces that can occur throughout the range of motion of the lift and ensure the capacity of the lifting gear used meets or exceeds those requirements during the rotation of the load.

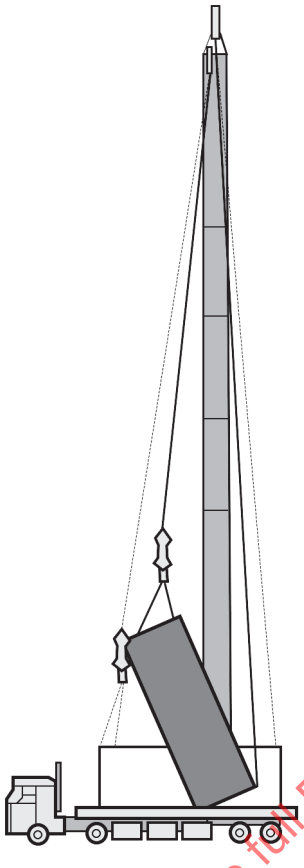
e) The total mass of the load shall be within the crane's rated capacity.

f) An assessment shall be made whether to rotate the load onto the main or the auxiliary hoist. Factors to consider can include load capacities and site conditions. Rotating onto the main hoist is preferred.

g) An assessment shall be made of the effect of variation in fleet angles of the hoist ropes. To prevent side loading, rotation shall be in parallel to the crane boom unless otherwise permitted by the crane manufacturer. See Figure 1.



a) Correct



b) Incorrect

Figure 1 — Preventing side loading to the boom

8.1.3 Supervision

The appointed person shall be in attendance and in overall control of the cranes in operation. Only this person shall give instructions to personnel operating machines, except in an emergency, when a commonly recognized stop signal may be given by any person observing a situation leading to danger.

If all the necessary points cannot be observed from one position, other personnel will be required at various positions to observe and report to the person in charge of the operation.

8.1.4 Coordination of crane motions

The crane motions should be coordinated to ensure that unintended variations in the direction and magnitude of the forces acting on the crane are minimized. In practice, there will always be some variation due to differences in response to the activation of the motion controller and the setting and efficiency of the braking system.

8.2 Non-fixed load-lifting attachments

When non-fixed load-lifting attachments are used, the manufacturer's or a competent person's guidance shall be obtained and followed. If this information is not available, the appointed person shall approve the non-fixed load lifting attachment for operation.

The mass of any non-fixed load-lifting attachments shall always be included as part of the load to be lifted. The accessories shall be tested, certified and plainly marked with the safe working load and mass of the accessories. The non-fixed load-lifting attachments shall only be used for the purpose for which they were designed.

Non-fixed load lifting attachments shall be used within the normal operating limits of the crane and comply with the requirements given in ISO 17096.

8.2.1 Grab attachment

It is essential that any grab used be of appropriate capacity for the material to be moved, having regard to the safe working load of the crane. A check should always be made in cases of doubt.

8.2.2 Magnet attachment

The power to the magnet shall not be switched on until the magnet has been lowered on to the load to be lifted. The magnet shall be carefully lowered on to the load and should not be allowed to strike a solid obstacle while in use. It should not be used on hot metal unless specifically designed for that application.

When not in use, the power shall be switched off to avoid the magnet becoming too hot; the magnet shall not be deposited on the ground but shall be rested on a clean, non-metallic platform, e.g. a wooden platform.

8.2.3 Vacuum lifting devices

Vacuum lifting devices shall be regularly inspected to ensure that adequate suction is maintained over the required period.

A vacuum lifting device shall only be used to lift loads that have a surface suitable for vacuum lifting pads.

Before being used for the first time or after any substantial repair the vacuum device shall be tested by a competent person by application of a test load. The test load surface shall, as far as is practicable, be similar to the worst type of surface on which the device is intended to be used.

The vacuum device, particularly the hoses and vacuum pads, shall be inspected before use at the beginning of each shift or day, and the warning device should be tested at the beginning of each week unless the vacuum device manufacturer has defined other inspecting and testing intervals.

8.2.4 Demolition (deconstruction) and other special lifting applications

Demolition (deconstruction) and other special lifting applications are not normally permitted with cranes. Unless prohibited by the manufacturer, the use of cranes for such purposes may however exceptionally be permitted by local regulations.

Cranes should be used cautiously when assisting demolition. Planners and supervisors shall consider, at minimum:

a) selection of equipment with a determination of load uncertainties and shock effects;

b) avoidance of excessive and abusive loading;

c) control of load transfer to the crane;

d) adequate ground support.

Special lifting applications (i.e. methods and procedures that are not covered in the manufacturer's instructions) shall require guidance from the crane manufacturer or, if such guidance is unavailable, shall be planned by a competent person.

8.3 Personnel lifting

Cranes are generally designed for lifting freely suspended loads. Lifting and lowering of persons is not permitted, unless it is the least hazardous method to complete the activity.

If equipment designed specifically for personnel handling is available to complete the task, it shall be used. However, cranes may be used to lift or lower persons in suspended platforms for working at height when it is the least hazardous way to complete the job. Local standards and regulations can exist that address the

complexity of using cranes for lifting and lowering persons and provide requirements and information for such operations. In the absence of such standards and regulations, the procedures given in Annex A should be followed.

This clause does not apply to cranes that are designed specifically for lifting of personnel by the manufacturer.