



# International Standard

**ISO 12480-1**

## **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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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](http://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*

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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.