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**Cranes — Training of slingers and  
signallers**

*Appareils de levage à charge suspendue — Formation des élingueurs  
et des signaleurs*

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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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23853 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 5, *Use, operation and maintenance*.

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# Cranes — Training of slingers and signallers

## 1 Scope

This International Standard specifies the minimum training to be given to trainee crane slingers and crane signallers to develop the basic slinging skills and to impart the requisite knowledge for competency required for slingers and signallers as defined in ISO 15513.

## 2 Normative references

The following referenced documents are indispensable for the application 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 15513, *Cranes — Competency requirements for crane drivers (operators), slingers, signallers and assessors*

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## 3 Prerequisite aptitudes and knowledge

Slingers and signallers shall be at least 18 years old. They shall be medically fit for the profession. The following factors should be considered.

- a) physical requirements
  - adequate sight and hearing to carry out the work correctly;
  - no dizziness when slinging and signalling at height;
  - no disqualifying ailment or infirmity;
  - no drug or alcohol-related problem.
- b) mental aptitude
  - behaviour under stress;
  - mental balance;
  - sense of responsibility.

Tests may be used to determine the aptitude of the trainee (manual skill, common sense, self-control, composure, accuracy, motion coordination and reflexes).

Trainees shall be able to read and understand the language in which the documents and information labels of the sling gear are written.

## 4 Training objectives

The objectives of slinger/signaller training are:

- to provide knowledge about cranes;
- to provide knowledge about slinging equipment;
- to teach safe slinging methods;
- to teach signalling methods;
- to impart safe slinging techniques;
- to provide knowledge regarding job planning, hazard identification and control procedures.

## 5 Training procedures

The duration and contents of the training procedures shall be sufficient to attain the objectives.

The training shall include both a theoretical programme and a practical programme. In particular, it is important that trainees are taught safe slinging work through case studies of accidents that have occurred during slinging work.

The practical training shall be carried out for a small group of trainees (maximum 10 trainees) by such procedures as follows:

- the training instructor shall demonstrate the aspects of basic slinging work, i.e. preparation of a lift plan, identification of site hazards, determination of the centre of gravity, estimation of the mass of a load, attaching slinging equipment on the load, hoisting, transporting and lowering the load;
- the trainee shall then perform the slinging work according to the demonstration by the instructor and repeat it until he/she becomes skilled. In particular he/she shall learn safe procedures for slinging work;
- the trainee acts as a slinger (or signaller) and one or two other trainees act as assistant(s).

At the completion of training, assessment of the results of the theoretical and practical programmes shall be conducted to confirm whether or not a trainee has achieved the training objectives.

## 6 Contents of training programme

### 6.1 Theoretical programme

#### 6.1.1 Knowledge of cranes

The following knowledge of cranes shall be included in the training programme:

- a) cranes in general:
  - vocabulary;
  - crane motions;
  - lifting capacity, rated capacity chart.

- b) types, outline of structure, purpose of use:
- mobile cranes;
  - tower cranes;
  - jib cranes;
  - bridge and gantry cranes.
- c) safety devices, load-lifting attachments, brakes.

### 6.1.2 Slinging equipment

The following knowledge of slinging equipment shall be included in the training programme:

- a) wire rope slings:
- rope construction;
  - rope lay;
  - working load limit;
  - precautions for use.
- b) chain slings:
- types of chain slings;
  - working load limit;
  - precautions for use.
- c) types, working-load limit, precautions when using fibre slings:
- fibre rope slings;
  - fibre webbing slings.
- d) types, working-load limit, precautions when using other slinging equipment:
- pulley (reeving) block;
  - slinging gear (clamps, lifting hooks, shackles, lifting beams, lifting nets, eye pieces);
  - pads, sleepers.

### 6.1.3 Checking (inspection) of slinging equipment

The following knowledge of the inspection of slinging equipment shall be included in the training programme:

- a) wire rope slings:
- checking of items (number of broken wires, reduction of rope diameter, wear, kink, deformation, corrosion, lubrication, abnormality at connecting part or end fitting);
  - discard criteria.

- b) chain slings:
  - checking of items (elongation, deformation, twist, crack, abnormality at joint section);
  - discard criteria.
- c) fibre slings:
  - fibre rope slings:
    - i) checking of items (wear, scratch, cut, corrosion, loose lay);
    - ii) discard criteria.
  - fibre webbing slings:
    - i) damage (wear, scratch, cut of sewing strings);
    - ii) outer abnormality (change of colour, colouring, melt, dirt);
    - iii) metal fitting (deformation, scratch, crack, corrosion);
    - iv) discard criteria.
- d) clamps:
  - abnormality of clamp body or lifting ring;
  - abnormality of throat opening;
  - damage, wear or clogging at teeth (knurled part) of cam or jaw;
  - function of clamp;
  - function of safety latch;
  - maintenance;
  - discard criteria.

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#### 6.1.4 Slinging methods

The following knowledge of slinging methods shall be included in the training programme:

- a) determination of the centre of gravity and estimation of the mass of loads;
- b) choice of slinging method corresponding to shape of load:
  - direct lifting;
  - basket-hitch lifting;
  - choke-hitch lifting;
  - clamp lifting;
  - lifting of unevenly shaped loads (non-symmetrical loads);
  - lifting by a lifting beam (spreader);
  - use of tagline.



- c) selection of slinging equipment corresponding to the mass of loads and the lifting angle;
- d) transportation of the lifted load.

#### 6.1.5 Signalling

The following knowledge of signalling shall be included in the training programme:

- a) hand signals;
- b) flag signals;
- c) radio communication (voice signals).

#### 6.1.6 Safety rules

#### 6.1.7 Job planning

The following knowledge of job planning shall be included in the training programme:

- a) job sequence;
- b) path of travel of the load;
- c) access and egress;
- d) ground or supporting surface condition;
- e) location of personnel involved in slinging work;
- f) coordination with other site personnel.

#### 6.1.8 Hazard identification and control procedures

The following knowledge of hazard identification and control procedures shall be included in the training programme:

- a) hazards associated with the use of cranes and slinging practices:
  - crushing hazards, such as falling load, load collapse, caught between moving load and other object;
  - cutting hazards, such as broken wire rope, sharp-edged load;
  - impact hazards, such as load sway, load collapse, flying objects;
  - entanglement hazards, such as with wire rope sling, tagline;
  - hazard of falling from height.
- b) potential hazards to be taken into consideration at lifting operation site:
  - overhead power lines;
  - overhead service lines, such as steam, gas, telephone;
  - trees;

- uneven and/or unstable ground;
- allowable floor loading as appropriate;
- surrounding buildings/vessels/structures/equipment;
- hazardous materials;
- corrosive substances;
- barricades;
- inadequate lighting;
- radio interference;
- inclement weather.

## 6.2 Practical programme

### 6.2.1 General

The practical programme shall include various steps for slinging work, such as safe procedures for slinging work, signalling, determination of the centre of gravity, estimation of the mass of loads, selection of slinging equipment, checking (inspection) of slinging equipment, attaching slinging equipment on the load and the hook, hoisting, transporting and lowering the load. With regard to the slinging methods, trainees shall learn at least the techniques required for basket-hitch lifting, choke-hitch lifting, clamp lifting and lifting of unevenly shaped loads.

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### 6.2.2 Safe procedures for slinging work

Practice in the following procedures for slinging work shall be included in the training programme:

- a) proper clothing, use of personal protective equipment;
- b) safety confirmation by finger-pointing and calling-out.

### 6.2.3 Signalling

Practice in the following procedures for signalling shall be included in the training programme:

- a) hand signals;
- b) flag signals;
- c) radio communication (voice signals).

### 6.2.4 Determination of the centre of gravity and estimation of the mass of loads

Practice in the determination of the centre of gravity and estimation of the mass of loads shall be included in the training programme.

### 6.2.5 Selection of slinging equipment

Practice in the selection of slinging equipment shall be included in the training programme.

## 6.2.6 Checking (inspection) of slinging equipment

Practice in the checking (inspection) of slinging equipment shall be included in the training programme.

## 6.2.7 Slinging

### 6.2.7.1 Attaching slinging equipment

Practice in the following procedures for attaching slinging equipment shall be included in the training programme:

- a) determination of the centre of gravity and points for attaching slinging equipment;
- b) guiding the hook above the load and lowering the hook;
- c) attaching slinging equipment on the load and the hook;
- d) confirmation of the safety of slinging condition.

### 6.2.7.2 Trial lift and hoisting the load

Practice in the following procedures for trial lift and hoisting the load shall be included in the training programme:

- a) precision hoisting and stop;
- b) safety confirmation;
- c) hoisting the load.

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### 6.2.7.3 Transporting the load

Practice in the following procedures for transporting the load shall be included in the training programme:

- a) planning the path of travel of the load;
- b) cross over (space shared with other cranes);
- c) signalling the transporting course and lowering position to a crane driver;
- d) guiding the load.

### 6.2.7.4 Lowering the load

Practice in the following procedures for lowering the load shall be included in the training programme:

- a) evaluating ground or supporting structure surface condition;
- b) guiding the load to the lowering place and preparing sleepers;
- c) lowering the load and stop lowering;
- d) precision lowering, grounding the load and confirmation of the stability;
- e) removing the slinging equipment from the hook and the load;
- f) checking the slinging equipment and storing it at a designated place.