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## Cranes — Requirements for mechanisms —

### Part 2: Mobile cranes

Appareils de levage à charge suspendue — Exigences pour les mécanismes —

Partie 2: Grues mobiles

ICS 53.020.20

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ISO/DIS 10972-2

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ISO 10972-2 was prepared by Technical Committee ISO/TC 96, Cranes, Subcommittee SC 6, Mobile cranes.

ISO 10972 consists of the following parts, under the general title Cranes - Requirements for mechanisms:

— Part 1: General

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Part 2: Mobile cranes
Part 3: Tower cranes

ISO/DIS 10972-2

- Part 4: Jib cranes https://standards.iteh.ai/catalog/standards/sist/ae759ff2-a8f1-4ace-bfa0-
- Part 5: Bridge and gantry cranes

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## Cranes — Requirements for mechanisms -

### Part 2: Mobile cranes

1 Scope

This part of ISO 10972 establishes requirements which apply specifically to the mechanisms and related components of mobile cranes, in addition to the general requirements given in ISO 10972-1

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These additional requirements some and siteh.ai)

- a) the arrangement, features and characteristics of the crane mechanisms, and
- b) the minimum requirements for certain mechanism components

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Rules for the proof of competence calculation regarding different limit states (yield strength, fatigue, wear) are excluded from this part of ISO 10972.

### 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 4301-2, Granes – Classification –Part 2: Mobile Cranes

ISO 4306-1, Cranes – Vocabulary – Part 1: General

4SO 4306-2, Cranes – Vocabulary – Part 2: Mobile Cranes

ISO 109721, Cranes – Requirements for mechanisms – Part 1: General

ISO 8087, Mobile Cranes – Drum and Sheave sizes

ISO 10245-1, Cranes – Limiting and Indicating Devices – Part 1; General

ISO 10245-2, Cranes – Limiting and Indicating Devices – Part 2: Mobile Cranes

IEC 60204-32, Safety of Machinery-Electrical Equipment of Machines – Part 32-Requirement for Hoisting Machines

#### **3** Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4306-1 and 4306-2 apply.

#### 4 Specific requirements for hoisting mechanisms on mobile cranes

#### 4.1 Boom hoist mechanism

Limiting and indicating devices per the requirements of ISO 10245-1 and 10245-2, shall be incorporated as applicable. Also refer to ISO 4301 for winch classification.

The boom hoist may use a rope drum for its drive or hydraulic cylinder(s) and the supporting structure may be a gantry or the same hydraulic cylinder(s) used to elevate the boom.

The boom hoist shall be capable of elevating and controlling the boom with its rated load (for wire rope boom hoists, when reeved according to the manufacturer's specifications) and shall be capable of supporting the boom and rated load without action by the operator.

In a wire rope supporting and elevating arrangement, boom lowering shall be done only under power control. Free-fall lowering of the boom shall not be permitted.

The boom hoist drum shall have sufficient wire rope capacity to operate the boom in all positions, from the lowest permissible to the highest recommended, when using the manufacturer's recommended reeving and wire rope size. No less than two full wraps of <u>wire</u> rope shall remain on the drum with the boom lowered to the level of the crane supporting surface. The-end of the wire rope shall be anchored to the drum by an arrangement specified by the winch manufacturer.

The drum shall provide a first layer wire rope pitch diameter in accordance with ISO 8087.

On machines with wire rope supported booms, a braking mechanism and an additional holding device which has a braking capability of at least one and one-half the maximum drive of the winch shall be provided to prevent inadvertent lowering of the boom

An integrally mounted holding device (such as a load check valve) shall be provided with boom support hydraulic cylinder(s) to prevent uncontrolled lowering of the boom in the event of a hydraulic system failure (e.g., supply hose rupture).

Where multiple hydraulic cylinders are used for the boom hoist, all cylinders must be hydraulically connected. The connection must have a safety factor of at least 4 against the maximum pressure induced with rated loads.

Where hoses are used for connecting the cylinders, velocity fuses shall be used on each cylinder to avoid uncontrolled movement of the boom in the case of hydraulic line failure.

#### 4.2 Load hoist mechanism

Limiting and indicating devices per the requirements of ISO 10245-1 and 10245-2 shall be incorporated as applicable. Also refer to ISO 4301-2 for winch classification.

The hoist mechanism may consist of a drum or hydraulic cylinder(s) with necessary wire rope reeving.

The load hoist mechanism shall have power and operational characteristics sufficient to perform all load lifting and lowering functions required in crane service when operated under recommended conditions.

An integrally mounted holding device (such as a load check valve) shall be incorporated with load hoist hydraulic cylinder(s) to prevent uncontrolled lowering of the load in the event of a hydraulic system failure (e.g., supply hose rupture).

Where brakes and clutches are used to control the motion of the load hoist drums, they shall be of a size and thermal capacity sufficient to control all rated crane loads with minimum recommended reeving. (Where maximum rated loads are being lowered with near maximum boom length, or operations involving long lowering distances, power controlled lowering is recommended to reduce demand on the load brake). Brakes and clutches shall be provided with adjustments where necessary to compensate for lining wear and to maintain force in springs, where used. Free fall lowering shall not be utilized where prohibited by national legislation.

Where free fall is provided A a means controllable from the operator's station shall be provided to hold the drum from rotating in the lowering direction and be capable of holding the rated load without further action by the crane operator. A means of positive free fall control shall be provided to ensure inadvertent disengagement of the lockout is not possible. Foot operated brakes having a continuous mechanical linkage between the actuating and braking means, capable of transmitting full braking force and equipped with a positive mechanical means to hold the linkage in the applied position meet this requirement.

Load hoist drums shall have wire rope capacity with the recommended wire rope size and reeving sufficient to perform crane service within the range of boom lengths, operating radii and vertical lifts specified by the crane manufacturer.

No less than two full wraps of wire rope shall remain on the drum when the hook block is in the extreme low position.

The wire rope shall be anchored to the drum by an arrangement specified by the winch manufacturer.

The drum flange shall extend a minimum of 1-1/2 times the wire rope diameter over the top layer of the wire rope at all times when performing lifting operations.

The load hoist drums shall provide a first layer <u>wire</u> rope pitch diameter in accordance with ISO 8087.

Drum rotation indicators should be provided and located to afford sensing by the operator.

Load hoist brakes when power operated, having no continuous mechanical linkage between the actuating and braking means are used for controlling loads, an automatic means shall be provided to set the brake to prevent the load from falling in the event of loss of brake control power.

Load hoist brakes when foot operated, shall be constructed so that the operator's feet, when in the proper position, will not slip off and a means shall be provided for holding the brakes in the applied position without further action by the crane operator.

Power controlled lowering systems shall be capable of handling rated loads and speeds as specified by the manufacturer. Such a system is recommended to assist in precision lowering and to reduce the demand on the load brake.

https://standards/iteh.a/catalog/standards/sist/ae759ff2-a8f1-4ace-bfa0-Sheaves used in multiple rope reeving shall have pitch diameters and grooves in accordance with ISO 8087:1995.

Winch classifications shall be in accordance with ISO 4301-2.

#### 5 Specific requirements for the boom telescoping mechanisms on mobile cranes.

Extension and retraction of boom sections may be accomplished through hydraulic, mechanical, electrical or manual means.

The powered retract function shall be capable of controlling any rated load which can be retracted.

An integrally mounted holding device (such as a load check valve) shall be provided with the telescopic cylinder(s) to prevent uncontrolled retraction of the boom in the event of a hydraulic system failure (e.g., supply hose rupture).

#### 6 Specific requirements for swing mechanisms on mobile cranes.

Swing bearing mounting. The structural mounting support for the bearing shall be of adequate strength and stiffness, as well as flat and smooth. The bearing shall also be adequately secured to take account of tension and shear (axial, radial and tangential) forces.

Swing control. The swing mechanism shall start and stop with controlled acceleration and deceleration.

Swing braking means and locking device. A braking means with holding power in both directions shall be provided to restrict the movement of the rotating superstructure, when desired during normal operation. The braking means shall be capable of being applied in the holding position and remaining so without further action by the operator.

A Swing locking pawl or other device, such as a boom support shall be provided to prevent the boom and superstructure from rotating when in transit. It shall be designed to prevent inadvertent engagement or disengagement.

#### 7 Crane Travel requirements

#### 7.1 Travel controls

On all crane types with a single control station, the controls for the travel function shall be located at the operator's station, tandards.iteh.ai)

On all wheel-mounted multiple control station cranes, the travel controls shall be located in the carrier cabin. Auxiliary travel controls may also be provided in the crane cab. If there is an operator in the crane cabin when the crane is traveling, appropriate means of communication (e.g. audible signals) shall be provided between the cabins.

#### 7.2Travel mechanism

On a crawler cranes, the travel and steering mechanism shall be arranged so that it is not possible for both crawlers to freewheel without operator control. Control shall be effected from the operator's position on the rotating upper structure.

For mobile cranes adapted for railway use, when the travel mechanism must be temporarily deactivated in the normal course of the requirements of the user, provision shall be made to disengage the travel mechanism from the cabin or outside the crane body.

#### 7.3 Travel brakes and locks

On crawler cranes, brakes or other locking means shall be provided to hold the machine stationary during working cycles on a level grade or while the machine is standing on the maximum gradient recommended for travel. Such brakes or locks shall be arranged to remain in engagement in the event of loss of operating pressure or power.