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Cranes — Access, guards and restraints — Part 5: Bridge and gantry cranes

Appareils de levage à charge suspendue — Moyens d'accès, dispositifs de protection et de retenue —

Partie 5: Ponts roulants et portiques



Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 11660 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11660-5 was prepared by Technical Committee ISO/TC 96, *Cranes*, Subcommittee SC 9, *Bridge and gantry cranes*.

ISO 11660 consists of the following parts, under the general title *Cranes — Access, guards and restraints*:

- *Part 1: General*
- *Part 2: Mobile cranes*
- *Part 3: Tower cranes*
- *Part 4: Jib cranes*
- *Part 5: Bridge and gantry cranes*

Cranes — Access, guards and restraints —

Part 5: Bridge and gantry cranes

1 Scope

This part of ISO 11660 establishes the particular requirements relating to the access, guards and restraints for bridge and gantry cranes as defined in ISO 4306-1 and gives criteria for the selection of the appropriate equipment under the various conditions of use expected of the crane.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 11660. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 11660 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 11660-1:1999, *Cranes — Access, guards and restraints — Part 1: General*.

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

3 Access

3.1 General

This clause deals with the operational access to bridge and gantry cranes mounted on elevated or ground runways, and with the requirements for access for the regular and emergency maintenance and repair of such cranes.

3.2 Bridge cranes in buildings or on elevated runways

3.2.1 Access to crane-access landing

Bridge and gantry cranes which are intended to have a permanent driver in the control cabs shall permit access from a permanent landing which has been fastened to the crane supporting structure.

The recommended means of access given in Table 1 shall be in accordance with the forms and dimensions given in Table 4 of ISO 11660-1:1999.

Table 1 — Recommended means of access

Height of crane access above floor level m	Recommended means of access
1 to 15	Stairs Inclined ladders Vertical ladders
15 to 25	Stairs
> 25	Powered access Stairs

3.2.2 Access landing

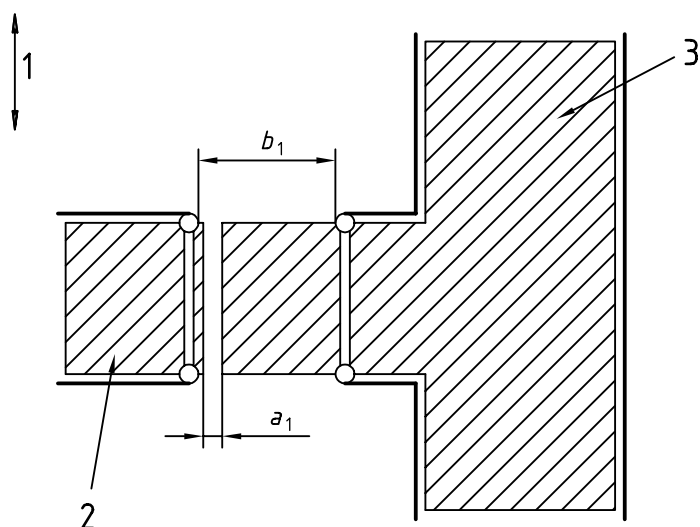
The normal access to the crane shall permit access or egress from an access landing. Access openings shall be protected by suitable self-closing means such as

- inward-opening doors or gates;
- sliding gates, vertical or horizontal;
- vertically pivoted rails.

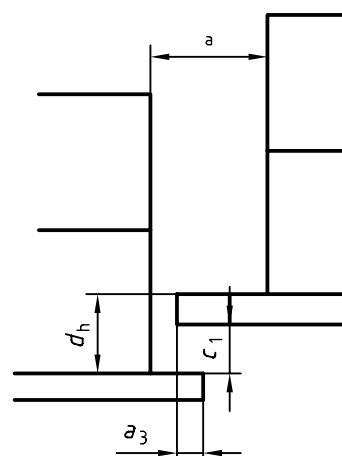
The access landing and the corresponding crane landing shall be within 10 mm of a common level or have a step of height between 180 mm and 250 mm.

Clearances in access landing shall be in accordance with Figure 1. If these clearances are not satisfied, other means shall be provided to address the shearing, crushing and falling hazards, e.g. interlocks.

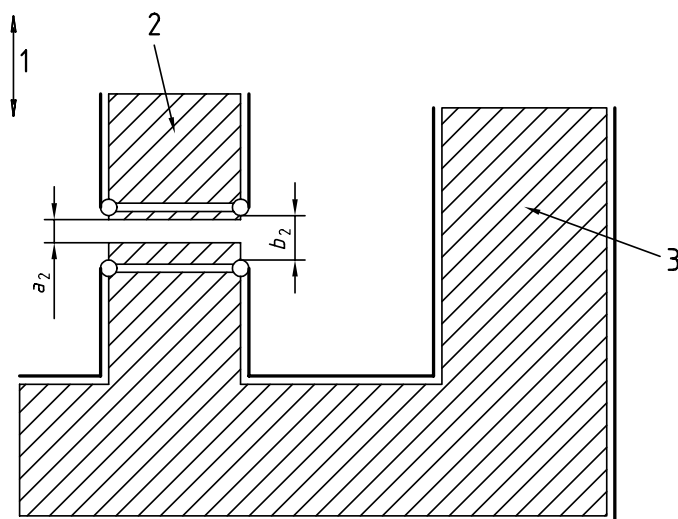
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a) Shearing condition ^a



c) Clearances in case of overlapping ^c



b) Crushing condition ^b

Key

- 1 Crane travel movement
- 2 Crane landing
- 3 Permanent landing
- a b_1 or b_2

^a Shearing condition:

- $50 \text{ mm} \leq a_1 \leq 100 \text{ mm}$
- $400 \text{ mm} \leq b_1 \leq 500 \text{ mm}$

^b Crushing condition:

- $150 \text{ mm} \leq a_2 \leq 250 \text{ mm}$
- $200 \text{ mm} \leq b_2 \leq 300 \text{ mm}$

^c Shearing and crushing conditions:

- $a_3 \leq 150 \text{ mm}$
- $c_1 \geq 150 \text{ mm}$
- $|d_h| < 10 \text{ mm}$ (without overlapping), or
- $180 \text{ mm} \leq |d_h| \leq 250 \text{ mm}$ (with overlapping)

Figure 1 — Clearances in access landing

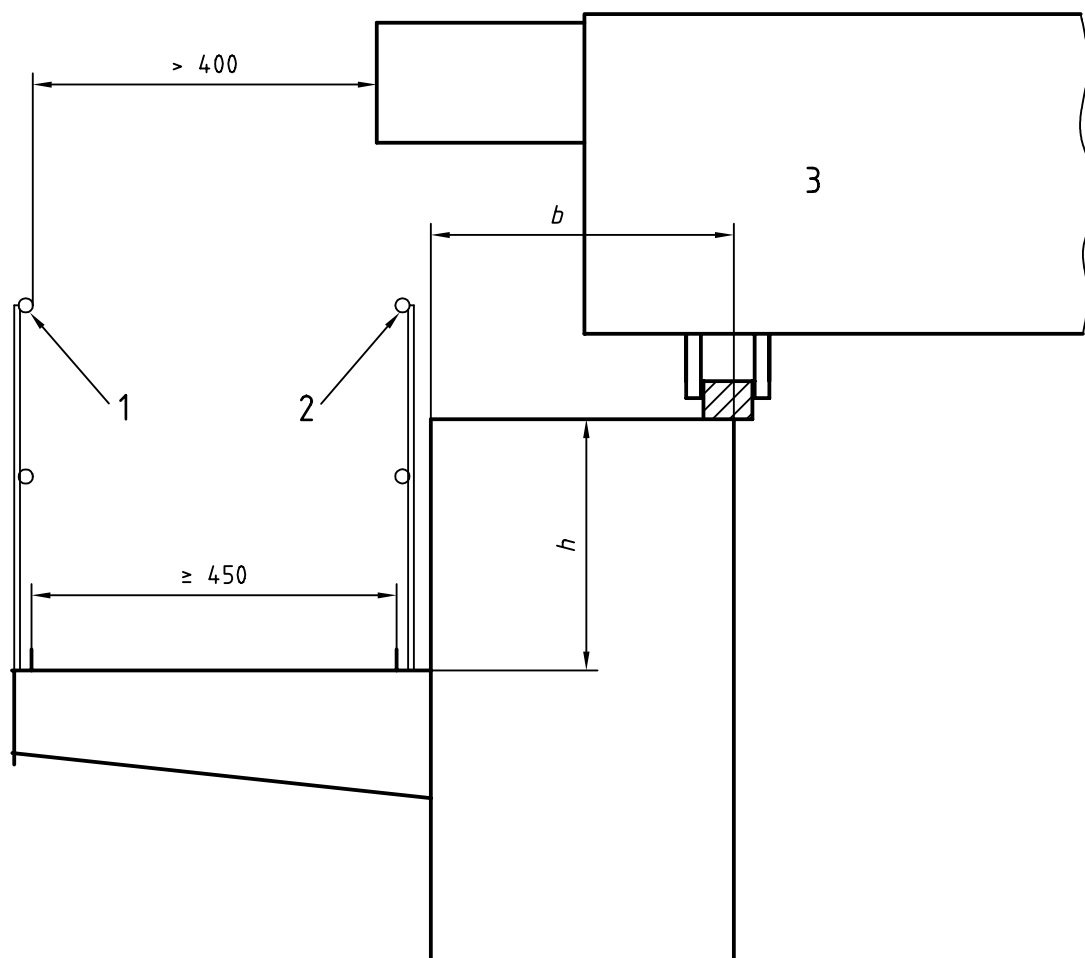
3.2.3 Alternative access over the crane

3.2.3.1 General

Access to the driver's cabin for driver or for maintenance personnel may be over crane structure. Any elevated walkways or platforms on the bridge, trolley or runway shall have handrails and toe boards in accordance with ISO 11660-1 on all exposed sides (see Figures 2 and 3). Where these clearances cannot be achieved, e.g. in existing buildings, alternative means of safety shall be provided to achieve safe access.

Access to the crane bridge and trolley may be by vertical ladders where stairs or steps are not practicable.

Dimensions in millimetres

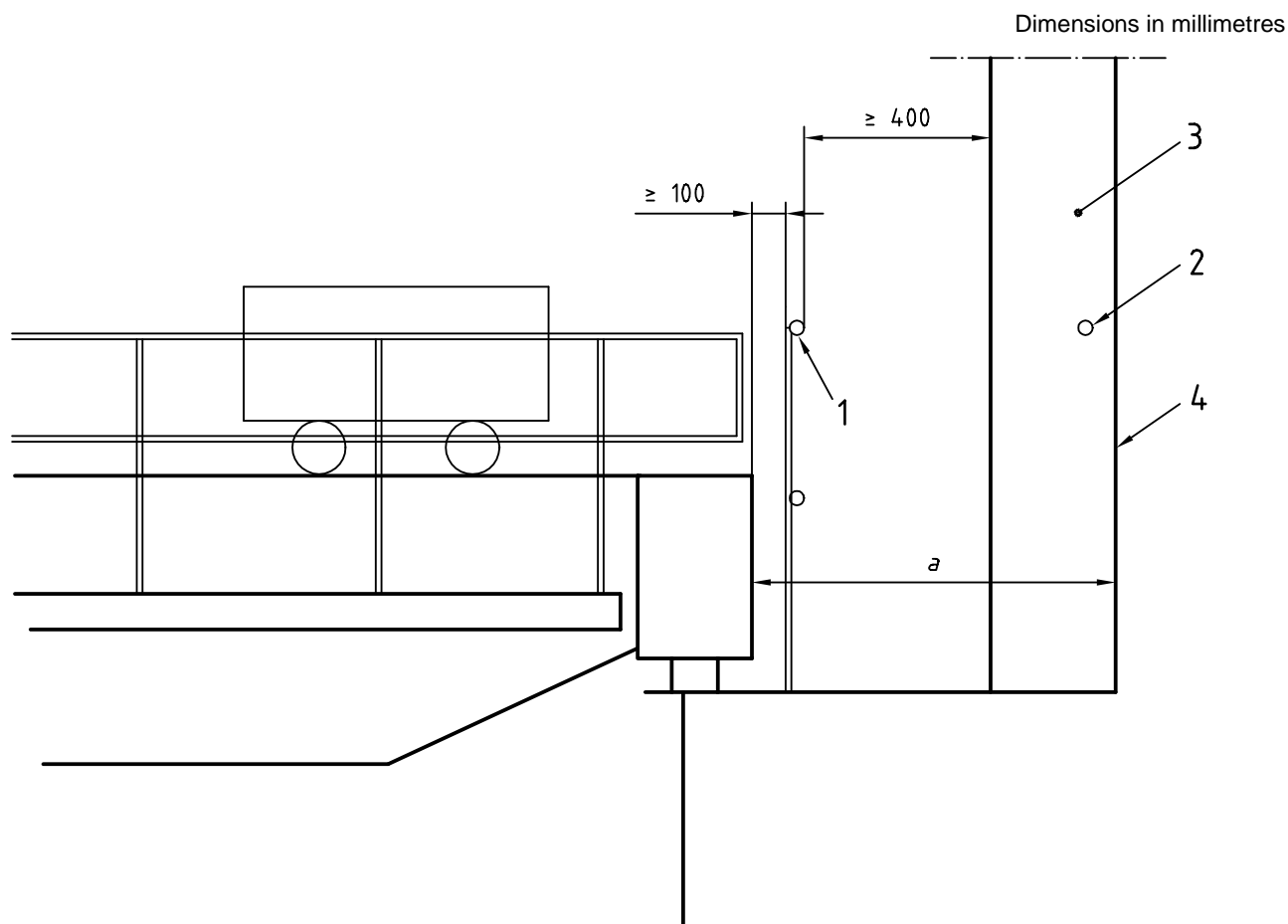


Key

- 1 Handrail A
- 2 Handrail B
- 3 Trolley

NOTE Handrail B may be omitted if $h + b \geq 1,25$ m or $h \geq 0,70$ m.

Figure 2 — Gangway on the bridge girder — Guarding conditions



Key

- 1 Handrail A
- 2 Handrail B
- 3 Column
- 4 Wall

NOTE 1 Handrail A may be omitted if $a \geq 600$; handrail B may be omitted if $a \geq 1000$ or handrail A is provided.

NOTE 2 With a distance of ≥ 100 mm and < 500 mm from railing to powered components, two horizontal intermediate bars in the permanent-landing railings are a safe solution in order to avoid feet reaching into hazardous area. In addition, this division of the railing height into thirds facilitates climbing over in the direction of the crane, in locations where no openings are provided in the railing, in order to avoid crushing hazards.

Figure 3 — Gangway on the runway — Guarding conditions

3.2.3.2 Access control

Access to all cranes shall require the permission of the driver.

When the factors listed below reduce the driver's accessibility, the user/supplier shall consider the use of a "Permit to Board" system.

A "Permit to Board" system shall inform the driver of the request to board, who gives permission to board to the person requesting access. This may be performed by a system of push-buttons and indicating lamps or by an acoustic intercommunication system.

Factors which influence the selection of the system are

- speed of travel,
- visibility of the access point from the driver's position,
- ambient conditions, visibility, noise levels, etc.

3.3 Access to gantry cranes

The access to ground-running gantry cranes shall comply with the general principles outlined in 3.2 above. A major risk with ground-running cranes is the crushing or striking of pedestrians adjacent to the legs or bogies of the crane. The access stairways or ladders should be designed whenever possible to be within the swept path of the legs or bogies. If this is not possible, a ladder fixed to the crane, without hoop guard up to 3 m above floor level, is acceptable.

3.4 Access to trolley

When the driver's cab is attached to the trolley, the rules described in 3.1 to 3.3 for access to the crane bridge shall also be applied for access from bridge to trolley.

4 Access for crane maintenance

4.1 General

When determining the quality of the access, the following shall be considered:

- frequency of visits to the part, as foreseen by the manufacturer;
- time available for performing maintenance;
- time required to gain access to the maintenance point;
- time spent performing the service required at that point;
- dimensions of the components to be handled.

Fixed platforming and access to them by stairs and/or steps are the preferred means. However, mobile access equipment is an acceptable alternative means of obtaining access for maintenance.

When the crane structure is used for building maintenance purposes, this shall be considered when determining the clearances (see ISO 9374-5) and special work platforms shall be provided, if necessary.

4.2 Mobile access equipment

When the use of mobile access equipment is envisaged in the design, the orientation and the position of the equipment shall facilitate its use.

The following types of mobile access equipment are considered to be suitable:

- scaffold towers, or self-standing stair systems;
- powered elevating platforms or cages.

The use of portable ladders above 2 m in length to gain access to any crane is considered unsafe.

4.3 Use of partial platforms

The use of partial platforms that allow access to those specific areas of the crane on which maintenance and repair are most likely to occur, is a recommended alternative to the systems described in 4.2. These platforms can be accessed by mobile access equipment or from the crane gantry or the crane beams themselves.

If the access is from the runway, a continuous handrail and steps or ladder shall be provided from the runway access to the partial platform. Partial platforms shall be equipped with handrail systems on all exposed sides. When the crane structure itself provides a restraint equivalent to that shown in Figure 2, the handrail adjacent to the structure may be omitted.

5 Headroom

5.1 Roof clearances

The roof clearance is defined as the minimum distance from the highest point of the crane to the roof.

In all cases the roof clearance shall be taken into account in order to prevent interferences between the crane and the building. Deformations of the roof underside caused by snow shall also be taken into account.

The roof clearance shall be at least 400 mm in the case of interrupted roof surface (trusses) when the crane is provided with fixed access means and platforms.

5.2 Driver clearance

The minimum headroom on the normal access route to the driver's control station shall be 2,0 m.

5.3 Maintenance personnel clearance

The minimum headroom on the route and at the maintenance platform shall be 1,8 m, with a permitted reduction to 1,4 m over a distance not exceeding 1,0 m. Where the minimum headroom is reduced, it shall be suitably marked.

6 Emergency egress

In cases where there is no permanent access to the cabin in all positions of the crane and trolley, provisions shall be made to provide a suitable alternative means of egress to allow for escape from the cabin in the event of breakdown of the crane or other urgent need for escape. The devices given in Table 2 are considered to be suitable when at least 25 % of the floor area swept by the crane is free of machines or goods, and when the goods being handled do not involve dangerous, e.g. hot ($> 100\text{ }^{\circ}\text{C}$), toxic or corrosive, materials.

In cases where the above conditions are not met, a permanent access shall be arranged to/from the cabin in all positions of the crane and trolley.

Table 2 — Acceptable devices for emergency egress

Height from the ground to the floor of the cabin or adjacent platform m	Device
1 to 5	Rope ladder, knotted rope or rope with safe-lock
1 to 10	Telescopic or folding ladder
1 to 15	Inertia reel and harness

7 Guarding

7.1 Electrical guarding

The electrical equipment on bridge and gantry cranes shall comply with the appropriate clauses of IEC 60204-32.

7.2 Mechanical guarding

In addition to the requirements in ISO 11660-1, the following requirements are applicable to bridge and gantry cranes.

- a) For cranes travelling on rails on the floor or ground level, the end carriages or the foremost bogies in both directions shall be equipped with rail sweepers;
- b) open gears, chain drives and similar power transmissions in permanent access zones shall be guarded;
- c) in the event of bearing failure, the guide rollers shall be guarded to prevent falling.

Bibliography

- [1] ISO 4306-1, *Cranes — Vocabulary — Part 1: General*.
- [2] ISO 9374-5:1991, *Cranes — Information to be provided — Part 5: Overhead travelling cranes and portal bridge cranes*.

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