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Third edition
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Commercial vehicles — Location of electrical and pneumatic connections between towing vehicles and trailers

Véhicules utilitaires — Emplacement des connexions électriques et pneumatiques entre véhicules tracteurs et véhicules remorqués

Reference number
ISO 4009:2000(E)

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

International Standard ISO 4009 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 15, *Interchangeability of components of commercial vehicles and buses*.

This third edition cancels and replaces the second edition (ISO 4009:1989), which has been technically revised.

Introduction

There were a number of reasons for this revision.

Both transport-industry trade unions and operators had been critical of the arrangement of the electrical and pneumatic connections on the rear cross-members of towing-vehicle chassis according to ISO 4009:1989, reporting an incidence of hand injuries and damage to supply lines and coupling heads.

Until now, no standard specified the arrangement of electrical connections on semi-trailers (ISO 1728, for example, relates only to pneumatic connections), nor of electrical and pneumatic connections for close-coupled vehicles.

It had become necessary to revise requirements of ISO 1728 in order to obviate the deleterious effects that walkways on the tractor have had on flexible connecting lines.

This International Standard now covers the use of 15-pin electrical plug connectors and the quick pneumatic coupling.

Commercial vehicles — Location of electrical and pneumatic connections between towing vehicles and trailers

1 Scope

This International Standard specifies the locations of coupling devices for electrical and pneumatic connections between towing and towed commercial road vehicles. It is applicable to heavy vehicles equipped with pneumatic braking systems and 24 V electrical equipment of the following types: drawbar-trailer combinations whose towing vehicles have rear-mounted couplings or couplings mounted forward and below, and articulated vehicles.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 1185, *Road vehicles — Electrical connections between towing and towed vehicles with 24 V systems — 7 pole connector type 24 N (normal).*

ISO 1726, *Road vehicles — Mechanical coupling between tractors and semi-trailers — Interchangeability.*

ISO 1728, *Road vehicles — Pneumatic braking connections between motor vehicles and towed vehicles — Interchangeability*.

ISO 3731, *Road vehicles — Electrical connections between towing and towed vehicles with 24 V systems — 7 pole connector type 24 S (supplementary).*

ISO 7638-1, *Road vehicles — Electrical connectors for braking systems — Part 1: Connectors for 24 V nominal supply voltage.*

ISO 11406, *Commercial road vehicles — Mechanical coupling between towing vehicles with rear-mounted coupling and drawbar trailers — Interchangeability.*

ISO 11407, *Commercial road vehicles — Mechanical coupling between towing vehicles with coupling mounted forward and below, and centre-axle trailers — Interchangeability*.

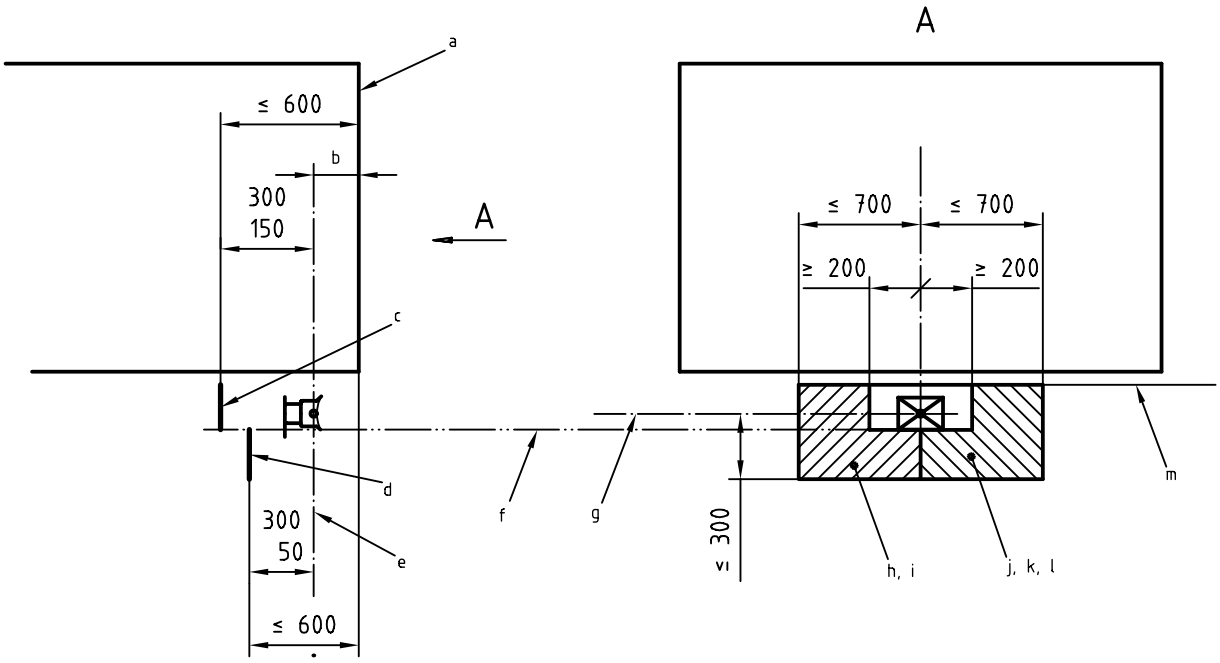
ISO 12098, *Commercial vehicles with 24 V systems — 15-pole connectors between towing vehicles and trailers — Dimensions and contact allocation*.

3 Requirements

3.1 Connection locations

The locations for electrical and pneumatic connections shall be in accordance with Figure 1 and Figure 2 for towing vehicles with rear-mounted couplings, Figure 3 for towing vehicles with couplings mounted forward and below, and Figure 4 for articulated vehicles. Selection of the respective locations shall be made such that the connectors are completely within the areas, or zones, specified in the corresponding figure or figures. Clearance dimensions shall be in accordance with 3.3.

Dimensions in millimetres



Within the shaded area, connections should be located as far outwards as possible. For ergonomic reasons, the connections should be able to be operated while standing on one side only of the drawbar. As alternatives to mounting the connections left and right of the vehicle's longitudinal axis, they may be mounted only on the left side of the reference plane for left-hand drive vehicles, or only on the right side for right-hand drive vehicles.

a Body rear edge.

b See ISO 11406.

c Upper mounting surface.

d Lower mounting surface.

e Trailer coupling vertical centre line.

f Trailer coupling lower edge.

g Trailer coupling horizontal centre line.

h Control line (ISO 1728 or alternative quick coupling head).

i 7-pin N/15-pin (ISO 1185, ISO 12098 or alternative connectors).

j Supply line (see ISO 1728).

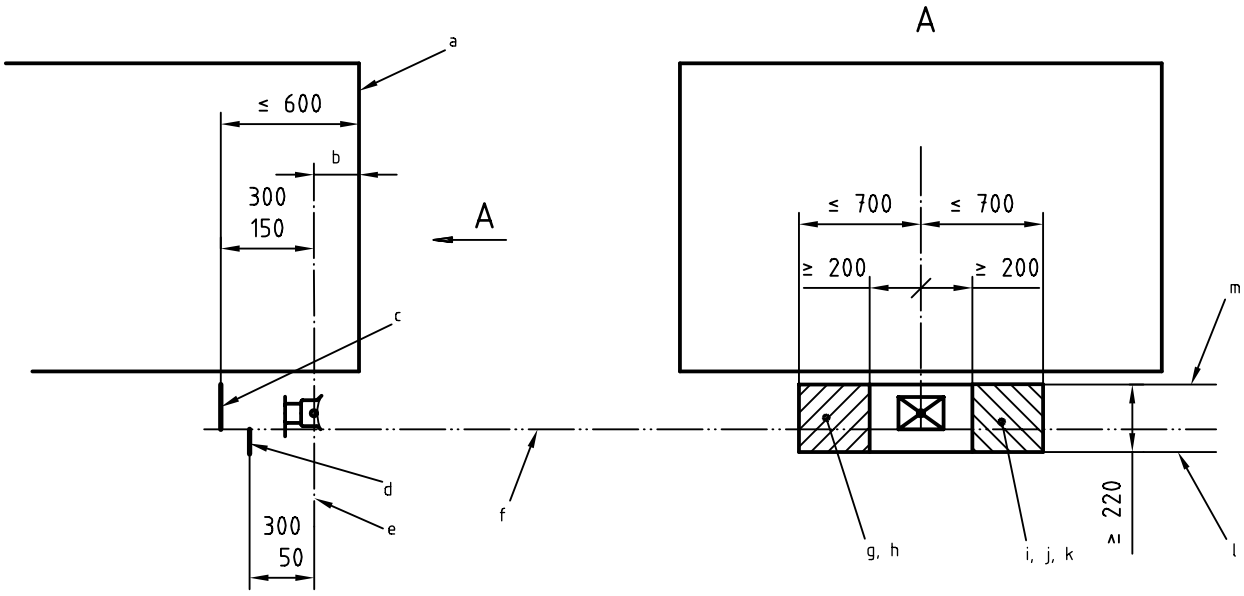
k 7-pin S (ISO 3731).

l ABS (see ISO 7638-1)

m Reference line, top of chassis.

Figure 1 — Towing vehicles with rear-mounted coupling (type A location zones)

Dimensions in millimetres



Within the shaded area, connections should be located as far outwards as possible. For ergonomic reasons, the connections should be able to be operated while standing on one side only of the drawbar. As alternatives to mounting the connections left and right of the vehicle's longitudinal axis, they may be mounted on the left side only of the reference plane for left-hand drive vehicles, or on the right side only for right-hand drive vehicles.

NOTE Type B is a necessary alternative to type A (Figure 1) for the case where there is an additional installation according to type C (Figure 3).

a Body rear edge.

b See ISO 11406.

c Upper mounting surface.

d Lower mounting surface.

e Trailer coupling vertical centre line.

f Trailer coupling lower edge.

g Control line (ISO 1728 or alternative quick coupling head).

h 7-pin N/15-pin (ISO 1185, ISO 12098 or alternative connectors).

i Supply line (see ISO 1728).

j 7-pin S (ISO 3731).

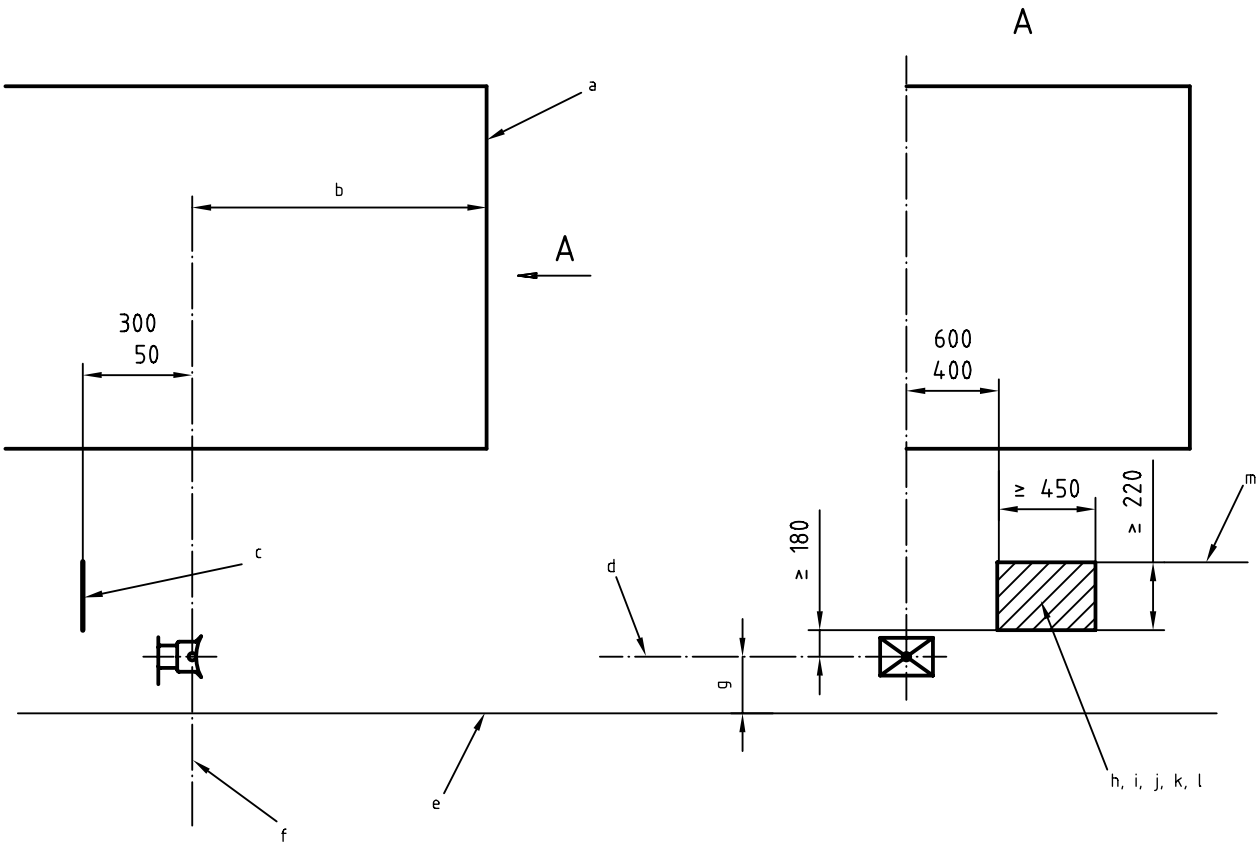
k ABS (see ISO 7638-1).

l Reference line: lower edge of coupling or of chassis frame, whichever is lower.

m Top of chassis: The mounting limit may exceed the top-of-chassis limit if 220 mm minimum is not feasible.

Figure 2 — Towing vehicles with rear-mounted coupling (type B location zones)

Dimensions in millimetres



Type B location zones may be additionally provided if the towing vehicle is equipped with an additional coupling on the rear cross-member. The arrangement of all connections shall be in the travel direction on the right-hand side for vehicles designed for right-hand traffic countries and on the left-hand side for those designed for left-hand traffic countries.

a Body rear edge.

b See ISO 11407.

c Mounting surface.

d Trailer coupling horizontal centre line.

e Road level.

f Trailer coupling vertical centre line.

g Laden, see ISO 11407.

h Control line (ISO 1728 or alternative quick coupling head).

i Supply line (see ISO 1728).

j ABS (see ISO 7638-1).

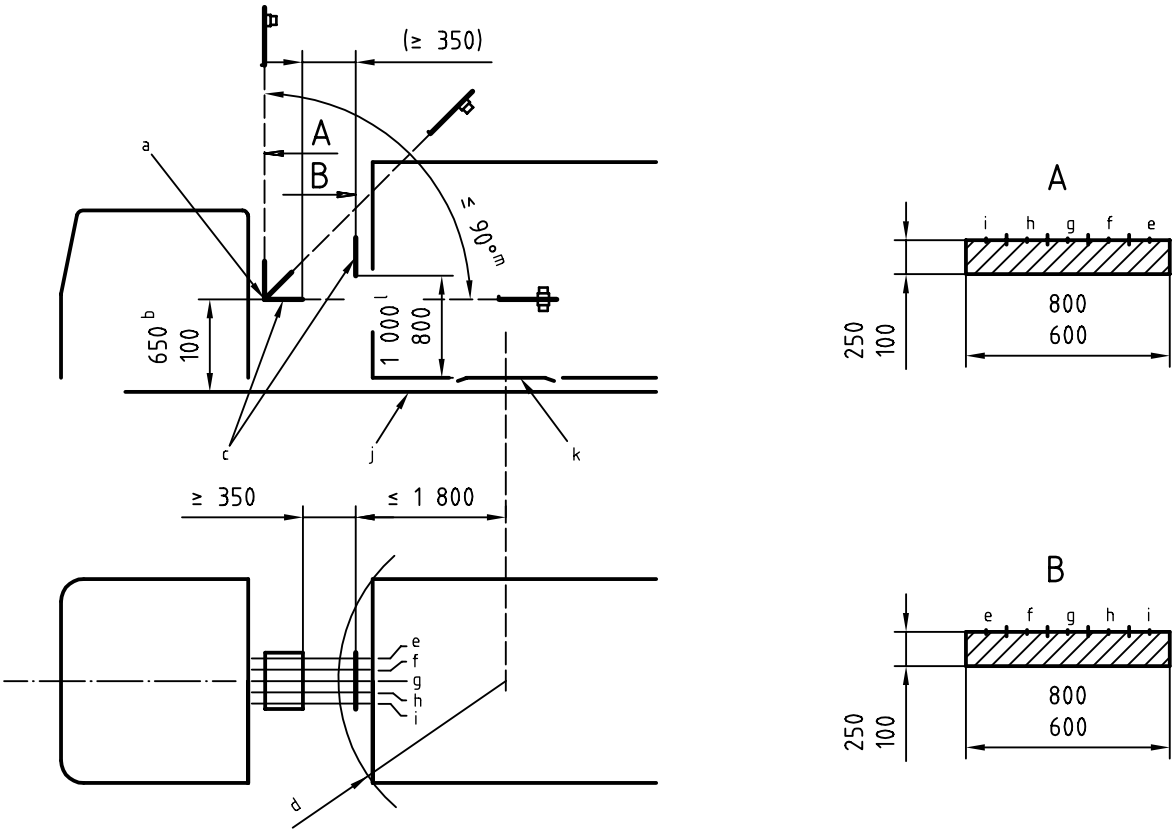
k 7-pin N/15-pin (ISO 1185, ISO 12098 or alternative connectors).

l 7-pin S (ISO 3731).

m Top of chassis: The mounting limit may exceed the top-of-chassis limit if 220 mm minimum is not feasible.

Figure 3 — Towing vehicles with coupling mounted forward and below (type C location zones)

Dimensions in millimetres



a Centre of rotation.

b When connections are mounted lower than 450 mm, the sockets and plugs shall be oriented upwards. Moreover, if dimensions 100 mm to 650 mm are not fulfilled, the designer shall ensure that in operation the coiled pipes and contacts do not come in contact with sharp edges of the vehicle structure (a typical solution is the use of a fixture mounted in front of the wall of the trailer).

c Mounting surfaces.

d See ISO 1726.

e Supply line (see ISO 1728)

f ABS (see ISO 7638-1).

g 7-pin S (ISO 3731).

h 7-pin N/15-pin (ISO 1185, ISO 12098 or alternative connectors).

i Control line (ISO 1728 or alternative quick coupling head).

j Upper edge chassis frame (longitudinal/tractor).

k Upper edge of fifth wheel plate

l For dedicated semi-trailers without a suitable front-wall structure, such as container chassis and semi-trailers with a front refrigeration unit, the couplings may be mounted lower than 800 mm to 1000 mm. However, for safety reasons, mountings shall be as high as possible without risk of fouling the load.

m The arrangement area on the tractor may be turned 90° max. upwards from the horizontal.

Figure 4 — Articulated vehicles (type D location zones)

3.2 Connection dimensions

The types and dimensions of electrical and pneumatic connections should be in accordance with ISO 1185, ISO 1728, ISO 3731, ISO 7638-1 and ISO 12098.

3.3 Clearance space

The clearance dimensions to be provided around the connections to ensure safe handling shall be in accordance with Figures 5 and 6. If non-standardized connections are used, the specified clearance space shall address the safety considerations referred to in the introduction.

3.4 Flexible pipe connection

3.4.1 Locations

The flexible pipe connections (with coupling head at the end of the pipe) shall be integrated components of:

— the trailer, in the case of a drawbar-trailer combination;

— the tractor, in the case of an articulated vehicle.

3.4.2 Length

3.4.2.1 Towing vehicles with rear-mounted coupling

In the case of these drawbar-trailer combinations, the location and length of the pipes depends on the location of the coupling heads and the fact that the maximum angle between the drawbar centre line and the longitudinal axis of the towing vehicle is 75° (see ISO 11406).

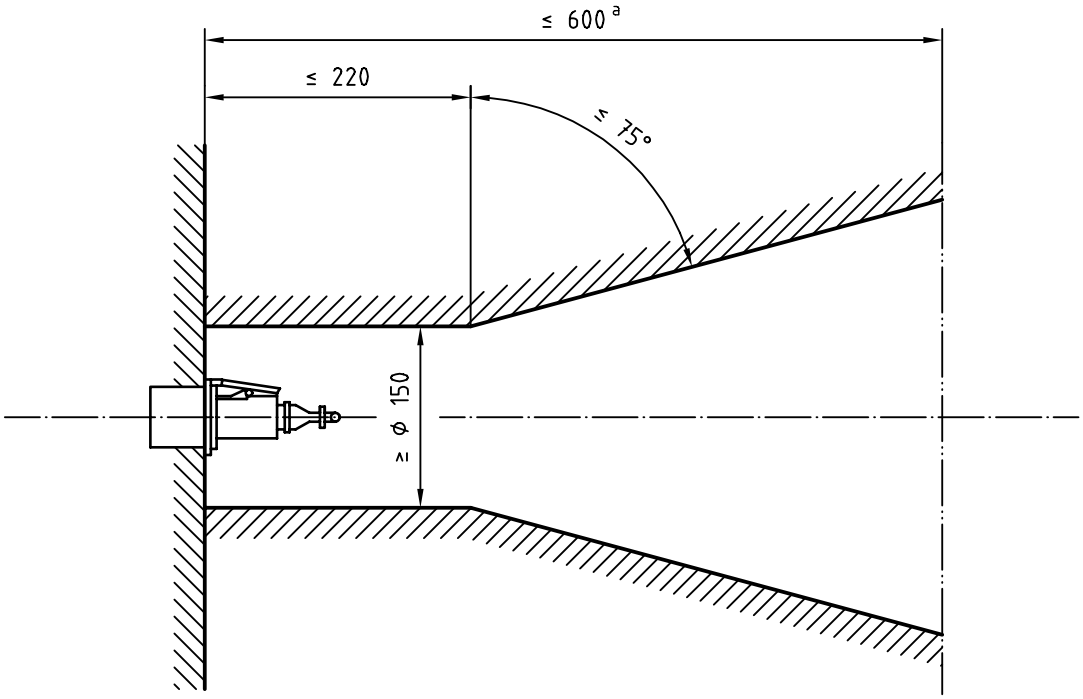
For angles of less than 60°, there shall be complete freedom of lateral movement, without tension on the pipes, and without the pipes rubbing against one another; for angles of from 60° to 75°, lateral movement shall be possible without causing deterioration of the pipes.

3.4.2.2 Towing vehicles with coupling mounted forward and below and articulated vehicles

In the case of these drawbar-trailer combinations and for that of articulated vehicles, the location and length of pipes depends on the location of the coupling heads and the fact that the maximum angle of articulation is 90° (see ISO 1726 and ISO 11407).

For angles within this range, lateral movement shall be possible without causing deterioration of the pipes.

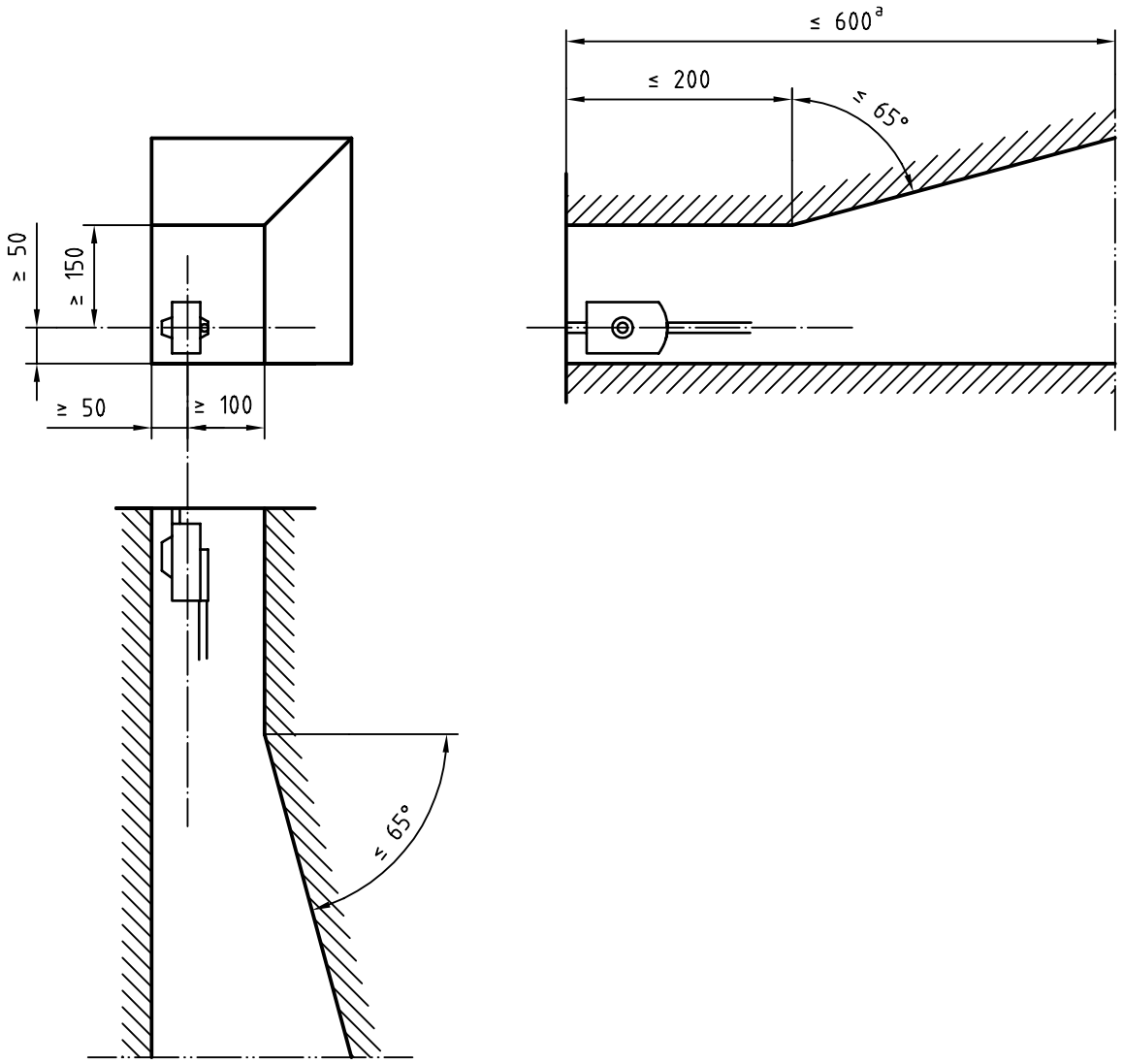
Dimensions in millimetres



a For types A, B and C.

Figure 5 — Clearance space for handling electrical connections

Dimensions in millimetres



a For types A, B and C.

Figure 6 — Clearance space for handling palm connections

ICS 43.040.10

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