BS EN 15432-1:2011

BSI Standards Publication

Winter and road service area maintenance equipments — Front-mounted equipments

Part 1: Fixed front mounting plates

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National foreword

This British Standard is the UK implementation of EN 15432-1:2011. Together with BS EN 15432-2, it supersedes BS EN 15432:2008 which will be withdrawn on publication of BS EN 15432-2.

The UK participation in its preparation was entrusted to Technical Committee B/513, Construction equipment and plant and site safety.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Matériels de viabilité hivernale et d'entretien des dépendances routières - Équipement frontal - Partie 1: Plaques de base avant fixes

Winterdienst- und Straßenbetriebsdienstausstattung - Frontanbauausstattungen - Teil 1: Feste Frontanbauplatten

This European Standard was approved by CEN on 3 June 2011.

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Foreword

This document (EN 15432-1:2011) has been prepared by Technical Committee CEN/TC 337 “Winter maintenance and road service area maintenance equipment”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2012 and conflicting national standards shall be withdrawn at the latest by January 2012.

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

This document together with EN 15432-2 supersedes EN 15432:2008.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements for the various elements of carrying vehicles to ensure interchangeability between a vehicle and different equipments that are to be mounted frontally. It specifies certain interchangeability dimensions of the front mounting plate, including its height above the ground, as well as the locations of coupling devices for electrical and hydraulic connections and for mechanical power take off (PTO).

This European Standard specifies three different classes of mounting plates in order to cover road vehicles, independently from vehicle category and maximum permissible load, of the greatest possible variety (commercial vehicles, multi-purpose vehicles, communal vehicles,…) which are capable of carrying front-mounted equipments for winter maintenance and for road service area maintenance.

This European Standard specifies, with regard to electrical and hydraulic connections and to PTO, only location areas, clearance spaces and preferred layout in order to ensure interchangeability. Requirements applying to connectors, coupling devices and PTO splines are given in EN 15431.

Normative Annex A specifies provisions for an advanced front coupling system that is able to allow for mounting and demounting equipments without the use of tools. Users having to address specific needs (e.g. extreme weather conditions) may require the vehicle be fitted with such automatic coupling system.

Normative Annex B gives provisions for a compact and light front mounting plate intended for combined road and off-road applications.

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.

EN 15431, *Winter and road service area maintenance equipments — Power system and related controls — Interchangeability and performance requirements*

ISO 1176:1990, *Road vehicles — Masses — Vocabulary and codes*.

3 Interchangeability requirements

3.1 Front mounting plate

3.1.1 General provisions

Mounting plates of all classes, as defined in following 3.1.2, shall be designed and installed to the carrying vehicle so as to allow for the easy and safe tilting of the cabin (if the vehicle has been designed to provide for this facility).

Mounting plates of all classes, as defined in following 3.1.2, shall be designed and installed to the carrying vehicle so as to allow for the mounting of a front towing hitch (if the vehicle has been designed to provide for this facility). Compliance to this requirement may be achieved in different ways, e.g. by a pivoting or folding mounting plate, by an appropriate un-obstructing design or by provisions for direct mounting of the hitch to the mounting plate itself.

Characteristics of the quick-coupling system designed to allow for mounting and demounting of equipments without the use of tools are given in Annex A.

Characteristics of the compact mounting plate designed for combined road and off-road applications are given in Annex B.

3.1.2 Mounting plate classes

Table 1 gives indication on installation heights and on recommended range of the maximum design total mass (ISO 1176:1990, 4.7, ISO-M07) of the carrying vehicle for each of the three classes of mounting plates that are defined in this European Standard.

Installation height is measured with the carrying vehicle being at kerb mass (ISO 1176:1990, 4.6, ISO-M06) from the ground to the upper edge of the mounting plate, as shown in Figures 2, 3 and 4.

Table 1 — Installation heights of mounting plate classes

Mounting plate class	Height mm	Recommended range of carrying vehicle maximum design total mass [a] t
F 1	1000 ± 60	≥ 7,5
F 2	870 ± 50	≥ 3,5 and ≤ 9
F 3	650 ± 30	≤ 6
[a] When mounting plates of classes F1 to F3 are being mounted on vehicles which are not covered by ISO 1176, recommended ranges as given in the table may not be applicable.		

3.1.3 Strength requirements

Mounting plates shall be designed so as to withstand to the maximum loads and moments that are given in Table 2 for each appropriate class. The values given in Table 2 refer to static loads and moments applied by the greatest variety of equipments (e.g. snow plough, grass cutting machine, …) that may be fixed on the mounting plate. Equipments apply static loads and moments when they are being held in a raised position for transportation and transfer purposes.

Table 2 — Maximum static loads

Mounting plate class	Vertical load, Fz kN	Bending moment, My kNm	Torsional moment, Mx kNm
F 1	22	22	45
F 2	12	12	18
F 3	5	5	5

Loads and moments given in Table 2 refer to the vehicle coordinate system as shown in Figure 1.

Mounting plates shall also be able to withstand to foreseeable dynamic forces which may arise when working with equipments having maximum static loads shown in Table 2.

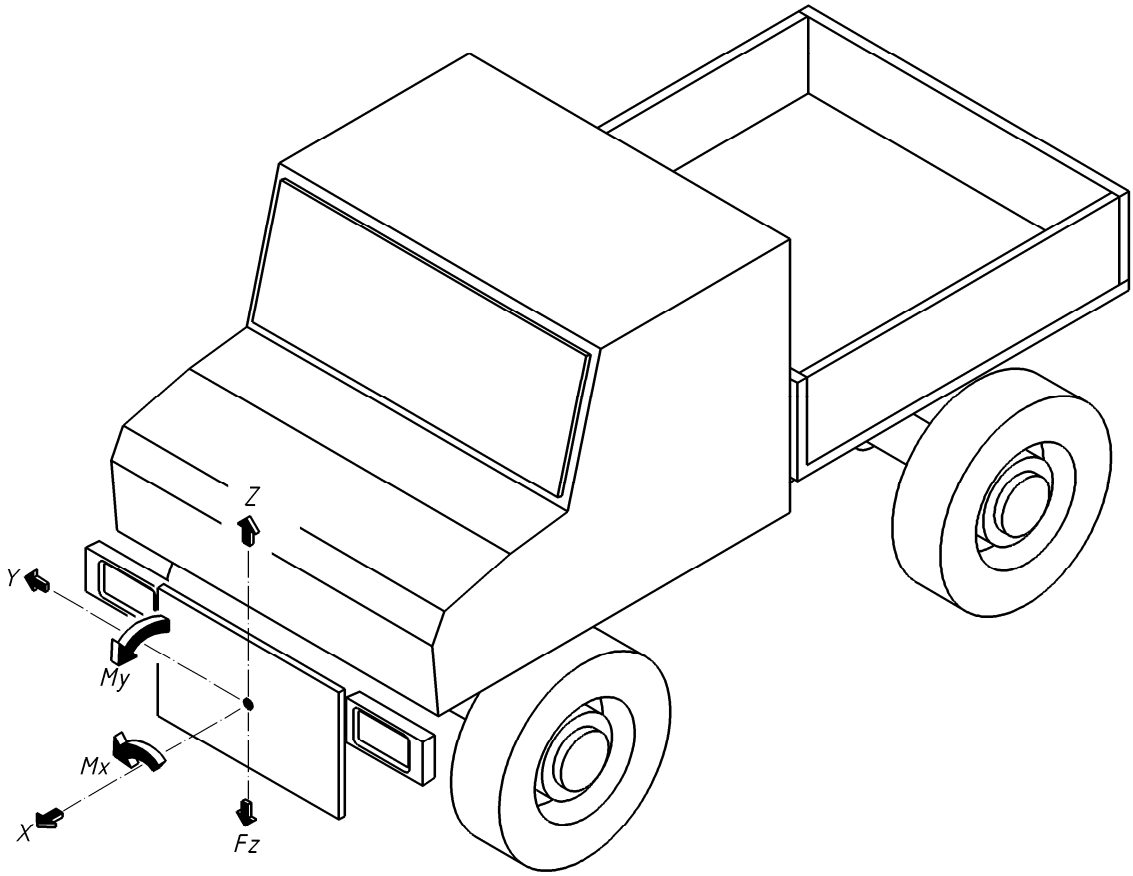


Figure 1 — Vehicle coordinate system

3.1.4 Designation

Mounting plates meeting the requirements of this European Standard shall be identified by the following information, in the order given:

a) reference to this European Standard;

b) indication of the mounting plate class.

EXAMPLE Mounting plate of class F 2: Mounting plate EN 15432-1:2011 F 2.

3.1.5 Interchangeability dimensions

Interchangeability dimensions of mounting plates shall be according to:

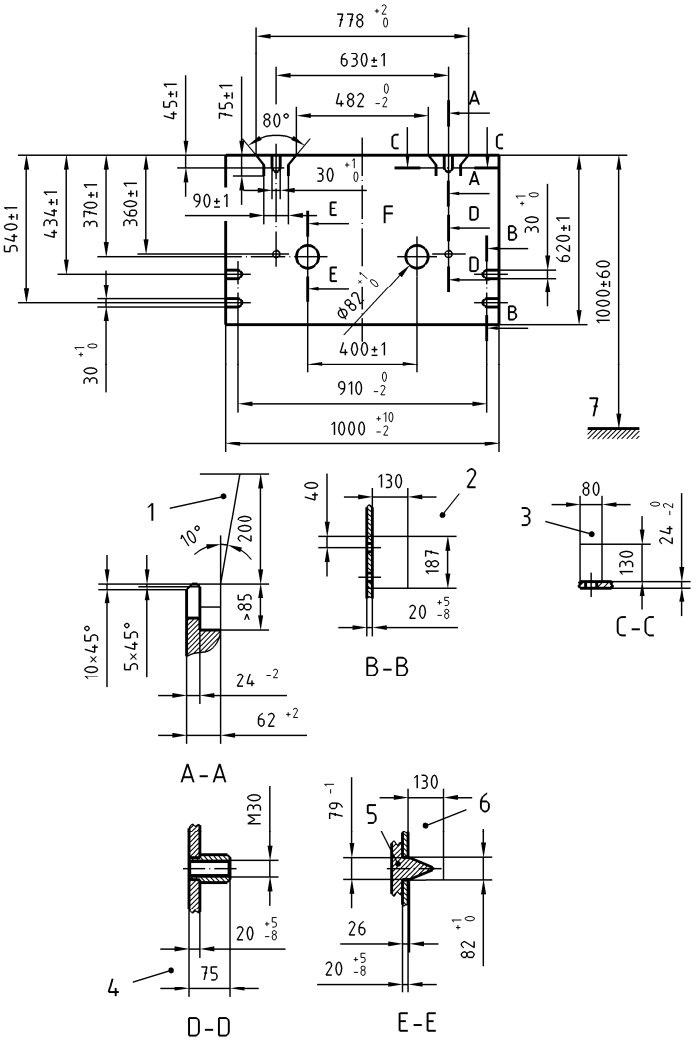
— Figure 2 for Class F 1 mounting plates;

— Figure 3 for Class F 2 mounting plates;

— Figure 4 for Class F 3 mounting plates.

Dimensions not specified in Figures 2, 3 and 4 are left to the discretion of the manufacturer.

Dimensions in millimetres



Option: Additional elements, which do not conflict with the characteristic dimensions, may be provided to couple infuse implements, using different fixing systems.

NOTE Additional cut-outs are allowed if the stiffness is not reduced thereby.

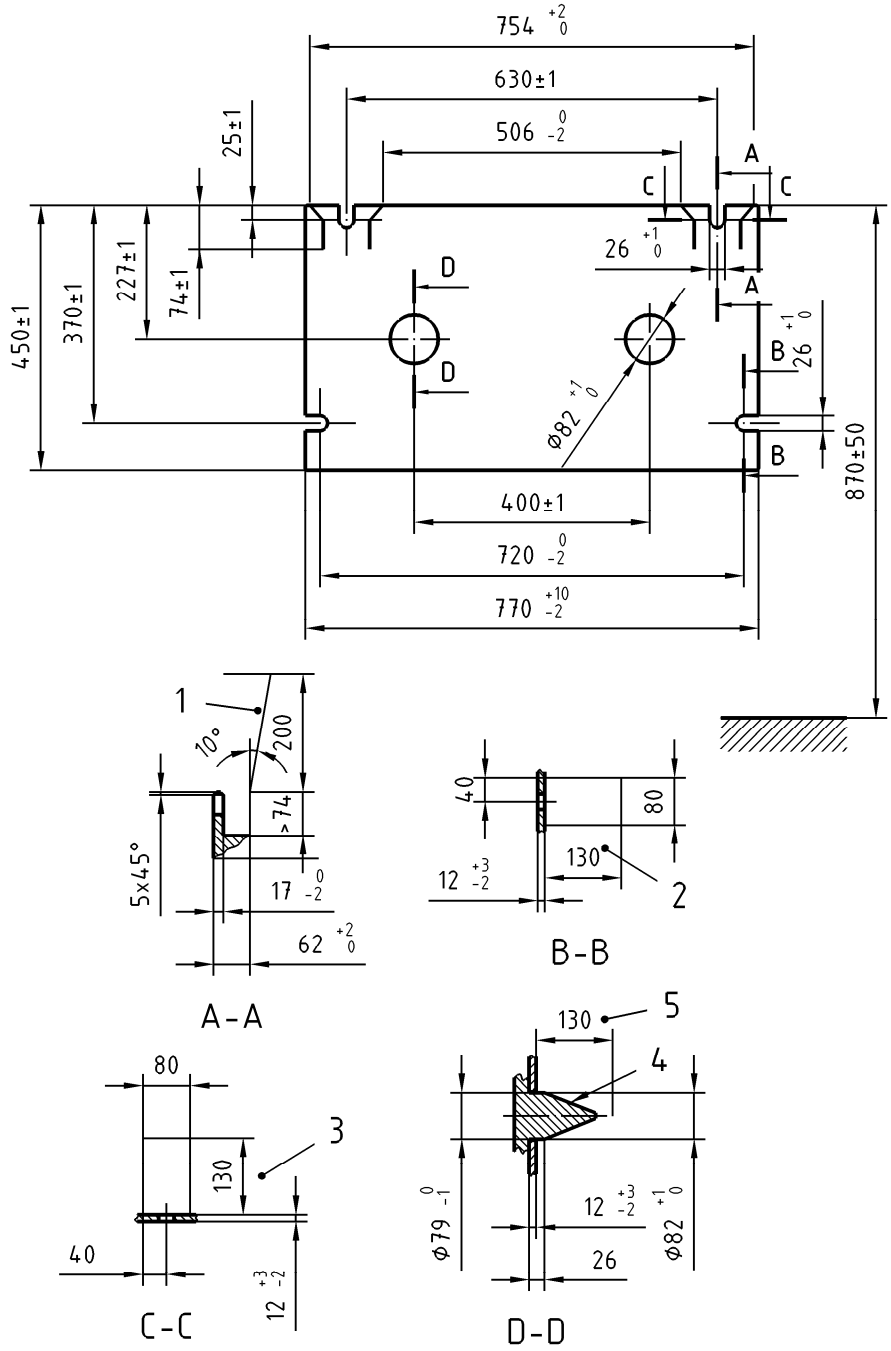
Figure 2 *(continued)*

Key

1 Clearance for claws
2 Clearance for swivel bolt
3 Clearance for swivel bolt
4 Clearance 75
5 Cone
6 Clearance 130
7 Ground level

Figure 2 — Dimensions for F 1 mounting plates

Dimensions in millimetres



NOTE Additional cut-outs are allowed if the stiffness is not reduced thereby.

Figure 3 — Dimensions for F 2 mounting plates

Dimensions in millimetres

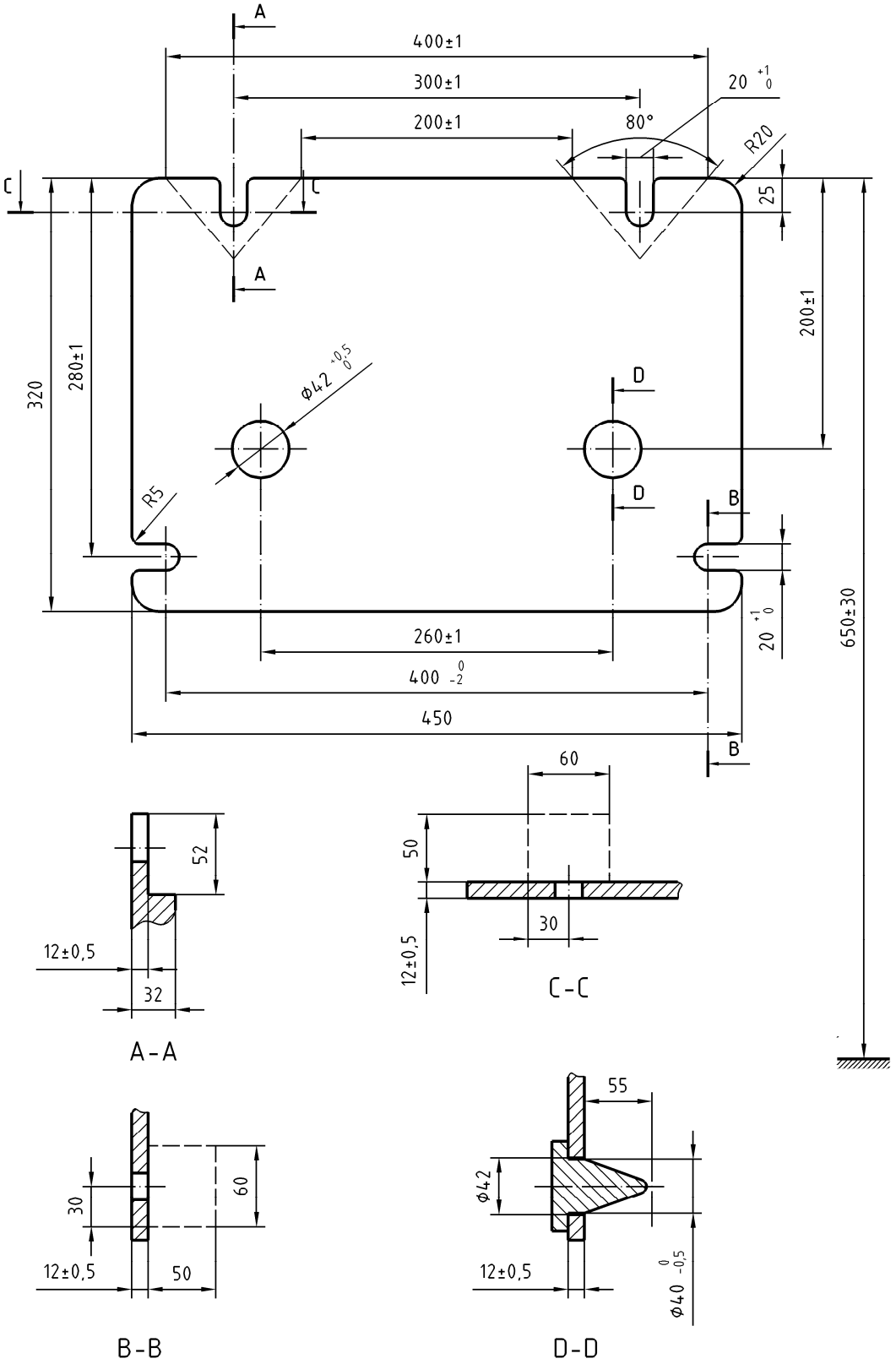


Figure 4 — Dimensions for F 3 mounting plates

3.1.6 Tool fixing systems

3.1.6.1 General

In order to ensure interchangeability with already in-use tools, mounting plates defined in this European Standard are designed in such a way as to allow for different fixing systems.

The choice of the most appropriate fixing system shall be left to the tool manufacturer and to the user.

The following subclauses give a description of all the fixing elements provided by each mounting plate class.

Additional fixing elements which do not conflict with the characteristic dimensions given in Figures 2, 3 and 4, i.e. which do not interfere with fixing elements listed in following 3.1.6.2, 3.1.6.3 and 3.1.6.4, may also be provided when there is a need of coupling in-use equipments having widespread fixing systems at national or regional level.

3.1.6.2 Class F 1 mounting plate

Class F 1 mounting plates provide for the following fixing elements:

— two pockets (centre to centre 630 mm ± 1 mm, section A-A in Figure 2) as a support for the relevant claws;

— two couples of lateral slots (∅ 30 mm + 1/-0 mm, centre to centre 910 mm + 0/-2 mm, section B-B in Figure 2) for the relevant swivelling bolts;

— a couple of upper slots (∅ 30 mm + 1/-0 mm, centre to centre 630 mm ± 1 mm, section C-C in Figure 2) for the relevant swivelling bolts;

— two threaded holes (M30, centre to centre 630 mm ± 1 mm, section D-D in Figure 2) for the relevant passing bolts;

— two holes (∅ 82 mm + 1/-0 mm, centre to centre 400 mm ± 1 mm, section E-E in Figure 2) for the relevant centring cones.

When using swivelling bolts, the use of appropriate washers is strongly recommended.

3.1.6.3 Class F 2 mounting plate

Class F 2 mounting plates provide for the following fixing elements:

— two pockets (centre to centre 630 mm ± 1 mm, section A-A in Figure 3) as a support for the relevant claws;

— a couple of lateral slots (∅ 26 mm + 1/-0 mm, centre to centre 720 mm + 0/-2 mm, section B-B in Figure 3) for the relevant swivelling bolts;

— a couple of upper slots (∅ 26 mm + 1/-0 mm, centre to centre 630 mm ± 1 mm, section C-C in Figure 3) for the relevant swivelling bolts;

— two holes (∅ 82 mm + 1/-0 mm, centre to centre 400 mm ± 1 mm, section D-D in Figure 3) for the relevant centring cones.

When using swivelling bolts, the use of appropriate washers is strongly recommended.

3.1.6.4 Class F 3 mounting plate

Class F 3 mounting plates provide for the following fixing elements:

— two pockets (centre to centre 300 mm ± 1 mm, section A-A in Figure 4) as a support for the relevant claws;

— a couple of lateral slots (∅ 20 mm + 1/-0 mm, centre to centre 400 mm + 0/-2 mm, section B-B in Figure 4) for the relevant swivelling bolts;

— a couple of upper slots (∅ 20 mm + 1/-0 mm, centre to centre 300 mm ± 1 mm, section C-C in Figure 4) for the relevant swivelling bolts;

— two holes (∅ 42 mm + 0,5/-0 mm, centre to centre 260 mm ± 1 mm, section D-D in Figure 4) for the relevant centring cones.

When using swivelling bolts, the use of appropriate washers is strongly recommended.

3.2 Electrical and hydraulic connections

Electrical connectors and hydraulic couplings for connecting the equipment to the vehicle shall be provided in the front of the vehicle as close as possible to the front mounting plate. Electrical and hydraulic connections on the vehicle can be oriented either forward (towards the front of the vehicle) or outward (towards the sides of the vehicle).

3.2.1 Location on the vehicle

The location for electrical and hydraulic connections, with respect to the front mounting plate, shall be in accordance with:

— Figure 5 and corresponding Table 3 for front-mounted connections (facing forward);

— Figure 6 and corresponding Table 4 for side-mounted connections (facing outward).

Selection of the respective locations shall be made such that connectors and coupling devices are completely within the volumes specified in Figures 5 and 6 and corresponding Tables 3 and 4.

Electrical and hydraulic connections for standard working lines shall be located within shaded area A. Hydraulic connections for additional working lines shall be located within shaded area B.

When electrical connectors or hydraulic couplings are located within area A or B, attention shall be paid so as to allow for the appropriate clearance (130 mm in Figures 2 and 3) for operating lateral swivelling bolts.

Dimensions in millimetres

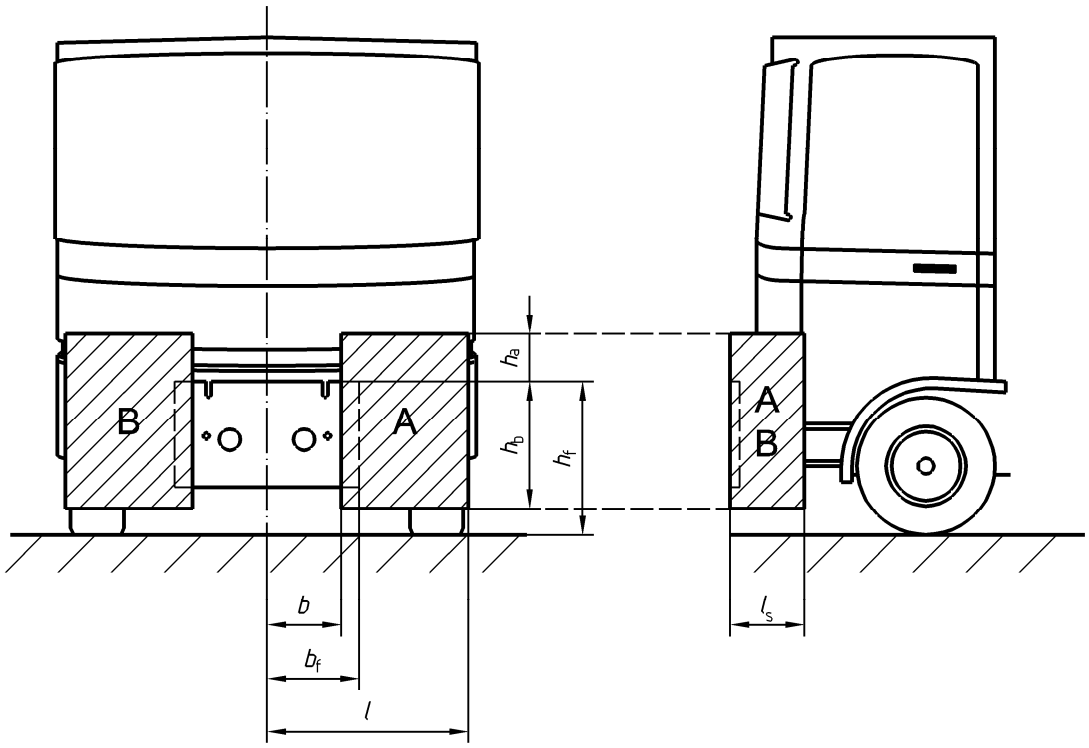
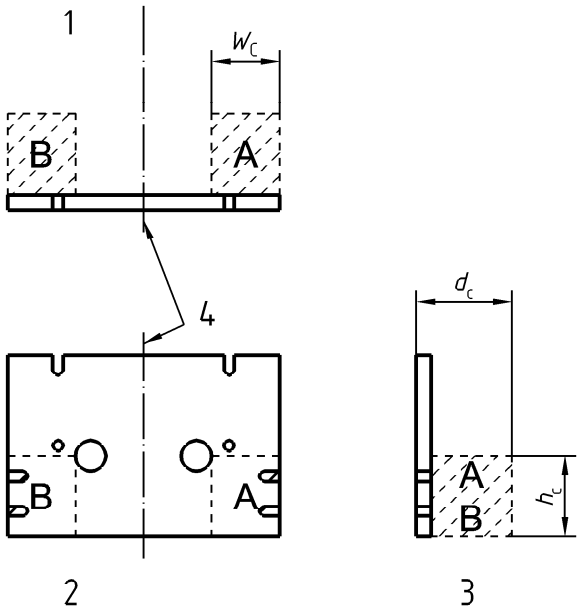


Figure 5 — Location volumes for electrical and hydraulic connections – Connectors facing forward

Table 3 — Dimensions of locating volumes – Connectors facing forward

Front Mounting Plate Type	h_f [mm]	b_f [mm]	b [mm]	h_a [mm]	h_b [mm]	l [mm]	l_s [mm]
F1	1 000 ± 60	500	400	310	720	1 000	400
F2	870 ± 50	385	300	310	620	1 000	400
F3	650 ± 30	225	200	150	450	600	200

Dimensions in millimetres



Key

1 Top view
2 Front view FMP
3 Lateral view left side
4 Longitudinal median plane of vehicle

Figure 6 — Location volumes for electrical and hydraulic connections — Connectors facing outward

Table 4 — Dimensions of locating volumes — Connectors facing outward

Front Mounting Plate Type	h_C [mm]	d_C [mm]	w_C [mm]
F1	200	300	200
F2	200	300	200
F3	200	300	200

3.2.2 Clearance space

The clearance space to be provided around the connections to ensure safe handling and easy operation shall be in accordance, respectively, with Figure 7 for electrical connectors and with Figure 8 for hydraulic coupling devices.

The minimum clearance space required for operating hydraulic couplings, as shown in Figure 8, does not exclude the opportunity of locating the couplings using typical layouts, e.g. as shown in the following Figure 9. In this case the minimum distance, centre to centre, between two couplings shall be 50 mm. When connecting couplings, operation will commonly proceed from left to right and from bottom to top (during demounting, on the contrary, operation will proceed from right to left and from top to bottom).

Dimensions in millimetres

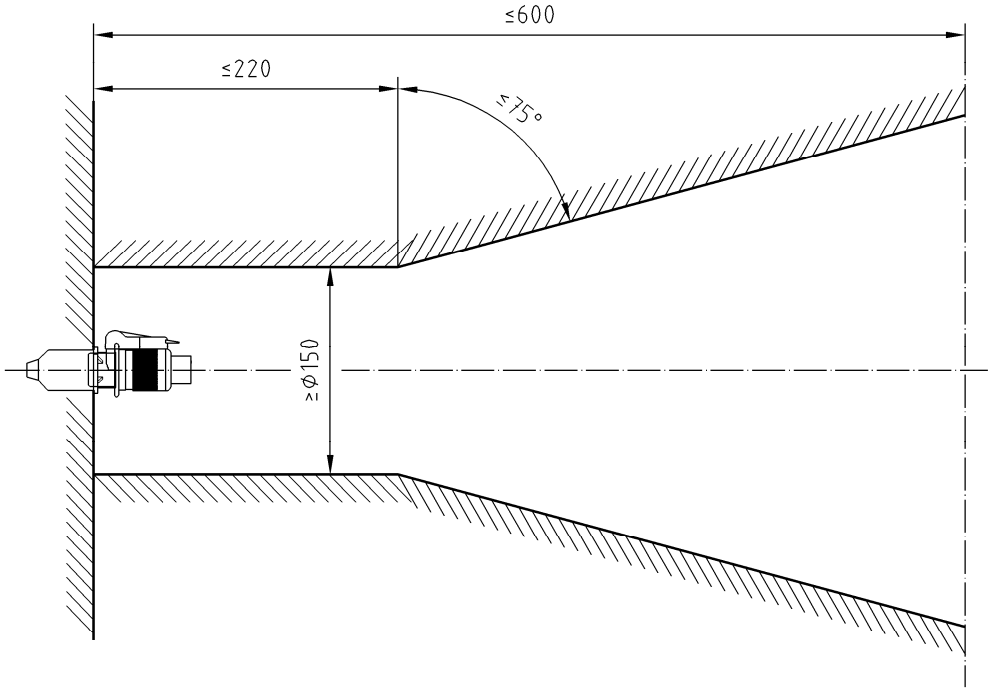


Figure 7 — Clearance space for handling electrical connections

Dimensions in millimetres

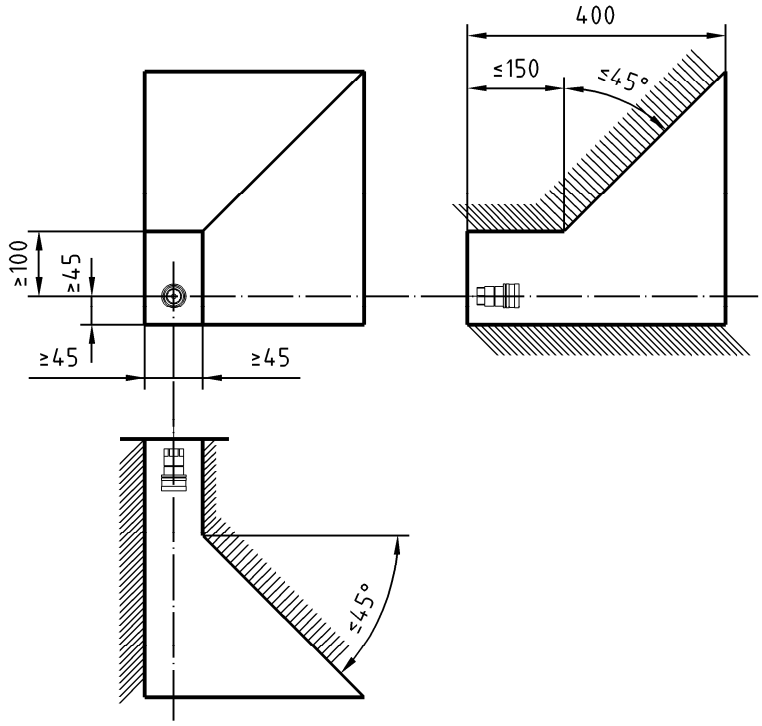


Figure 8 — Clearance space for handling hydraulic connections

3.2.3 Connection types

The types and dimensions of electrical connectors and of hydraulic coupling devices shall be in accordance with EN 15431.

3.2.4 Identification and preferred layout of hydraulic connections

Identification of, using appropriate symbols and colours, and assignment of functions to hydraulic connections shall be in accordance with EN 15431.

Connections for standard and additional working lines should preferably be located using a horizontal layout. Connections may also be split on two rows. In this case the numerical sequence should be kept from top to bottom. Figure 9 shows examples of preferred layouts for standard working lines.

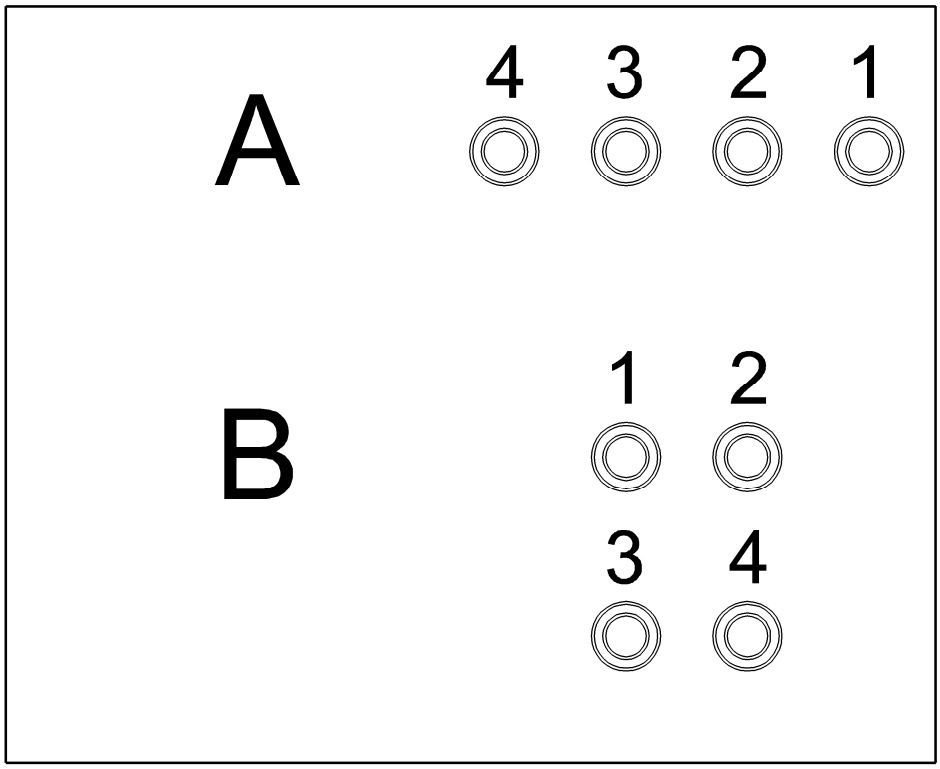


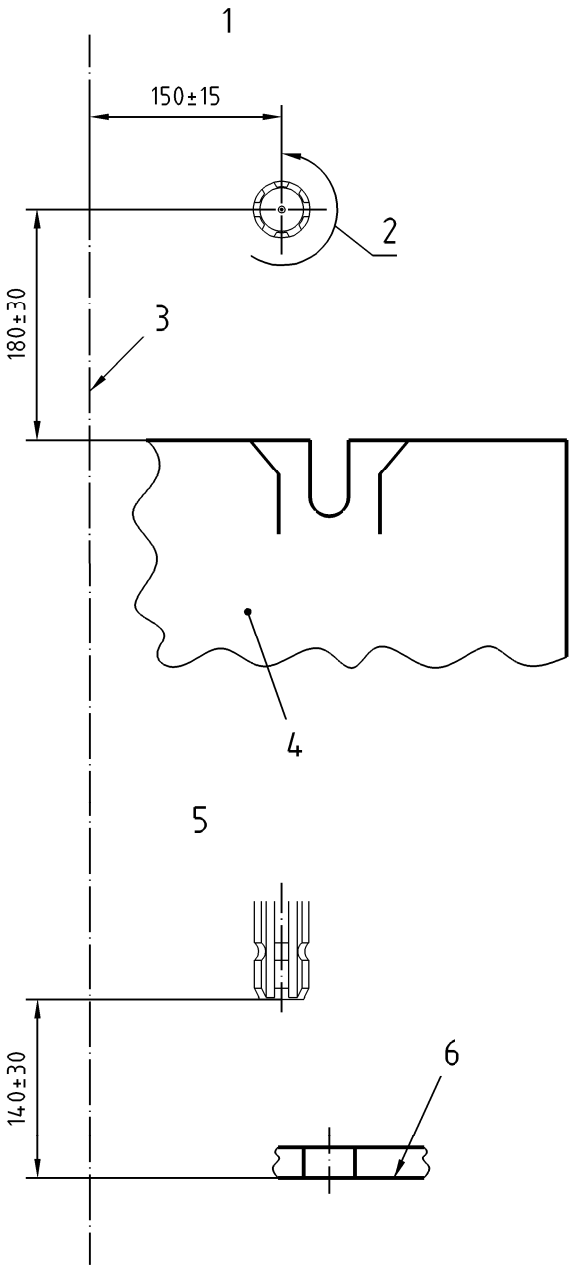
Figure 9 — Preferred layout for hydraulic coupling devices

3.3 Mechanical Power Take Off (PTO)

The location for PTO, with respect to the front mounting plate, shall be in accordance with Figure 10.

Types and dimensions of the splined shafts for PTO shall be in accordance with EN 15431.

Dimensions in millimetres



Key

1 FRONT
2 Direction of rotation (viewed from front)
3 Longitudinal median plane of vehicle
4 Front mounting plate
5 TOP
6 Front edge of the front mounting plate

Figure 10 — Location for PTO

Annex A
(normative)

Quick-coupling VV95 system for front mounted equipments

A.1 General

Annex A specifies a class for a new/modern type of mounting plate in order to cover vehicles having a maximum design total mass higher than 6 t, of the greatest possible variety (commercial vehicles, multi-purpose vehicles, agricultural tractors, earth-moving machinery,...) which are capable of carrying front-mounted tools for winter maintenance and for road service area maintenance. The plate is designed for quick and easy mounting of equipments on trucks that are used also for purposes other than winter maintenance and road service area maintenance. The mounting is made by one man and without any tools.

This front coupling system will be designated as VV95 plate.

Annex A specifies, with regard to electrical and hydraulic connections, only location areas, clearance spaces and preferred layout in order to ensure interchangeability. Requirements applying to connectors and coupling devices are given in EN 15431.

A.2 Interchangeability requirements

A.2.1 Front mounting plate

A.2.1.1 General provisions

Mounting plate VV95, as defined in following A.2.1.2, shall be designed and installed to the carrying vehicle so as to allow for the easy and safe tilting of the cabin (if the vehicle has been designed to provide for this facility).

Mounting plate VV95, as defined in following A.2.1.2, shall be designed and installed to the carrying vehicle so as to allow for the mounting of a front towing hitch (if the vehicle has been designed to provide for this facility). Compliance to this requirement may be achieved in different ways, e.g. by a pivoting or folding mounting plate, by an appropriate unobstructing design or by provisions for direct mounting of the hitch to the mounting plate itself.

A.2.1.2 Mounting plate class

Table 1 gives indication on the installation height and on recommended range of the maximum design total mass (ISO-M07, item 4.7 of ISO 1176:1990) of the carrying vehicle for Class VV95 mounting plate.

Installation height is measured with the carrying vehicle being at kerb mass (ISO-M06, item 4.6 of ISO 1176:1990) from the ground to the centre of the lower lock-journal on the plate, as shown in Figure A.2.

Table A.1 — Installation height of Class VV95 mounting plate

Mounting plate class	Height mm	Recommended range of carrying vehicle maximum design total mass t
VV95	480 ± 30	≥ 6

A.2.1.3 Strength requirements

Class VV95 mounting plate shall be designed so as to withstand to the maximum loads and moments that are given in Table A.2. The values given in Table A.2 refer to static loads and moments applied by the greatest variety of tools (e.g. snow plough, grass cutting machine,..) that may be fixed on the mounting plate. The tools apply static loads and moments when they are being held in a raised position for transportation and transfer purposes.

Table A.2 — Maximum static loads for Class VV95 mounting plate

Mounting plate class	Vertical load, Fz kN	Bending moment, My kNm	Torsional moment, Mx kNm
VV95	80	23,7	14,4

Loads and moments given in Table A.2 refer to the vehicle coordinate system as shown in Figure 1.

A.2.1.4 Designation

Mounting plate meeting the requirements of this Annex shall be identified by the following information, in the order given:

a) reference to this European Standard;

b) reference to this annex;

c) indication of Class VV95.

EXAMPLE Mounting plate, EN 15432-1:2011, Annex A VV95.

A.2.1.5 Interchangeability dimensions

Interchangeability dimensions of Class VV95 mounting plate shall be according to Figure A.1.

Dimensions not specified in Figure A.1 are left to the discretion of the manufacturer.

Dimensions in millimetres

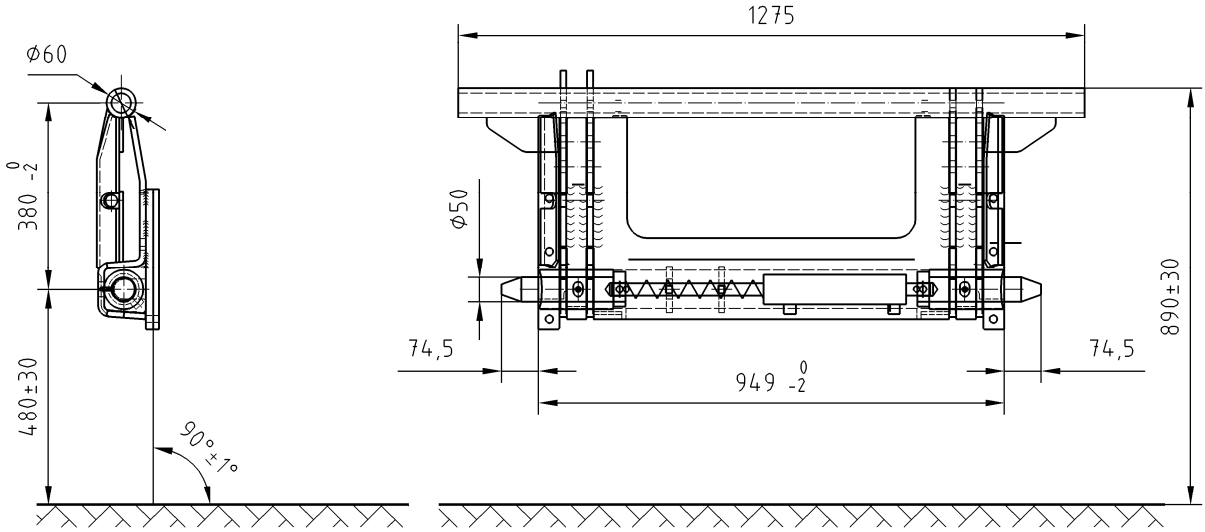


Figure A.1 — Dimensions for VV95 mounting plate

A.2.1.6 Tool fixing systems

A.2.1.6.1 General

The following clause gives a description of the fixing elements provided by Class VV95 mounting plates.

A.2.1.6.2 Class VV 95 mounting plate fixing elements

Class VV95 mounting plates provide for the following fixing elements:

— upper pipe on VV95 attachment, ∅ 60 mm, width 1 275 mm;

— lower lock-journals on VV95 attachment, ∅ 50 mm d11C/C, vertical distance between pipe and journal axis to axis 380 mm + 0/-2 mm;

— hydraulic locking of journals.

A.2.2 Electrical and hydraulic connections

A.2.2.1 Location on the vehicle

The locations for electrical and hydraulic connections, with respect to the front mounting plate, shall be in accordance with Figure 5. Selection of the respective locations shall be made such that connectors and coupling devices are completely within the areas specified in Figure A.2.

Dimensions in millimetres

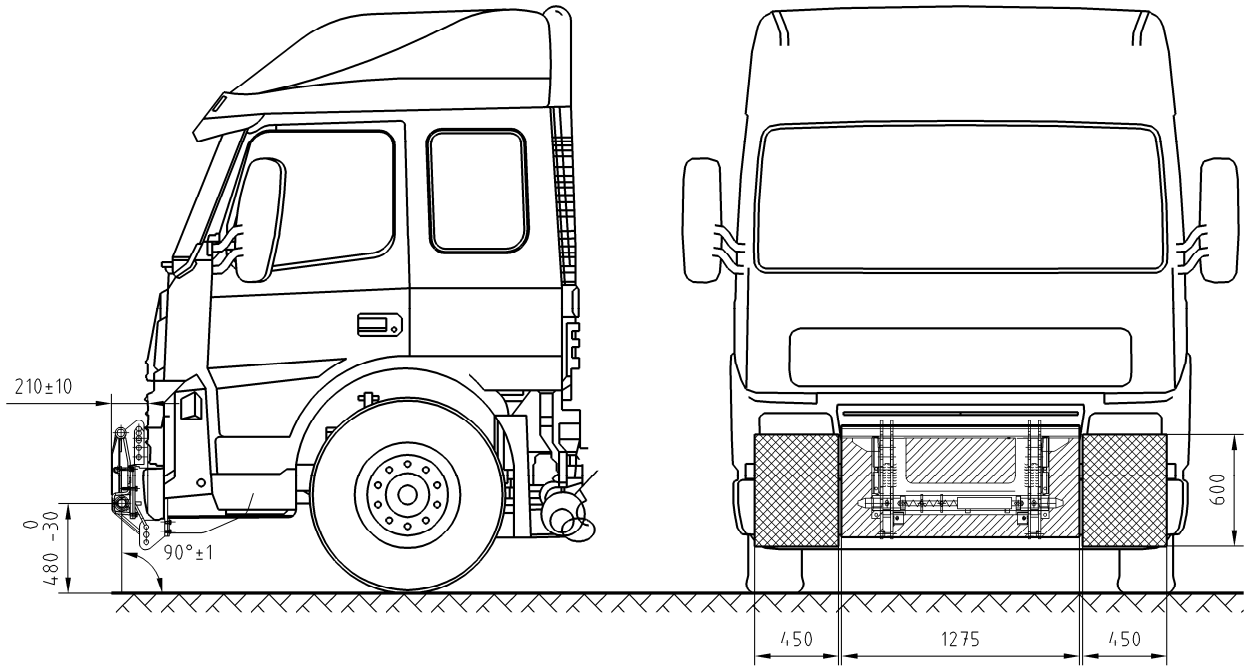


Figure A.2 — Installation of VV95 mounting plate and relevant connection locations

A.2.2.2 Clearance space

Provisions given in 3.2.2 apply.

A.2.2.3 Connection types

Provisions given in 3.2.3 apply.

A.2.2.4 Identification and preferred layout of hydraulic connections

Provisions given in 3.2.4 apply.

A.2.3 Mechanical Power Take Off (PTO)

Provisions given in 3.3 apply.

Annex B
(normative)

Compact F1/C front mounting plate for combined road and off-road applications

B.1 General

Annex B specifies class for a compact and light front mounting plate, based on the F1 plate, for combined road and off-road applications. It covers off-road vehicles having a maximum design total mass higher than 6 t which are capable of carrying front-mounted tools for winter maintenance and for road service area maintenance. The plate is designed for saving weight and for avoiding losses in the approach angle of the vehicle when used for off-road applications.

This front mounting plate will be designated as F1/C plate.

B.2 Interchangeability requirements

B.2.1 Front mounting plate

B.2.1.1 General provisions

Front mounting plate F1/C, as defined in following B.2.1.2, shall be designed and installed to the carrying vehicle so as to allow for the easy and safe tilting of the cabin (if the vehicle has been designed to provide for this facility).

Front mounting plate F1/C, as defined in following B.2.1.2, shall be designed and installed to the carrying vehicle so as to allow for the mounting of a front towing hitch (if the vehicle has been designed to provide for this facility). Compliance to this requirement may be achieved in different ways, e.g. by a pivoting or folding mounting plate, by an appropriate unobstructing design or by provisions for direct mounting of the hitch to the mounting plate itself.

B.2.1.2 Mounting plate class

Table 1, Class F1, gives indication on the installation height and on recommended range of the maximum design total mass (ISO-M07, item 4.7 of ISO 1176:1990) of the carrying vehicle for Class F1/C mounting plate.

Installation height is measured with the carrying vehicle being at kerb mass (ISO-M06, item 4.6 of ISO 1176) from the ground to the upper edge of the mounting plate, as shown in Figure B.1.

B.2.1.3 Strength requirements

Class F1/C mounting plate shall be designed so as to withstand to the maximum loads and moments that are given in Table 2, Class F1. The values given in Table 2 refer to static loads and moments applied by the greatest variety of tools (e.g. snow plough, grass cutting machine,..) that may be fixed on the mounting plate. The tools apply static loads and moments when they are being held in a raised position for transportation and transfer purposes.

Loads and moments given in Table 2 refer to the vehicle coordinate system as shown in Figure 1.

B.2.1.4 Designation

Mounting plate meeting the requirements of this Annex shall be identified by the following information, in the order given:

a) reference to this European Standard;

b) reference to this annex;

c) indication of Class F1/C.

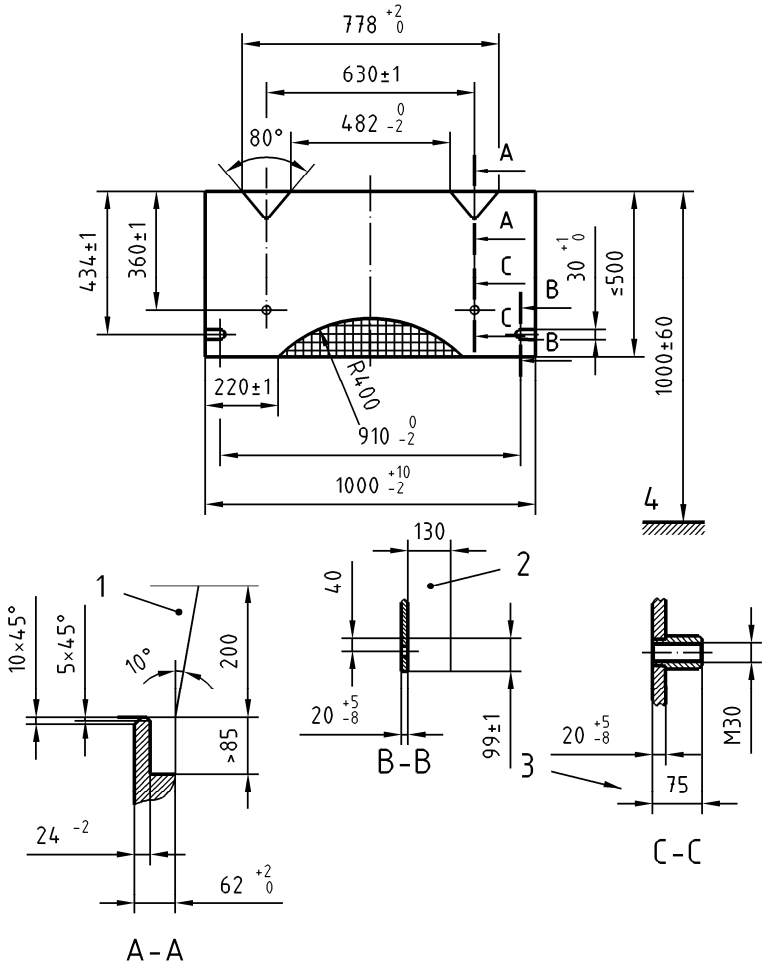
EXAMPLE Mounting plate, EN 15432-1:2011, Annex B F1/C.

B.2.1.5 Interchangeability dimensions

Interchangeability dimensions of Class F1/C mounting plate shall be according to Figure B.1.

Dimensions not specified in Figure B.1 are left to the discretion of the manufacturer.

Dimensions in millimetres



Key

1 Clearance for claws
2 Clearance for swivel bolt
3 Clearance 75
4 Ground level

Option 1:

The hight of the plate shall not exceed 500 mm. In order to improve the ground clearance, an area (shown hatched) in the center, can be cut out, with a radius of max. 400 mm. Please note, that 220 mm of material must remain at either side.

Option 2:

The frontmountingplate can be an assembly, comprising of several parts.

Option 3:

Additional elements, which do not conflict with the characteristic dimensions, may be provided to couple in use implements, using different fixing systems.

Option 4:

Additional cut-outs are allowed if the stiffness is not reduced thereby.

Figure B.1 — Dimensions for F1/C mounting plate

B.2.1.6 Tool fixing systems

B.2.1.6.1 General

The following clause gives a description of the fixing elements provided by Class F1/C mounting plates.

B.2.1.6.2 Class F1/C mounting plate fixing elements

Class F1/C mounting plates provide for the following fixing elements:

— two pockets (centre to centre 630 mm ± 1 mm, section A-A in Figure B.1) as a support for the relevant claws;

— a couple of lateral slots (∅ 30 mm + 1/-0 mm, centre to centre 910 mm + 0/-2 mm, section B-B in Figure B.1) for the relevant swivelling bolts;

— two threaded holes (M30, centre to centre 630 mm ± 1 mm, section C-C in Figure B.1) for the relevant passing bolts.

When using swivelling bolts, the use of appropriate washers is strongly recommended.

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