

INTERNATIONAL STANDARD

**ISO
8812**

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Earth-moving machinery — Backhoe loaders — Definitions and commercial specifications

*Engins de terrassement — Chargeuses-pelleteuses — Définitions
et spécifications commerciales*



Reference number
ISO 8812:1999(E)

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.

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.

International Standard ISO 8812 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 4, *Commercial nomenclature, classification and rating*.

Annex A forms an integral part of this International Standard.

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Earth-moving machinery — Backhoe loaders — Definitions and commercial specifications

1 Scope

This International Standard establishes terminology and the content of commercial literature specifications for self-propelled crawler or wheeled backhoe loaders and their equipment.

This International Standard is applicable to backhoe loaders as defined in 3.1. It is not applicable to loaders equipped with a backhoe attachment in accordance with ISO 7131:1997, 3.3.1.

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 3450:1996, *Earth-moving machinery — Braking systems of rubber-tyred machines — Systems and performance requirements and test procedures.*

ISO 4250-1:1996, *Earth-mover tyres and rims — Part 1: Tyre designation and dimensions.*

ISO 4250-2:1995, *Earth-mover tyres and rims — Part 2: Loads and inflation pressures.*

ISO 4250-3:1997, *Earth-mover tyres and rims — Part 3: Rims.*

ISO 5010: 1992, *Earth-moving machinery — Rubber-tyred machines — Steering requirements.*

ISO 6014:1986, *Earth-moving machinery — Determination of ground speed.*

ISO 6015:1989, *Earth-moving machinery — Hydraulic excavators — Methods of measuring tool forces.*

ISO 6016:1998, *Earth-moving machinery — Methods of measuring the masses of whole machines, their attachments and components.*

ISO 6165:1997, *Earth-moving machinery — Basic types — Vocabulary.*

ISO 6746-1:1987, *Earth-moving machinery — Definitions of dimensions and symbols — Part 1: Base machine.*

ISO 6746-2:1987, *Earth-moving machinery — Definitions of dimensions and symbols — Part 2: Equipment.*

ISO 7131:1997, *Earth-moving machinery — Loaders — Terminology and commercial specifications.*

ISO 7135:—¹⁾, *Earth-moving machinery — Hydraulic excavators — Terminology and commercial specifications.*

ISO 7451:1997, *Earth-moving machinery — Volumetric ratings for hydraulic excavator buckets and backhoe loader buckets.*

ISO 7457:1997, *Earth-moving machinery — Determination of turning dimensions of wheeled machines.*

ISO 7546:1983, *Earth-moving machinery — Loader and front loading excavator buckets — Volumetric ratings.*

ISO 9249:1997, *Earth-moving machinery — Engine test code — Net power.*

ISO 14397-1:—²⁾, *Earth-moving machinery — Loaders and backhoe loaders — Part 1: Calculation and verification methods for operating loads.*

3 General definitions

See also ISO 6165.

3.1

backhoe loader

self propelled crawler or wheeled machine, having a main frame designed to carry both front-mounted equipment and rear-mounted backhoe equipment (normally with outriggers); when used in the backhoe mode, the machine is stationary and normally digs below ground level; when used in the loader mode (bucket use), the machine loads through forward motion

NOTE 1 A backhoe work cycle normally comprises excavating, elevating, swinging, and discharging material. A loader work cycle normally comprises filling, elevating, transporting, and discharging material.

NOTE 2 Backhoe loader directional references: the terms right, left, front or rear are determined from the operator's position when seated in the travelling direction stated by the manufacturer.

3.2

base machine

machine with, if required, cab, canopy and operator-protective structures, without equipment or attachments, but including the mountings necessary to connect equipment or attachments

NOTE For the purposes of this International Standard, the base machine of a backhoe loader includes equipment and attachments.

3.3

equipment

set of components mounted onto the base machine which allow an attachment to perform its primary design function

3.4

optional equipment

optional items of equipment mounted onto the base machine to increase, for example, capacity, flexibility, comfort and safety

¹⁾ To be published. (Revision of ISO 7135:1993)

²⁾ To be published.

3.5

attachment (tool)

assembly of components that can be mounted onto the base machine or equipment for specific use

3.6

component

part, or an assembly of parts, of a base machine, equipment or attachment

4 Base machine

4.1 Types of backhoe loaders

4.1.1 Side-shift backhoe

See Figure 1.

4.1.2 Centre pivot backhoe

See Figure 2.

4.1.3 Drive and steering system

4.1.3.1 Rigid frame, front wheel steer, rear wheel drive

See Figure 3.

4.1.3.2 Rigid frame, front/all wheel steer, all wheel drive

See Figure 4.

4.1.3.3 Articulated steering, rear wheel drive

See Figure 5.

4.1.3.4 Articulated steering, all wheel drive

See Figure 6.

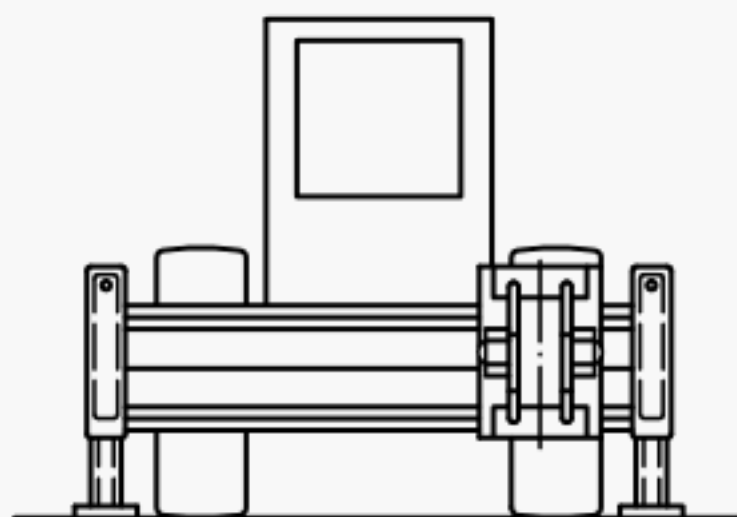


Figure 1 — Side-shift backhoe

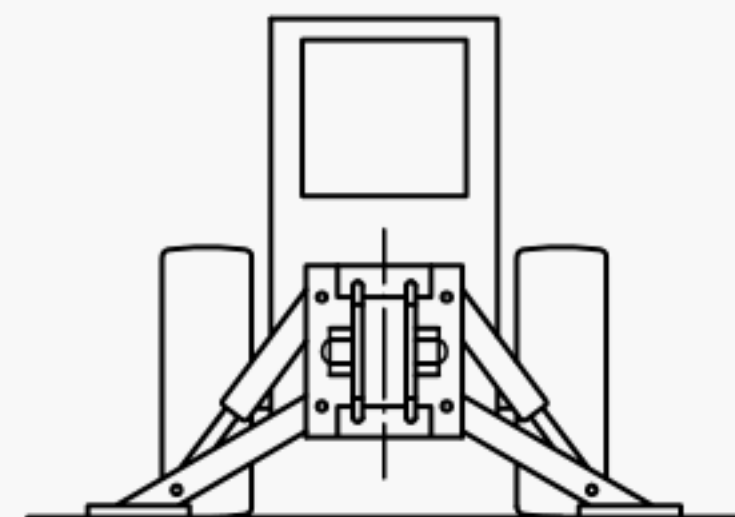


Figure 2 — Centre pivot backhoe

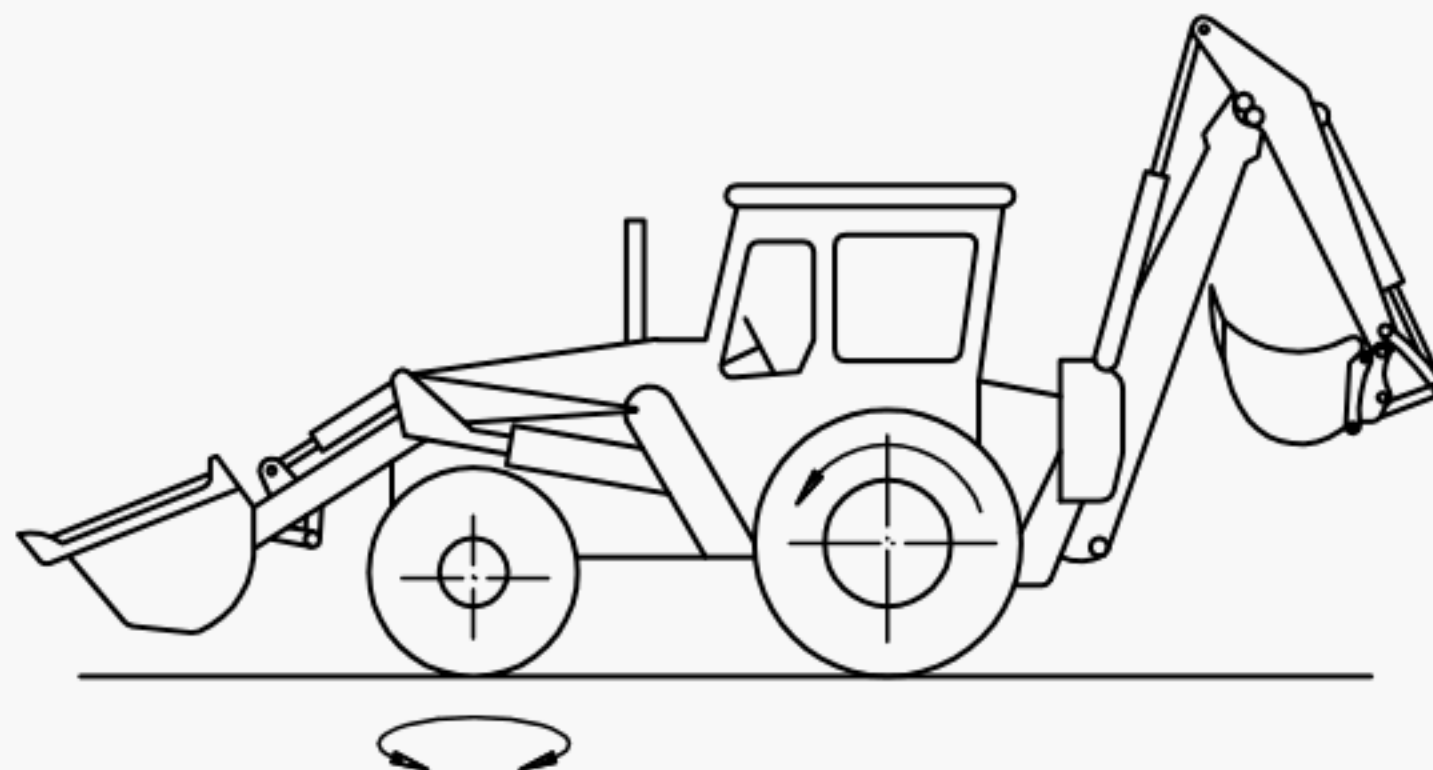


Figure 3 — Rigid frame, front wheel steer, rear wheel drive

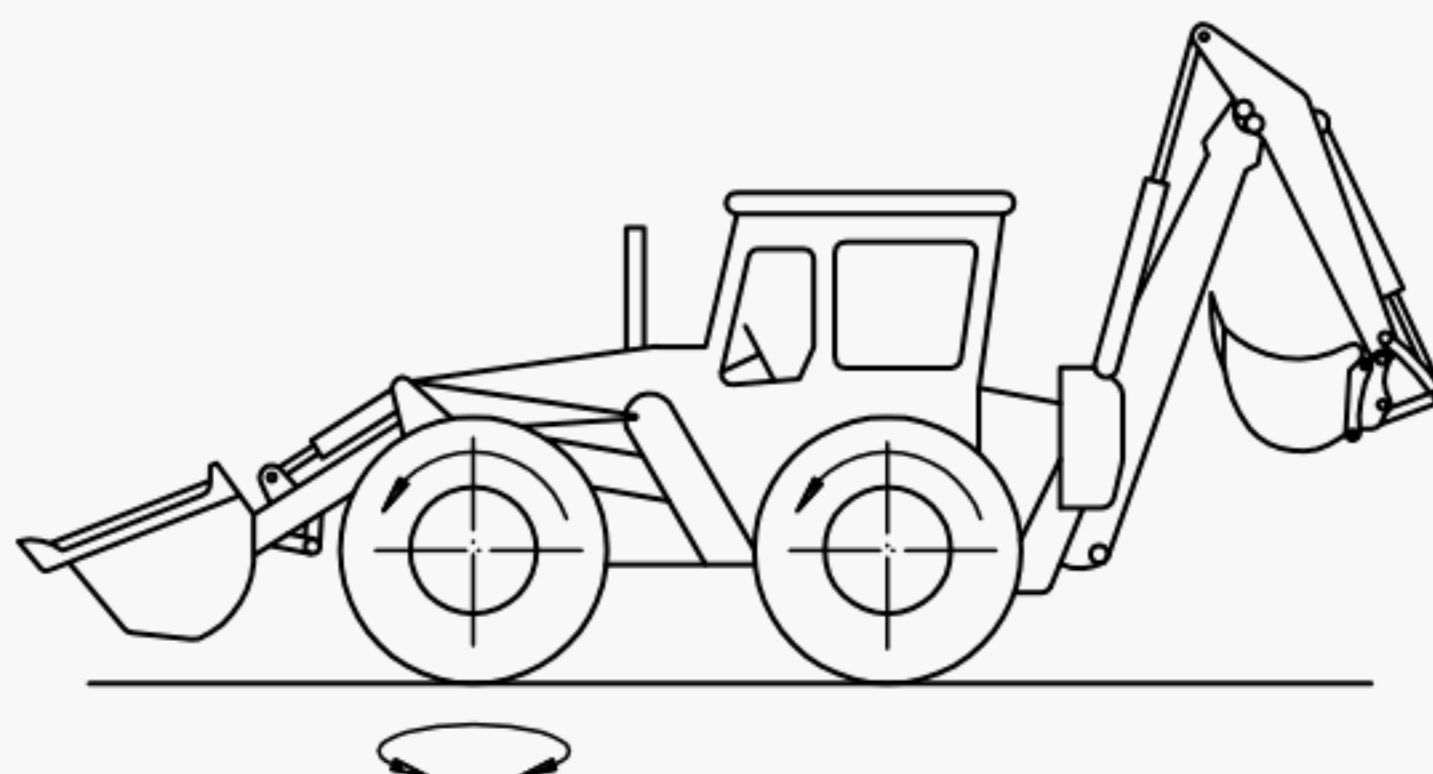


Figure 4 — Rigid frame, front/all wheel steer, all wheel drive

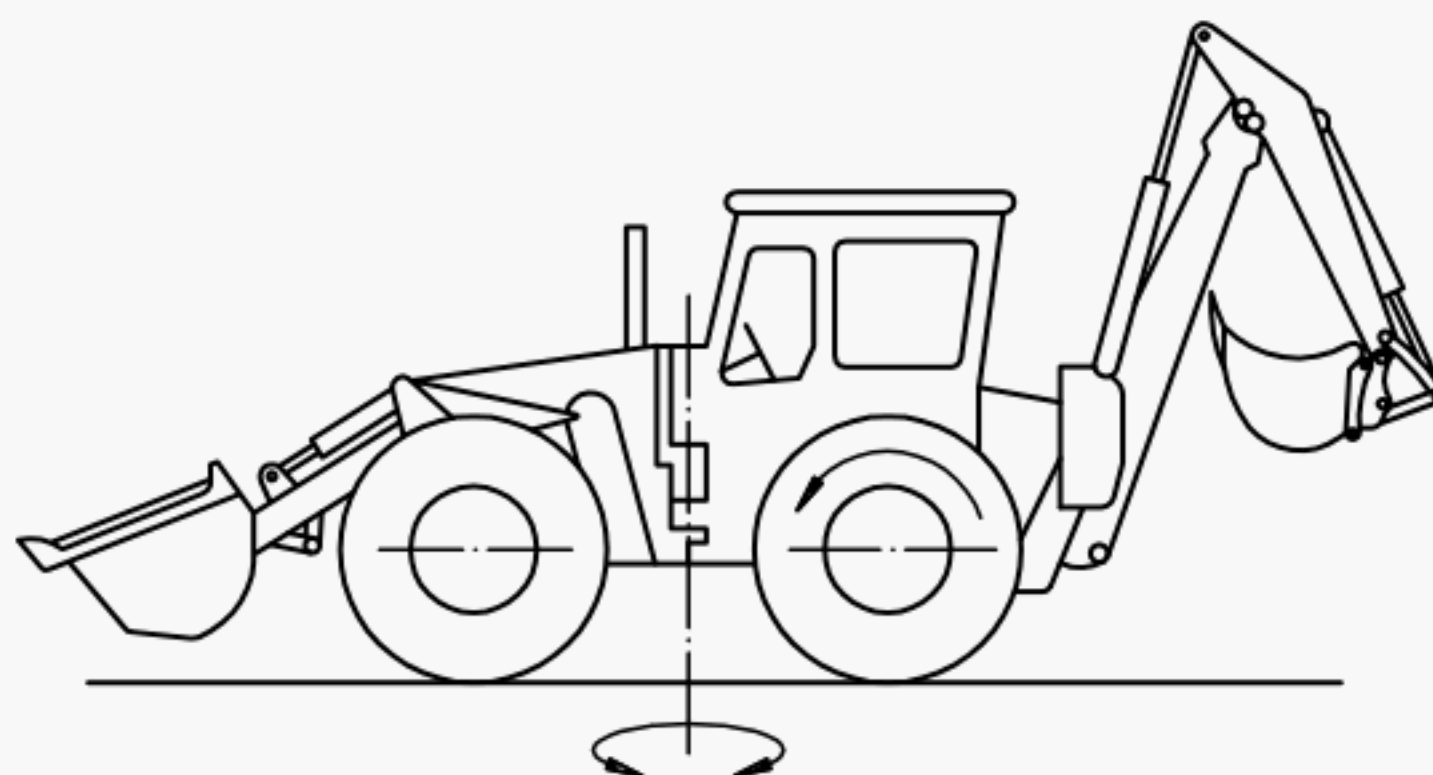


Figure 5 — Articulated steering, rear wheel drive

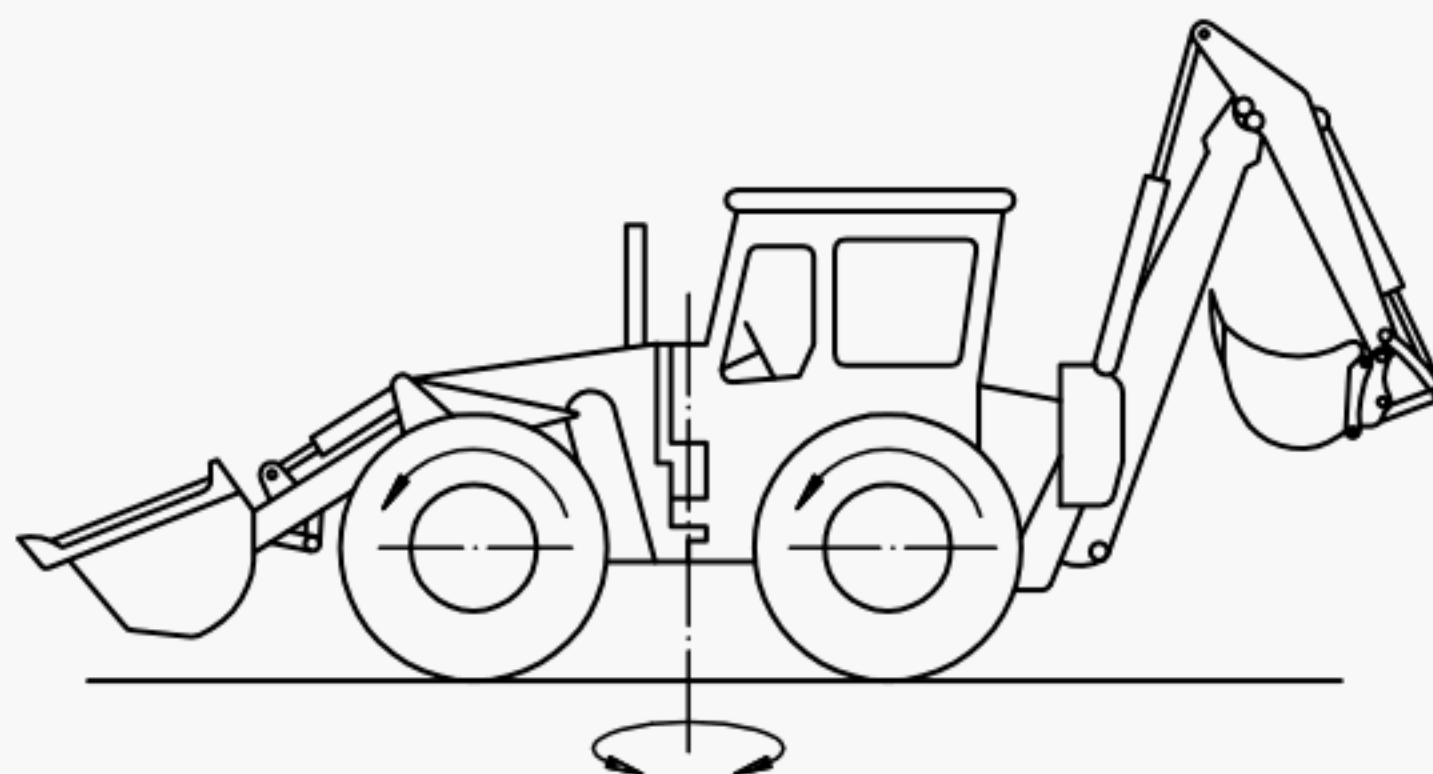


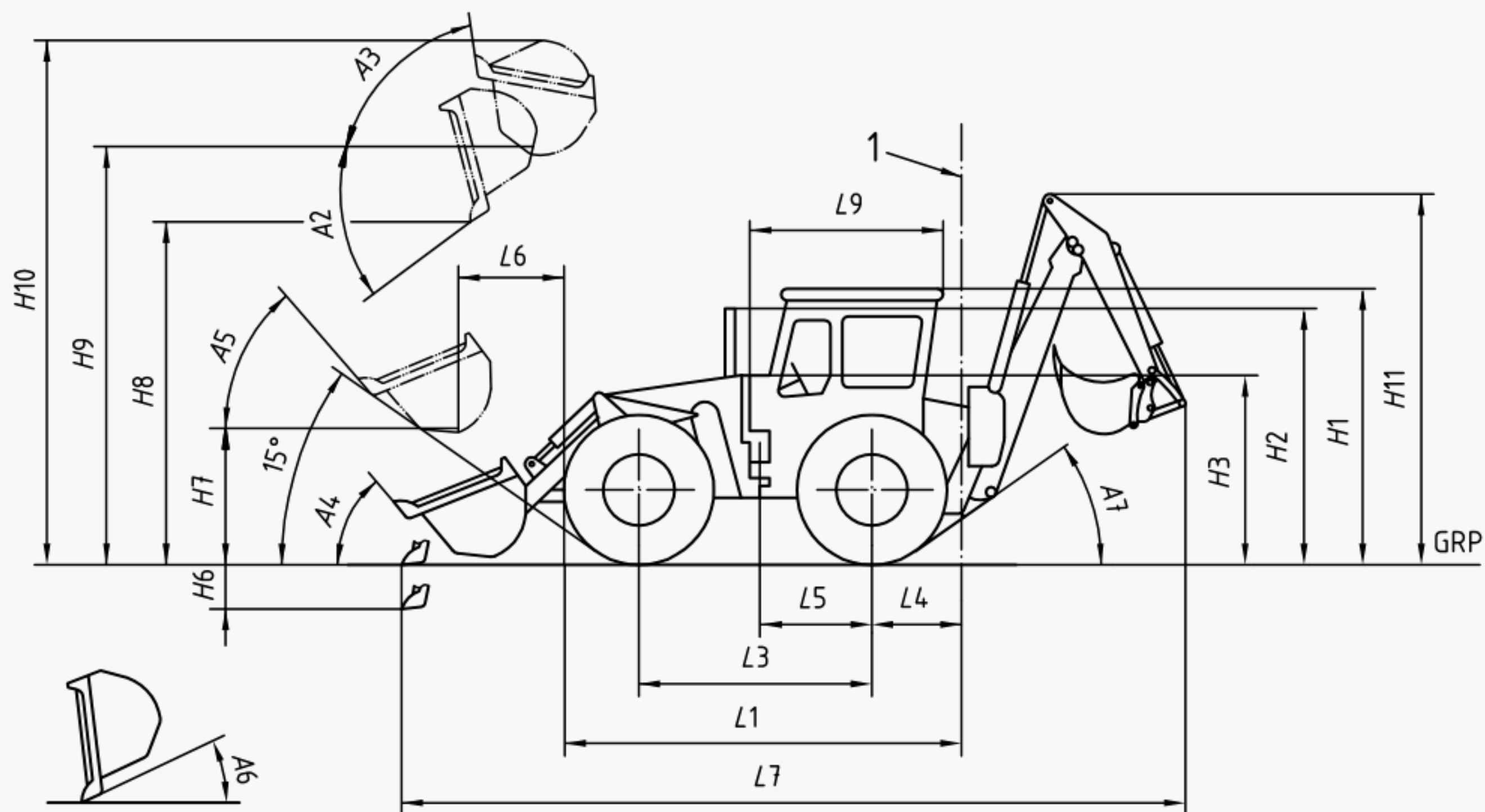
Figure 6 — Articulated steering, all wheel drive

4.2 Dimensions

See Figures 7 and 8.

For definitions of dimensions, see ISO 6746-1.

For definition of dimensions strictly related to backhoe loaders, see annex A.



Key

1 Swing pivot

Figure 7 a) — Dimensions of backhoe loader

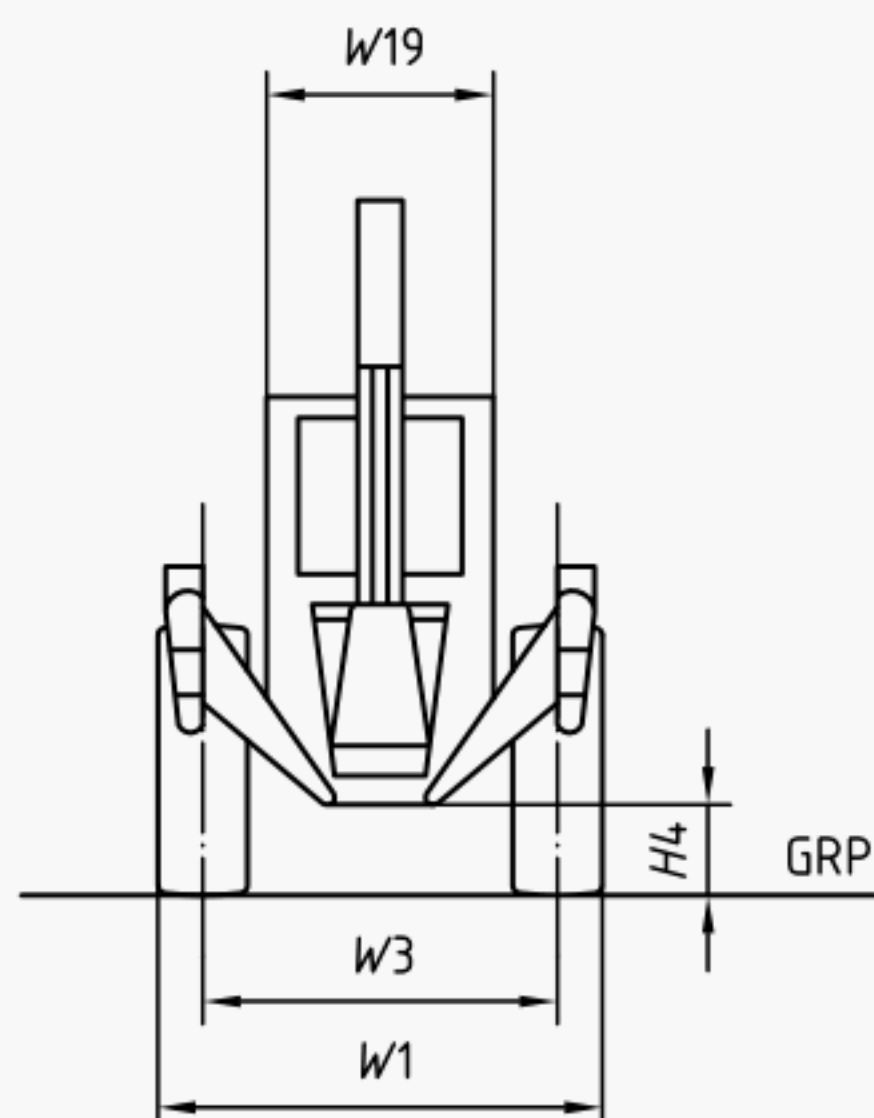
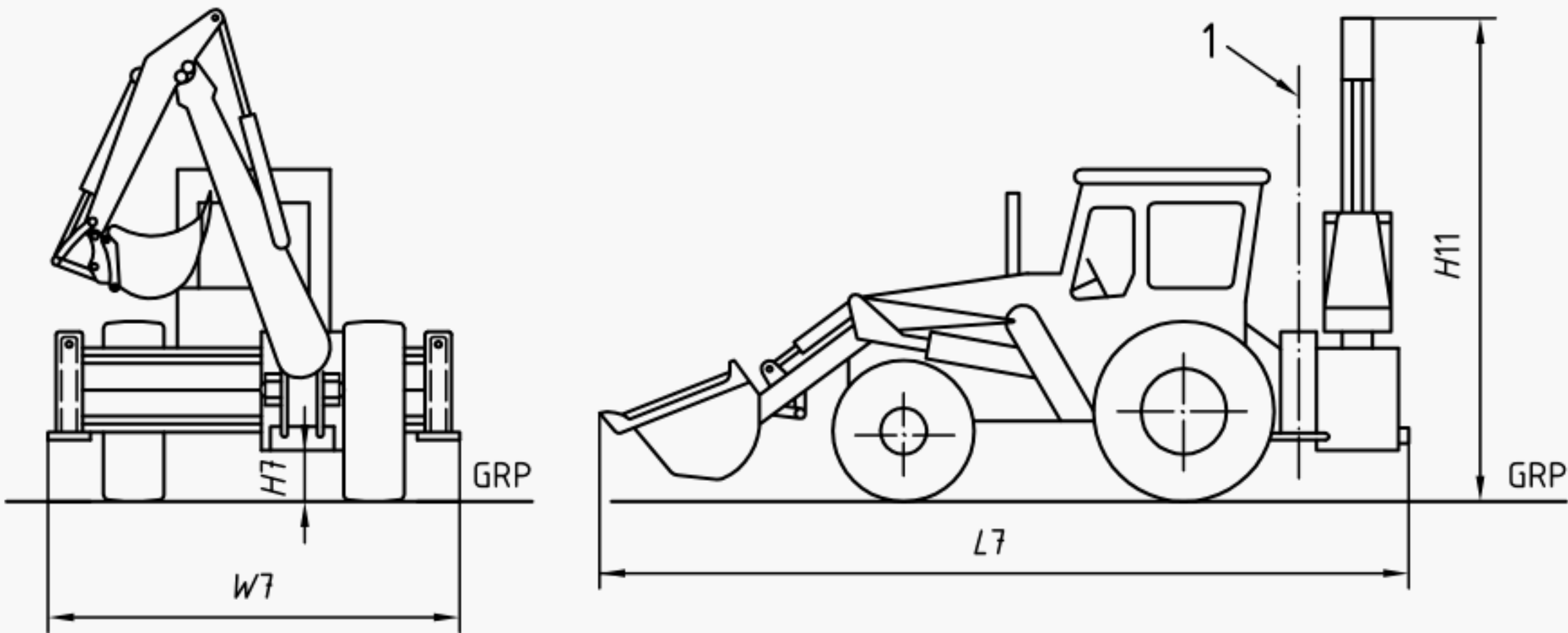


Figure 7 b) — Centre pivot backhoe



Key
1 Swing pivot

Figure 7 c) — Side-shift backhoe

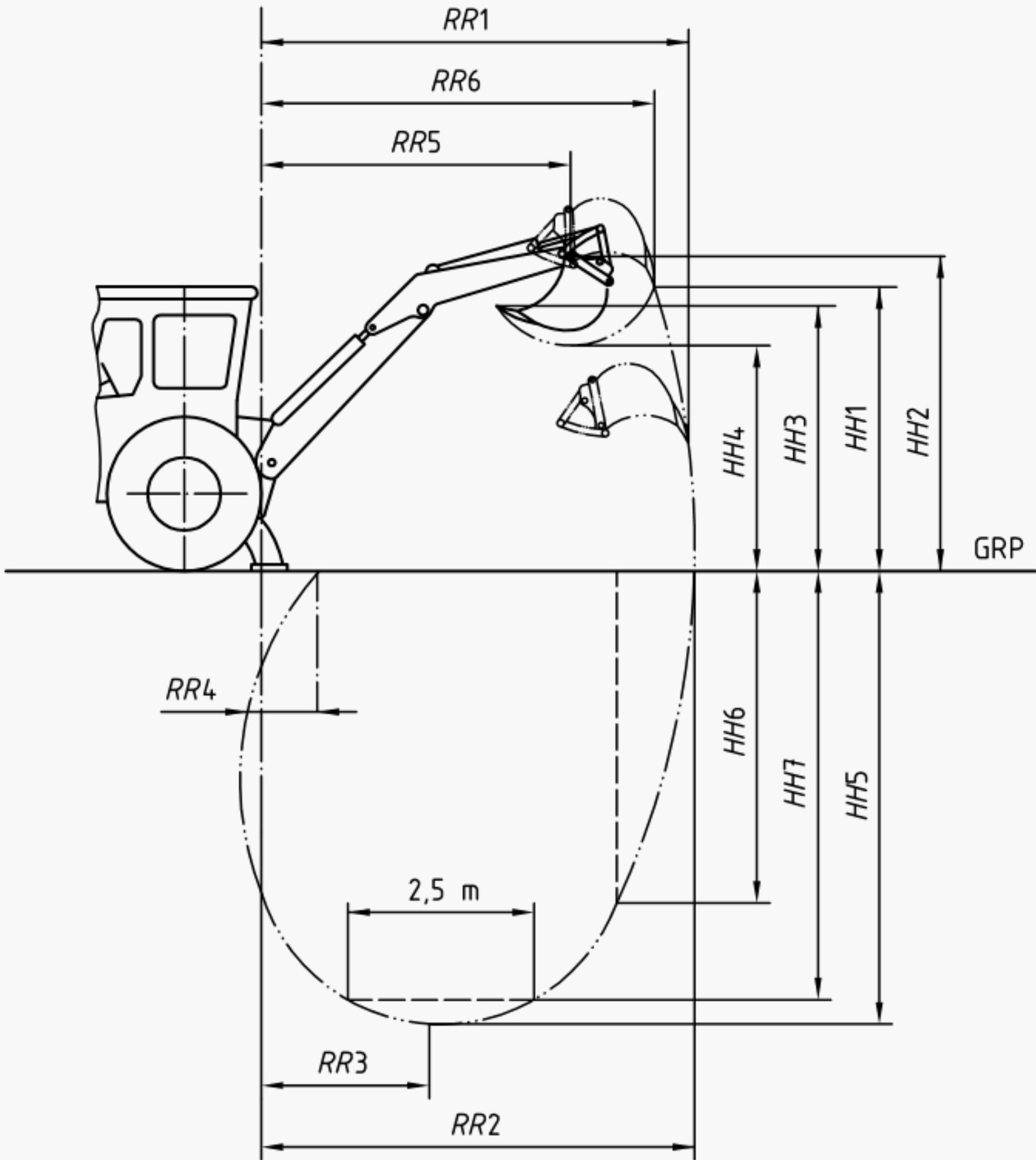


Figure 8 — Digging dimensions

4.2.1 Operational positions of backhoe

The dimensions indicated in Figures 9, 10 and 11 shall be obtained with the main bearing surfaces of the stabilisers on the ground and with all tyres tangent to ground and at their recommended air pressure.

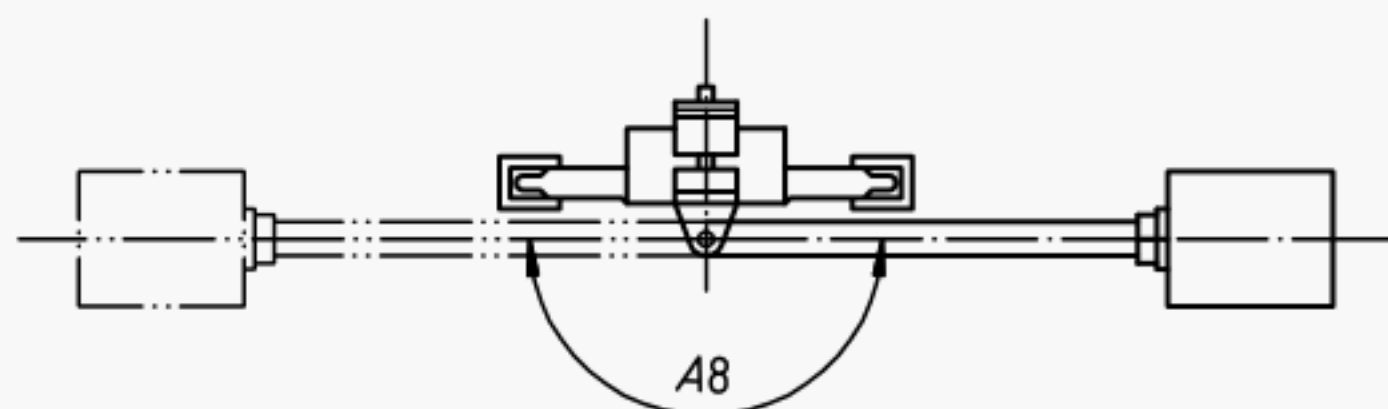


Figure 9 — Backhoe swing pivot axis

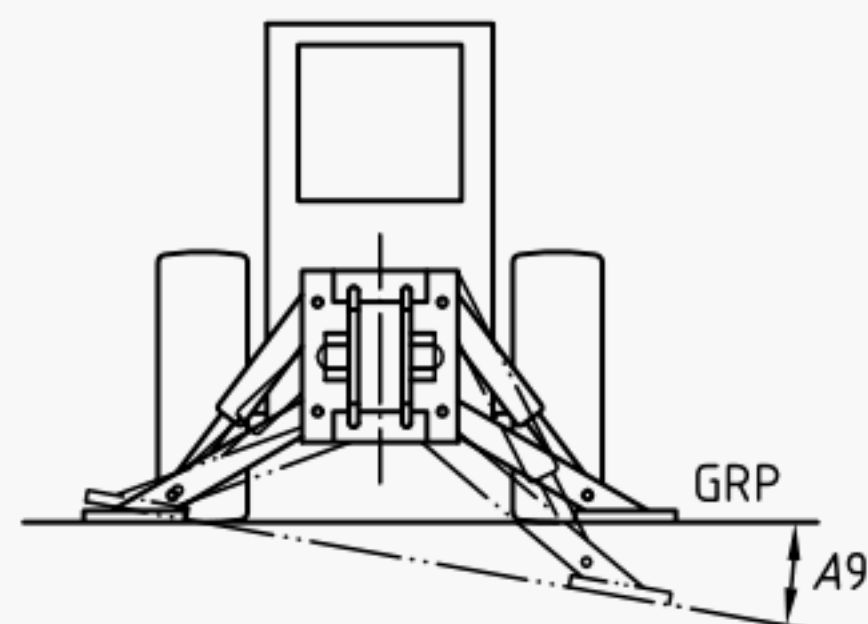


Figure 10 — Levelling angle

4.2.2 Operational position of stabilisers

4.2.2.1 Overall width

Stabilisers down and shown in operating positions; see Figures 11 and 12.

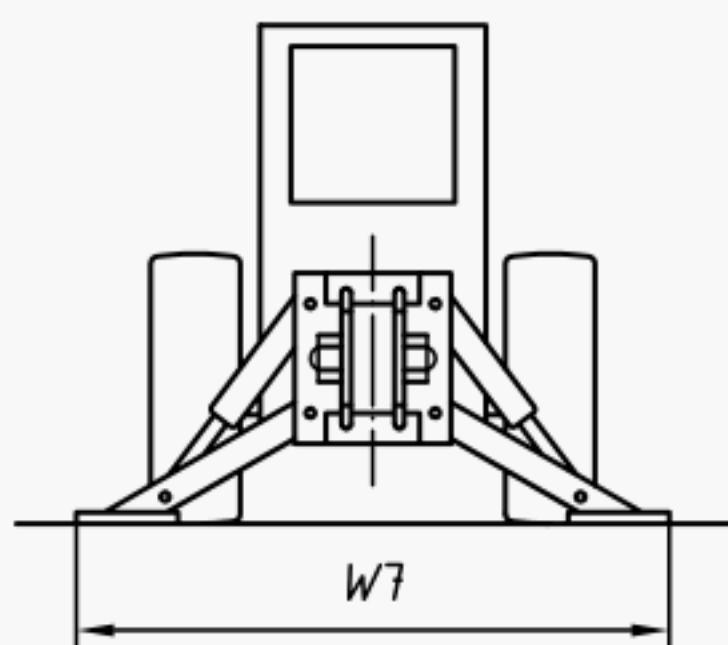


Figure 11 — Centre pivot backhoe

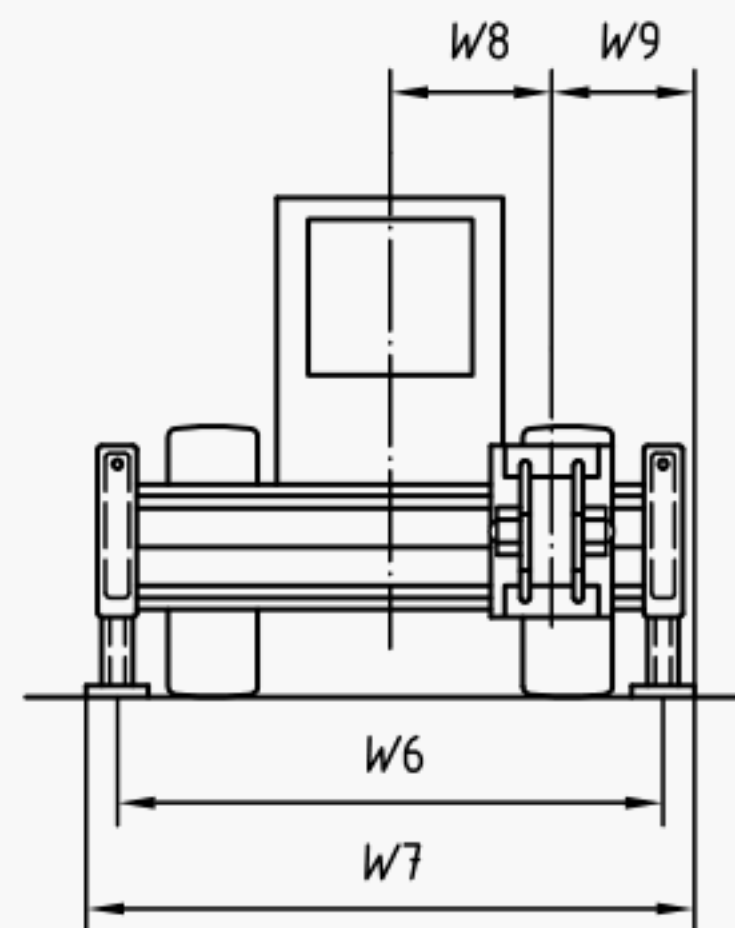


Figure 12 — Side shift backhoe

4.2.3 Manoeuvring dimensions

See Figures 13 and 14.

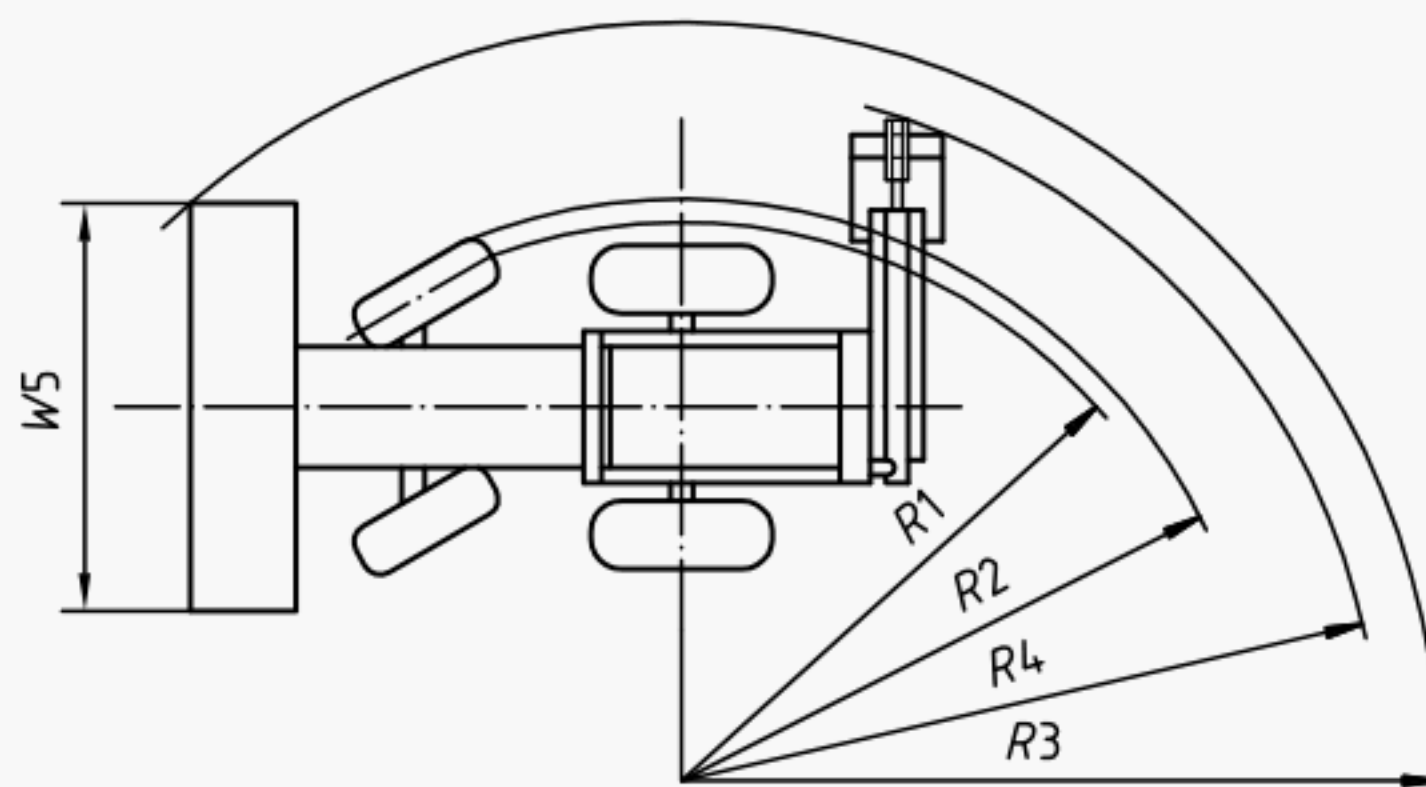


Figure 13 — Manoeuvring dimensions (rigid frame)

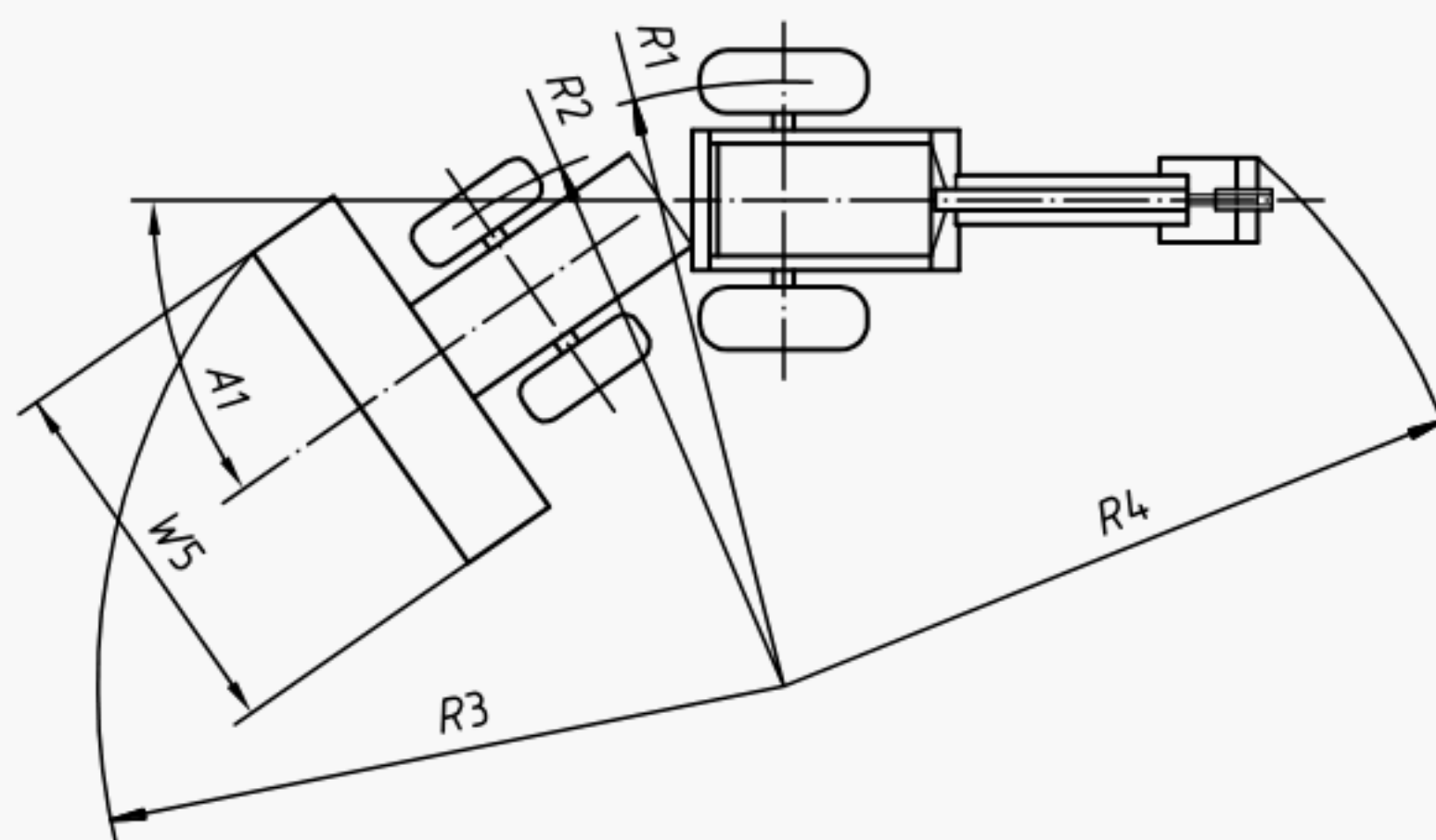


Figure 14 — Manoeuvring dimensions (articulated frame)

NOTE Bucket in carry position and backhoe in transport position

4.3 Masses

4.3.1

operating mass

mass of the base machine with equipment and empty attachments as specified by the manufacturer, operator (75 kg), full fuel tank and all fluid systems at the levels specified by the manufacturer

4.3.2

shipping mass

mass of the base machine without operator, fuel level at 10 % of tank capacity, all fluid systems at their levels specified by the manufacturer and with or without equipment, attachments, cab, canopy, ROPS³⁾ and/or FOPS⁴⁾, wheels and counterweights as stated by the manufacturer

NOTE If the machine has to be disassembled for shipping purposes, the masses of these dismantled components should be stated by the manufacturer.

³⁾ ROPS: Roll-over protective structure.

⁴⁾ FOPS: Falling object protective structure.

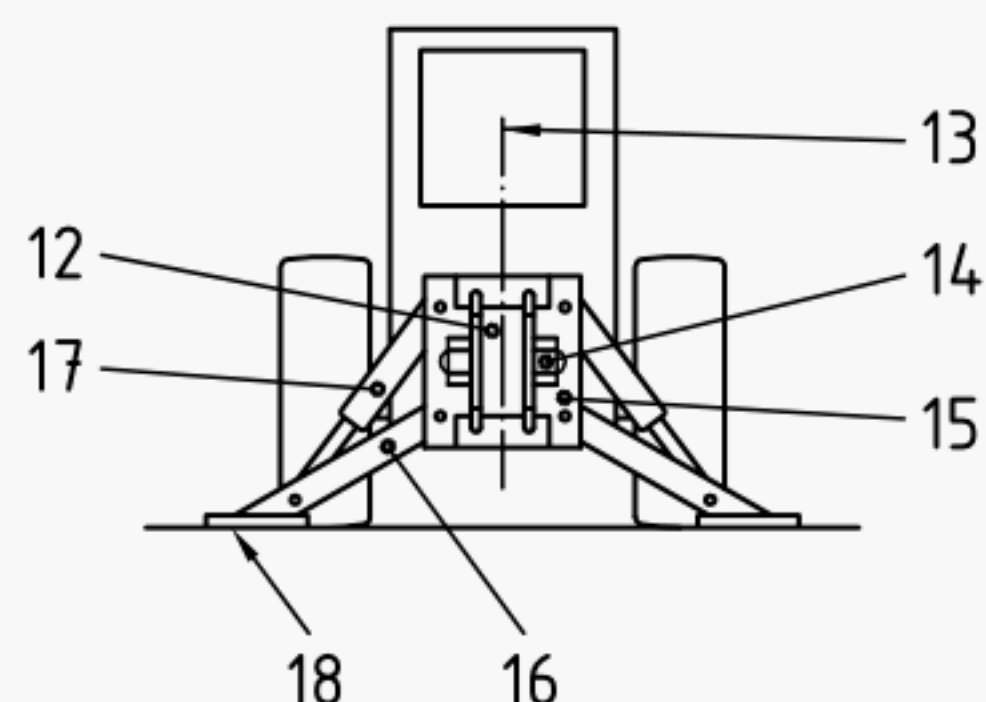
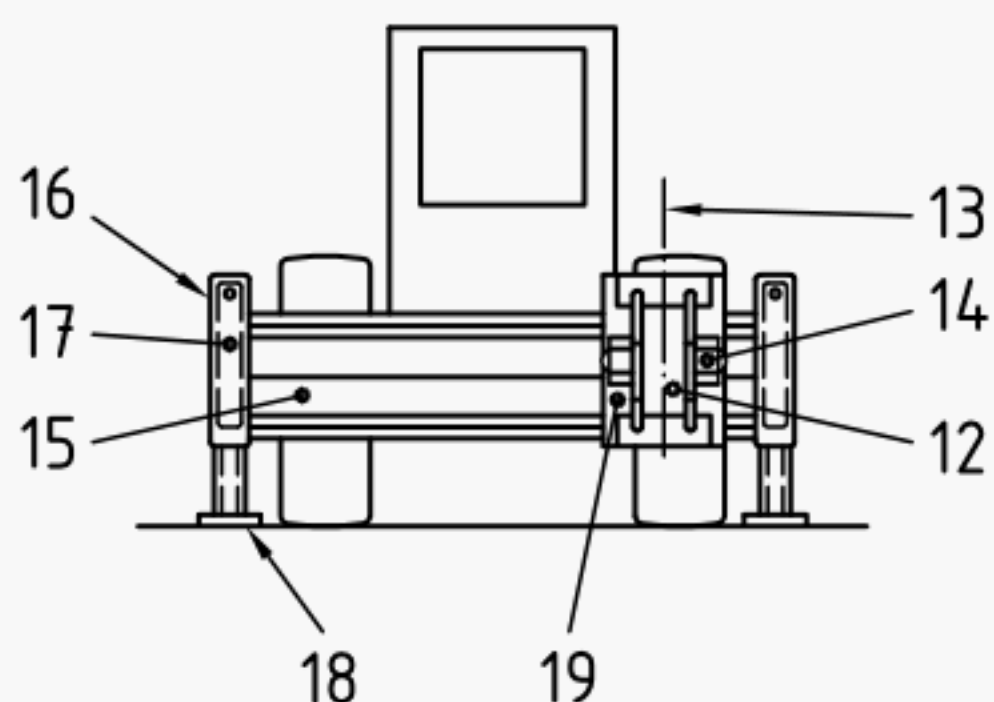
4.3.3**cab, canopy, ROPS and/or FOPS mass**

mass of a cab, canopy, ROPS or FOPS with all their components, and mountings required to secure these to the base machine

4.4 Nomenclature (see diagram numbers)

4.4.1 For nomenclature strictly related to loader portion, see ISO 7131.

4.4.2 For backhoe equipment, see Figures 15, 16 and 17 and ISO 7135.

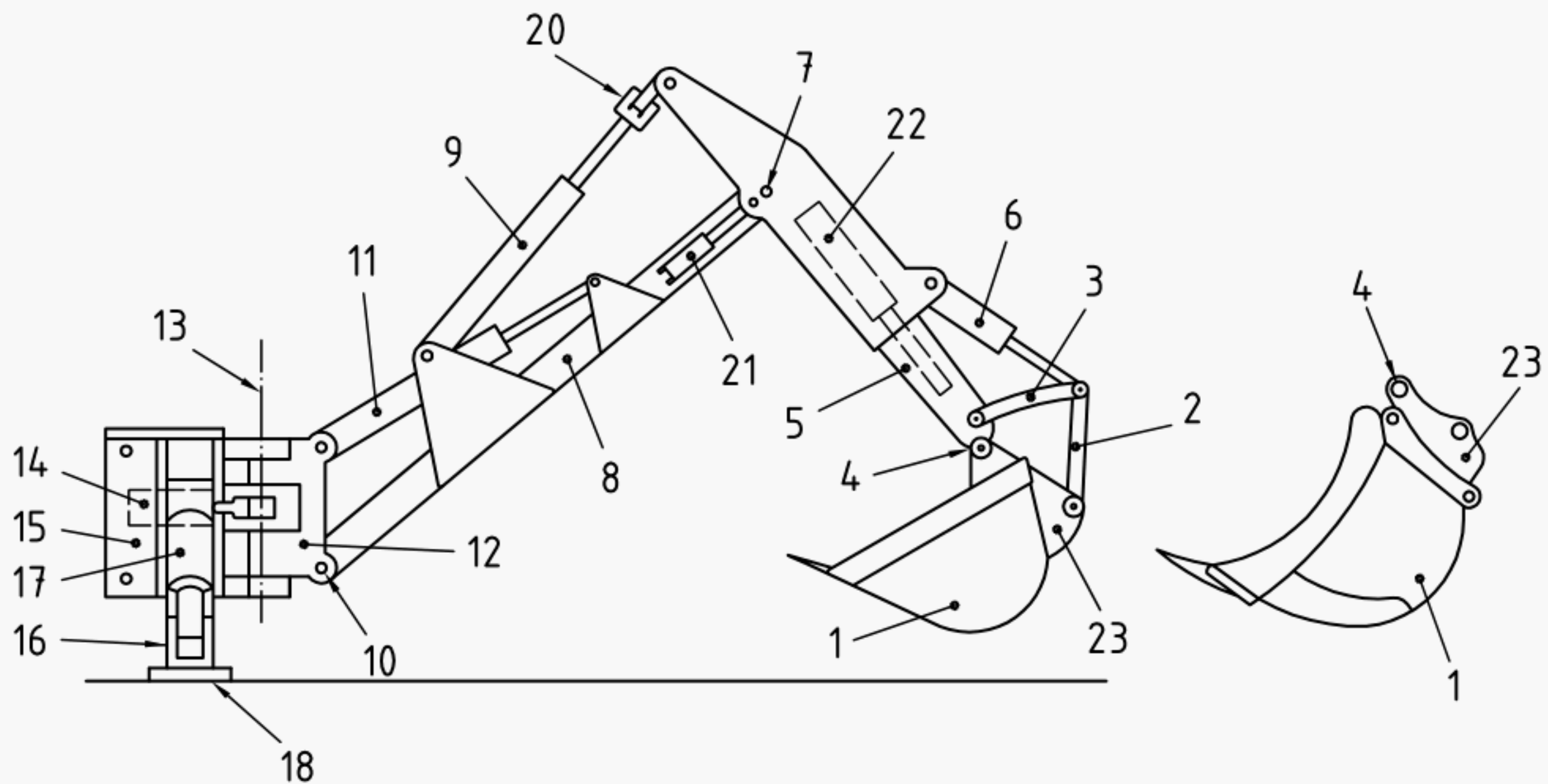
**Key**

- 12 Swing frame
- 13 Swing pivot centre line
- 14 Swing actuator/cylinder
- 15 Main frame

- 16 Stabiliser (right or left)
- 17 Stabiliser cylinder (right or left)
- 18 Stabiliser pad (right or left)
- 19 Side shift frame (sliding frame)

Figure 15 — Side shift backhoe

Figure 16 — Centre pivot backhoe



Key

1	Bucket	9	Arm cylinder
2	Bucket linkage	10	Boom pivot pin
3	Guide linkage	11	Boom cylinder
4	Bucket pivot pin	12 -19	See Figures 15 and 16
5	Arm (extendable)	20	Tie link
6	Bucket cylinder	21	Side deflection cylinder
7	Arm pivot	22	Extendable arm cylinder
8	Boom	23	Attachment bracket

Figure 17 — Backhoe with side deflection and extendable arm

5 Attachment (tool) nomenclature

5.1 Loader bucket

5.2 Backhoe bucket

6 Performance terminology

6.1 General

6.1.1 ISO net power (engine)

See ISO 9249.

6.1.2
maximum travel speeds

See ISO 6014.

6.1.3
braking performance

See ISO 3450.

6.1.4
steering capability

See ISO 5010.

6.1.5
turning radius

See ISO 7457.

6.2 Loader operation

6.2.1
rated operating load

See ISO 14397-1.

6.2.2
breakout force

See ISO 14397-1.

6.2.3
tipping load

See ISO 14397-1.

6.2.4
tipping load at specified height

See ISO 14397-1.

6.2.5
raising time

See ISO 7131.

6.2.6
lowering time

See ISO 7131.

6.2.7
dump time

See ISO 7131.

6.3 Backhoe operation

6.3.1 maximum hoe tool force using bucket cylinder(s)

See ISO 6015.

6.3.2 maximum hoe tool force using arm cylinder(s)

See ISO 6015.

7 Commercial literature specifications — SI units (examples)

7.1 Engine (specify characteristics)

Manufacturer and model

Diesel or spark ignition

Type of cycle (2 or 4 stroke)

Naturally aspirated, mechanically supercharged, or turbocharged

Number of cylinders

Displacement

Bore

Stroke

Cooling system (air or water cooled).

Type of fuel

Power, flywheel net: at r/min
Torque-maximum: at r/min (where applicable)
Starter type: electric, air, other.....
Electrical system: V

7.2 Transmission (specify type)

Manual shift with flywheel clutch
Manual shift with torque converter
Power shift with torque converter
Hydrostatic
Electric
Number of speeds, forward and reverse
Travel speeds (forward, reverse)

7.3 Drive axle(s) (specify type)

Fixed vs. oscillating

Bevel gear and pinion

Differential

Two speed

Hydrostatic

Final gear (planetary hub or in house gears)

2-wheel drive or 4-wheel drive (2WD, 4WD)

7.4 Steering (specify type; see ISO 5010)

Articulated steering

Front wheel steer

Rear wheel steer

All wheel steer

Manual, hydrostatic (power assisted, full-power steering)

Emergency steer method

7.4.1 Performance

Turning diameter left and right: (see ISO 7457)

Articulation angle:

Machine clearance diameter:.....

Tyre clearance diameter:

7.5 Brakes (specify type)**7.5.1 Service brake**

Type (drum, disc, wet or dry)

Actuating system type (full air, full hydraulic, air over hydraulic, mechanical, etc.)

7.5.2 Parking brake

Type

Actuating system

7.5.3 Secondary brake

Type

Actuating system

7.5.4 Brake performance (specify)

See ISO 3450.

7.6 Tyres and rims (see ISO 4250-1, ISO 4250-2 and ISO 4250-3)

Size and type

Tread

Ply rating

Rim size

7.7 Hydraulic system

Cylinders (number, type and dimensions):

— Lift

— Tilt

— Bucket

Pump type(s)

Number of pumps

Regulating system

Pump flow at given pressure, at rated engine speed

Main relief valve opening pressure

7.8 System fluid capacities

Fuel tank

Engine crankcase

Cooling system

Transmission

Transfer case

Hydraulic system

Axles

Final drive case(s)

7.9 Masses

7.9.1 Operating mass

7.9.2 Shipping mass

7.10 Filtration system (type)

Engine

Transmission

Steering and braking

Hydraulic

7.11 Characteristics which may be affected by bucket selection (machine equipped with non-standard tyres)

See ISO 7131:1997, 7.8.

Annex A

(normative)

Base machine — Dimensions — Symbols, terms and definitions

See Tables A.1 and A.2.

For dimensions of the loader portion and backhoe portion, see ISO 7131 and ISO 7135, respectively.

Table A.1

Symbol	Term	Definition	Drawing
A7	Angle of departure	Maximum angle between the horizontal GRP ⁵⁾ and a plane tangent to the rear tyres or tracks of a machine and passing through the lowest point of any structure or component behind the tyres or tracks, which limit the magnitude of the angle.	
A8	Backhoe swing angle	Maximum swing angle of uninterrupted rotation on Z plane described by the backhoe boom during movement around the backhoe swing pivot centreline.	
A9	Levelling angle	The maximum side slope in degrees that the backhoe can dig a vertical trench by adjusting the stabilizers.	

⁵⁾ The GRP and the X, Y and Z coordinates are defined in ISO 6746-1.

Table A.1 (continued)

Symbol	Term	Definition	Drawing
<i>H11</i>	Transport height	Distance on Z co-ordinate between the GRP and the highest point of the backhoe fitted in its transport position.	
<i>L7</i>	Overall length in transport position	Distance on X co-ordinate between two X planes passing through the farthest points of the front and rear of the machine with equipment/attachment fitted in transport position.	
<i>R3</i>	Minimum turning radius with bucket in carry position	Distance on Z plane between the turning centre and the farthest point on the side of the bucket when the machine is executing its smallest practicable turn.	
<i>R4</i>	Backhoe clearance radius	Distance on Z plane between the turning centre and the farthest point of the backhoe when the machine is executing its smallest practicable turn.	

Table A.1 (continued)

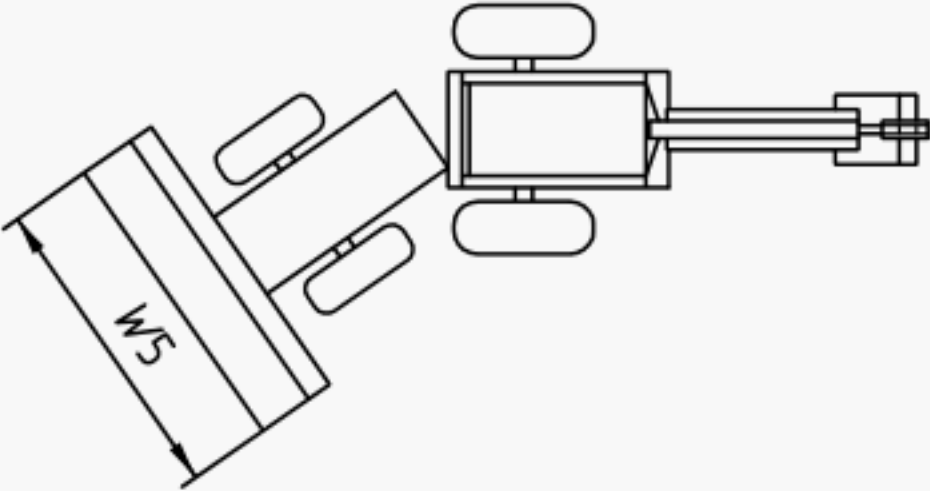
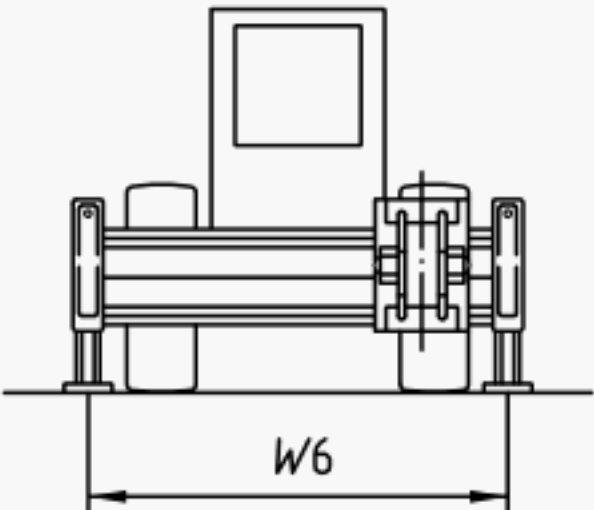
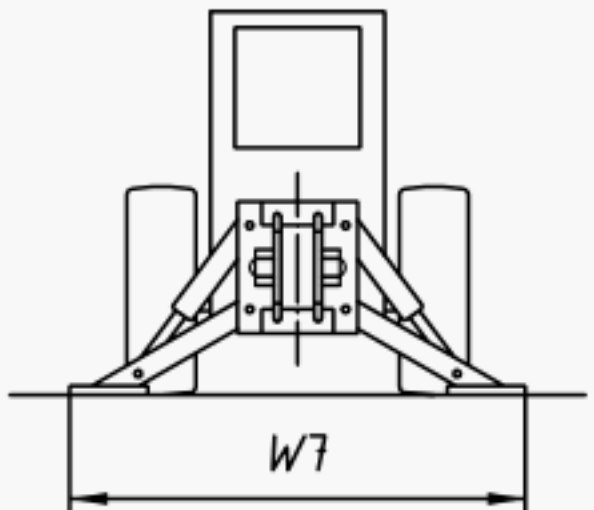
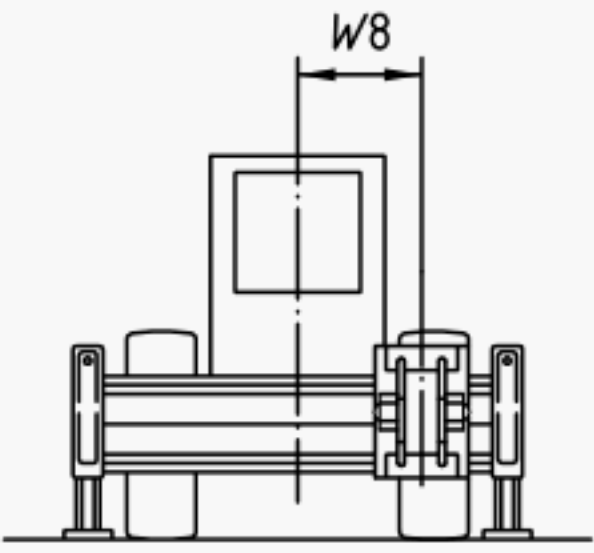
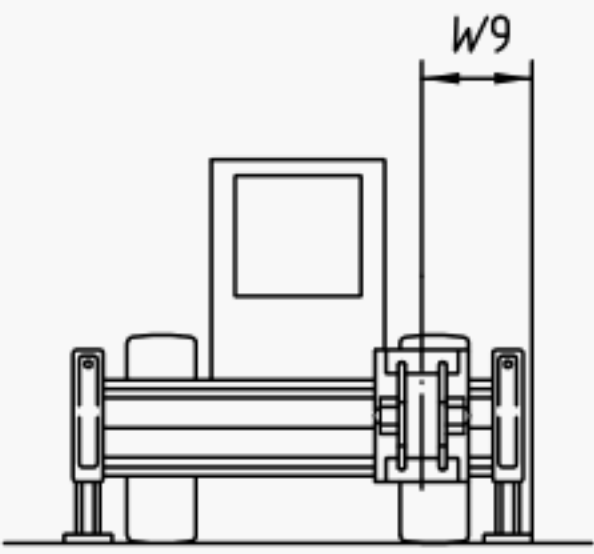
Symbol	Term	Definition	Drawing
W5	Bucket width	Distance on Y co-ordinate between two Y planes passing through the farthest point on the side of the bucket.	
W6	Stabiliser spread	Distance on Y co-ordinate between two Y planes passing through the centres of the stabilizer pads when positioned as shown.	
W7	Stabiliser overall width	Distance on Y co-ordinate between two Y planes passing through the farthest point of the stabilizers (in down position) on both sides.	
W8	Sliding frame maximum operating distance	Distance on Y co-ordinate between two Y planes passing through the centreline of the machine and the swing pivot centre line when it is at maximum offset position.	
W9	Wall clearance	Distance on Y co-ordinate between two Y planes passing through the swing pivot centre in its full side shift position and the outer point of the backhoe or the machine.	

Table A.2

Symbol	Term	Reference
<i>A1</i>	Articulation angle	See ISO 6746-1
<i>A2</i>	Dump angle	See ISO 7131
<i>A3</i>	Maximum rollback, fully raised	See ISO 7131
<i>A4</i>	Maximum rollback at ground	See ISO 7131
<i>A5</i>	Maximum rollback at carry position	See ISO 7131
<i>A6</i>	Maximum grading angle	See ISO 7131
<i>A7</i>	Angle of departure	See Table A.1
<i>A8</i>	Backhoe swing angle	See Table A.1
<i>A9</i>	Levelling angle	See Table A.1
<i>H1</i>	Maximum height	See ISO 6746-1
<i>H2</i>	Maximum height (without cab or ROPS)	See ISO 6746-1
<i>H3</i>	Shipping height	See ISO 6746-1
<i>H4</i>	Ground clearance	See ISO 6746-1
<i>H6</i>	Digging depth	See ISO 7131
<i>H7</i>	Carry position (height)	See ISO 7131
<i>H8</i>	Dump height	See ISO 7131
<i>H9</i>	Height to hinge pin, fully raised	See ISO 7131
<i>H10</i>	Overall operating height, fully raised	See ISO 7131
<i>H11</i>	Transport height	See Table A.1
<i>HH1</i>	Maximum height of cutting edge (<i>HH20</i>)	See ISO 7135:—, annex B
<i>HH2</i>	Maximum bucket hinge pin height (<i>HH21</i>)	See ISO 7135:—, annex B
<i>HH3</i>	Maximum bucket loading clearance (<i>HH22</i>)	See ISO 7135:—, annex B
<i>HH4</i>	Maximum dumping height (<i>HH23</i>)	See ISO 7135:—, annex B
<i>HH5</i>	Maximum digging depth (<i>HH24</i>)	See ISO 7135:—, annex B
<i>HH6</i>	Maximum vertical digging depth (<i>HH25</i>)	See ISO 7135:—, annex B

Table A.2 (continued)

Symbol	Term	Reference
<i>HH7</i>	Maximum digging depth at 2,5 m floor length (<i>HH26</i>)	See ISO 7135:—, annex B
<i>L1</i>	Maximum length	See ISO 6746-1
<i>L3</i>	Wheel base	See ISO 6746-1
<i>L4</i>	Rear overhang	See ISO 6746-1
<i>L5</i>	Rear axle to pivot of articulation	See ISO 6746-1
<i>L7</i>	Overall length	See Table A.1
<i>L9</i>	Cab overall length (<i>L19</i>)	See ISO 7135
<i>R1</i>	Turning radius	See ISO 6746-1
<i>R2</i>	Machine clearance radius	See ISO 6746-1
<i>R3</i>	Minimum turning radius with bucket in carry position	See Table A.1
<i>R4</i>	Backhoe clearance radius	See Table A.1
<i>RR1</i>	Maximum reach	See ISO 7135
<i>RR2</i>	Maximum reach at GRP	See ISO 7135
<i>RR3</i>	Reach at maximum digging depth	See ISO 7135
<i>RR4</i>	Minimum reach at GRP	See ISO 7135
<i>W1</i>	Maximum width	See ISO 6746-1
<i>W3</i>	Tread (wheel)	See ISO 6746-1
<i>W5</i>	Bucket width	See Table A.1
<i>W6</i>	Stabiliser spread	See Table A.1
<i>W7</i>	Stabiliser overall width	See Table A.1
<i>W8</i>	Sliding frame maximum operating distance	See Table A.1
<i>W9</i>	Wall clearance	See Table A.1
<i>W19</i>	Overall width of cab	See ISO 7135

