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ISO 8812

Second edition
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Earth-moving machinery — Backhoe loaders — Terminology and commercial specifications

Engins de terrassement — Chargeuses-pelleteuses — Terminologie et spécifications commerciales

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 4, *Terminology, commercial nomenclature, classification and ratings*.

This second edition cancels and replaces the first edition (ISO 8812:1999), which has been technically revised.

Earth-moving machinery — Backhoe loaders — Terminology 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, as defined in ISO 6165, and their equipment.

This International Standard is not applicable to loaders equipped with a backhoe attachment in accordance with ISO 7131:2009, 3.3.1.1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6746-1:2003, *Earth-moving machinery — Definitions of dimensions and codes — Part 1: Base machine*

ISO 6746-2, *Earth-moving machinery — Definitions of dimensions and codes — Part 2: Equipment and attachments*

ISO 7131:2009, *Earth-moving machinery — Loaders — Terminology and commercial specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6165, ISO 6746-1, ISO 6746-2 and the following apply.

3.1
backhoe loader
self-propelled crawler or wheeled machine having a main frame designed to carry both front-mounted *equipment* (3.3) and rear-mounted backhoe equipment (normally with outriggers or stabilizers)

Note 1 to entry: When used in the backhoe mode, the machine is stationary and normally digs below ground level.

Note 2 to entry: When used in the loader mode (bucket use), the machine loads through forward motion.

Note 3 to entry: A backhoe work cycle normally comprises excavating, elevating, swinging, and discharging of material. A loader work cycle normally comprises filling, elevating, transporting and discharging of material.

3.2
base machine
machine with a cab or canopy and operator protective structures if required, without *equipment* (3.3) or *attachments* (3.5) but possessing the necessary mountings for such equipment and attachments

3.3
equipment
set of *components* (3.6) mounted onto the *base machine* (3.2), which allows an *attachment* (3.5) to perform the primary design function of the machine

3.4
optional equipment
optional items of *equipment* (3.3) mounted onto the *base machine* (3.2) to increase, for example, capacity, flexibility, and comfort

3.5
attachment
assembly of *components* (3.6) that can be mounted onto the *base machine* (3.2) or *equipment* (3.3) for specific use

3.6
component
part or an assembly of parts of a *base machine* (3.2), *equipment* (3.3), or an *attachment* (3.5)

3.7 Masses

3.7.1
operating mass
OM
mass of the *base machine* (3.2), with *equipment* (3.3) and empty *attachment* (3.5) in the most usual configuration as specified by the manufacturer, and with the operator (75 kg), full fuel tank, and all fluid systems (i.e. hydraulic oil, transmission oil, engine oil, engine coolant) at the levels specified by the manufacturer and, when applicable, with sprinkler water tank(s) half full

[SOURCE: ISO 6016:2008, 3.2.1]

Note 1 to entry: Ballast mass at delivery can be included if specified by the manufacturer.

3.7.2
shipping mass
SM
mass of the *base machine* (3.2) without an operator, with the fuel level at 10 % of tank capacity or with the minimum fuel level needed for machine shipping purposes as specified by the manufacturer, whichever is higher, with all fluid systems at the levels specified by the manufacturer and with empty sprinkler tank(s), when applicable, and with or without *equipment* (3.3), ballast, *attachment* (3.5), cab, canopy, operator-protective structures, wheels and counterweights as stated by the manufacturer

[SOURCE: ISO 6016:2008, 3.2.6]

Note 1 to entry: If the manufacturer intends that the machine be partially disassembled for shipping purposes, the masses of the disassembled items shall also be stated.

4 Base machine

4.1 Types of backhoe loaders

Backhoe loaders are classified according to the following attributes.

4.1.1 Type of backhoe equipment

4.1.1.1 Side-shift backhoe

See Figure 1.

4.1.1.2 Centre pivot backhoe

See Figure 2.

4.1.2 Drive and steering system

4.1.2.1 Rigid frame, front-wheel steer, rear-wheel drive

See Figure 3 a).

4.1.2.2 Rigid frame, front/all-wheel steer, all-wheel drive

See Figures 3 b) and 3 c).

4.1.2.3 Rigid frame, all-wheel steer, rear-wheel drive

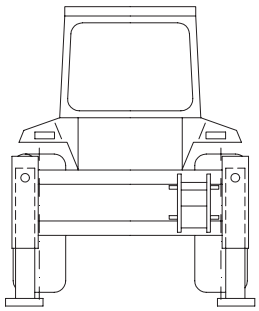
See Figure 3 d).

4.1.2.4 Articulated steering, rear-wheel drive

See Figure 4 a).

4.1.2.5 Articulated steering, all-wheel drive

See Figure 4 b).



NOTE Backhoe linkage removed to improve clarity.

Figure 1 — Side-shift backhoe

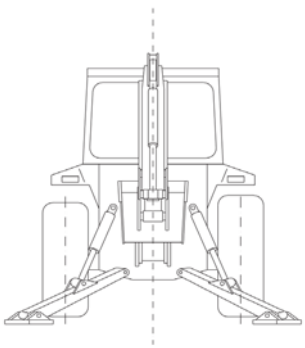
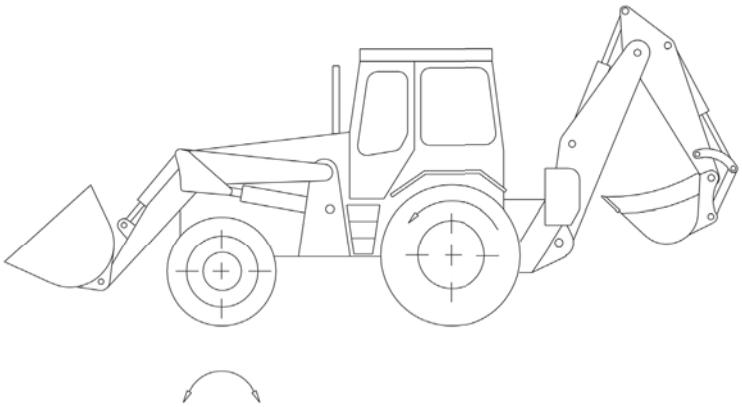
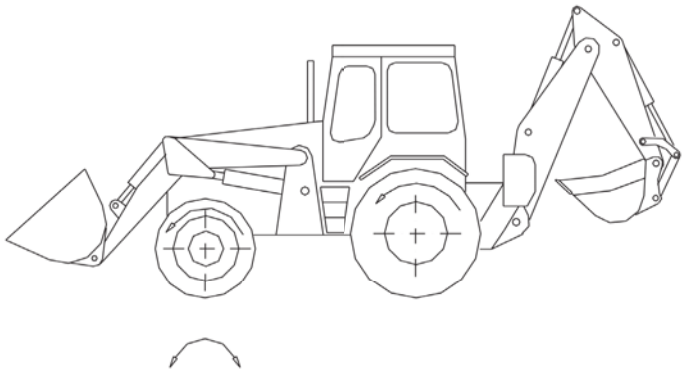


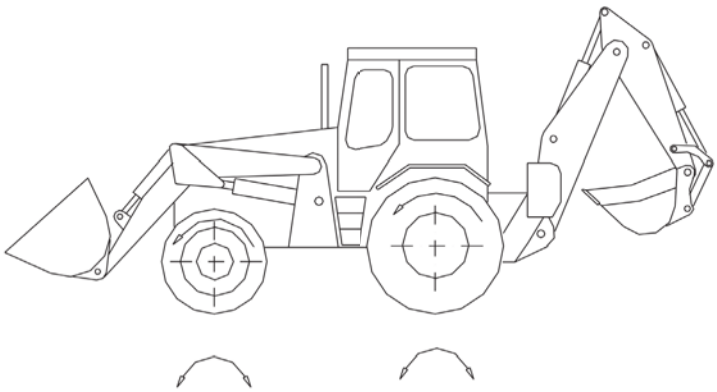
Figure 2 — Centre pivot backhoe



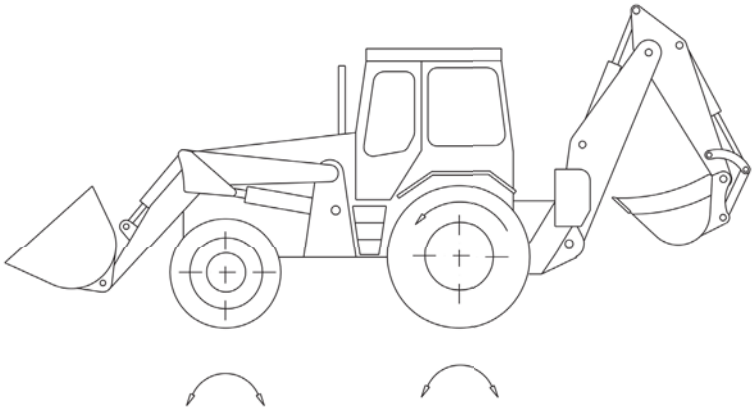
a) Front-wheel steer, rear-wheel drive



b) Front-wheel steer, all-wheel drive

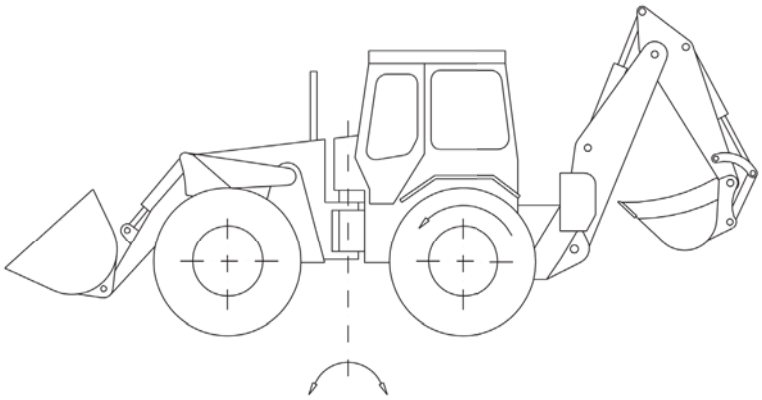


c) All-wheel steer, all-wheel drive

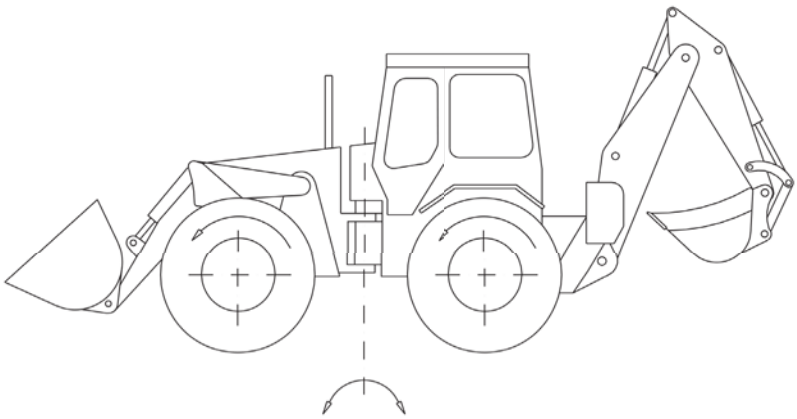


d) All-wheel steer, rear-wheel drive

Figure 3 — Rigid frame



a) Rear-wheel drive



b) All-wheel drive

Figure 4 — Articulated steering

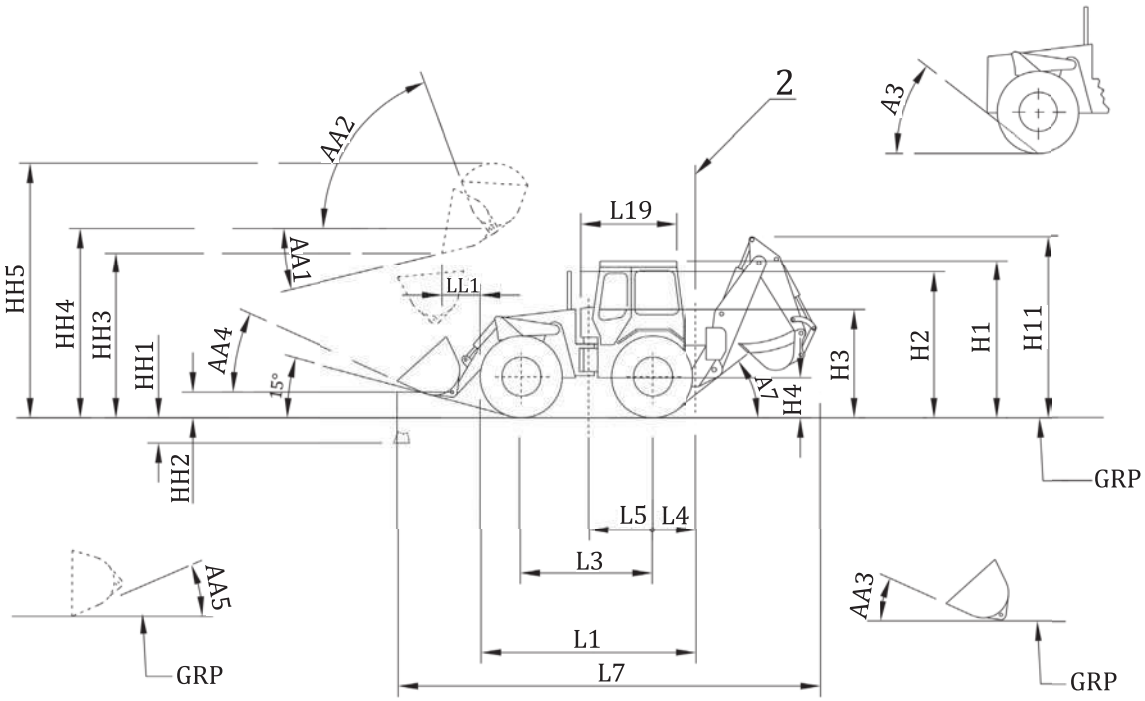
NOTE Front and rear wheels could have different sizes.

4.2 Dimensions

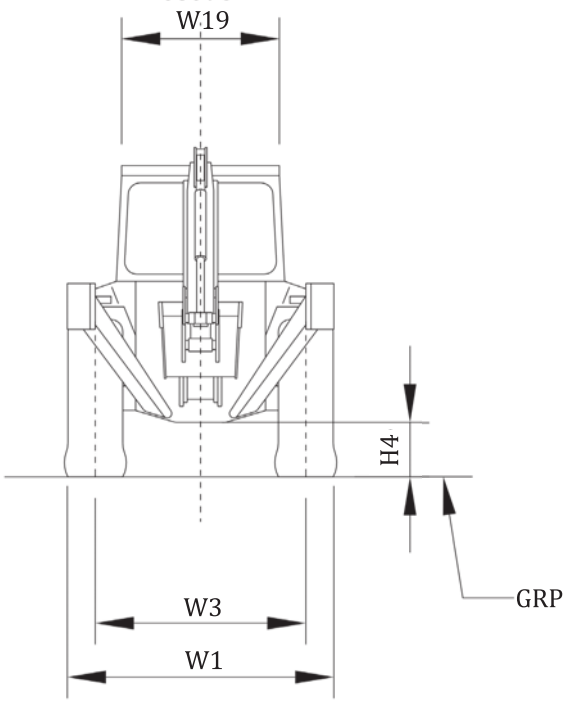
See Figures 5 and 6. The dimensions indicated in Figures 5 and 6 shall be obtained with all tyres tangent to ground and at their recommended air pressure.

For definitions of dimensions, see ISO 6746-1 and ISO 7131.

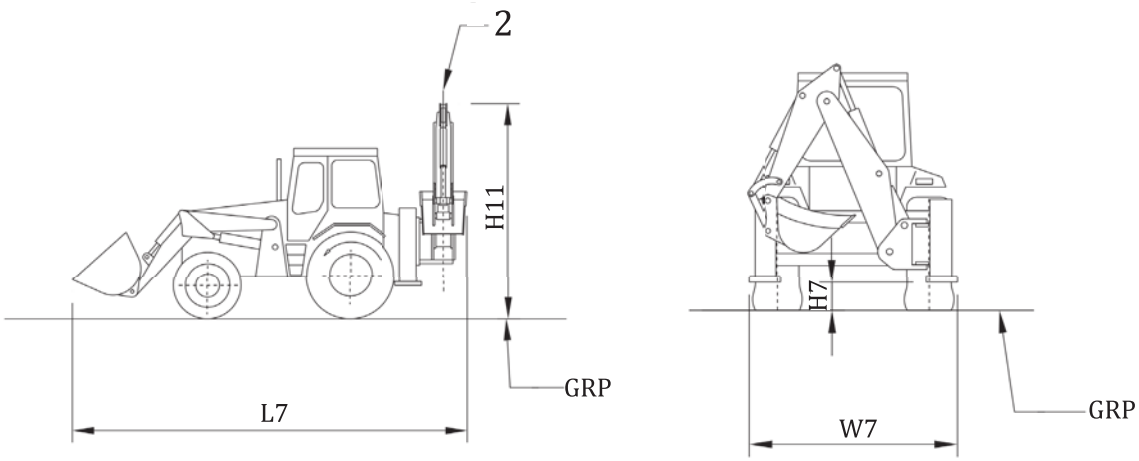
For definition of dimensions strictly related to backhoe loaders, see Annex A.



a) Backhoe loader



b) Centre pivot backhoe



c) Side-shift backhoe

Key

2 swing pivot

GRP ground reference plane

Figure 5 — Dimensions

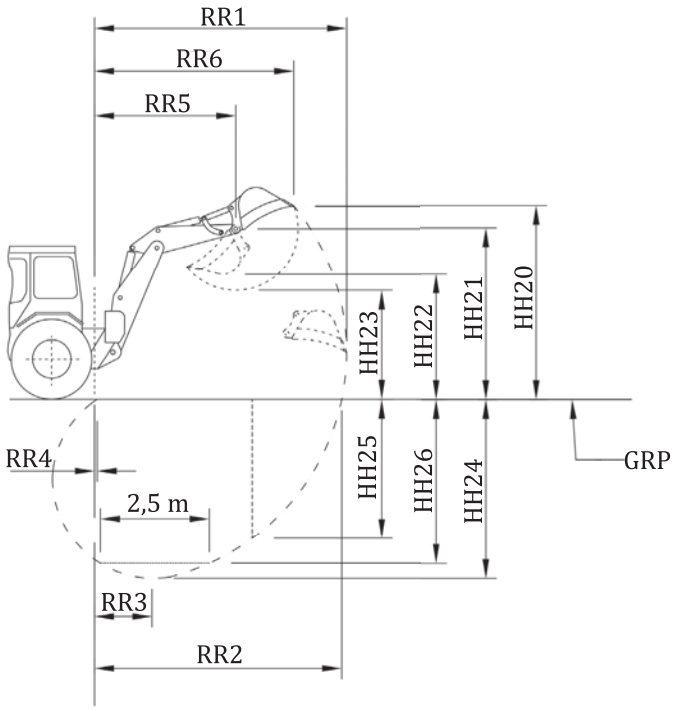


Figure 6 — Digging dimensions

4.2.1 Operational positions of backhoe

The dimensions indicated in Figures 7 and 8 shall be obtained with the main bearing surfaces of the stabilizers on the ground and with all tyres tangent to ground and at their recommended air pressure.

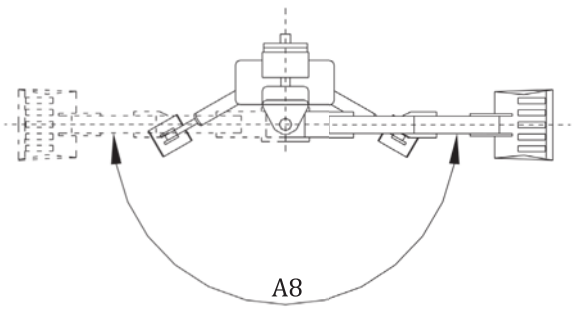


Figure 7 — Backhoe swing pivot axis (plane view)

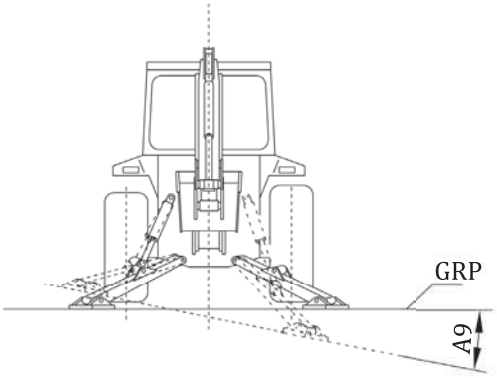


Figure 8 — Levelling angle

4.2.2 Operational position of stabilizers and outriggers

4.2.2.1 Overall width

Stabilizers and outriggers shown in operating positions. See Figures 9 and 10.

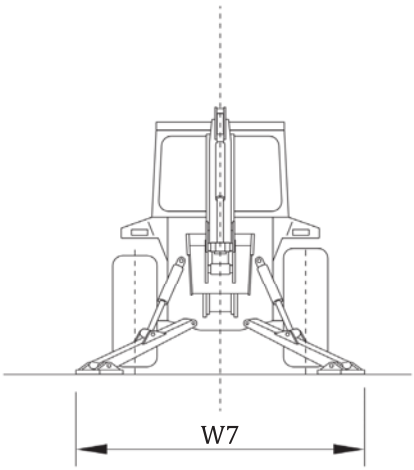
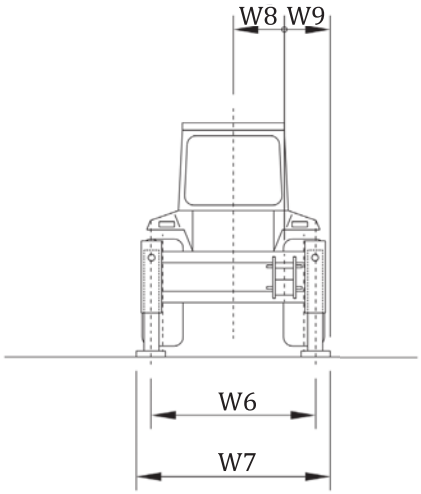


Figure 9 — Centre pivot backhoe

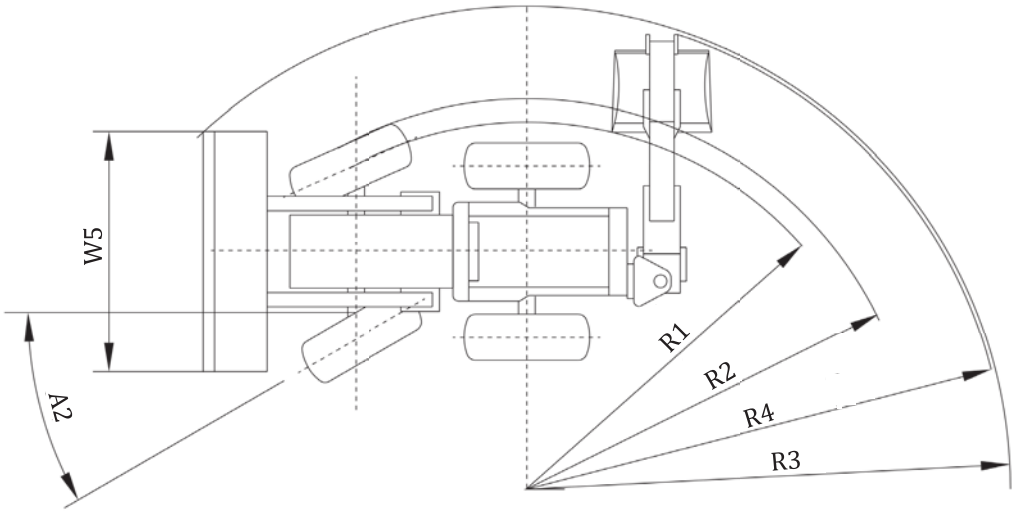


NOTE Backhoe linkage removed to improve clarity.

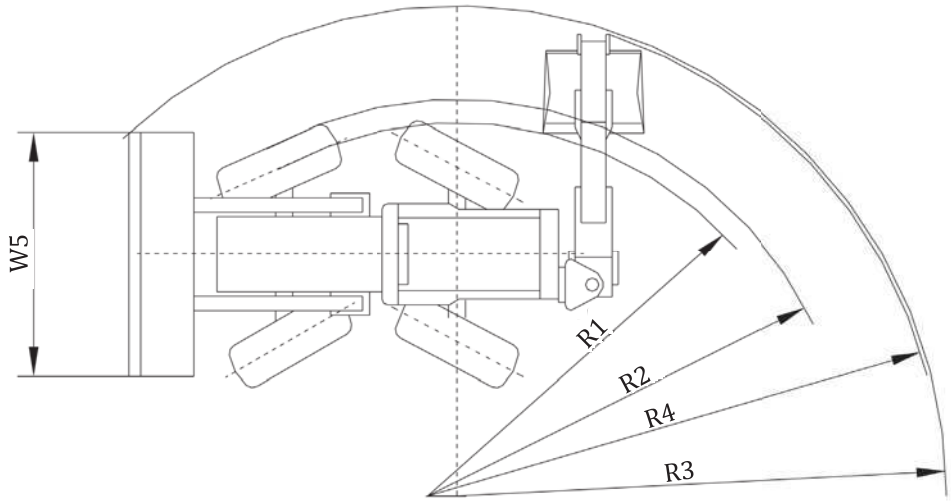
Figure 10 — Side-shift backhoe

4.2.3 Manoeuvring dimensions

See Figures 11 a), 11 b), and 12.



a) Rigid frame and front-wheel steer



b) Rigid frame and all-wheel steer

Figure 11 — Manoeuvring dimension

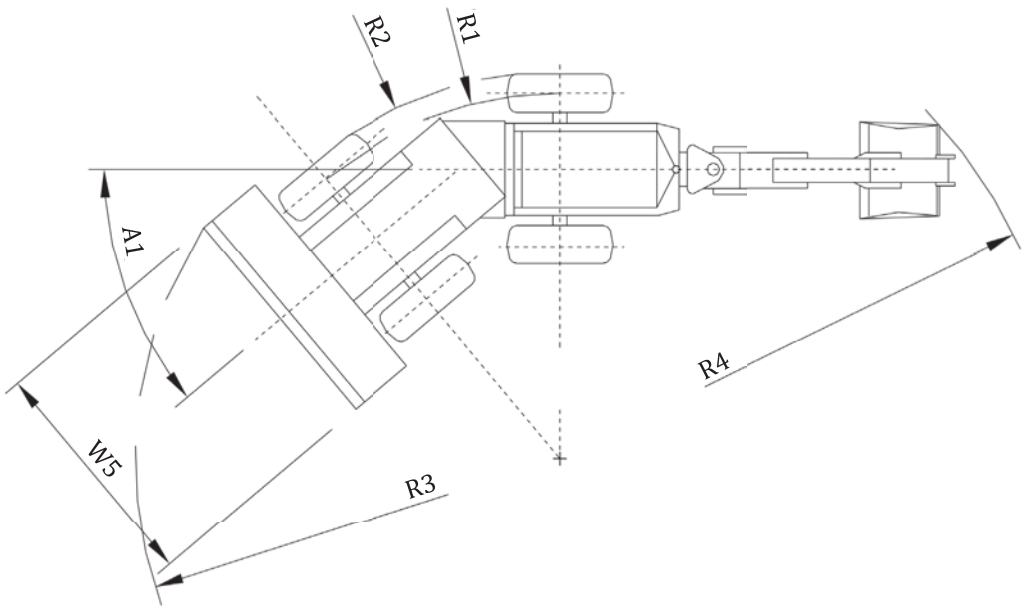


Figure 12 — Manoeuvring dimensions (articulated frame)

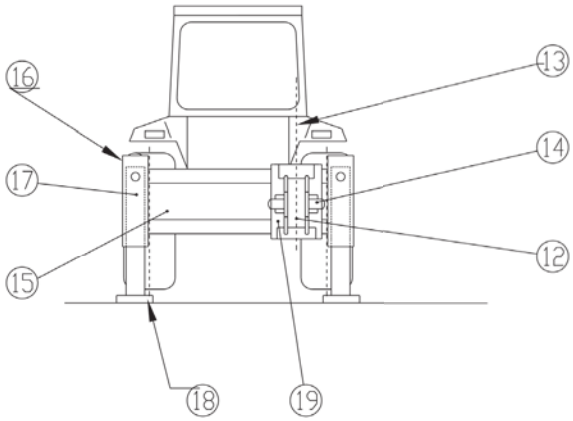
NOTE Bucket in carry position and backhoe in transport position.

4.3 Nomenclature

See diagram numbers.

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

4.3.2 For backhoe equipment, see Figures 13, 14, and 15 and ISO 7135.

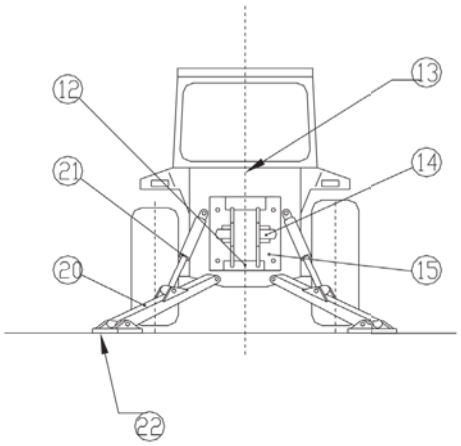


Key

12 swing frame
13 swing pivot centre line
14 swing actuator/cylinder
15 main frame
16 outrigger (right or left)
17 outrigger cylinder (right or left)
18 outrigger pad (right or left)
19 side-shift frame (sliding frame)

NOTE Backhoe linkage removed to improve clarity.

Figure 13 — Side-shift backhoe

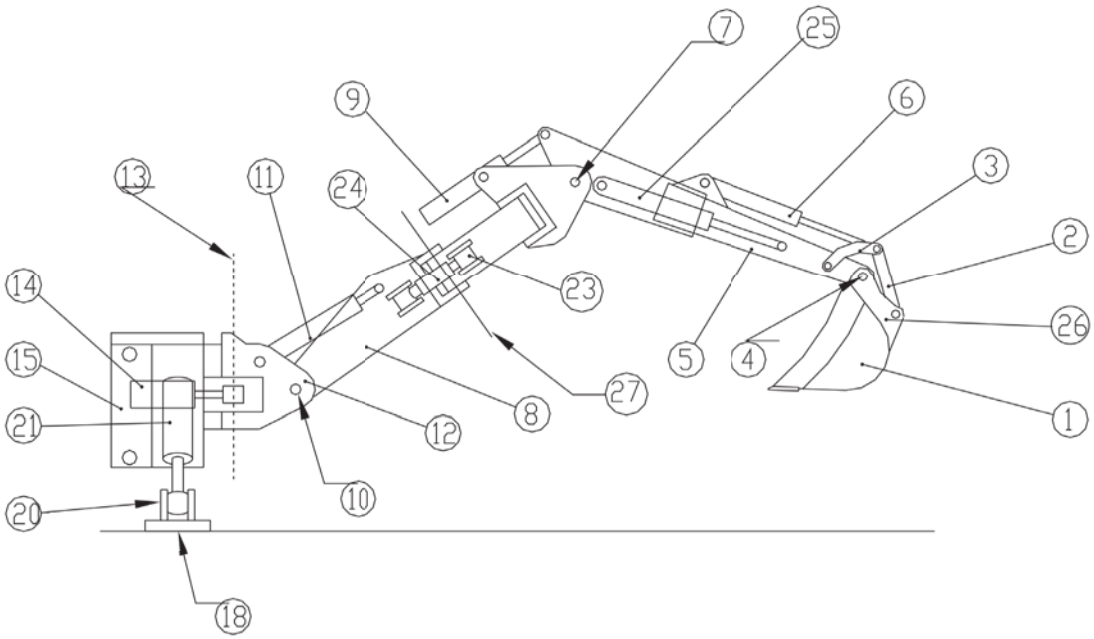


Key

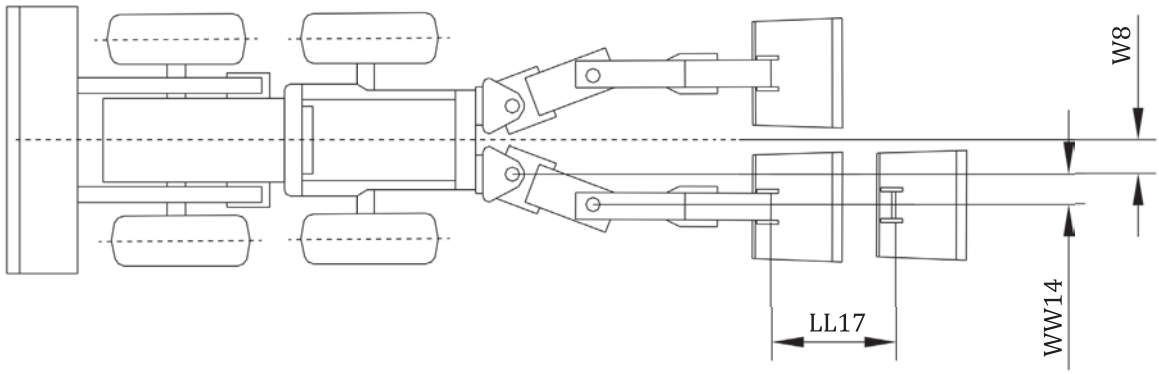
12 swing frame
13 swing pivot centre line
14 swing actuator/cylinder
15 main frame
20 stabilizer (right or left)
21 stabilizer cylinder (right or left)
22 stabilizer pad (right or left)

NOTE Backhoe linkage removed to improve clarity.

Figure 14 — Centre pivot backhoe



a) Offset dimensions



b) Offset dimensions (plain view)

Key

1	bucket	10	boom pivot pin
2	bucket linkage	11	boom cylinder
3	guide linkage	12–22	see Figures 13 and 14
4	bucket pivot pin	23	tie link
5	arm (extendable)	24	side deflection cylinder
6	bucket cylinder	25	extendable arm cylinder
7	arm pivot	26	quick coupler
8	boom	27	arm deflection pivot centre line
9	arm cylinder		

Figure 15 — 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.

See ISO 14396.

NOTE ISO 14396 can also be referenced for certain national or regional requirement purposes.

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 14397-2.

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 cylinders

See ISO 6015.

6.3.2 Maximum hoe tool force using arm cylinders

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 and reverse)

7.3 Drive axles

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

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 types

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 cases

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 can be affected by bucket selection (machine equipped with non-standard tyres)

The following characteristics can be affected:

a) bucket capacity (nominal heaped);

b) overall operating height;

c) overall length;

d) dump angle;

e) dump height;

f) reach, fully raised;

g) rollback (specify height);

h) maximum rollback at ground;

i) carry position;

j) maximum rollback at carry position;

k) digging depth;

l) bucket width;

m) maximum grading angle;

n) operating mass (can be further affected by tyre selection, tyre ballast, counterweight, or attachments);

o) operating load;

p) tipping load (can be further affected by tyre selection, tyre ballast, counterweight, or attachments);

q) tipping load, at specified height (can be further affected by tyre selection, tyre ballast, counterweight, or attachments);

r) breakout force (can be further affected by tyre selection, tyre ballast, counterweight, or attachments);

s) machine clearance radius (can be further affected by tyre selection).

Annex A
(normative)

Base machine — Dimensions — Symbols, terms and definitions

See Tables A.1 and A.2.

Annex A defines base machine height, width, and angular dimensions for backhoe loaders. For dimensions of the loader portion and backhoe portion, see ISO 7131 and ISO 7135, respectively.

Table A.1

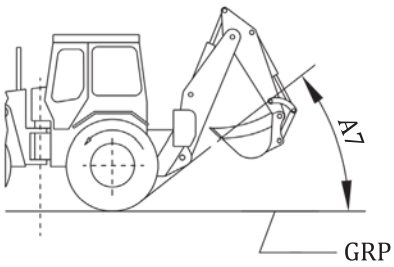
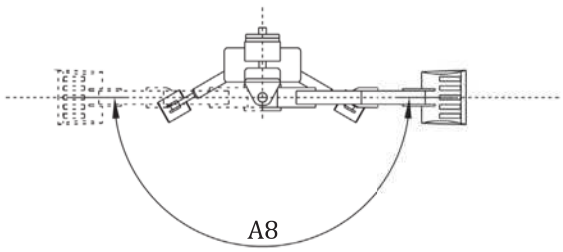
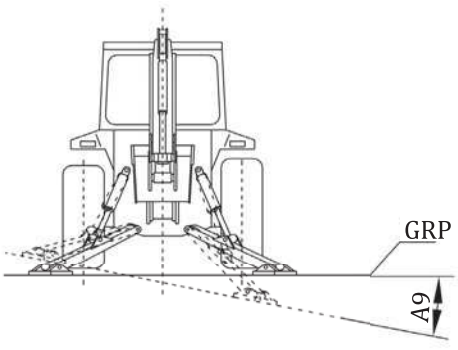
Code	Term	Definition	Illustration
A7	Angle of departure	Maximum angle between the horizontal GRP and a plane tangent to the rear tyres or tracks of a machine and passing through the lowest point of any structure or component behind the tyres or tracks, which limit the magnitude of the angle.	
A8	Backhoe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

Table A.1 *(continued)*

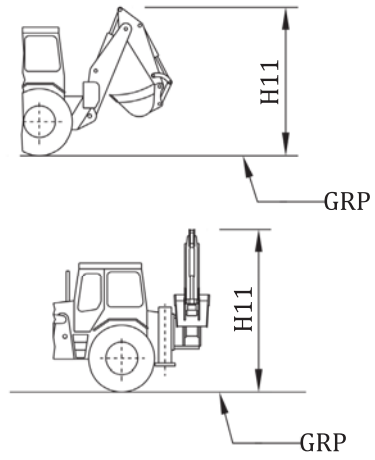
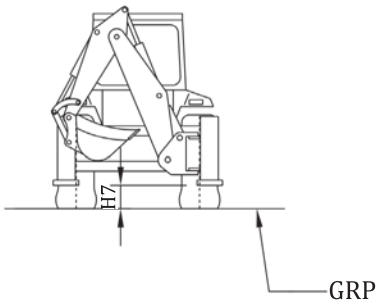
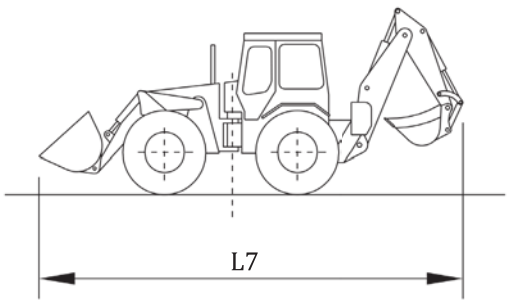
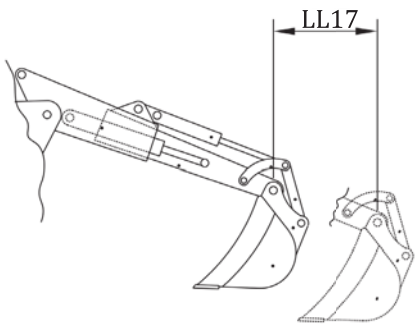
Code	Term	Definition	Illustration
H11	Transport height	Distance on Z coordinate between the GRP and the highest point of the backhoe fitted in its transport position.	
H7	Outrigger (stabilizer) carry height	Distance on Z coordinate between the GRP and the outrigger (stabilizer) pad's lowest point with the outrigger (stabilizer) fitted in its transport position.	
L7	Overall length in transport position	Distance on X coordinate between two X planes passing through the farthest points of the front and rear of the machine with equipment/ attachment fitted in transport position.	
LL17	Extendable arm offset	Distance on X coordinate between the X planes passing through the bucket pivot pin when the extendable arm is at minimum length and the same plane when the extendable arm is at maximum offset position.	

Table A.1 *(continued)*

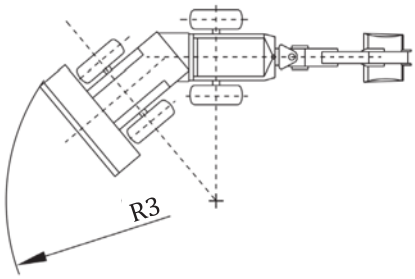
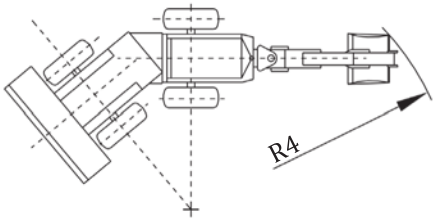
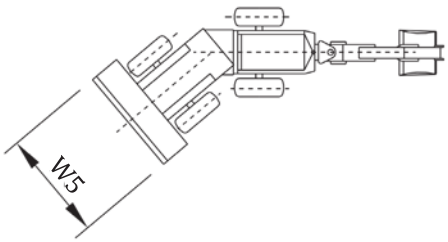
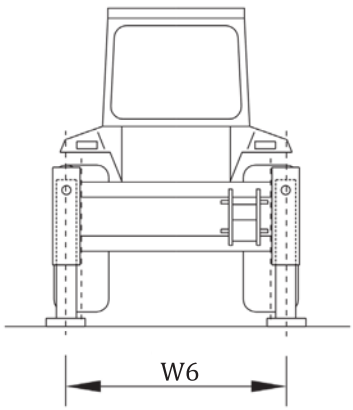
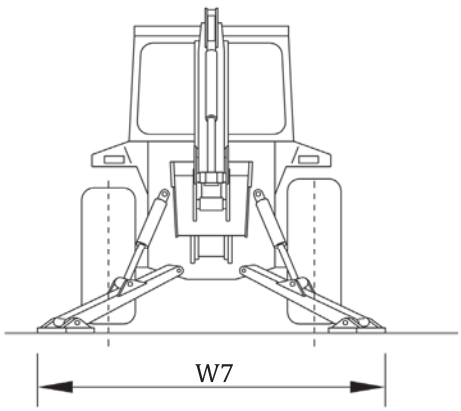
Code	Term	Definition	Illustration
R3	Minimum turning radius with bucket in carry position	Distance on Z plane between the turning centre and the farthest point on the side of the bucket when the machine is executing its smallest practicable turn.	
R4	Backhoe clearance radius	Distance on Z plane between the turning centre and the farthest point of the backhoe when the machine is executing its smallest practicable turn.	
W5	Bucket width	Distance on Y coordinate between two Y planes passing through the farthest point on the side of the bucket.	
W6	Outrigger spread	Maximum distance on Y coordinate between two Y planes passing through the centres of the outrigger pads when positioned as shown.	
W7	Stabilizer (outrigger) overall width	Distance on Y coordinate between two Y planes passing through the farthest point of the stabilizers (outrigger), in down position, on both sides.	

Table A.1 *(continued)*

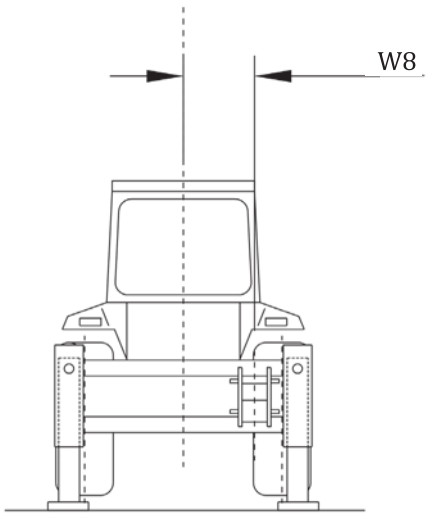
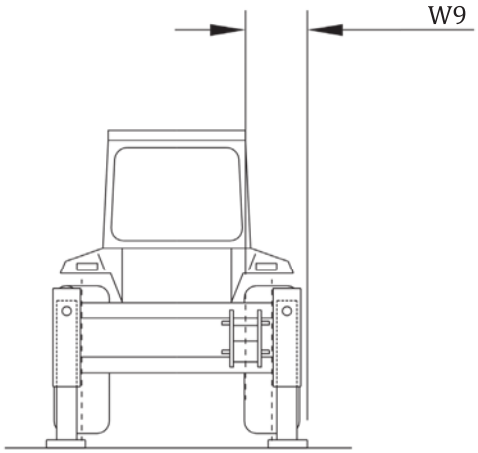
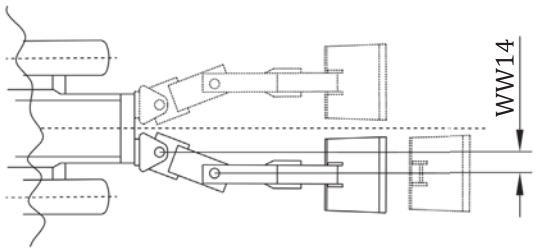
Code	Term	Definition	Illustration
W8	Sliding frame maximum operating distance	Distance on Y coordinate between two Y planes passing through the centre line of the machine and the swing pivot centre line when it is at maximum offset position.	
W9	Wall clearance	Distance on Y coordinate between two Y planes passing through the swing pivot centre line in its full side-shift position and the outer point of the backhoe or the machine.	
WW14	Arm deflection offset	Distance on Y coordinate between two Y planes passing through the swing pivot centre line and the arm deflection pivot centre line when it is at maximum offset position.	
NOTE The X, Y and Z coordinates and X, Y and Z planes comprise the three-dimensional coordinate system used for defining the dimensions of earth-moving machinery in accordance with ISO 6746-1. The ground reference plane (GRP) is also defined therein.			

Table A.2

Symbol	Term	Reference
A1	Articulation angle	See ISO 6746-1:2003, Annex E
A2	Ackermann steering angle	See ISO 6746-1:2003, Annex E
A3	Angle of approach	See ISO 6746-1:2003, Annex E
A4	Angle of departure	See ISO 6746-1:2003, Annex E
AA1	Dump angle	See ISO 7131:2009, Annex A
AA2	Maximum rollback fully raised	See ISO 7131:2009, Annex A
AA3	Maximum rollback at ground	See ISO 7131:2009, Annex A
AA4	Maximum rollback at carry position	See ISO 7131:2009, Annex A
AA5	Maximum grading angle	See ISO 7131:2009, Annex A
A7	Angle departure	See Table A.1
A8	Backhoe swing angle	See Table A.1
A9	Levelling angle	See Table A.1
H1	Maximum height	See ISO 6746-1:2003, Annex A
H2	Maximum height (without cab or ROPS)	See ISO 6746-1:2003, Annex A
H3	Shipping height	See ISO 6746-1:2003, Annex A
H4	Ground clearance	See ISO 6746-1:2003, Annex A
HH1	Digging depth	See ISO 7131:2009, Annex A
HH2	Carry position (height)	See ISO 7131:2009, Annex A
HH3	Dump height	See ISO 7131:2009, Annex A
HH4	Height to hinge pin, fully raised	See ISO 7131:2009, Annex A
HH5	Overall operating height, fully raised	See ISO 7131:2009, Annex A
HH20	Maximum height of cutting edge	See ISO 7135:2009, Annex B
HH21	Maximum bucket hinge pin height	See ISO 7135:2009, Annex B
HH22	Maximum bucket (grab) loading clearance	See ISO 7135:2009, Annex B
HH23	Maximum dumping height	See ISO 7135:2009, Annex B
HH24	Maximum digging depth	See ISO 7135:2009, Annex B
HH25	Maximum vertical digging depth	See ISO 7135:2009, Annex B
HH26	Maximum digging depth at 2,5 m floor length	See ISO 7135:2009, Annex B
L1	Maximum length	See ISO 6746-1:2003, Annex C
L3	Wheel base	See ISO 6746-1:2003, Annex C
L4	Rear overhang	See ISO 6746-1:2003, Annex C
L5	Rear axle to pivot of articulated steering	See ISO 6746-1:2003, Annex C
L7	Overall length in transport position	See Table A.1
LL1	Reach fully raised	See ISO 7131:2009, Annex A
LL17	Extendable arm offset	See Table A.1
L19	Cab overall length	See ISO 7135; Annex A
R1	Turning radius	See ISO 6746-1:2003, Annex D
R2	Clearance radius	See ISO 6746-1:2003, Annex D
R3	Minimum turning radius with bucket in carry position	See Table A.1
R4	Backhoe clearance radius	See Table A.1
RR1	Maximum reach	See ISO 7135:2009, Annex B
RR2	Maximum reach at GRP	See ISO 7135:2009, Annex B
RR3	Reach at maximum digging depth	See ISO 7135:2009, Annex B
RR4	Minimum reach at GRP	See ISO 7135:2009, Annex B

Table A.2 *(continued)*

Symbol	Term	Reference
RR5	Reach to bucket pin centre at minimum height	See ISO 7135:2009, Annex B
RR6	Reach at maximum height	See ISO 7135:2009, Annex B
W1	Maximum width	See ISO 6746-1:2003, Annex B
W3	Tread (wheel type)	See ISO 6746-1:2003, Annex B
W5	Bucket width	See Table A.1
W6	Stabilizer spread	See Table A.1
W7	Stabilizer (outrigger) overall width	See Table A.1
W8	Sliding frame maximum operating distance	See Table A.1
W9	Wall clearance	See Table A.1
WW14	Arm deflection offset	See Table A.1
W19	Cab width overall	See ISO 7135:2009, Annex A

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