



BSI Standards Publication

Earth-moving machinery — Hydraulic excavators — Terminology and commercial specifications

National foreword

This British Standard is the UK implementation of ISO 7135:2009+A1:2019. It supersedes BS ISO 7135:2009, which is withdrawn.

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Earth-moving machinery — Hydraulic excavators — Terminology and commercial specifications

Engins de terrassement — Pelles hydrauliques — Terminologie et spécifications commerciales



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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7135 was prepared by Technical Committee 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 7135:1993](#)), which has been technically revised.

Earth-moving machinery — Hydraulic excavators — Terminology and commercial specifications

1 Scope

This International Standard establishes terminology and the content of commercial literature specifications for self-propelled crawler and wheeled hydraulic excavators and their equipment and attachments.

It is applicable to common components and does not cover terms or commercial specifications specific to walking excavators.

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.

[ISO 3450](#), *Earth-moving machinery — Braking systems of rubber-tyred machines — Systems and performance requirements and test procedures for braking systems*

[ISO 5010](#), *Earth-moving machinery — Rubber-tyred machines — Steering requirements*

[ISO 6014](#), *Earth-moving machinery — Determination of ground speed*

[ISO 6015](#), *Earth-moving machinery — Hydraulic excavators and backhoe loaders — Methods of determining tool forces*

[ISO 6165:2006](#), *Earth-moving machinery — Basic types — Identification and terms and definitions*

[ISO 6746-1](#), *Earth-moving machinery — Definitions of dimensions and codes — Part 1: Base machine*

[ISO 6746-2:2003](#), *Earth-moving machinery — Definitions of dimensions and codes — Part 2: Equipment and attachments*

[ISO 9249](#), *Earth-moving machinery — Engine test code — Net power*

[ISO 10265](#), *Earthmoving machinery — Crawler machines — Performance requirements and test procedures for braking systems*

[ISO 10567](#), *Earth-moving machinery — Hydraulic excavators — Lift capacity*

[ISO 14396](#), *Reciprocating internal combustion engines — Determination and method for the measurement of engine power — Additional requirements for exhaust emission tests in accordance with ISO 8178*

3 Terms and definitions

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

3.1 General

3.1.1

excavator

self-propelled machine on crawlers, wheels or legs, having an upper structure capable of a 360° swing and with mounted equipment, which is primarily designed for excavating with a bucket, without movement of the undercarriage during the work cycle

Note 1 to entry: An excavator work cycle normally comprises excavating, elevating, swinging and discharging of material.

Note 2 to entry: An excavator can also be used for object or material handling/transportation.

Note 3 to entry: [Figures 1 to 3](#) describe the types of excavator defined in [3.1.1.1](#) to [3.1.1.3](#).

3.1.1.1

minimal swing radius excavator

MSRX

 excavator designed for operation in a confined space, having an upper structure with a short swinging radius and with its fully retracted equipment and attachment swinging within a tubular envelope corresponding to 120 % of the width of the undercarriage 

3.1.1.2

compact excavator

excavator with an operating mass less than or equal to 6 000 kg

3.1.1.3

walking excavator

excavator with three or more supporting legs, which can be articulated, telescopic or both, and that can be fitted with wheels

3.1.1.4

minimal tail radius excavator

MTRX

excavator having an upper structure with a short rear-end radius swinging within a tubular envelope corresponding to 120 % of the width of the undercarriage while other parts of the machine, including its fully retracted equipment and attachment, swinging beyond this tubular envelope

Note 1 to entry: Minimal tail radius excavators are used to enhance the usability on work sites where the swing area of the rear of the machine is limited, while maintaining operation performance of a standard excavator. 

3.1.2

base machine

excavator with a cab or canopy and operator-protective structures if required, without equipment or attachments, but possessing the necessary mountings for such equipment and attachments

Note 1 to entry: [Figures 4](#) and [5](#) describe the base machine and its dimensions.

3.1.3

cab riser

any spacer that increases the height of the SIP greater than 250 mm relative to the normal configuration or a system that raises the cab away from the excavator in an upward direction either through a mechanical or hydraulic system

Note 1 to entry: For the SIP (seat index point), see [ISO 5353](#).

3.1.4 Equipment and attachment positions

3.1.4.1

transport position

orientation in which the equipment and its affixed attachment is placed when the excavator is positioned for shipment or transport on a flat level surface, such as a rail car or flat bed trailer, as recommended by the manufacturer

Note 1 to entry: The minimal overall length and height of the excavator will result from this position.

3.1.4.2

manoeuvring position

orientation in which the equipment and its affixed attachment is placed when the excavator is positioned as recommended by the manufacturer for travel requiring numerous turns

3.1.4.3

travel position

orientation in which the equipment and its affixed attachment is placed when the excavator is positioned as recommended by the manufacturer for long-distance straight-line travel

3.2 Masses

3.2.1

operating mass

OM

mass of the base machine, with equipment and empty attachment 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, definition 3.2.1]

3.2.2

shipping mass

SM

mass of the base machine without an operator, and with fuel level at 10 % of tank capacity or with 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), if required, and with or without equipment, ballast, attachment, cab, canopy, operator-protective structures, wheels and counterweights as stated by the manufacturer

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

[SOURCE: ISO 6016:2008, definition 3.2.6]

3.3 Attachments

3.3.1

attachment

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

[SOURCE: ISO 6746-2:2003, definition 3.5]

Note 1 to entry: Attachments for hydraulic excavators normally are the working tool attached to the end of the arm or a telescopic boom that provides the digging, cutting, grabbing and processing function of the excavator.

3.3.2

hoe bucket

hoe-type bucket

bucket attached to the arm or telescopic boom and linkage equipment that generally cuts towards the machine

SEE: [Figure 12](#)

3.3.3

grab-type bucket

grab bucket

clamshell bucket

clamshell-type bucket

bucket attached to the arm and linkage equipment that digs or grabs in a generally vertical direction, discharging below and above the ground reference plane (GRP)

SEE: [Figure 16](#)

SEE: [Figure 17](#)

3.3.4

shovel bucket

shovel-type bucket

bucket attached to the arm and linkage equipment that cuts away from the machine and generally upwards, discharging above the ground reference plane (GRP)

SEE: [Figure 18](#)

3.3.5

quick coupler

assembly of components attached to the end of the arm and linkage that facilitates the quick mounting and removal of the attachment from the arm and linkage

Note 1 to entry: A quick coupler can be considered as part of the equipment if integrated directly into the arm.

3.3.6

blade

component mounted on the undercarriage of the base machine that is generally used for backfilling trenches and for limited excavation, and which can also be used as a stabilizer

3.4 Equipment

3.4.1

equipment

set of components mounted onto the base machine to provide the primary design function of the excavator

Note 1 to entry: The definitions given in [3.4.2](#) to [3.4.6](#) are based on the main geometrical digging curves of most common applications of hydraulic excavators.

Note 2 to entry: Other equipment and derivatives are available.

Note 3 to entry: [Figures 6](#) to [21](#) show types of equipment.

3.4.2

telescopic boom equipment

boom, with the necessary mountings for an attachment, which can be extended and retracted, and that generally cuts toward the machine through the telescoping action of the boom

SEE: [Figure 21](#)

Note 1 to entry: It is primarily used for excavation and/or grading of slopes either above or below ground level.

3.4.3

hoe equipment

boom, arm and linkage with the mountings for a hoe-type bucket that generally cuts towards the machine

SEE: [Figure 6](#)

Note 1 to entry: It is primarily used for below-ground level excavation.

3.4.4

shovel equipment

boom, arm and linkage that use a shovel-type bucket attached at the end of the arm that cuts away from the machine and generally upwards

SEE: [Figure 18](#)

Note 1 to entry: It is primarily used for above-ground level excavation.

3.4.5

grab equipment

clamshell equipment

boom, arm and linkage that uses a grab-type or clamshell-type bucket that digs or grabs in a generally vertical direction, discharging below and above the GRP

SEE: [Figure 25](#)

3.4.6

swing-type boom

boom assembly mounted on the front of the undercarriage that can articulate, allowing the machine to excavate at various angles relative to the longitudinal centreline of the machine

Note 1 to entry: A swing-type boom can allow the machine to excavate adjacent to a vertical surface.

4 Base machine

4.1 Classification by type

The excavators shall be classified by their undercarriage and by their equipment.

See also [Clause 5](#).

a) Undercarriage

- Crawler excavator (see [Figure 1](#))
- Wheeled excavator (see [Figure 2](#))
- Walking excavator (see [Figure 3](#))

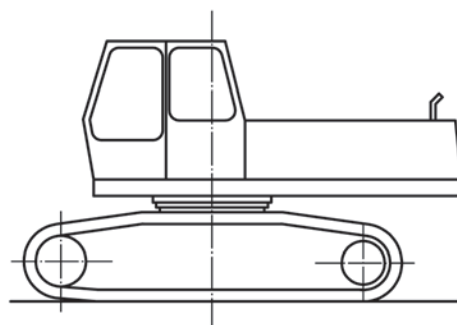


Figure 1 — Crawler excavator

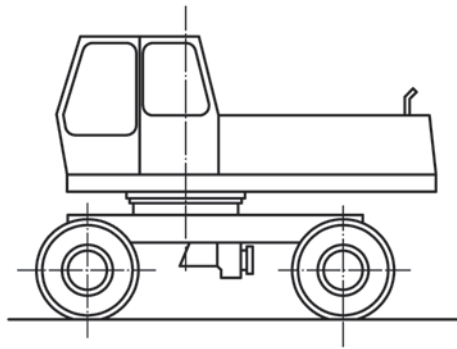


Figure 2 — Wheeled excavator

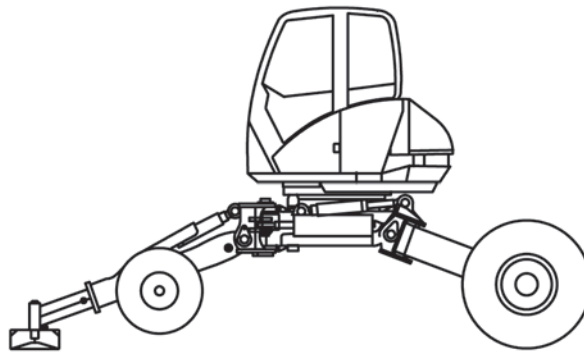


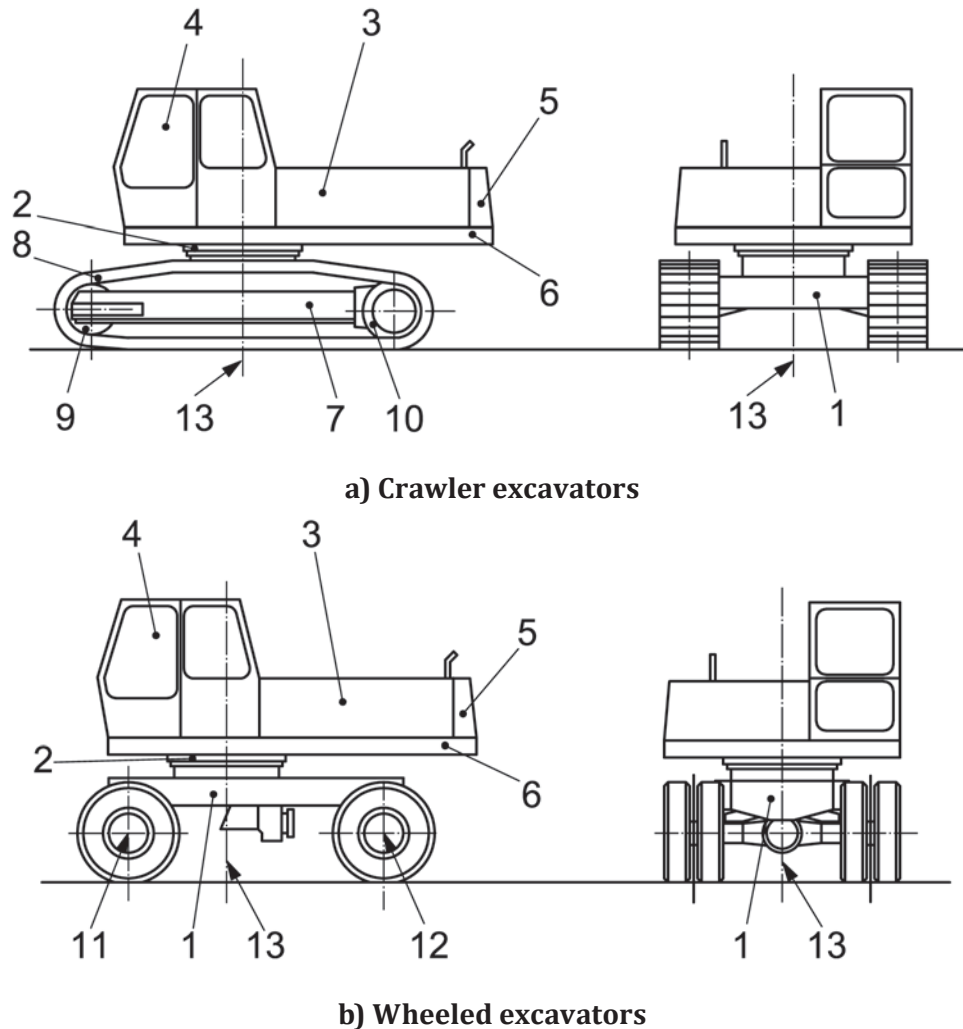
Figure 3 — Walking excavator

b) **Equipment**

- Backhoe (see [Figure 23](#))
- Shovel (see [Figure 24](#))
- Clamshell (see [Figure 25](#))
- Telescoping boom (see [Figure 26](#))

4.2 Component nomenclature

Component nomenclature shall be in accordance with [Figure 4 a\)](#) or [b\)](#), according to whether the base machine is a crawler or wheeled excavator.



Key

1	undercarriage	8	crawler tracks
2	swing bearing	9	idler
3	upper structure	10	sprocket
4	cab	11	steering axle (front)
5	counterweight	12	rigid axle (rear)
6	revolving frame	13	axis of rotation
7	track frame		

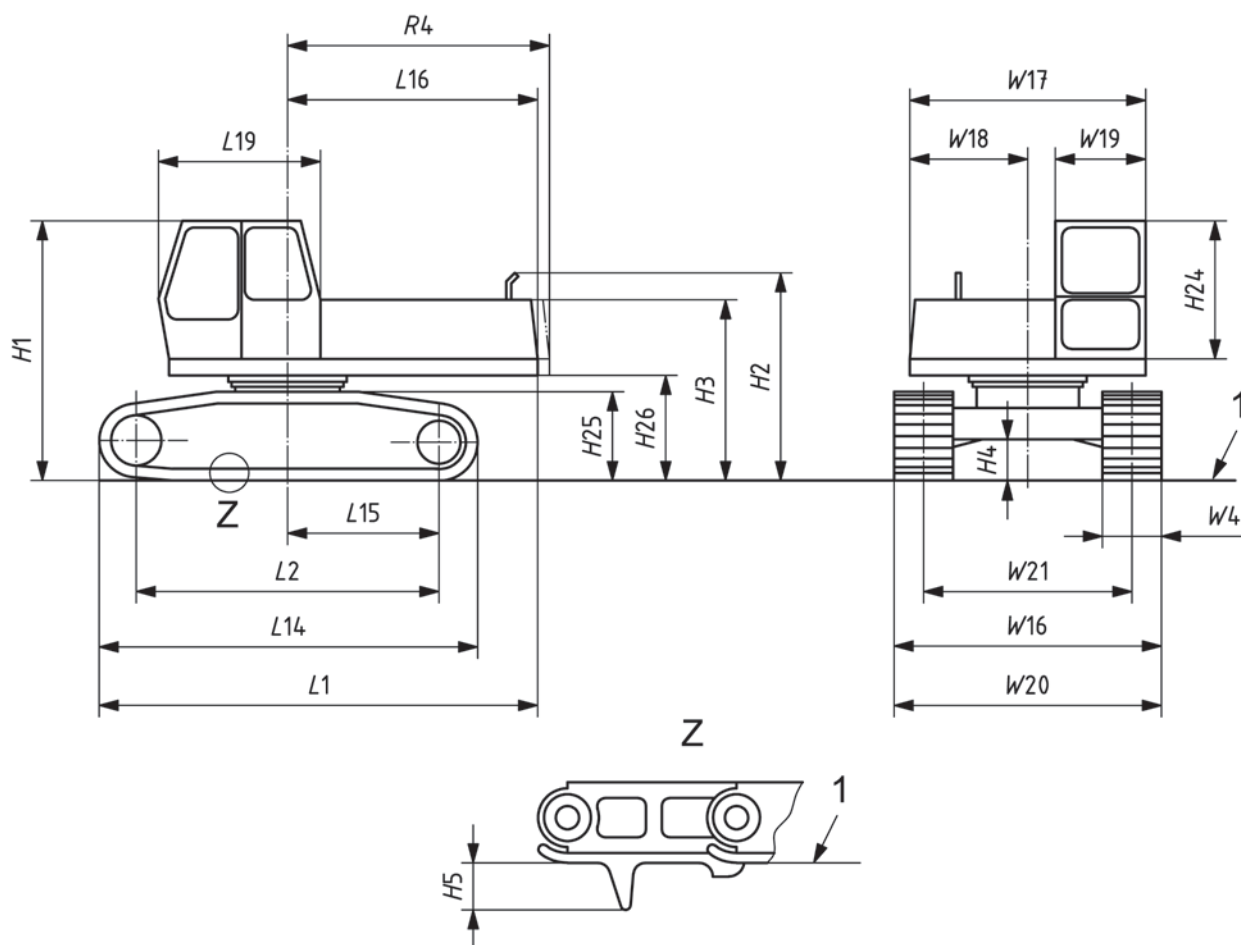
Figure 4 — Base machine nomenclature

4.3 Dimensions

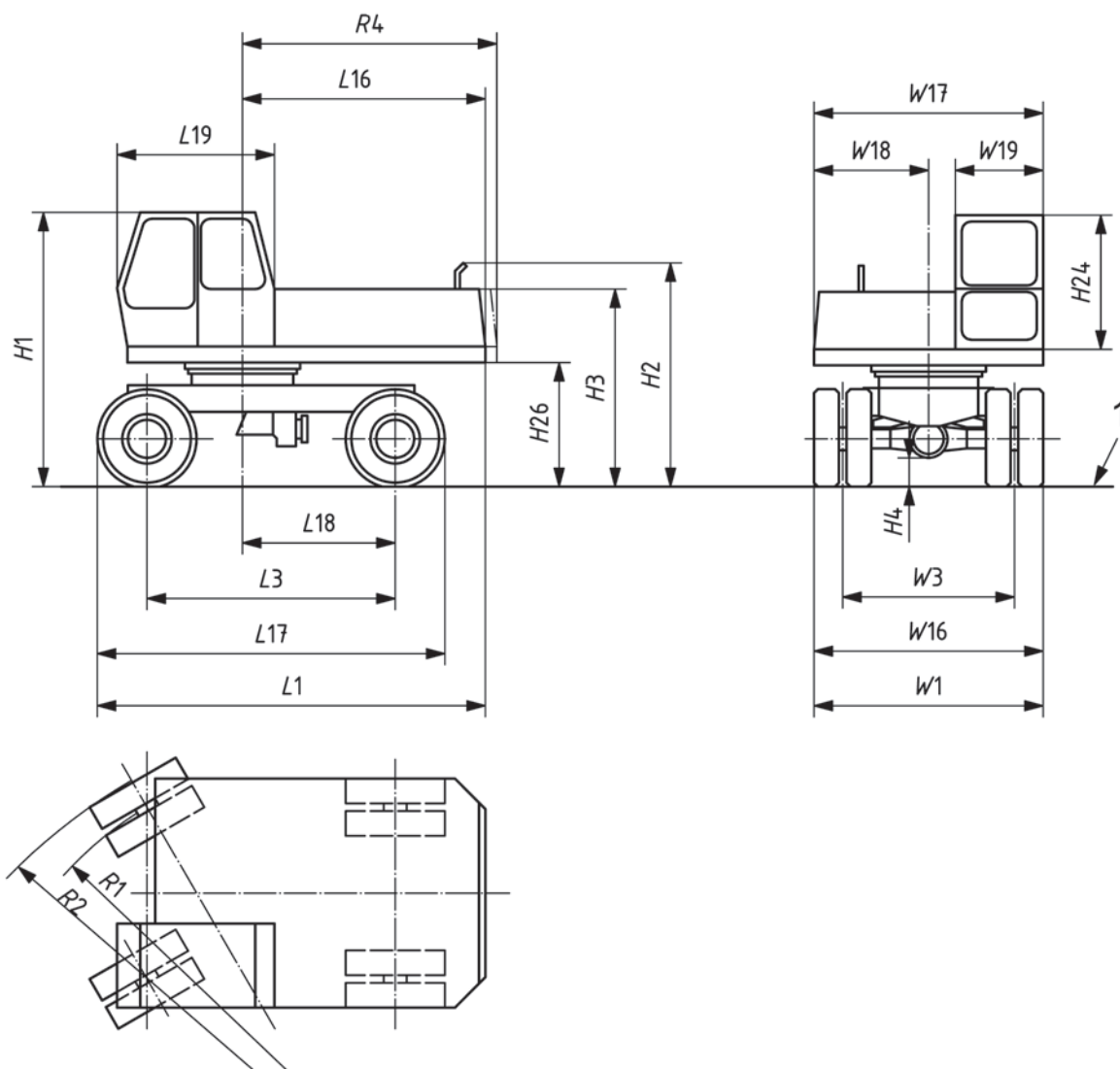
The base-machine dimensions shall be in accordance with [Figure 5](#).

The definitions of those base-machine dimensions common to earth-moving machinery are given in [ISO 6746-1](#).

The base-machine dimensions shown in [Figure 5](#) that are specific to hydraulic excavators are defined in [Annex A](#).



a) Crawler excavators



b) Wheeled excavators

Key

- 1 ground reference plane (GRP)

Figure 5 — Base machine dimensions

5 Equipment and attachments

5.1 Equipment and attachments nomenclature

Equipment and attachments nomenclature shall be in accordance with [Figures 6 to 22](#).