INTERNATIONAL STANDARD

ISO 7134

Second edition
1993-11-15

Earth-moving machinery — Graders — Terminology and commercial specifications

Engins de terrassement — Niveleuses — Terminologie et spécifications commerciales

INTERNATIONAL ISO

Reference number
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Contents

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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.

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 7134 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Sub-Committee SC 4, *Commercial nomenclature, classification and rating*.

This second edition cancels and replaces the first edition (ISO 7134:1985), of which it constitutes a technical revision.

Earth-moving machinery — Graders — Terminology and commercial specifications

1 Scope

This International Standard establishes terminology and the content of commercial literature specifications for self-propelled graders and their equipment.

This International Standard applies to graders as defined in ISO 6165.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3450:1985, *Earth-moving machinery — Wheeled machines — Performance requirements and test procedures for braking systems.*

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

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

ISO 6165:1987, *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 6747:1988, *Earth-moving machinery — Tractors — Terminology and commercial specifications.*

ISO 7457:1983, *Earth-moving machinery — Measurement of turning dimensions of wheeled machines.*

ISO 9249:1989, *Earth-moving machinery — Engine test code — Net power.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 General

3.1.1 grader: Self-propelled wheeled machine having an adjustable blade, positioned between front and rear axles, which cuts, moves and spreads materials usually to grade requirements [ISO 6165].

3.1.2 base machine: Grader without equipment, as described by the manufacturer's specifications, but provided with the necessary mountings to secure the attachments.

3.1.3 equipment: Set of components mounted onto the base machine to fulfil the primary design function.

3.1.4 attachment: Optional assembly of components that can be mounted onto the base machine for a specific use.

3.1.5 component: Part or an assembly of parts of a base machine, equipment or an attachment.

3.2 Masses

3.2.1 operating mass: Mass of the base machine, equipment specified by the manufacturer, operator (75 kg), full fuel tank and full lubricating, hydraulic and cooling systems.

3.2.2 shipping mass: Mass of the base machine without operator, with full lubricating, hydraulic and cooling systems, 10 % of fuel tank capacity and with or without equipment, cab, canopy, ROPS[1] or FOPS[2], as stated by the manufacturer.

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

3.3 Performance

3.3.1 net power: (See ISO 9249.)

3.3.2 maximum travel speeds: Maximum speeds that can be obtained on hard level surfaces in each of the forward and reverse gear ratios available. (See ISO 6014.)

3.4 Attachments

NOTE 1 Dimensions for these attachments are defined and described in 3.7.

3.4.1 scarifier: Mechanism having teeth for penetrating and loosening to shallow depths such materials as earth, asphaltic and gravel roads, and similar surfaces. The scarifier may be located on the grader ahead of the front wheels or between front and rear wheels.

3.4.2 ripper: Attachment which consists of a frame connected to the rear part of the base machine by means of a mounting bracket. It is equipped with one or more teeth.

3.4.3 snowplough: Structure located ahead of the front wheels, designed to move snow laterally by the ploughing action of a mould-board. The plough may be either one-way or V configuration.

3.4.4 front blade: Blade usually curved as a mould-board located ahead of the front wheels, designed to scrape and push earth and similar materials generally forward.

3.5 Steering capability

3.5.1 turning radius: (See ISO 7457.)

3.6 Dimensions of base machine

3.6.1 front axle ground clearances, $H18$: Distance on Z coordinate between the ground reference plane (GRP)[3] and two positions on the axle:

a) at the lowest point of the front axle lying in the zero Y plane;

b) at the lowest point of the axle at a distance of 25 % of the front tread to either side of the zero Y plane. See figure 1.

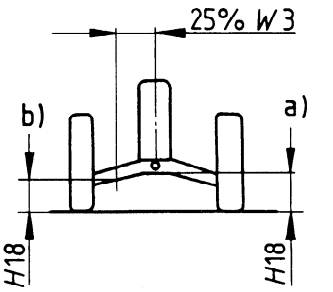


Figure 1 — Dimension $H18$

1) ROPS: Roll-over protective structure.

2) FOPS: Falling object protective structure.

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

3.6.2 blade height, $H19$**:** Dimension obtained by measuring the distance on the Z coordinate from the lower edge of the cutting edge to the top edge of the blade, measured at blade mid-length. See figure 2.

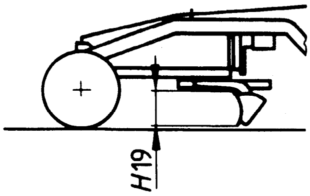


Figure 2 — Dimension $H19$

3.6.3 lift above ground, $H20$**:** Vertical height from the GRP to a Z plane containing the lower edge of the blade cutting edge when this edge is in an X plane. If blade pitch is adjustable, blade pitch angle is adjusted for maximum lift above the ground. See figure 3.

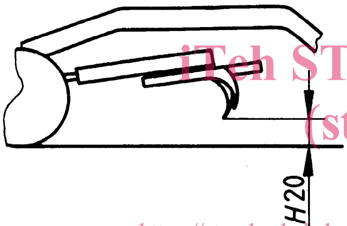


Figure 3 — Dimension $H20$

3.6.4 blade length, $W8$**:** Overall length measured between parallel vertical planes passing through the extreme ends of the blade or cutting edges or end bits, whichever is longer. See figure 4.

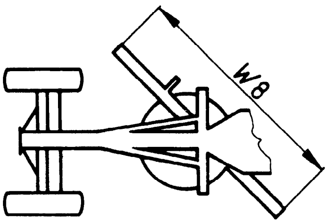


Figure 4 — Dimension $W8$

3.6.5 shoulder reach, $W9$**:** Distance from a Y plane through the outside surface of a front tyre to a Y plane through the outermost point on the end of the blade, cutting edge or end bit with the lower edge of the cutting edge being maintained on the GRP and in an X plane, with no blade sideshift and wheels not leaned. For machines having crab steer capability, the manufacturer may specify an additional amount of reach available. See figure 5.

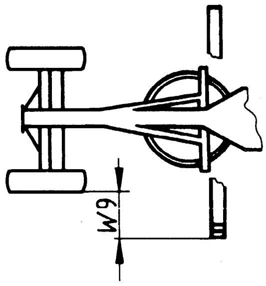


Figure 5 — Dimension $W9$

3.6.6 circle sideshift, $W14$**:** Distance on Y coordinate between the zero Y plane and a Y plane through the centre point of the circle when the circle has been shifted to a position to the left or right of the zero Y plane. See figure 6.

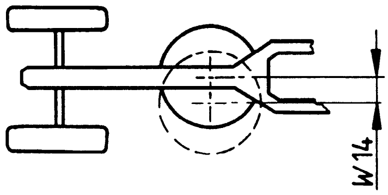


Figure 6 — Dimension $W14$

3.6.7 blade sideshift, $W15$: Offset from the middle position of a blade which is movable, with respect to the circle, along a line parallel to an element lying along the length of the blade. See figure 7.

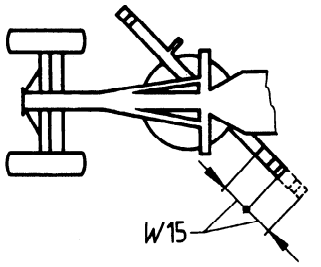


Figure 7 — Dimension $W15$

3.6.8 tandem centre distance, $L9$: Distance on X coordinate between X planes passing through the centres of front and rear wheels of the tandem. See figure 8.

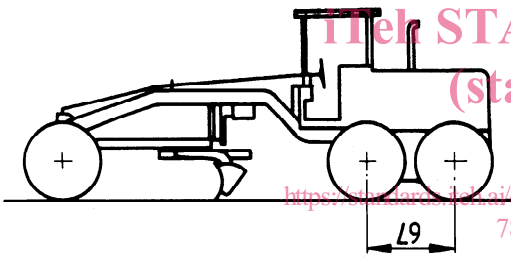


Figure 8 — Dimension $L9$

3.6.9 blade base, $L12$: Distance on X coordinate between an X plane through the centreline of the front wheels and an X plane through the front edge of the cutting edge with the edge on the ground reference plane (GRP). If the blade pitch is adjustable, the blade pitch angle is to be at the mid-point of the adjustment. See figure 9.

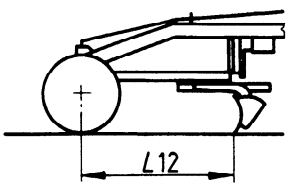


Figure 9 — Dimension $L12$

3.6.10 blade angle, $A8$: Angle between a vertical plane through the lower edge of the cutting edge and an X plane. See figure 10.

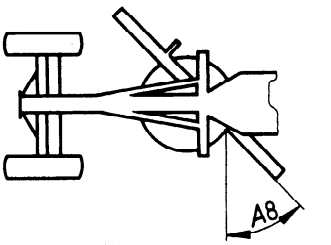


Figure 10 — Dimension $A8$

3.6.11 blade tilt angle, $A9$: Angle that the plane generated by the cutting edge, moving in the grader direction of travel, makes with relation to the GRP. See figure 11.

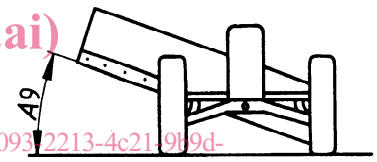


Figure 11 — Dimension $A9$

3.6.12 blade pitch angle, $A10$: Angle between the plane containing the forward surface of a flat cutting edge, or tangent to the forward surface at the bottom edge of the curved cutting edge, and the GRP when the lower edge of the cutting edge is on the GRP. See figure 12.

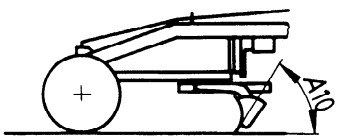


Figure 12 — Dimension $A10$

3.6.13 blade pitch angle adjustment range, *A*11: Angle obtained by rotating an adjustable blade from one extreme pitch angle to the other. See figure 13.

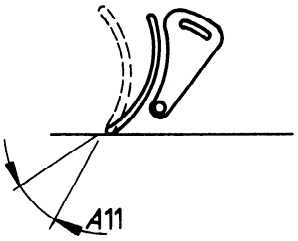


Figure 13 — Dimension *A*11

3.6.14 wheel lean angle, *A*12: Angle between a vertical plane and a plane through a surface of the wheel rim when the wheel is in a lean position. See figure 14.

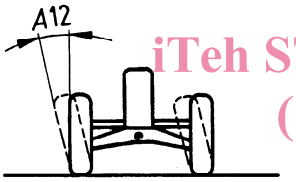


Figure 14 — Dimension *A*12

3.7.2 snowplough height at leading end, *HH*19: Distance on *Z* coordinate between GRP and highest point on the snowplough at the leading end of a one-way configuration plough or at the centre of the V in a V configuration plough. See figure 16.

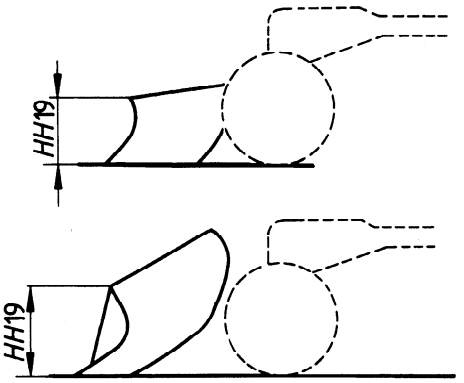


Figure 16 — Dimension *HH*19

3.7.3 cutting edge width, *WW*7: Distance on *Y* coordinate between two *Y* planes through the extreme ends of the cutting edges or end bits. See figure 17.

3.7 Attachment dimensions

3.7.1 snowplough maximum height, *HH*18: Distance on *Z* coordinate between GRP and highest point on the snowplough at or near the rear (outer) end. See figure 15.

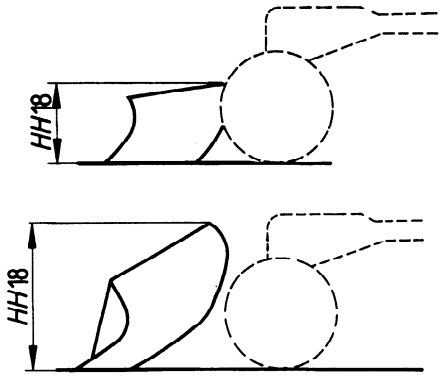


Figure 15 — Dimension *HH*18

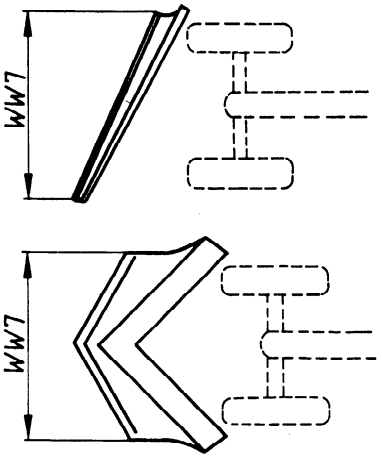


Figure 17 — Dimension *WW*7

3.7.4 front overhang, *LL7*: Distance on *X* coordinate between two *X* planes passing through the centres of the front wheels and the front extreme point of attachment when the attachment is resting on the GRP. See figure 18.

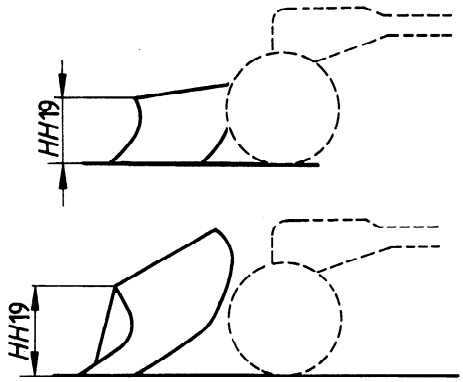


Figure 18 — Dimension *LL7*

4 Base machine

4.1 Types of graders

Graders are classified according to the following attributes.

4.1.1 Undercarriage — Number of wheels

The number of wheels may be

a) four (see figure 19), or

b) six (see figure 20).

4.1.2 Number of engines

Graders have one engine (see figure 21).

4.1.3 Engine location

The grader engine may be located:

a) at the front (see figure 22), or

b) the rear (see figure 23).

4.1.4 Steering system

The system may be

a) front-wheel steer (see figure 24), or

b) front-wheel and articulated frame steer (see figure 25).

4.1.5 Drive system

The drive system may be

a) two-wheel drive (see figure 26),

b) four-wheel drive (see figure 27), or

c) six-wheel drive (see figure 28).

4.2 Dimensions

Dimensions of the base machine (grader) are shown in figure 29.

For definitions of dimensions, see ISO 6746-1.

For definitions of dimensions strictly related to graders, see 3.6.

4.3 Nomenclature

4.3.1 Grader component nomenclature

See figure 30 for grader component nomenclature.

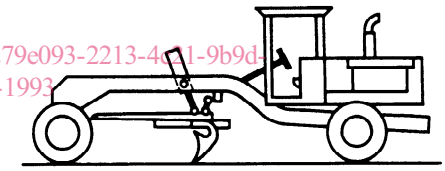


Figure 19 — Four-wheel grader

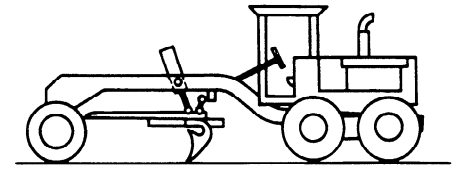


Figure 20 — Six-wheel grader

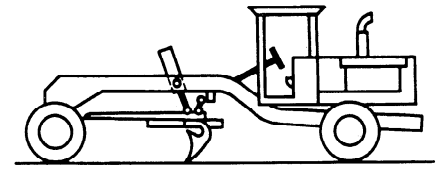


Figure 21 — One engine grader

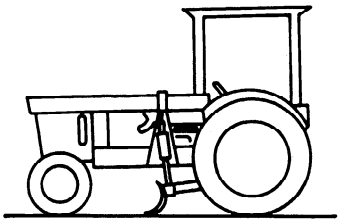


Figure 22 — Front engine grader

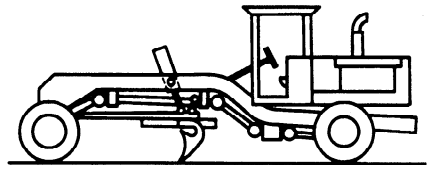


Figure 23 — Rear engine grader

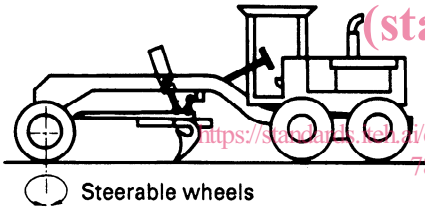


Figure 24 — Front-wheel steer grader

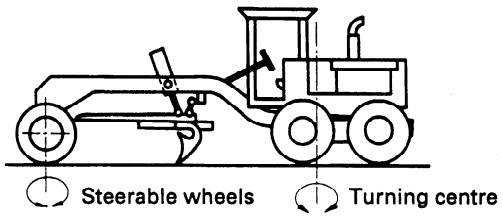


Figure 25 — Front-wheel and articulated frame steer grader

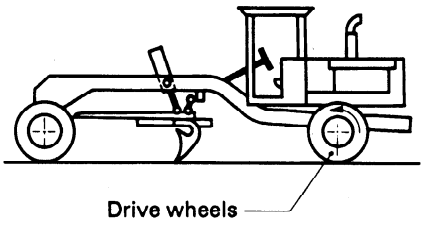
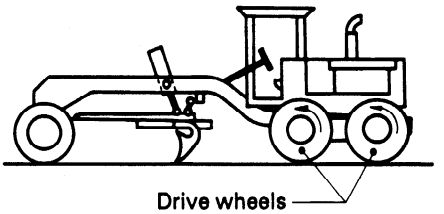


Figure 26 — Two-wheel drive grader



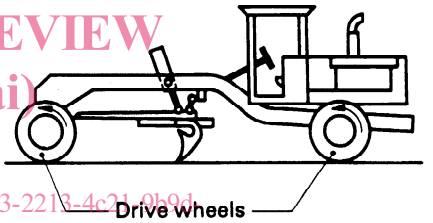


Figure 27 — Four-wheel drive grader

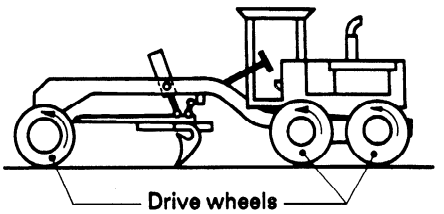


Figure 28 — Six-wheel drive grader