INTERNATIONAL STANDARD

ISO 7133

Third edition
2013-03-15

Earth-moving machinery — Scrapers — Terminology and commercial specifications

Engins de terrassement — Décapeuses — Terminologie et spécifications commerciales

Reference number
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Foreword

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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 7133 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 4, *Terminology, commercial nomenclature, classification and ratings*.

This third edition cancels and replaces the second edition (ISO 7133:1994), which has been technically revised.

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Earth-moving machinery — Scrapers — Terminology and commercial specifications

1 Scope

This International Standard establishes terminology and the content of commercial literature specifications for scrapers (including towed scrapers) and their equipment.

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 5010, *Earth-moving machinery — Rubber-tyred machines — Steering requirements*

ISO 6484, *Earth-moving machinery — Elevating scrapers — Volumetric ratings*

ISO 6485, *Earth-moving machinery — Tractor-scraper — Volumetric rating*

ISO 6746-1, *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 7457, *Earth-moving machinery — Determination of turning dimensions of wheeled machines*

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

3 Terms and definitions

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

3.1 General

3.1.1
scraper
self-propelled or towed crawler or wheeled machine which has a bowl with a cutting edge positioned between the axles, and which cuts, loads, transports, discharges and spreads material through its forward motion

Note 1 to entry: The loading through a forward motion can be assisted by a powered mechanism (elevator) fixed to the scraper bowl.

[SOURCE: ISO 6165:2012, 4.7]

3.1.2
towed scraper
scraper that is not self-propelled but which is propelled instead by a towing machine on which the operator's station is located

[SOURCE: ISO 6165:2012, 4.7.1]

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3.1.3
base machine
machine 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 scraper

[SOURCE: ISO 6746-1:2003, 3.3]

3.1.4
equipment
set of components mounted onto the base machine to fulfil the primary design function

3.1.5
attachment
optional assembly of components that can be mounted onto the base machine for a specific use

3.1.6
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 with empty bowl, equipment specified by the manufacturer, operator (75 kg), full fuel tank and full lubricating, hydraulic and cooling systems

3.2.2
payload
manufacturer's rated mass that can be carried in the scraper bowl

3.2.3
loaded mass
sum of the operating mass and the payload loaded in accordance with ISO 6485

3.2.4
axle distribution
percentage of machine mass or the actual mass of each axle, empty and loaded

3.2.5
shipping mass
mass of the base machine with empty bowl, without operator, with full lubricating, hydraulic and cooling systems, 10 % of fuel tank capacity and with or without equipment, cab, canopy and/or operator protective structure, as stated by the manufacturer

3.2.6
cab [canopy] [ROPS] [FOPS] mass
mass of cab [canopy] [ROPS (roll-over protective structure)] [FOPS (falling-object protective structure)] with all components and mountings required to secure it to the base machine

3.3 Modes of operation

3.3.1
push-pull or dual loading
mode of operation which allows one scraper to assist in loading another by pushing or pulling through engagement devices which usually include push plates, a hook and a bail

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3.4 Performance

3.4.1
net power
power obtained on a test bed at the end of the crankshaft or its equivalent, at the corresponding engine speed, with the equipment and auxiliaries listed in ISO 15550:2002, Table 1, column 2, and required in column 3 (fitted for engine net power test)

Note 1 to entry: If the power measurement can only be carried out with a mounted gearbox, the losses in the gearbox should be added to the measured power to give the net engine power.

[SOURCE: ISO 15550:2002, 3.3.3.1, modified.]

3.4.2
maximum travel speed
maximum speed that can be obtained on hard level surfaces in each of the forward and reverse gear ratios available, with scraper bowl empty

3.4.3
rimpull
force available between the tyre and the ground to propel the scraper

3.4.4
rimpull with direct drive transmission
rimpull calculated or measured at the rated engine speed and at maximum engine torque in each forward speed

Note 1 to entry: The maximum pull can be limited by mass and traction conditions.

3.4.5
rimpull with power shift transmission [electric drive] [hydrostatic drive]
rimpull given by the calculated or measured pull versus machine speed curves in each forward gear range

Note 1 to entry: The maximum pull can be limited by mass and traction conditions.

4 Base machine

4.1 Types of scrapers

Scrapers shall be classified according to the following attributes.

4.1.1 Method of loading

The method of loading may be

— open-bowl loading (see Figure 1), or

— elevated loading (see Figure 2).

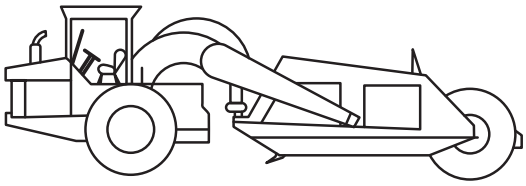

Figure 1 — Open-bowl loading

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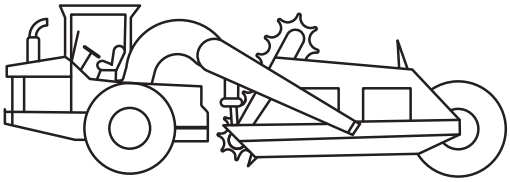


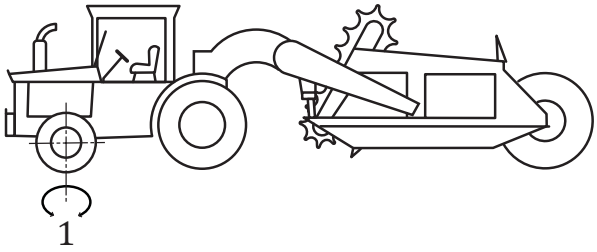
Figure 2 — Elevated loading

4.1.2 Steering system

The steering system may be

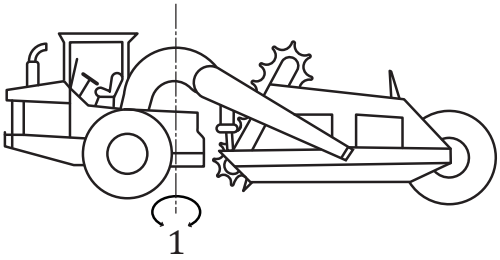
— front-wheel steer (see Figure 3), or

— articulated steer (see Figure 4).



Key
1 steerable wheels

Figure 3 — Front-wheel steer



Key
1 turning centre

Figure 4 — Articulated steer

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4.1.3 Number of axles

The base machine may have

— two axles (see Figure 5), or

— three axles (see Figure 6).

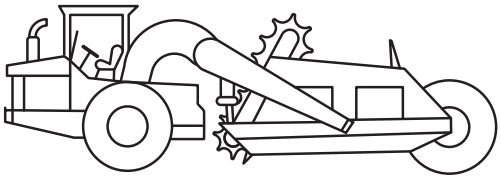

Figure 5 — Two axles

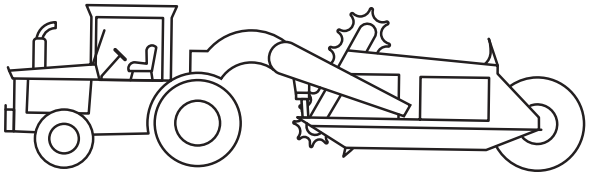

Figure 6 — Three axles

4.1.4 Number of engines

The base machine may have:

— one engine (see Figure 7), or

— two engines (see Figure 8).

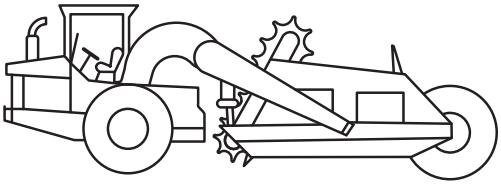

Figure 7 — One engine

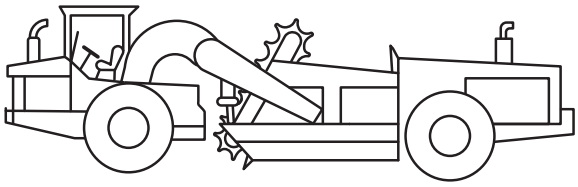

Figure 8 — Two engines

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4.1.5 Drive system

The drive system may be

— front-wheel drive (see Figure 9),

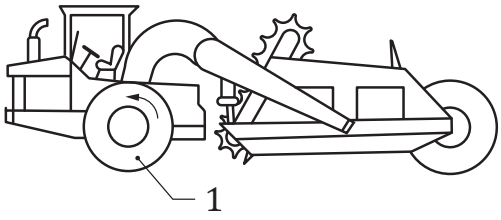
— all-wheel drive (see Figure 10),

— centre-axle drive (see Figure 11), or

— in the case of towed scrapers, no drive (see Figure 12).

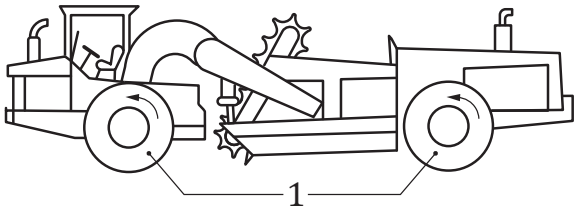
NOTE 1 Scrapers require the application of tractive effort to load material into the bowl. This tractive effort can be developed by the scraper itself, by another scraper temporarily or permanently connected, or by a pushing tractor. The tractive effort for a towed scraper is supplied by the towing machine.

NOTE 2 Elevating scrapers have a powered mechanism fixed to the scraper bowl to assist in loading material.



Key
1 drive wheels

Figure 9 — Front-wheel drive



Key
1 drive wheels

Figure 10 — All-wheel drive

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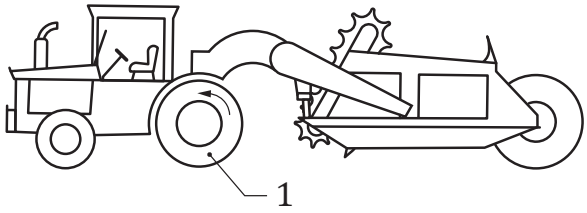

Key
1 drive wheels

Figure 11 — Centre-axle drive

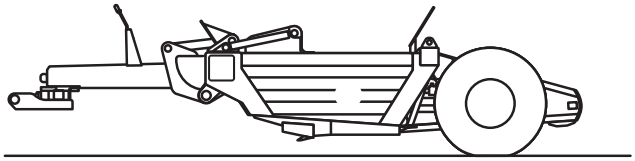

Figure 12 — Towed scraper

4.2 Dimensions

Dimensions of the base machine (scraper and towed scraper) are shown in Figures 13 and 14.

For the definitions of the base machine dimensions, see ISO 6746-1.

For definitions of dimensions strictly related to scrapers, see Annex A.

All dimensions are measured when the bowl is at the highest position unless otherwise noted. Wheel tread width may differ for each axle.

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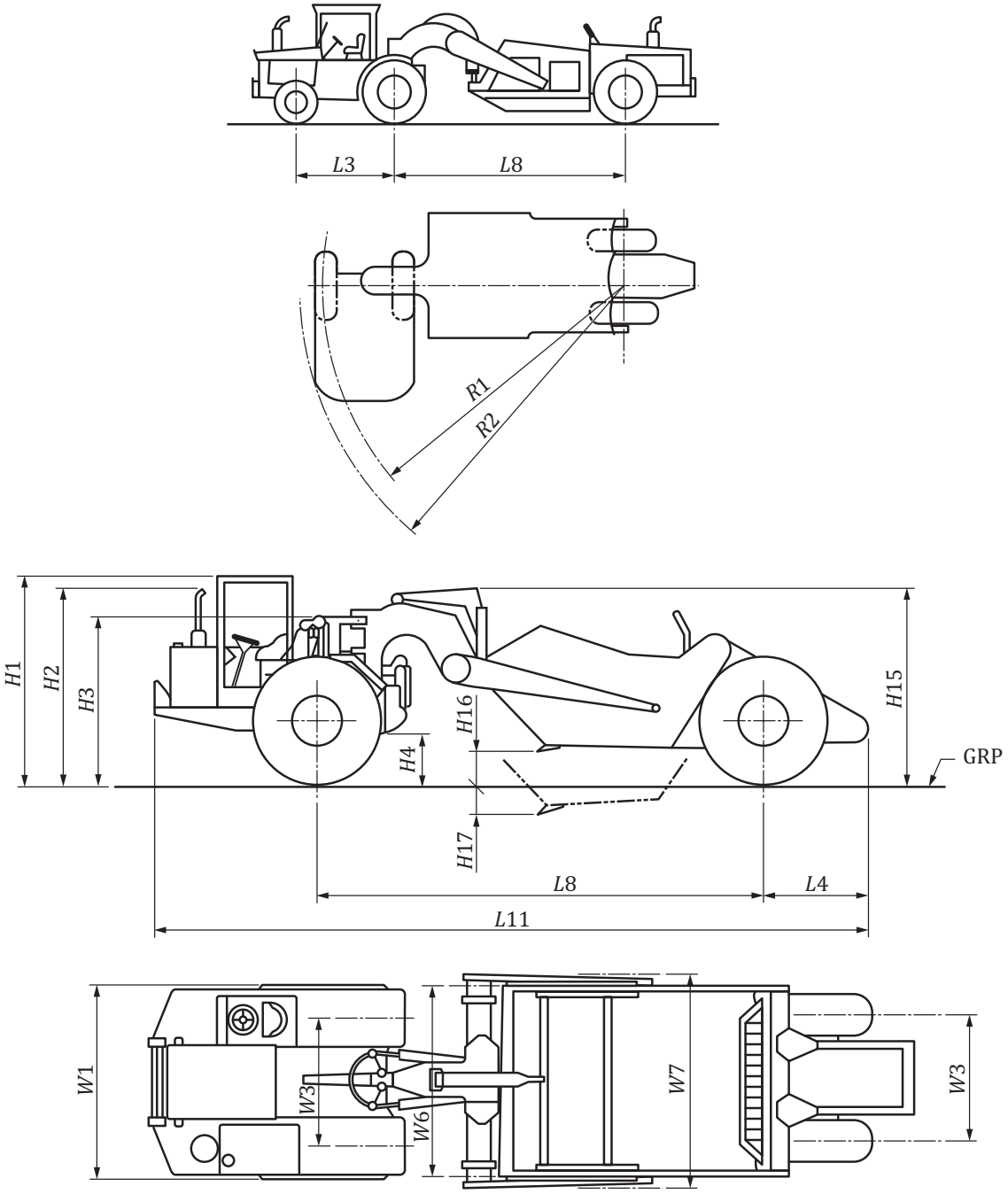

Figure 13 — Dimensions of base machine — Scraper

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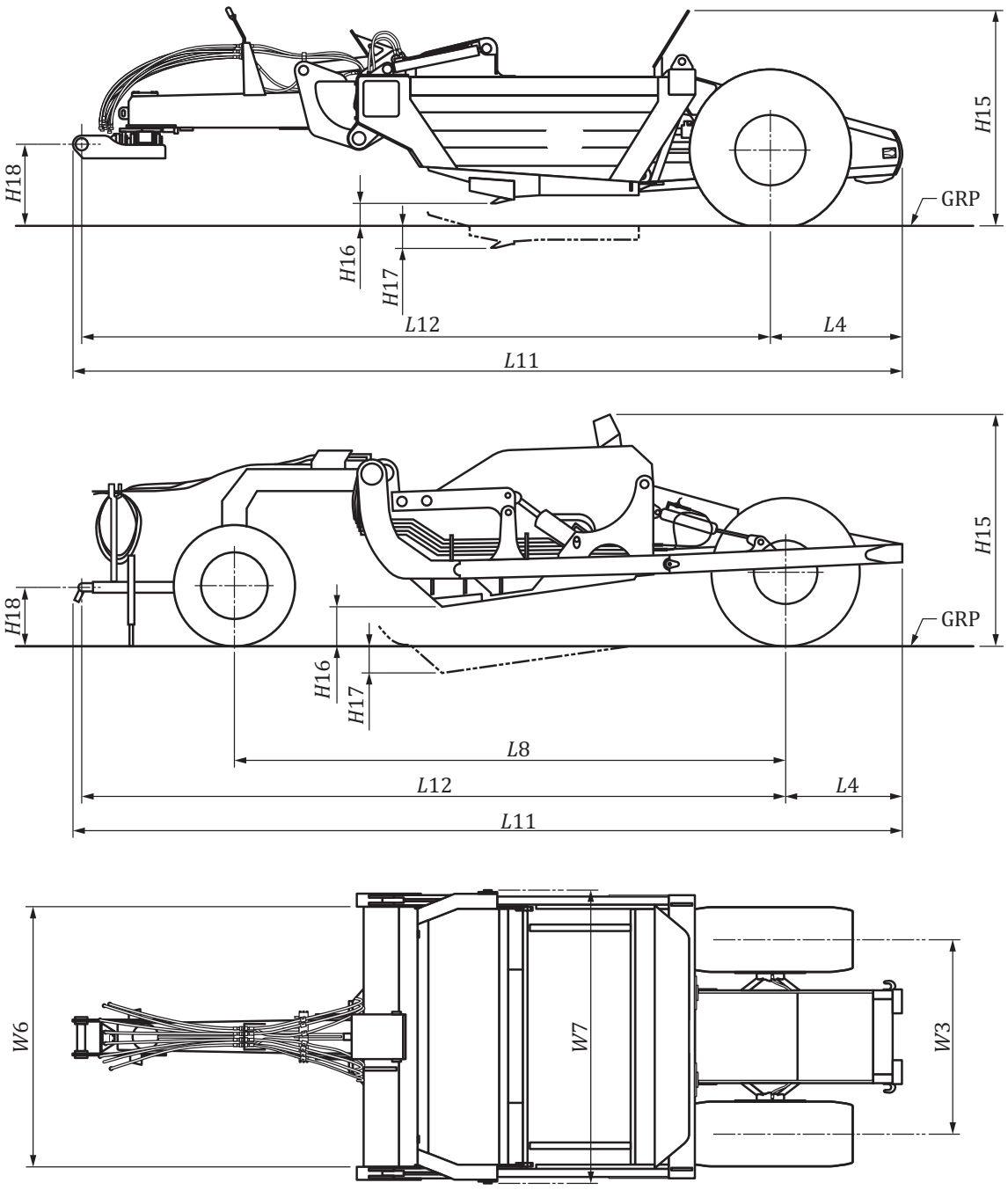

Figure 14 — Dimensions of base machine — Towed scraper

4.3 Nomenclature

For tractor component nomenclature, see Figure 15.

For scraper component nomenclature, see Figure 16 and 17.

For attachment nomenclature, see Figure 18.

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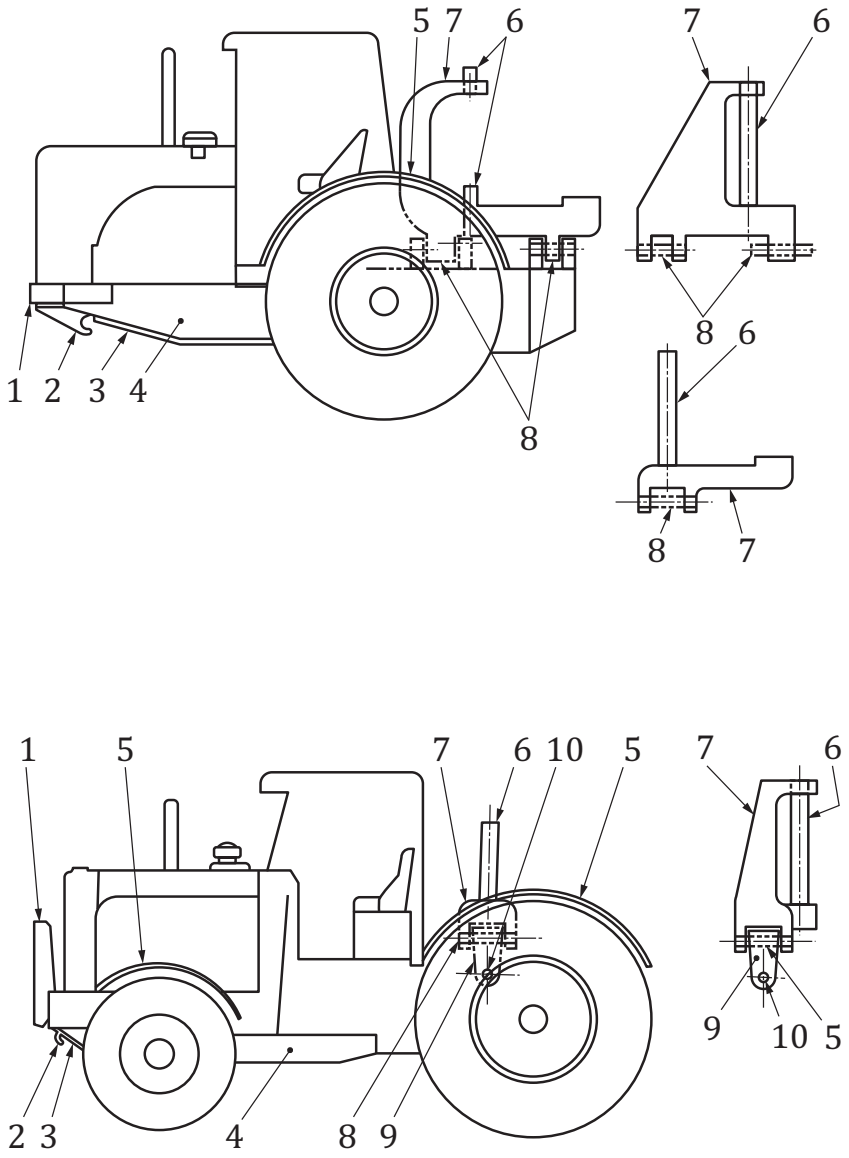

Key

1	bumper	6	king pin, hitch
2	hook, pull	7	hitch
3	guard, bottom	8	pin, oscillating pivot
4	frame, main	9	yoke, hitch
5	fender	10	pin, fore and aft pivot

Figure 15 — Tractor component nomenclature

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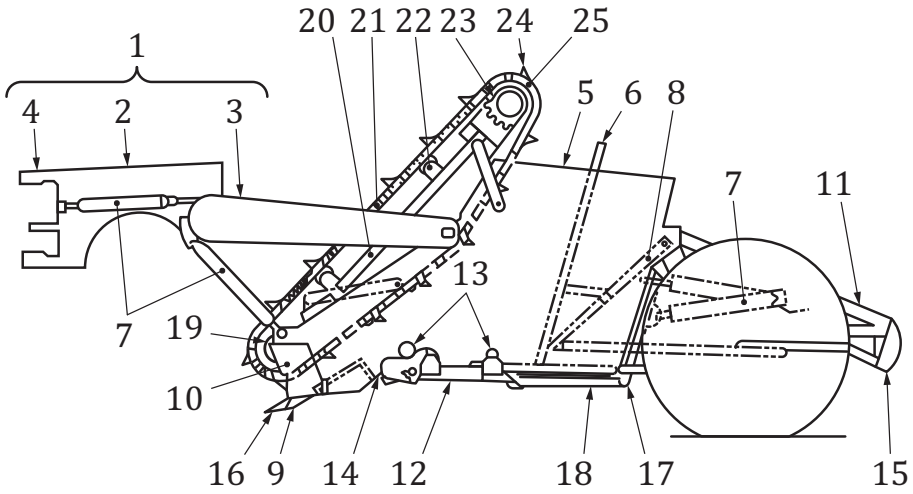

Key

1	frame, draft	14	strike-off
2	gooseneck	15	bumper
3	arm, draft	16	tooth
4	housing, kingpin	17	lever, floor
5	bowl	18	link, floor
6	ejector	19	idler, lower
7	cylinder	20	frame, elevator
8	lever, ejector	21	chain
9	cutting edge	22	chain carrier roller
10	bit, side	23	sprocket, chain
11	frame, rear	24	flight elevator
12	floor, moveable	25	drive, elevator
13	roller, floor or side		

Figure 16 — Scraper component nomenclature — Elevated loading

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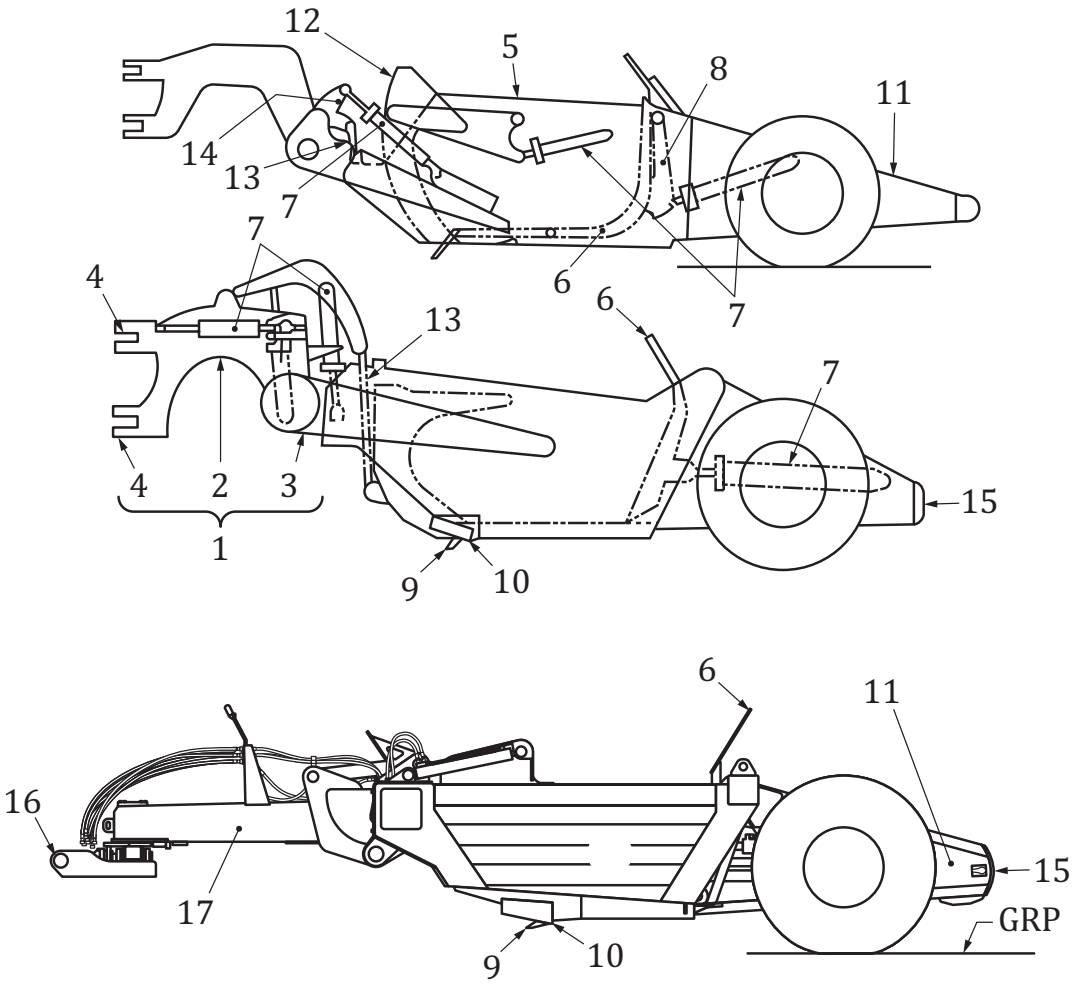

Key

1	frame, draft	10	bit, side
2	gooseneck	11	frame, rear
3	arm, draft	12	apron
4	housing, kingpin	13	link, apron or bowl
5	bowl	14	lever, apron or bowl
6	ejector	15	plate, push
7	cylinder	16	hitch
8	lever, ejector	17	tongue
9	cutting edge	GRP	ground reference plane

Figure 17 — Scraper component nomenclature — Open-bowl loading

4.3.1 Attachment nomenclature

See Figure 18 for attachment and attachment component nomenclature.

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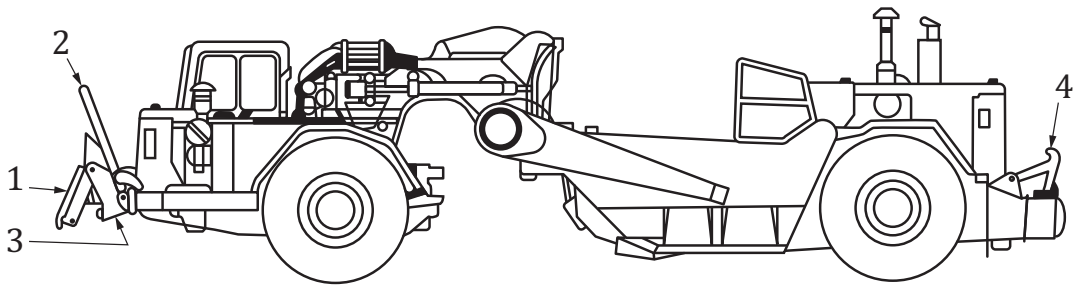

Key

1 bush plate, front
2 bail nosepiece
3 bail bearings
4 hook

Figure 18 — Attachment and attachment component nomenclature

5 Commercial literature specifications

The following is applicable for specification in commercial literature. Units of measure shall be expressed in SI units (International System).

5.1 Engine

The following shall be specified for each engine, as applicable:

a) manufacturer and model;

b) ignition type, i.e. diesel or spark-ignition;

c) type of cycle, i.e. two- or four-stroke;

d) form of air aspiration, i.e. naturally aspirated, mechanically supercharged or turbocharged;

e) number of cylinders;

f) bore;

g) stroke;

h) displacement;

i) cooling system, i.e. air- or water-cooled;

j) type of fuel;

k) ISO net flywheel power at a given engine speed;

l) maximum torque at a given engine speed;

m) starter type;

n) electrical system voltage.

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5.2 Transmission

The following may be specified, as applicable:

— manual shift with flywheel clutch;

— power shift with torque converter;

— hydrostatic;

— electric;

— number of speeds (forward and reverse);

— maximum travel speeds (a graph of rimpull versus speed should be shown).

5.3 Drive axle(s)

The drive axle type(s) shall be specified and the following may be specified, as applicable:

— steerable;

— fixed, oscillating and/or suspended;

— hydrostatic;

— electric;

— bevel gear and pinion;

— differential: standard, non-slip, lock-up;

— planetary final drive.

5.4 Steering

5.4.1 The type of steering, in accordance with ISO 5010, shall be specified, as applicable. For example:

— articulated;

— front wheel steer;

— boosted, manual, hydrostatic;

— power;

— hydrostatic;

— emergency steer method.

5.4.2 The following performance information shall be specified:

a) turning radius, as defined in ISO 7457, left and right;

b) machine clearance diameter, as defined in ISO 7457.

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5.5 Brakes

5.5.1 Service brakes

The type and actuating system of the service brakes shall be specified. For example:

— type (drum, disc, wet or dry);

— type of actuating system (mechanical, air, hydraulic, electrical, combination).

5.5.2 Parking brake

The type of parking brake may be specified.

5.5.3 Secondary brakes

The type of secondary brakes may be specified.

5.5.4 Retarding brake

The type and actuating system of the retarding brake may be specified.

5.5.5 Brake performance

The brake performance may be specified. See ISO 3450.

5.5.6 Towed scraper brakes

The type of brakes on a towed scraper shall be specified if applicable. The type of coupling(s) may be specified.

5.6 Tyres

The size and type shall be specified. Examples of other information which may be specified are

— tread,

— ply rating, and

— rim size.

5.7 Hydraulic system

5.7.1 Working pumps

The following shall be specified:

a) type;

b) relief pressure;

c) pump flow at a given pressure, at rated engine speed.

5.7.2 Hydraulic motors

The type and function of the hydraulic motors shall be specified.

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5.8 Elevated loading drive

The following shall be specified, as applicable:

a) speed;

b) number of flights;

c) dimensions.

5.9 Bowl

The following shall be specified in accordance with ISO 6484 and ISO 6485:

a) rated capacity;

b) type of floor;

c) type of ejector;

d) type of apron.

5.10 Cutting edge

The size of the cutting edge may be specified.

5.11 System fluid capacities

The following shall be specified:

a) fuel tank;

b) hydraulic system.

The following may be specified:

— engine crankcase;

— cooling system;

— transmission;

— differential;

— final drive.

5.12 Masses

The following shall be specified:

a) total operating (empty) mass;

b) payload;

c) total loaded mass.

The following may be specified:

— distribution of operating (empty) mass between

  1) front axle,

  2) drive axle, and

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3) rear axle;

— distribution of loaded mass between

1) front axle,

2) drive axle, and

3) rear axle.

5.13 Towed scraper hitch vertical load

The empty and laden vertical load on the hitch shall be specified.

5.14 Towing tractor power

The recommended power range for the towing tractor may be specified.

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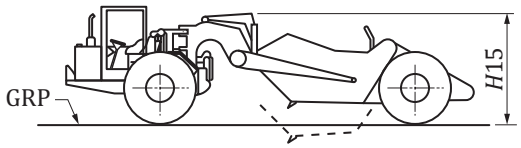
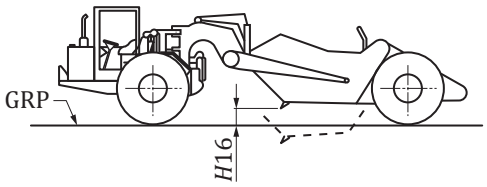
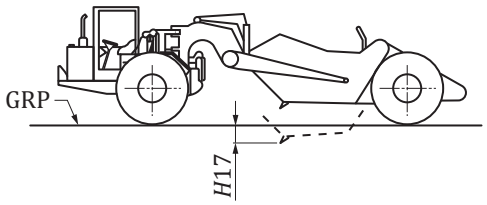
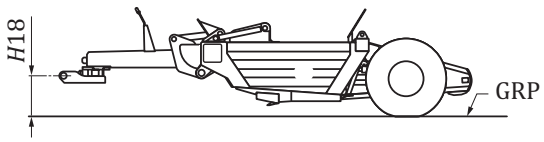
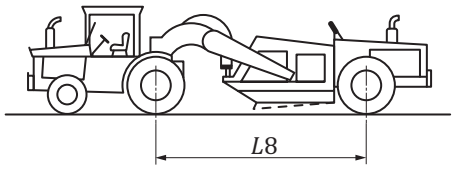
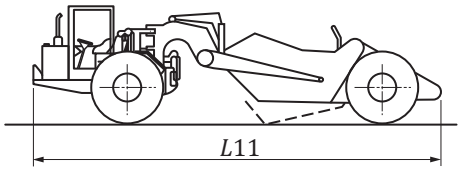
Annex A
(normative)

Equipment dimensions

Annex A defines scraper equipment dimensions and specifies their codes.

Code	Term and definition	Illustration
*H*15	**height of scraper** distance on Z coordinate between the ground reference plane (GRP) and the highest point on the scraper, with apron closed and the bowl at its highest position.	
*H*16	**clearance under cutting edge in travel position** distance on Z coordinate between the GRP and the cutting edge with the bowl at the highest position	
*H*17	**maximum cutting depth** distance on Z coordinate between the GRP and the cutting edge with the bowl at the lowest position below GRP	
*H*18	**height of towed scraper hitch** distance on Z coordinate between the GRP and the centreline of the hitch device	
*L*8	**wheel base** distance on X coordinate between two X planes passing through the centres of the rear wheels of the tractor and the rear wheels of the scraper when the bowl is at its highest position	
*L*11	**overall length of scraper** distance on X coordinate between two X planes passing through the foremost point of the tractor and the rearmost point of the scraper when the bowl is at its highest position	

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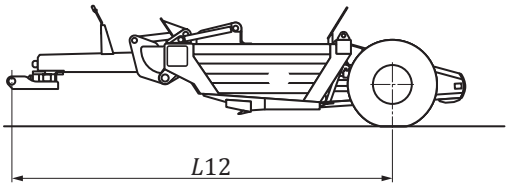
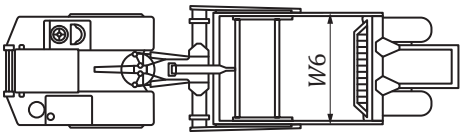
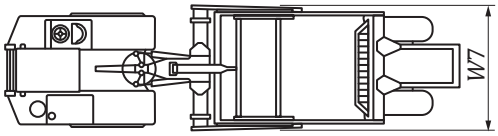
Code	Term and definition	Illustration
*L*12	**length between hitch centreline and centreline of rear tire** distance on X coordinate between two X planes passing through the hitch centreline and the centreline of the rear wheels of a towed scraper when the bowl is at its highest position	
*W*6	**width of cut** distance on Y coordinate between two Y planes passing through the furthest points of the cutting edge or side bits of the bowl	
*W*7	**scraper width** distance on Y coordinate between two Y planes passing through the furthest points of the scraper	

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