

BS ISO 7133:2013



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Earth-moving machinery — Scrapers — Terminology and commercial specifications

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National foreword

This British Standard is the UK implementation of ISO 7133:2013. It supersedes BS 6914-9:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/513/1, Earth moving machinery (International). A list of organizations represented on this committee can be obtained on request to its secretary.

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**Earth-moving machinery —
Scrapers — Terminology and
commercial specifications**

*Engins de terrassement — Décapeuses — Terminologie et
spécifications commerciales*



Reference number
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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.

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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.

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]

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

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](#)).

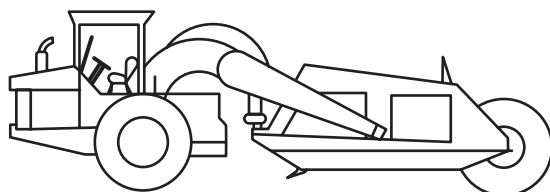


Figure 1 — Open-bowl loading

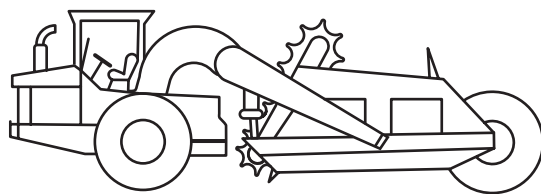
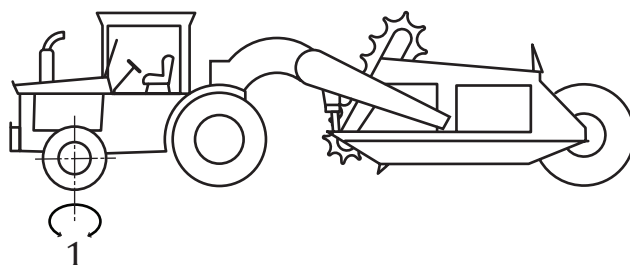


Figure 2 — Elevated loading

4.1.2 Steering system

The steering system may be

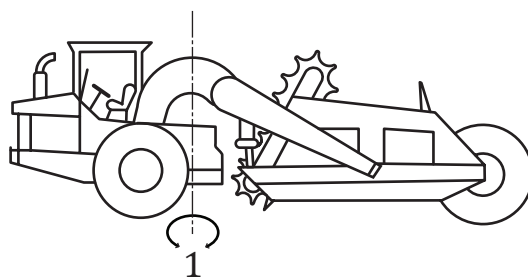
- front-wheel steer (see [Figure 3](#)), or
- articulated steer (see [Figure 4](#)).



Key

- 1 steerable wheels

Figure 3 — Front-wheel steer



Key

- 1 turning centre

Figure 4 — Articulated steer

4.1.3 Number of axles

The base machine may have

- two axles (see [Figure 5](#)), or
- three axles (see [Figure 6](#)).

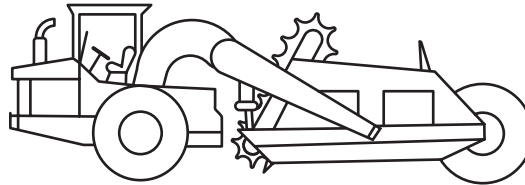


Figure 5 — Two axles

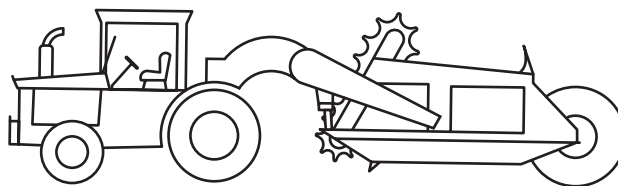


Figure 6 — Three axles

4.1.4 Number of engines

The base machine may have:

- one engine (see [Figure 7](#)), or
- two engines (see [Figure 8](#)).

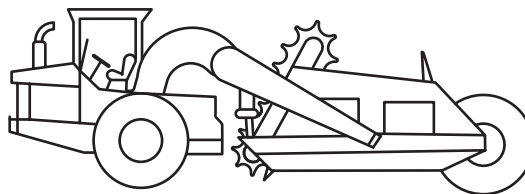


Figure 7 — One engine

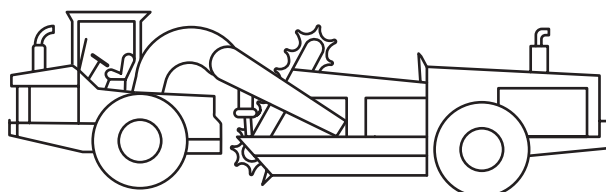


Figure 8 — Two engines

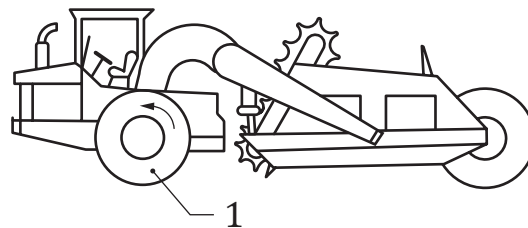
4.1.5 Drive system

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.

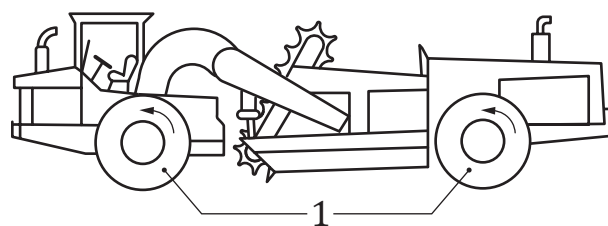
NOTE 2 Elevating scrapers have a powered mechanism fixed to the scraper bowl to assist in loading material.



Key

1 drive wheels

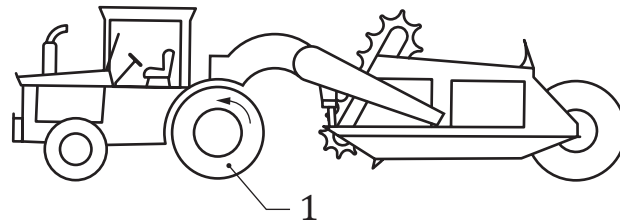
Figure 9 — Front-wheel drive



Key

1 drive wheels

Figure 10 — All-wheel drive



Key

1 drive wheels

Figure 11 — Centre-axle drive

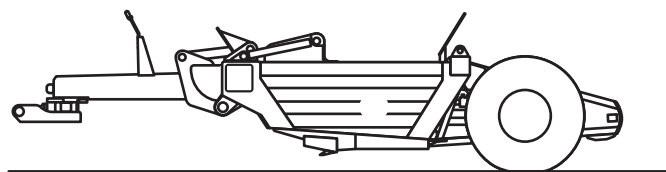


Figure 12 — Towed scraper

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.

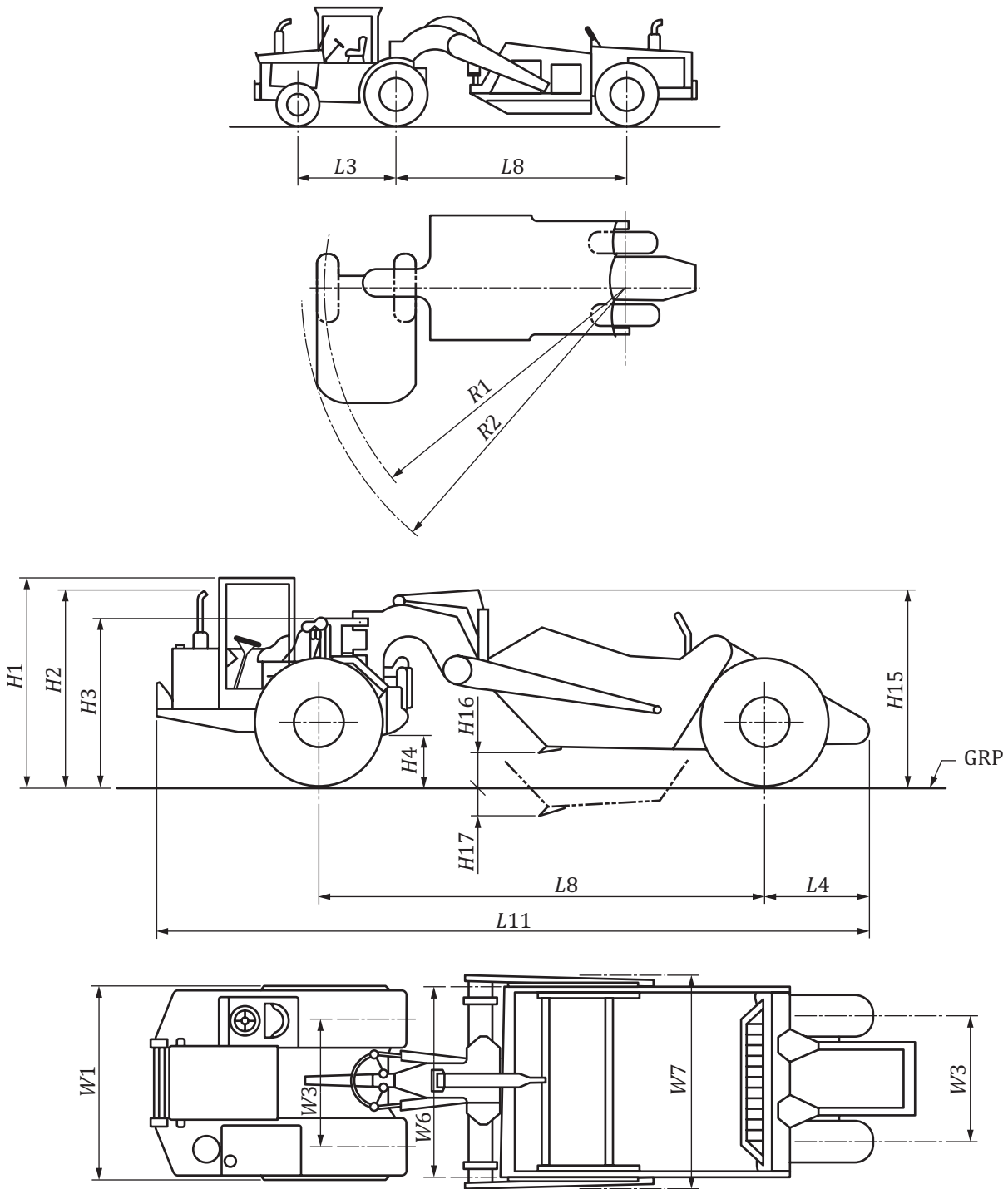


Figure 13 — Dimensions of base machine — Scraper

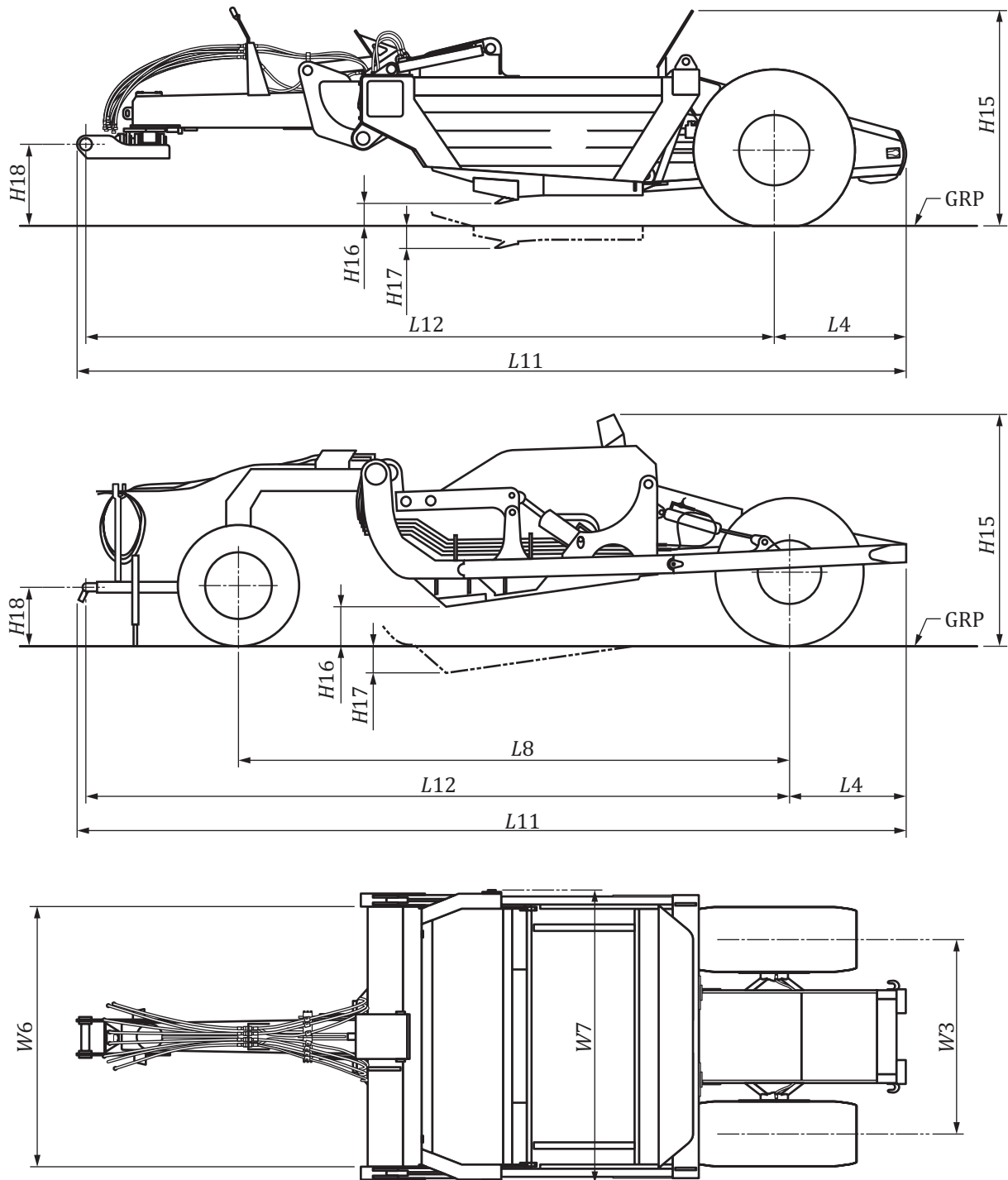


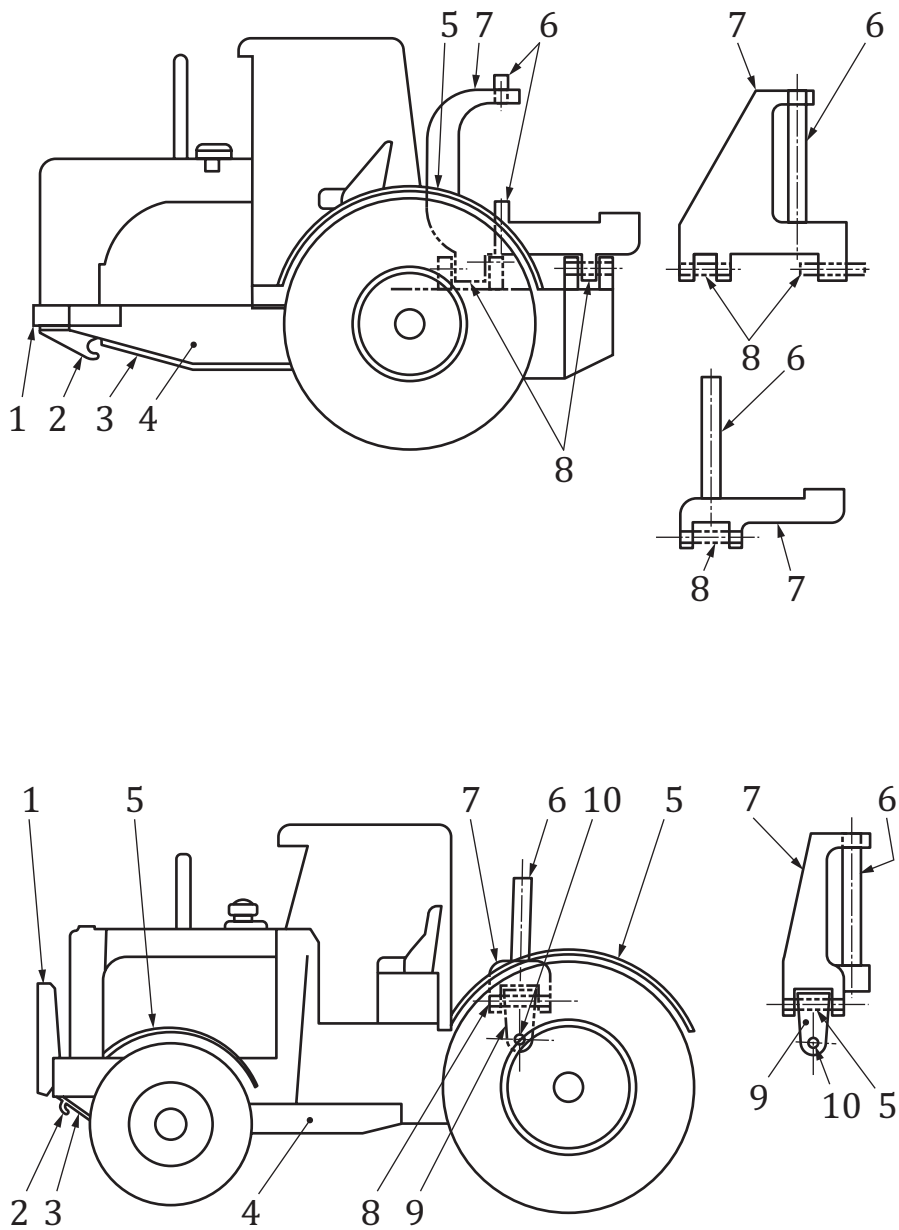
Figure 14 — Dimensions of base machine — Towed scraper

4.3 Nomenclature

For tractor component nomenclature, see [Figure 15](#).

For scraper component nomenclature, see [Figure 16](#) and [17](#).

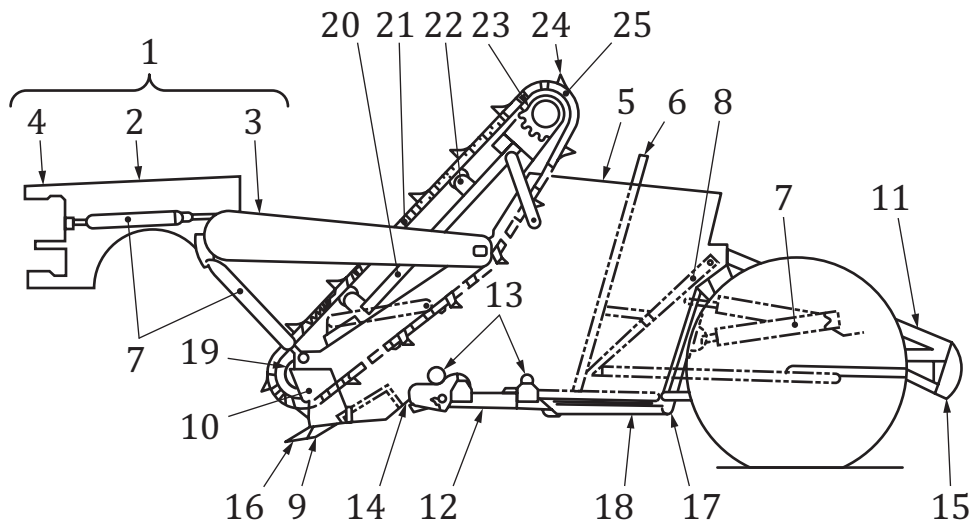
For attachment nomenclature, see [Figure 18](#).



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 |

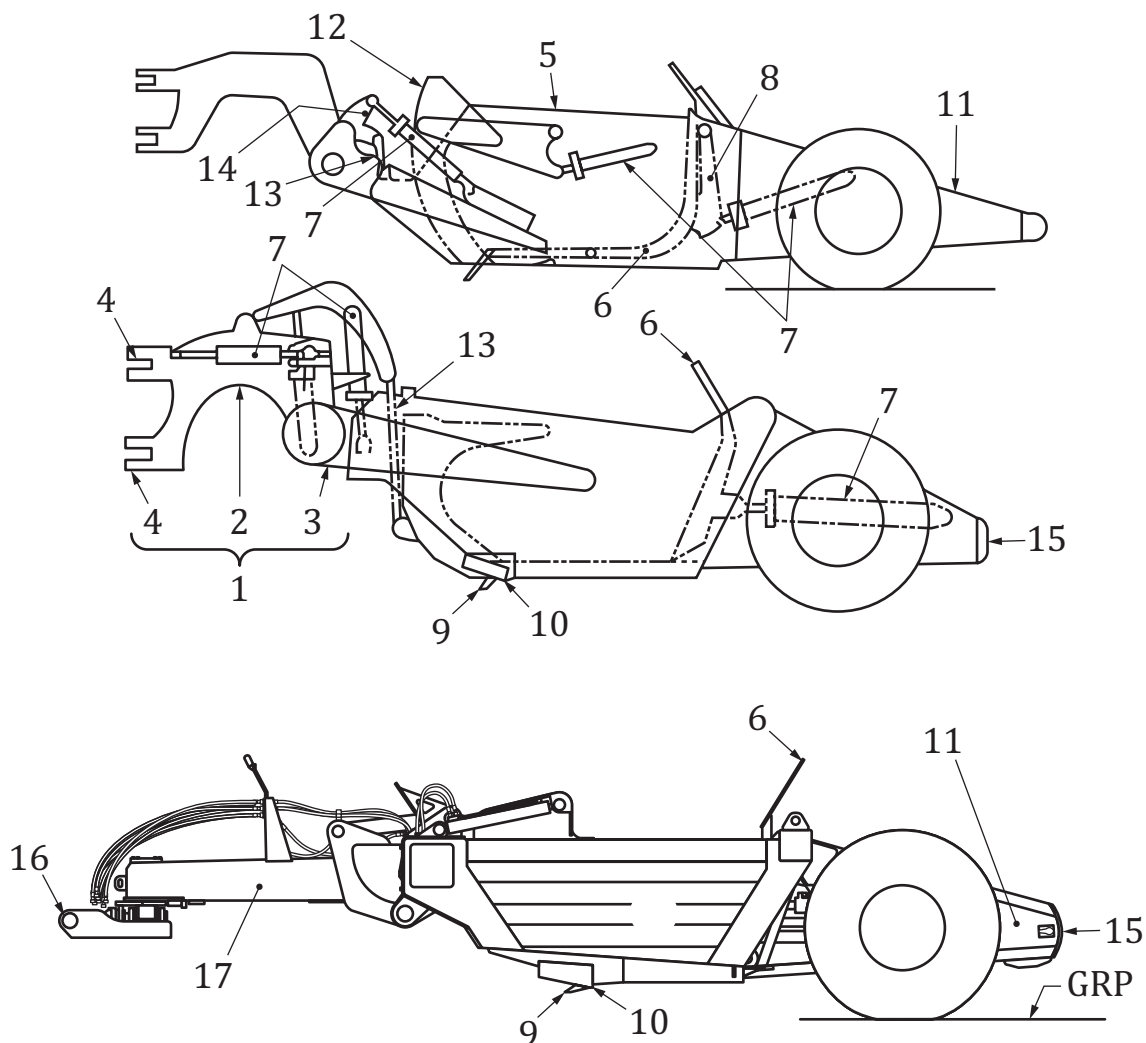
Figure 15 — Tractor component nomenclature



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



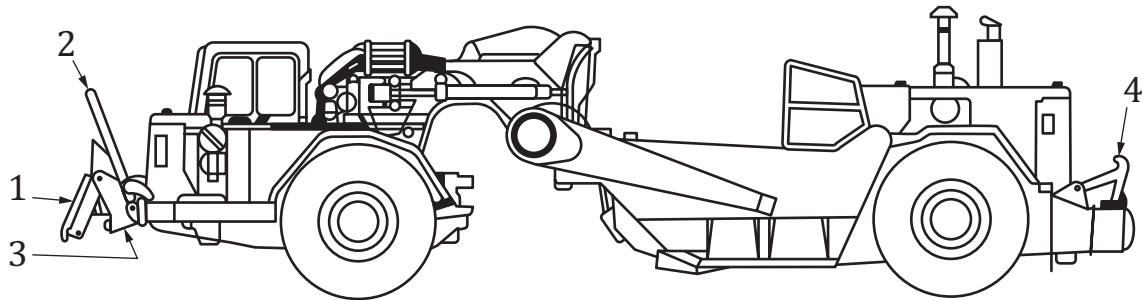
Key

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.



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.

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.

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.

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

- 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

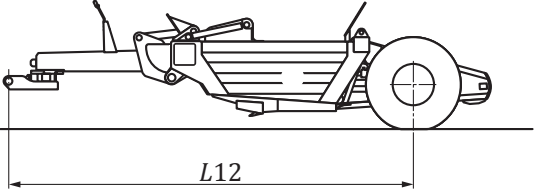
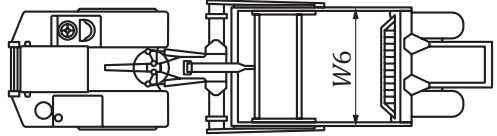
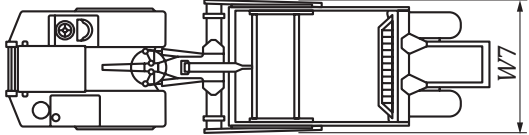
The recommended power range for the towing tractor may be specified.

Annex A (normative)

Equipment dimensions

[Annex A](#) defines scraper equipment dimensions and specifies their codes.

Code	Term and definition	Illustration
<i>H15</i>	<p>height of scraper</p> <p>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.</p>	
<i>H16</i>	<p>clearance under cutting edge in travel position</p> <p>distance on Z coordinate between the GRP and the cutting edge with the bowl at the highest position</p>	
<i>H17</i>	<p>maximum cutting depth</p> <p>distance on Z coordinate between the GRP and the cutting edge with the bowl at the lowest position below GRP</p>	
<i>H18</i>	<p>height of towed scraper hitch</p> <p>distance on Z coordinate between the GRP and the centreline of the hitch device</p>	
<i>L8</i>	<p>wheel base</p> <p>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</p>	
<i>L11</i>	<p>overall length of scraper</p> <p>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</p>	

Code	Term and definition	Illustration
<i>L12</i>	<p>length between hitch centreline and centreline of rear tire</p> <p>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</p>	 <p>The illustration shows a side view of a towed scraper. A horizontal dimension line labeled <i>L12</i> extends from the vertical centerline of the hitch at the front to the vertical centerline of the rear wheel at the back.</p>
<i>W6</i>	<p>width of cut</p> <p>distance on Y coordinate between two Y planes passing through the furthest points of the cutting edge or side bits of the bowl</p>	 <p>The illustration shows a top-down view of the scraper bowl. A vertical dimension line labeled <i>W6</i> indicates the width of the cutting edge.</p>
<i>W7</i>	<p>scraper width</p> <p>distance on Y coordinate between two Y planes passing through the furthest points of the scraper</p>	 <p>The illustration shows a top-down view of the entire scraper. A vertical dimension line labeled <i>W7</i> indicates the total width of the machine.</p>

Bibliography

- [1] ISO 3450, *Earth-moving machinery — Wheeled or high-speed rubber-tracked machines — Performance requirements and test procedures for brake systems*
- [2] ISO 6014, *Earth-moving machinery — Determination of ground speed*
- [3] ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

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