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**Road operation machinery and  
associated equipment — Sweepers —  
Commercial specifications**

*Machines d'exploitation des routes et matériel associé — Balayeuses  
de voirie — 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 document 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](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 195, *Building construction machinery and equipment*, Subcommittee SC 2, *Road operation machinery and associated equipment*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document defines commercial specifications for road surface cleaning machines which are designed to clean debris from improved road and pavement surfaces. These machines are typically equipped with a pick-up system and can convey the spoil into the hopper which can be then be discharged at a dumping ground, unload station, in a debris container or refuse reload stations. Road surface cleaning machines are equipped with sweep gear to scarify debris.

Chassis-mounted sweepers typically have a large capacity hopper and are designed to operate on streets, highways, airports and large vehicle parking areas (i.e. traffic areas) or industrial plants where a larger volume of debris needs to be swept.

Self-propelled sweepers and pedestrian-controlled sweepers typically have a lesser capacity hopper and, by design, are more manoeuvrable to clean debris from narrow streets, pedestrian zones or small parking lots.

Towed sweepers (e.g. towed by a tractor or other vehicle) can be used for similar applications as mentioned above.

Additional equipment for special cleaning applications can also be attached to a sweeper.

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# Road operation machinery and associated equipment — Sweepers — Commercial specifications

## 1 Scope

This document establishes content for commercial specifications for sweepers that are self-propelled (see [Annex A](#)) with an integrated chassis, chassis-mounted, pedestrian-controlled or towed behind a vehicle.

This document applies to road surface cleaning machines used in outdoor improved surface applications for cleaning debris from public areas, roads, airports and industrial plants. This document does not specifically cover the carrier vehicle or towing vehicle (e.g. lorry).

This document does not apply to:

- cleaning machines for winter maintenance;
- cleaning machines for indoor applications;
- rotary road brush attachments which can be coupled to tractors and other machinery;
- machines or components that are specifically designed for cleaning tram lines and rail tracks;
- industrial sweepers.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 22242, *Road construction and road maintenance machinery and equipment — Basic types — Identification and description*.

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 22242 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### **road surface cleaning machine sweeper**

machine designed for cleaning debris from improved surfaces

Note 1 to entry: Road surface cleaning machines can move debris to a *hopper* (3.3) or other type of disposal container which is attached to the machine by mechanical or pneumatic means, or by combination of each.

Note 2 to entry: Combinations of these types of road surface cleaning machines are possible.

### 3.1.1

#### **chassis-mounted sweeper**

*sweeper* (3.1), where the sweeping attachments are fixed or mounted on a carrier vehicle chassis

EXAMPLE Truck.

Note 1 to entry: Chassis-mounted sweepers are classified as large or small depending on the net volume capacity.

Note 2 to entry: See [Table 1](#).

### 3.1.2

#### **self-propelled sweeper**

*sweeper* (3.1) with a specially designed chassis, where the sweeping attachments are integrated

Note 1 to entry: This machine can be a ride-on machine, operator-assisted machine or pedestrian-controlled machine fitted with a seat or a sulky. See [Figures A.1](#) to [A.3](#) for further information.

Note 2 to entry: Self-propelled sweepers are categorized as maxi-compact, compact, midi-compact, or mini-compact depending on the net volume capacity.

Note 3 to entry: See [Figures A.1](#) to [A.6](#).

### 3.1.3

#### **mechanical sweeper**

machine whereby debris collected by a *sweeping gear* (3.4) from the road surface is transported and deposited into the *hopper* (3.3) by means of a mechanical device

EXAMPLE A conveyor system is used.

Note 1 to entry: See [Figure A.4](#).

### 3.1.4

#### **vacuum sweeper**

machine whereby debris collected by a *sweeping gear* (3.4) from the road surface is transported and deposited into the *hopper* (3.3) by means of air movement, provided by an impeller or a fan, with the air subsequently ventilated to atmosphere

Note 1 to entry: See [Figure A.6](#).

### 3.1.5

#### **regenerative air sweeper**

machine whereby debris collected by a *sweeping gear* (3.4) from the road surface is transported and deposited into the *hopper* (3.3) by means of air movement, provided by an impeller or a fan, with the air recirculating back to the pick-up device

Note 1 to entry: See [Figure A.5](#).

### 3.1.6

#### **street-washing machine**

machine that deposits water under pressure onto the road surface from an onboard water tank

### 3.1.7

#### **street-flushing machine**

machine that deposits water without pressure onto the road from an onboard water tank

### 3.1.8

#### **suction machine**

machine whereby debris collected from the road surface by an air suction system with pickup heads is transported and deposited into the *hopper* (3.3) by means of air movement, provided by an impeller or a fan

**3.1.9****towed sweeper**

*sweeper* (3.1) with a *sweeping gear* (3.4) with or without a collecting system

EXAMPLE Trailer sweeper as shown in [Figure A.8](#).

**3.1.10****pedestrian-controlled sweeper**

*self-propelled sweeper* (3.1.2) normally controlled by the operator walking with the unit

Note 1 to entry: See [Figure A.7](#).

**3.2****traffic area**

paved area in which there is vehicular and or pedestrian traffic

Note 1 to entry: Not included are railway tracks, which are solely for rail-mounted traffic, as well as traffic areas inside buildings and underground.

**3.3****hopper**

container to collect debris

**3.4****sweeping gear**

gear that transports road debris to the pick-up location of the *sweeper* (3.1)

Note 1 to entry: Sweeping gear is the collective name for all components such as *broom(s)* (3.5) and related control systems.

**3.5****broom**

brush

device with bristles that rotates to move debris

Note 1 to entry: Broom(s) can be of various types and be used in various configurations. Rotation axis of broom(s) can be horizontal or vertical.

**3.6****water recirculation system**

system which allows water to return to the sweeping process after separating debris, e.g. by filters or sieves and, in some cases, by a separator

**3.7****debris pick-up system**

air suction system with pick-up heads, tubes, hoses and fan system or mechanical pick-up system with *broom(s)* (3.5) and conveyer belts with any hybrid system in between to transport the debris into the *hopper* (3.3)

Note 1 to entry: See [Figure E.1](#).

Note 2 to entry: The debris pick-up system can either be an air suction system or a mechanical pick-up system with broom(s) and conveyer belts.

**3.8**  
**shipping mass**

SM  
mass of the *sweeper* (3.1) 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 water tank(s), when applicable, and with or without equipment, attachment(s) 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 are also be stated and included in any transportation skid (e.g. wooden pallets) and protective packaging.

**3.9**  
**gross volume capacity of the hopper**

total inner volume of the *hopper* (3.3)

Note 1 to entry: See [Figure E.1](#).

Note 2 to entry: The volume is measured by calculation by determining the inner volume below the screen (if not fitted, then up to roof level) minus the volume of all mechanical parts, which are placed inside the hopper, e.g. fan, suction-tube, exhaust-filter and actuators and separate dirt water storage.

**3.10**  
**net volume capacity of the hopper**

maximum solid and liquid debris contents that can be held by the *hopper* (3.3)

Note 1 to entry: See [Figure E.1](#).

Note 2 to entry: The volume is measured by calculation by determining the inner volume below the screen minus the volume of all mechanical parts, which are placed inside the hopper, e.g. fan, suction-tube, exhaust-filter and actuators and separate *debris water storage* (3.13).

**3.11**  
**loading capacity**

useful load (net load) indicated in kilograms which is the gross mass of the vehicle minus the *shipping mass* (3.8) of the vehicle

Note 1 to entry: See also *gross volume capacity of the hopper* (3.9).

[SOURCE: EN 15429-1:2007, 4.4, modified — Note 1 to entry has been added.]

**3.12**  
**fresh water tank capacity**

maximum usable volume of the fresh water tank

**3.13**  
**debris water storage**

maximum usable debris water volume

**3.14**  
**sweeping path width**

maximum cleaned width behind the *sweeper* (3.1) in the straight direction of motion with new *broom(s)* (3.5) in the maximum working position, without leaving debris trails between broom(s) and *debris pick-up system* (3.7)

Note 1 to entry: See also *shipping mass* (3.8).

### 3.15 turning and sweeping dimensions

circles of the chassis and *broom(s)* (3.5) measured to the outer and innermost parts in the working position

Note 1 to entry: External turning circle of the machine and *sweepers* (3.1) are relevant for sweeping between walls. For an illustration of the dimensions, see [Figure B.1](#).

Note 2 to entry: Each vehicle has right-hand and left-hand turning clearance circles.

### 3.16 working area

area for working operations of units as side gutter *broom(s)* (3.5), side roller broom(s) as far as a *debris pick-up system* (3.7)

Note 1 to entry: The working area can also be outside of the vehicle profile and can be adjustable.

Note 2 to entry: The working area for *sweepers* (3.1) can be public *traffic area* (3.2).

EXAMPLE Right-hand or left-hand driven debris pick-up.

### 3.17 brush inclination

angle between the brush drive shaft and the vertical reference line

Note 1 to entry: Brush inclination angles shall be in accordance with [Annex C](#).

EXAMPLE Right-hand or left-hand driven debris pick-up.

### 3.18 hopper discharge angle

maximum angle under which the tipped *hopper* (3.3) can be discharged

Note 1 to entry: The hopper discharge angle shall be in accordance with [Annex D](#).

Note 2 to entry: The hopper discharge angle is measured between the inner hopper bottom and the ground.

### 3.19 hopper dumping height

vertical distance measured between the ground and the lowermost edge of *hopper* (3.3) dumping lip or any other parts of the dumping mechanism at the maximum discharge angle under unladen conditions that indicates maximum height of piled debris

Note 1 to entry: The hopper dumping height shall be in accordance with [Annex D](#) and [Annex E](#).

### 3.20 hopper dumping clearance

vertical distance measured between the ground and the lowermost edge of the *hopper* (3.3) or any other parts of the dumping mechanism at the maximum discharge angle under unladen conditions that clears the maximum height of mating container

Note 1 to entry: The hopper dumping clearance shall be in accordance with [Annex D](#) and [Annex E](#).

### 3.21 hopper dumping reach

horizontal distance measured between rear end of the machine and *hopper* (3.3) discharge door that enables closer access to mating container

Note 1 to entry: The hopper dumping reach shall be in accordance with [Annex D](#) and [Annex E](#).

### 3.22

#### **dust suppression water system**

device or set of components used to reduce the amount of fugitive dust emission from a *sweeper* (3.1) by using water sprays

### 3.23

#### **gross vehicle mass**

GVM

gross vehicle weight

GVW

maximum machine mass as approved by the manufacturer, which combines the *operating mass (OM)* (3.24) of the machine with the heaviest combination of equipment and attachments, the heaviest combination of optional equipment, the *loading capacity* (3.11), as specified by the manufacturer, and, when applicable, full water tank(s), full *debris water storage* (3.13) and the rated ballast mass (BM)

Note 1 to entry: The gross vehicle mass may be regulated by laws or regulations for the respective region.

### 3.24

#### **operating mass**

OM

mass of the *sweeper* (3.1), with equipment (and attachment) and empty *hopper* (3.3) and *debris water storage* (3.13) in the most usual configuration as specified by the manufacturer, and with the operator mass, full fuel tank(s) 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 full water tank(s)

Note 1 to entry: The mass of the operator can differ depending on the respective region.

Note 2 to entry: The mass of the operator is not included for pedestrian-controlled-sweepers.

### 3.25

#### **overall length**

distance between front and rear outermost fixed parts

Note 1 to entry: Wander hoses and high-pressure cleaner and other mounted attachments are fixed parts.

### 3.26

#### **overall width**

distance between left and right outermost fixed parts

Note 1 to entry: Wander hoses and high-pressure cleaner and other mounted attachments are fixed parts.

### 3.27

#### **overall height**

distance from ground level up to uppermost edge of fix parts

EXAMPLE Roof or fixed beacon.

Note 1 to entry: If the warning beacon is tiltable, then the distance is in between ground level and uppermost edge of the fixed parts.

## 4 Classification

Sweepers covered by this document are classified in [Table 1](#).

**Table 1 — Classification of sweepers**

Machine type	Sub-type	Net volume capacity m <sup>3</sup>
Chassis-mounted sweeper	Large	> 4
	Small	≤ 4
Self-propelled sweeper	Maxi-compact sweeper	> 2,5
	Compact sweeper	≤ 2,5
	Midi-compact sweeper	≤ 1
	Mini-compact sweeper	≤ 0,2
Pedestrian-controlled sweeper	With hopper	≤ 0,1

## 5 Commercial specifications

### 5.1 General information

The following information shall be specified:

- name and address of sweeper unit manufacturer;
- name and address of importer (if imported);
- model number.

### 5.2 Sweeping path width of the suction machine

The following information shall be specified (as applicable):

- pick-up/suction nozzle only in millimetres (mm);
- pick-up/suction nozzle and one side broom in millimetres (mm);
- pick-up/suction nozzle and extension broom in millimetres (mm);
- pick-up/suction nozzle, side and extension broom in millimetres (mm).

### 5.3 Mass and loads

The following information shall be specified:

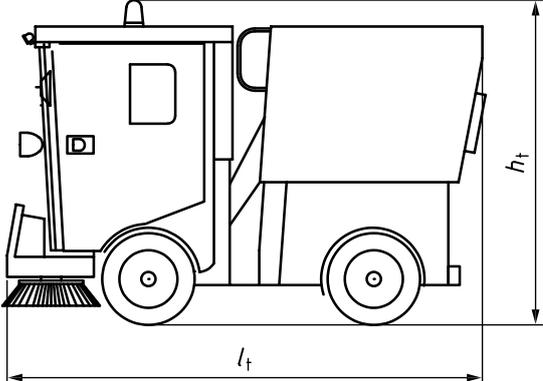
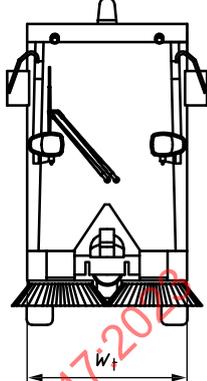
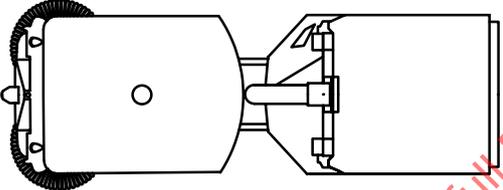
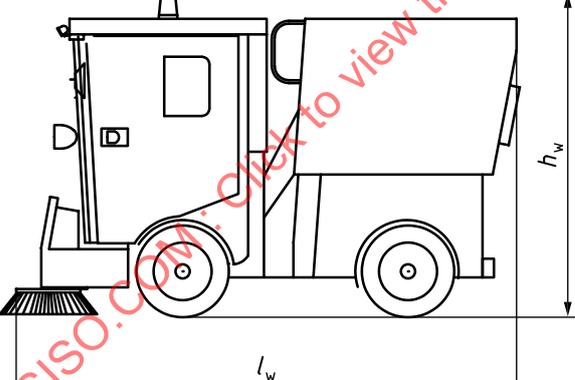
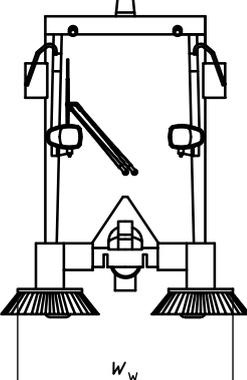
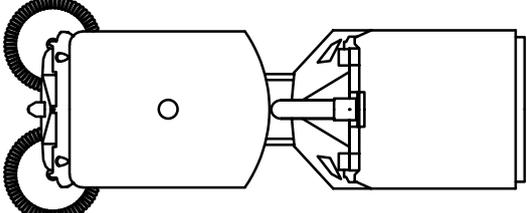
- operating mass in kilograms (kg);
- shipping mass in kilograms (kg);
- laden mass in kilograms (kg);
- loading capacity in kilograms (kg);
- gross vehicle mass in kilograms (kg).

### 5.4 Machine dimensions

For the structure and the dimension characteristics of sweepers, see also [Annex A](#).

The information in [Table 2](#) shall be specified.

Table 2 — Machine dimensions under operating conditions

Transport position in transporting mode		
overall length $l_t$ in millimetres (mm)		
overall width $b_t$ in millimetres (mm)		
overall height $h_t$ in millimetres (mm)		
		
Working position in operating mode		
overall length $l_w$ in millimetres (mm)		
overall width $b_w$ in millimetres (mm)		
overall height $h_w$ in millimetres (mm)		
		

### 5.5 Driving characteristics

The information in [Table 3](#) shall be specified.

Table 3 — Driving characteristics under operating conditions

	transporting mode	operating mode
max. speed (m/s)		
turning radius (mm) (in accordance with <a href="#">Annex B</a> )		
	gross vehicle mass	
max. gradeability (%)		

## 5.6 Drive system

### 5.6.1 Internal combustion engine for sweeper

The following information shall be specified (if applicable);

- manufacturer;
- model;
- swept capacity in litres (l);
- fuel type (e.g. petrol/gasoline, diesel, synthetic fuel, biofuel, CNG/LPG fuel);
- net power in accordance with ISO 14396 in kilowatts (kW);
- rated speed in rotations per minute ( $\text{min}^{-1}$ );
- cooling;
- number of cylinders;
- fuel tank capacity in litres (l).

### 5.6.2 Alternative drive systems electrically/battery-powered sweepers

For alternative driven engines (e.g. electric, hydrogen fuel cell, internal electric engine and hybrid systems), the following information shall be specified (if applicable):

- manufacturer (of the vehicle, not of the battery);
- capacity of the battery (kWh);
- on board and/or external charger;
- type of charging plug (e.g. type 1 / type 2 / CCS / CHAdeMo / Tesla Supercharger / protective socket);
- charging time (up to 100 % at minimum 10 °C) in hours (h);
- charging cycles (up to 80 %);
- type of current (AC or DC);
- pressure of the fuel cell in the storage tanks (kPa);
- charging current in amperes (A);
- charging voltage in volts (V);
- using time (above 0 °C) in hours (h);

- high voltage (HV) capability in volts (V);
- onboard voltage in volts (V).

NOTE Hydrogen propulsion and synthetic fuels are not taken into account.

### 5.7 Transmission device for sweeping gear

The following information shall be specified, as applicable:

- type:
  - hydraulic;
  - electric;
  - mechanical sweeper;
  - hydro-mechanical;
- number of speeds:
  - forward;
  - reverse.

### 5.8 Dust suppression water system

#### 5.8.1 General

The following information shall be specified, as applicable:

- number of spray nozzles;
- spray nozzle orifice/bore diameter (mm);

#### 5.8.2 Freshwater system for street-washing and/or street-flushing machines

The following information shall be specified, as applicable:

- number of pumps;
- volume of each pump (l/m/min);
- fresh water tank capacity in litres (l);
- pressure (MPa).

#### 5.8.3 Water recirculation system for street-washing and/or street-flushing machines

The following information shall be specified, as applicable:

- number of pumps;
- volume of each pump (l/m/min);
- recirculating water tank capacity in litres (l);
- recirculating water pump capacity in litre per minute (l/min);
- pressure (MPa).

## 5.9 Debris hopper

The following information shall be specified, as applicable:

- net volume capacity ( $\text{m}^3$ );
- gross volume capacity in ( $\text{m}^3$ );
- hopper dumping height (mm) (in accordance with [Annex D](#));
- hopper dumping clearance (mm) (in accordance with [Annex D](#));
- hopper dumping reach (mm) (in accordance with [Annex D](#)).

## 5.10 Sweeping gear

### 5.10.1 Side (gutter) broom

The following information shall be specified for the broom system, as applicable:

- diameter (mm);
- range of revolutions (min-max) in rotations per minute ( $\text{min}^{-1}$ ).

### 5.10.2 Extension (main) broom

The following information shall be specified for the extension (main) broom, as applicable:

- diameter (mm);
- range of revolutions (min-max) in rotations per minute ( $\text{min}^{-1}$ ).

### 5.10.3 Transfer broom

The following information shall be specified for the broom system, as applicable:

- diameter (mm);
- range of revolutions (min-max) in rotations per minute ( $\text{min}^{-1}$ ).

### 5.10.4 Broom inclination angle

The following information shall be specified for the broom inclination angle, as applicable:

- angle on the vertical longitudinal plane of the vehicle (forward angle)  $\beta$ ;
- angle on the vertical transversal plane of the vehicle (sideward angle)  $\gamma$ .

## 5.11 Blower system

The following information shall be specified for the blower system, as applicable:

- speed range in  $\text{min}^{-1}$ ;
- rating  $\text{m}^3/\text{min}$  at  $1 \text{ min}^{-1}$ ;
- drive type.

## 5.12 Vacuum system

The following information shall be specified for the vacuum sweeper, as applicable:

- nozzle width (mm);
- pick-up area (i.e. working area) (cm<sup>2</sup>);
- internal diameter of hose (mm).

## 5.13 Hydraulic system

### 5.13.1 General

The following information shall be specified for the hydraulic system, as applicable:

- hydraulic tank capacity in litres (l).

### 5.13.2 work hydraulic (continuous/rotating function)

The following information shall be specified for the hydraulic system, as applicable:

- number of continuous functions at loop 1 (e.g. front);
- max. volume of each pump (l/min);
- max. pressure of each pump (Mpa);
- number of continuous functions at loop 2, (e.g. rear);
- max. volume of each pump (l/min);
- max. pressure of each pump (Mpa);
- number of continuous functions at loop *n*, (e.g. centre);
- max. volume of each pump (l/min);
- max. pressure of each pump (Mpa).

### 5.13.3 work hydraulic (linear function)

The following information shall be specified for the hydraulic system, as applicable:

- max. volume in loop (l/min);
- max. pressure in loop (MPa);
- number of single acting functions for mounted equipment 1 (e.g. front);
- number of double acting functions for mounted equipment 1 (e.g. front);
- number of single acting functions for mounted equipment 2, (e.g. centre);
- number of double acting functions for mounted equipment 2, (e.g. centre);
- number of single acting functions for mounted equipment *n*, (e.g. rear);
- number of double acting functions for mounted equipment *n*, (e.g. rear).

**5.13.4 auxiliary drive for sweeping functions (if any)**

The following information shall be specified for the hydraulic system, as applicable:

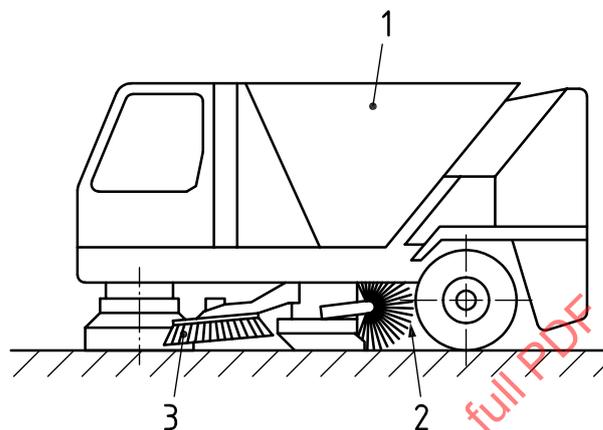
- number of pumps;
- max. volume of each pump (l/min);
- number of motors/engines.

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## Annex A (informative)

### Structure and dimension characteristics of sweepers

#### A.1 Self-propelled sweeper - Front tricycle type

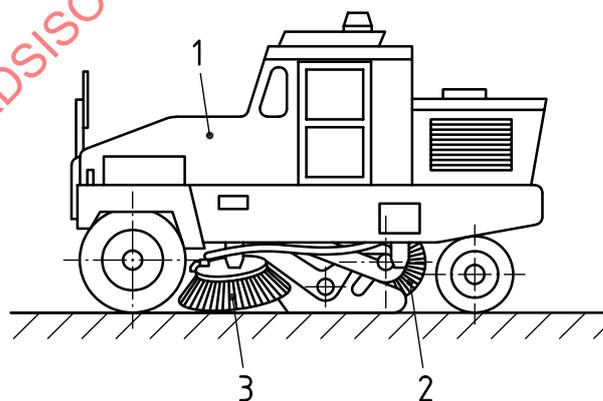


**Key**

- 1 hopper
- 2 extension (main) broom
- 3 side (gutter) broom

Figure A.1 — Self-propelled sweeper - Front tricycle type

#### A.2 Self-propelled sweeper - Rear tricycle type

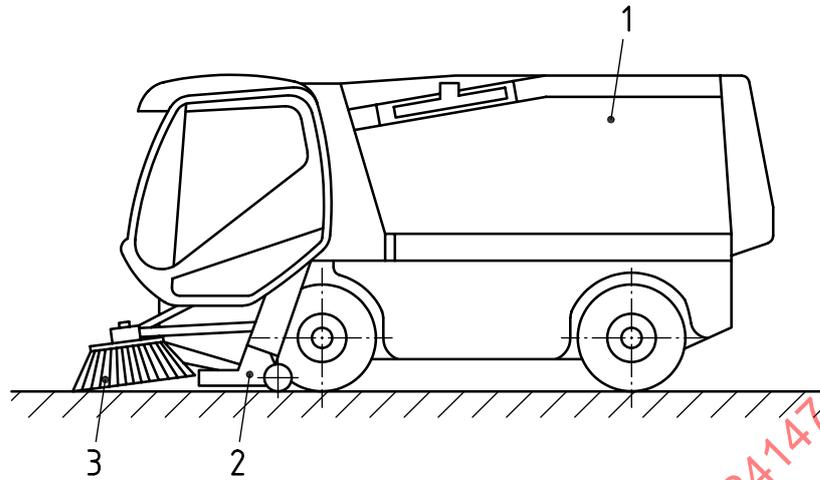


**Key**

- 1 hopper
- 2 extension (main) broom
- 3 side (gutter) broom

Figure A.2 — Self-propelled sweeper - Rear tricycle type

### A.3 Self-propelled sweeper

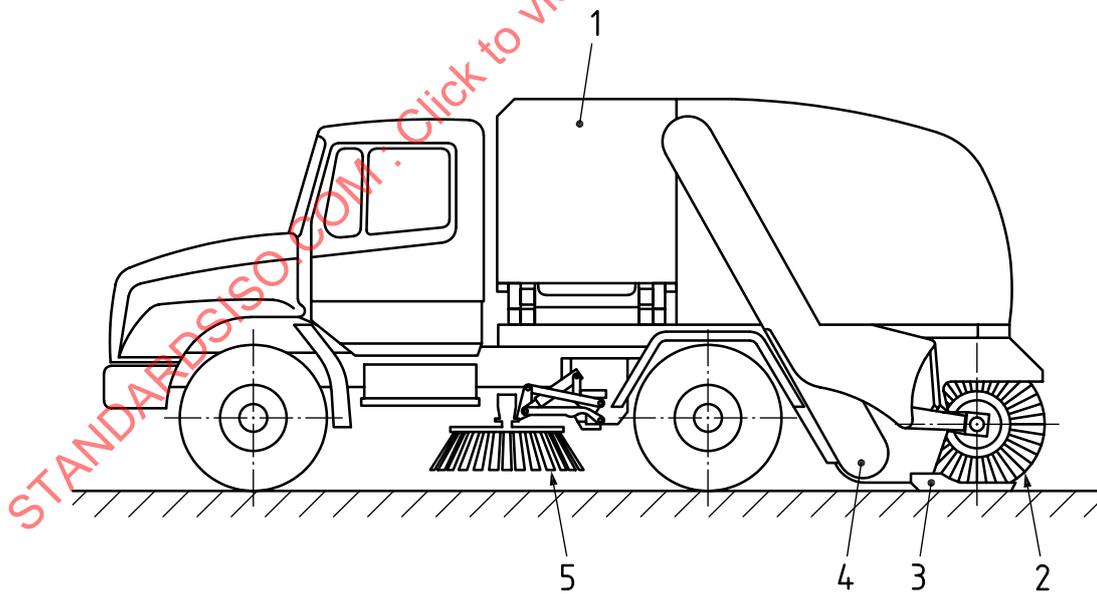


**Key**

- 1 hopper
- 2 vacuum nozzle
- 3 side broom

**Figure A.3 — Self-propelled sweeper – Integral chassis**

### A.4 Chassis-mounted sweeper – Mechanical type

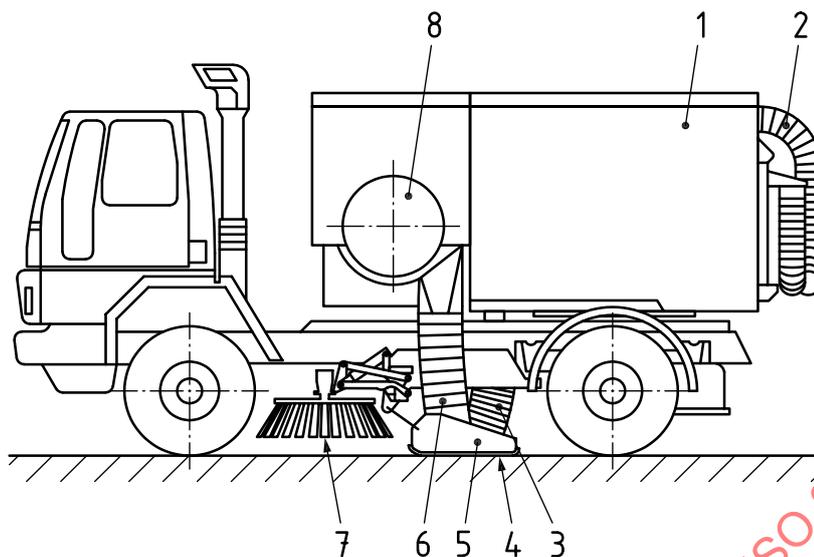


**Key**

- 1 hopper
- 2 extension (main) broom
- 3 drag shoe
- 4 elevator
- 5 side brush

**Figure A.4 — Chassis-mounted sweeper – Mechanical street**

**A.5 Chassis-mounted sweeper – Regenerative air sweeper (type)**

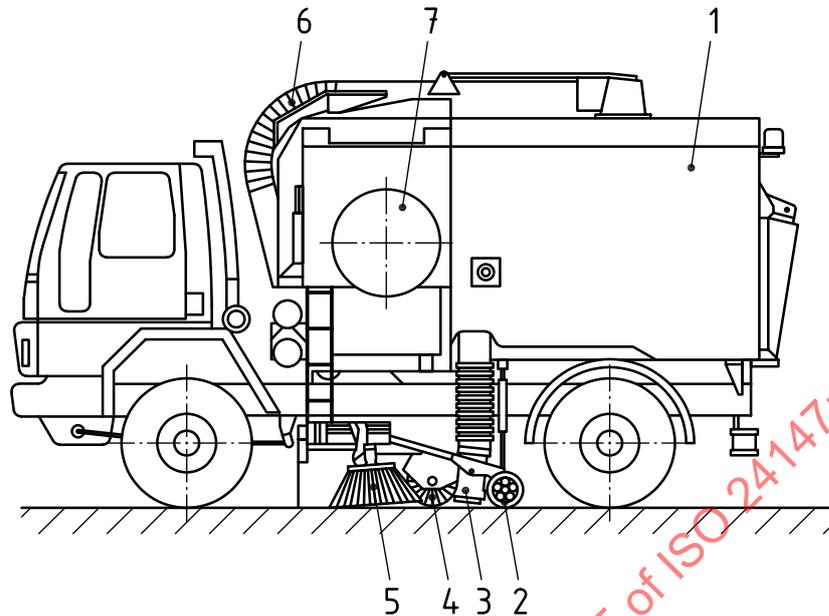


**Key**

- 1 hopper
- 2 wander hose
- 3 vacuum hose
- 4 skids
- 5 pick-up head
- 6 pressure hose
- 7 side (gutter) broom
- 8 fan

**Figure A.5 — Chassis-mounted sweeper – Regenerative air sweeper**

### A.6 Chassis-mounted sweeper - Vacuum type



#### Key

- 1 hopper
- 2 caster wheel
- 3 vacuum nozzle
- 4 transfer broom
- 5 side (gutter) broom
- 6 wander hose
- 7 fan

Figure A.6 — Chassis-mounted sweeper - Vacuum sweeper type

### A.7 Pedestrian-controlled sweeper

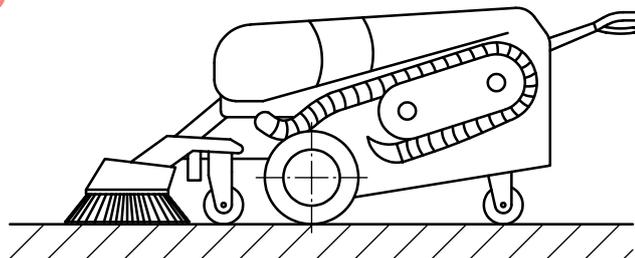


Figure A.7 — Pedestrian-controlled sweeper

A.8 Towed sweeper

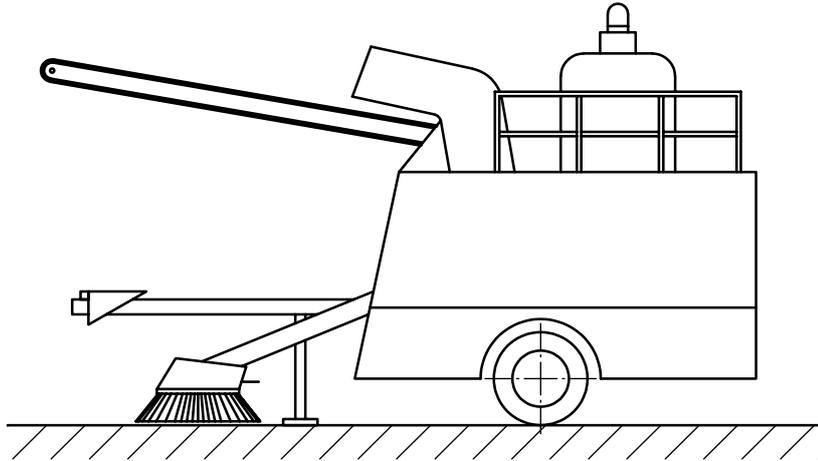
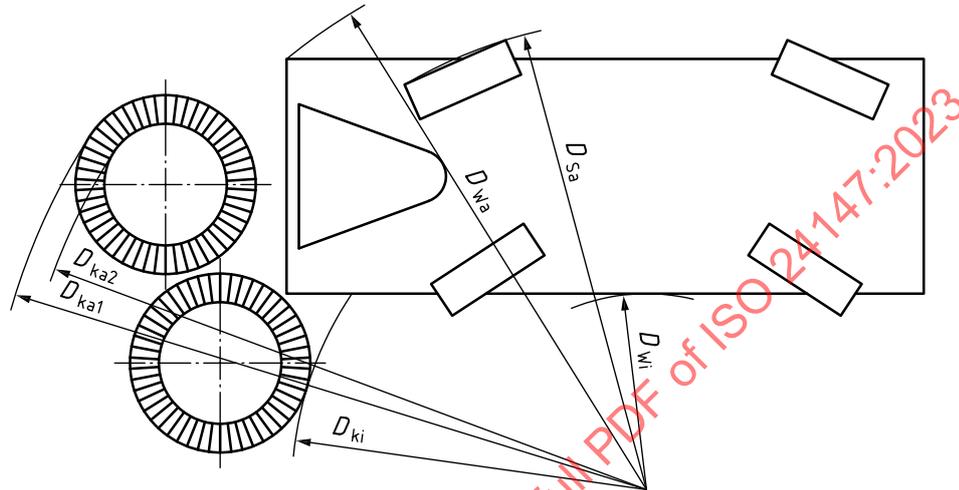


Figure A.8 — Towed sweeper

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## Annex B (normative)

### Turning and sweeping dimensions



#### Key

- $D_{ka1}$  external sweeping circle of machine, measured to the outermost brush in working position (relevant for sweeping between walls)
- $D_{ka2}$  external turning circle of machine, measured to the non-flexible parts of the outermost brush in transport position (relevant for turning between walls)
- $D_{ki}$  inner sweeping circle of machine, measured to the innermost brush in working position without interruption of the sweeping and steering operation
- $D_{Sa}$  turning circle of machine, measured at the outside of the outermost wheel
- $D_{Wa}$  turning circle of the machine, measured at the outermost front machine contour
- $D_{Wi}$  turning circle of the machine, measured at the innermost machine contour

NOTE Each vehicle has right-hand and left-hand turning clearance circles.

Figure B.1 — Turning and sweeping dimensions