



Performance of Walk-Behind and Ride-On Sweepers

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Issue table

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1 Scope

The listed definitions are the characteristic performance parameters for walk-behind and ride-on floor sweepers. Road and street sweepers and other spray machines are not included. As agreed to by the membership of ICMMA, all member companies will follow these definitions and measurement constraints when reporting sweeper performance in sales and marketing literature. Reported values shall be in metric units, with optional imperial units following in parenthesis.

2 Minimum Aisle Turn-Around Width

Definition:

The minimum aisle width the machine can turn around in without reversing. The value is reported in metres (inches).

Intent:

This parameter is intended to be an indication of the manoeuvrability of the machine during operation.

Measurement Constraints:

Aisle Turn-Around Width is measured as the minimum distance between two parallel vertical planes that allows the machine to turn 180 degrees, during normal operation, without contacting either of the planes with anything other than Brush bristles. During the measurement all retractable Brushes are retained in their fullest retracted position. If the machine is not symmetrical the result must state in which direction the turn was made.

3 Battery Amp-Hour Capacity (Ah)

Definition:

The rated capacity of a battery pack (see IEC 60255-1), presenting the maximum electrical current the battery pack can continuously supply over a 5-hour period. The value is reported in amp-hours (Ah).

Intent:

This parameter is intended to be an indication of the power storage capacity of the battery pack.

Measurement Constraints:

Battery Amp-Hour Capacity as defined in IEC 60255-1 can be provided by the battery supplier.

4 Productivity – Theoretical Productivity

Definition:

The area of floor covered per unit of time, assuming uninterrupted, continuous operation in sweeping mode. This is a calculated value, reported in square metres per hour (square feet per hour).

Intent:

This parameter is intended to be an estimate of the theoretical coverage of a type of sweeping machine. The parameter is not an estimate of the actual coverage a machine would achieve over the course of a cleaning shift.

Measurement Constraints:

Theoretical Productivity is equal to the cleaning width multiplied by the cleaning speed. The Cleaning Width is as defined in these definitions. The Sweeping Speed is calculated from the standardised data given below:

$$\begin{aligned}\text{Ride-on Sweepers} &= 7\text{km/h} \\ \text{Driven Walk-behind Sweepers} &= 4 \text{ km/h}\end{aligned}$$

5 Calculated Battery-Powered Machine Maximum Run Time

Definition:

An estimate of how long a battery-powered machine can be expected to run between battery charges, under battery conditions given in IEC 60255-1 and light machine operation. This is a calculated value, for a specific battery pack, reported in hours, rounded to the nearest tenth of an hour.

Intent:

This parameter is intended to be an estimate of the expected machine run time, based only on the rated input current of the machine and the rated capacity of the batteries.

Measurement Constraints:

Machine Run Time is a calculated value, based on two factors. The first factor is the measured average electrical current draw of the machine, under light load conditions. The second factor is the rated capacity of the battery pack (IEC 60255-1), at the specific discharge rate equal to the measured machine current draw. The capacity of the battery pack at this specific discharge rate is normally supplied by the battery manufacturer.

$$\text{Run Time} = \text{Capacity of batteries at measured current draw}$$

The current draw used for this calculation shall be the total machine current draw, operating on level smooth concrete at a typical sweeping speed, with a new Brush and side Brushes (as applicable) and the main Brush down force adjusted per the manufacturer's instructions for light sweeping conditions. The type of main Brush, side Brushes and battery amp hour rating should be given with the Run Time rating.

6 Sweeping Path Width

Definition:

The nominal path the machine sweeps based solely on the nominal width of the main Brush and side Brushes. The Sweeping Path Width should be given for a standard machine, and the widths for machines fitted with options should each be noted separately. The value is reported in millimetres to the nearest 10mm (inch).

Intent:

This parameter is intended to indicate the effective sweeping width of the machine, not the physical width of the machine.

Measurement Constraints:

Sweeping Path Width is the measured width of floor that is swept while travelling in a straight line.

7 Gross Vehicle Weight (GVW) Excluding Operator

Definition:

The Gross Vehicle Weight of the machine, when ready for operation. The Gross Vehicle Weight, GVW, is the maximum stated weight including operating weight, full fuel tank (where applicable), personnel protection options, accessories and attachments. The value is reported in kilograms (pounds).

Intent:

This parameter is intended to indicate the overall weight of the machine in its operational condition.

Measurement Constraints:

Machine Weight shall include largest suggested batteries, all cords, hoses, wands and Brushes, but with empty dust bags or hoppers.

8 Machine Transport Width

Definition:

The minimum width the machine can pass through. The value is reported in metres (inches).

Intent:

This parameter is intended to be an indication of the manoeuvrability of the machine during transport, not the effective cleaning width of the machine.

Measurement Constraints:

Machine Width is measured as the minimum distance between two parallel vertical planes that allows the machine to pass between the planes, while moving in a straight line. Any machine part removable without the use of tools and taken off for this measurement must be reported with the result.

9 Maximum Floor Load

Definition:

The maximum pressure exerted onto a floor surface by any wheel or caster on the machine, during expected operation or transport mode. The value is reported in Megapascals, Mpa (pounds per square inch, psi) (1 Mpa = 145psi).

Intent:

This parameter is intended to indicate the suitability of the machine for specific floor surfaces. The value can be compared against the static load limit rating of the floor surface. Where wheel/caster options are available, maximum load figures should be reported against each option.

Measurement Constraints:

Maximum Floor Load is equal to the maximum force supported by each wheel or

caster, under any expected load condition, including transport configuration, divided by the footprint of that wheel or caster. The machine weight shall be the GVW (Gross Vehicle Weight) as defined in these definitions plus 75kg (standard operator weight). The wheel or caster footprint shall be determined under the maximum expected load conditions, on a smooth concrete floor, while ignoring the area lost due to the tread pattern.

Uniform force distribution shall be assumed across the footprint contact area. Pneumatic tyres are to be inflated as per the manufacturer's instructions.

10 Motor Power – Drive Motor, Brush Motor and Side Brush Motor

Definition:

The rated output of each of the motors, based on a continuous duty cycle rating, as defined by the motor manufacturer. The value is stated in watts (horsepower).

Intent:

This parameter is intended to be an indication of the maximum possible output power of the motor, independent of its suitability to a specific application.

Measurement Constraints:

The motor manufacturer normally supplies these values.

11 Sound Pressure Level

Definition:

The Overall A-Weighted Emission Sound Pressure Level, at the operator position. The value is reported in dB(A).

Intent:

This parameter is intended to be an indication of the noise that the operator is exposed to during the normal operation of the machine.

Measurement Constraints:

Sound Pressure Level is measured in accordance with EN 60704-1. The microphone is set as follows for different categories of machines:

Walk Behind Machines: As specified in the standard.

Ride-On Machine with an operator platform: a distance of 0.40m behind the handle, a height of 1.55m above the operator platform.

Ride-On Machines with an operator seat or sulky: 0.80m above the middle of the seat plane.

Attention is drawn to the requirements of The Control of Noise at Work Regulations: 2005.

12 Speed – Transport Mode (Power driven machines)

Definition:

The transport speed of the machine, travelling in a straight, forward direction, on a flat

smooth surface. The value is reported in kilometres per hour (miles per hour).

Intent:

This parameter is intended to indicate the maximum transport speed of the machine, with no other machine functions operating.

Measurement Constraints:

Transport Mode Speed is measured after acceleration to the maximum speed is complete. The measurement shall be made with the machine at its GVW (Gross Vehicle Weight), as defined in these definitions, plus a standard operator weight (75kg).

13 Speed – Typical Sweeping Mode

Definition:

The working speed of the machine travelling in a straight, forward direction, on a straight, forward flat, smooth surface. The value is reported in kilometres per hour (miles per hour).

Intent:

This parameter is intended to indicate the recommended maximum working speed of the machine, with all floor-cleaning functions of the machine operating.

Measurement Constraints:

Typical Sweeping Mode speed is measured after acceleration to the maximum safe and efficient working speed is complete. The measurement shall be made with the machine at its GVW (Gross Vehicle Weight), as defined in these definitions. The machine speed and machine loading shall be the load condition related to the rated current draw, as defined in IEC 60335-2-72, Clause 10.

14 Filter Area

Definition:

The Filter Area is the open area of the filter element available to the flow of working air. The value is reported in square metres (square inches).

Intent:

This parameter is intended to indicate the effective size of the available air filter, i.e. the area that, after insertion and correct positioning of the filter, is available to the flow of air.

Measurement Constraints:

The filter area may be that quoted by the filter supplier, or that measured directly after disassembly.

Filter Performance:

This is the filtration performance of the filter media at the expected airflow seen in the machine. It shall be expressed as a percentage of particles filtered, at a defined particle size, e.g.

99.97% at 0.3 microns, measured at the actual machine airflow.

15 Rated Hopper Capacity (Debris volume)

Definition:

The maximum functional volume of debris that a hopper may hold in normal operation. The value is reported in litres (ft³), and shall be specified as Rated Hopper Capacity.

Intent:

This parameter is intended to indicate the useful volume of the hopper.

Measurement Constraints:

This value is the sum of the uniform rectangular cross-section hopper capacity (i.e. how much fluid the hopper could hold), and (where appropriate) the Heaped Capacity (i.e. how much dry debris could be piled above the top of the uniform cross-section).

16 Rated Hopper Weight Capacity

Definition:

The maximum functional weight of debris that a hopper may hold in normal operation. The value is reported in kilograms (pounds), and shall be specified as Rated Hopper Weight Capacity.

Intent:

This parameter is intended to indicate the maximum weight the hopper could safely lift and dump.

Measurement Constraints:

The Rated Hopper Weight Capacity is a machine design detail, determined during the engineering of the specific machine. The determination shall take into account ergonomics, handling, mechanical strength and fatigue as well as other engineering considerations.

17 Maximum Incline – Full Hopper

Definition:

The maximum grade of a smooth concrete ramp that a machine can safely drive up and down when the hopper is at its Rated Hopper Weight Capacity. The value is reported in percent gradient.

Intent:

This parameter is intended to indicate the maximum incline which the sweeper can ascend and for which the braking system can hold the sweeper, and for which it can descend, and the braking system can stop it.

Warning: The reported parameter is not intended to indicate any degree of safety or stability should attempts be made to turn the machine on the maximum incline reported.

Measurement Constraints:

The Maximum Incline – Full Hopper rating is the maximum incline that the machine can ascend while at its Rated Hopper Weight Capacity and the braking system be able to hold it. The primary braking system must be able to stop the fully loaded machine

while descending the rated grade.

18 Maximum Incline – Empty Hopper

Definition:

The maximum grade of a smooth concrete ramp that a machine can safely drive up and down when the hopper is empty. The value is reported in percent gradient.

Intent:

This parameter is intended to indicate the maximum incline which the sweeper can ascend and for which the braking system can hold the sweeper, and for which it can descend, and the braking system can stop it.

Warning: The reported parameter is not intended to indicate any degree of safety or stability should attempts be made to turn the machine on the maximum incline reported.

Measurement Constraints:

The Maximum Incline – Empty Hopper rating is the maximum incline that the machine can ascend while the hopper is empty. The primary braking system must be able to stop the machine while descending the rated grade.

19 Vibration

Definition:

Values should be quoted for 'hand-arm vibration' and 'whole-body vibration' as applicable.

Intent:

This parameter is intended to indicate the vibration expected during normal handling.

Measurement Constraints:

Measure according to BS EN ISO 5349, parts 1 and 2. Attention is drawn to the requirements of The Control of Vibration at Work Regulations: 2005.

20 References

BS EN 60704-1:1997, IEC 60704-1:1997

Test code for the determination of airborne acoustical noise emitted by household and similar electrical appliances. General requirements.

BS EN 60335-2-72:1999

Specification for the safety of household and similar electrical appliances. Particular requirements. Automatic machines for floor treatment for commercial and industrial use.

BS EN ISO 5349-1:2001

Mechanical vibration. Measurement and evaluation of human exposure to hand transmitted vibration. General requirements.

BS EN ISO 5349-2:2002

Mechanical vibration. Measurement and assessment of human exposure to hand-

transmitted vibration. Practical guidance for measurement at the workplace.