



**International Code of Practice:
Performance of Walk-Behind and
Ride-On Scrubber Driers**

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Issue table

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Table of Contents

1	Scope.....	4
2	Air Flow.....	4
3	Minimum Aisle Turn-Around Width.....	4
4	Battery Amp-Hour Capacity (Ah).....	5
5	Calculated Battery-Powered Machine Run Time.....	5
6	Productivity – Theoretical Productivity.....	5
7	Productivity – Realistic Productivity.....	6
8	Maximum Operational Scrub Deck Down Force.....	7
9	No Load Brush Speed.....	7
10	Cleaning Path Width.....	7
11	Gross Vehicle Weight – GVW (Excluding operator).....	8
12	Machine Transport Width.....	8
13	Maximum Floor Load.....	8
14	Motor power – Drive motor and Brush Motor.....	9
15	Solution Flow Rate.....	9
16	Sound Pressure Level.....	9
17	Speed – Transport mode (Power Driven Machines).....	10
18	Speed – Working Mode.....	10
19	Tank Capacity – Solution Tank and Recovery Tank.....	10
20	Maximum Vacuum.....	11
21	Vibration Levels.....	11

1 Scope

The listed definitions are the characteristic performance parameters for walk-behind and ride-on floor scrubbers. As agreed to by the membership of ICMMA, all member companies will follow these definitions, and measurement constraints, when reporting scrubber performance in sales and marketing literature. Reported values shall be in metric units, with optional Imperial units following in parenthesis.

2 Air Flow

Definition:

The volume of air movement through a machine per unit of time under standard atmospheric conditions. The value is reported in litres per second (cubic feet per minute).

Intent:

This parameter is intended to be an indication of the vacuum capability of the machine under high-flow conditions.

Measurement Constraints:

Airflow is to be measured as given in IEC 60312. All the requirements apply with the following clarifications/exceptions:

- The squeegee hose will be treated as the vacuum hose, and be directly connected to the Plenum Chamber as described.
- For battery-powered machines, tests will be conducted with a power supply that can regulate the voltage to $\pm 2.5\%$ of the rated voltage.
- The calculated Maximum Air Flow (38mm (1.5”) orifice on Plenum Chamber) shall be reported.
- Manufacturers may choose to include calculated airflow figures for additional test orifices if they so desire.

3 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.

4 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:

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

Measurement Constraints:

Battery Amp-Hour Capacity as defined in IEC 60255-1 can be provided by the battery supplier. The reported capacity is that relating to a 5-hour discharge period.

5 Calculated Battery-Powered Machine Run Time

Definition:

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

Intent:

The parameter is intended to be an estimate of the expected machine run time, based only on the rated current draw (amps) 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 rated current draw of the machine, as defined in IEC 60335-2-72, Clause 10. The second factor is the rated capacity of the battery pack (IEC 60255-1), at a discharge rate equal to the measured current draw (see below). The capacity of the battery pack at this specific discharge rate is normally supplied by the battery manufacturer.

$$\text{Run Time} = \text{Capacity of the batteries at the current rating}$$

The current rating used for this calculation shall be the total machine current draw, operating on level Vinyl Composite (VCT) floor with pads of medium density and water, at a typical scrubbing speed, at the lightest scrub pressure setting recommended for this machine on VCT. A machine with a cylindrical scrub deck shall be tested with the brushes recommended for use on VCT.

6 Productivity – Theoretical Productivity

Definition:

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

Intent:

This parameter is intended to be an estimate of the theoretical coverage of a type of

cleaning 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 product of the cleaning width and the cleaning speed. The Cleaning Width is as defined in these definitions. The Cleaning Speed is set as follows for different categories of machines:

Ride-on Auto-scrubbers = 75 m/min (250 ft/min)

Driven Walk-behind Auto-scrubbers = 60 m/min (200 ft/min)

Pad assist (non-drive) Auto-scrubbers = 45 m/min (150 ft/min)

7 Productivity – Realistic Productivity

Definition:

The area of floor covered per unit of time, taking into account all expected breaks from continuous scrubbing 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 actual coverage that could be achieved over the course of a cleaning shift, assuming approximate values for expected inefficiencies in operation.

Measurement Constraints:

Realistic Productivity takes into account tank size, rate of solution usage, and drain/refill time. The figure is an average over the run time of a single battery charge. The calculation involves the following factors:

- Standard solution coverage rate, estimated as 50 sq. m. per litre.
- Standard transport time to and from drain/refill station, estimated as 10 minutes.
- Standard tank drain and fill rates, estimated as 15 litre per minute.
- Cleaning path overlap factor, estimated at 0.9.
- Obstructed path factor, estimated as 0.9. (Accounts for the fact that cleaning path is not a single pass, but involves slowing down for turns, manoeuvring around objects, etc.)

To calculate realistic productivity:

- Dispensing rate litres/min (gal/min) = width x speed (See clause 5) / solution flow rate (see clause 14)
- Scrub time per tank (min) = tank capacity / dispensing rate
- Drain/fill time per tank (min) = transport time + tank capacity / drain/fill rate
- Total time per tank (min) = scrub time per tank + drain/fill time per tank
- Area cleaned per tank m² (sq.ft.) = scrub time per tank x speed x width
- Productivity m²/min (sq.ft./min) = Total area cleaned per tank / total time per tank
- Realistic Productivity m²/min (sq.ft./min) = Productivity x Overlap factor x Obstructed factor

8 Maximum Operational Scrub Deck Down Force

Definition:

The maximum down-force on the floor, applied by the face of all brushes or pads. The value is reported in kilonewtons (pounds force).

Intent:

This parameter is intended to be an indication of the maximum scrubbing force that can be generated by the machine in normal operation, without overloading motors or circuit protection devices.

Measurement Constraints:

For machines having stepped down-force settings, the highest (greatest down force) setting should be selected, and the values at other settings may be quoted. For machines having infinitely variable settings, the 'maximum' setting should be selected.

Maximum Scrub Deck Down-Force is equal to the reactive force while operating the machine in a stationary position, at its gross vehicle weight (GVW), with the deck on a stainless steel sheet (1.5 mm thick). The reported value is the force that can be maintained for 15 seconds in this stationary position, using pads of medium density and clean tap water. The machine must be able to traverse as intended while exerting this down force.

9 No Load Brush Speed

Definition:

The rate at which the brush or pad driver, disc or cylindrical, is spinning under a no load condition. The value is reported in revolutions per minute, RPM.

Intent:

This parameter is intended to be a characteristic of motor design.

Measurement Constraints:

Brush Speed readings will be taken with the brushes or pads not in contact with the ground. The measurement shall be conducted with a power supply that can regulate the voltage to within 2.5% of the rated voltage.

10 Cleaning Path Width

Definition:

The nominal path the machine cleans, based solely on the nominal width of the brushes or pads. This is the width that is exposed to the full cleaning process. The value is reported in cm (inch).

Intent:

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

Measurement Constraints:

Cleaning Path Width is the measured width of floor that is wetted and scrubbed while travelling in a straight line.

11 Gross Vehicle Weight – GVW (Excluding operator)

Definition:

The Gross Vehicle Weight of the machine, when ready for operation. The value is reported in kilograms (pounds).

Intent:

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

Measurement Constraints:

Machine Weight shall include full clean water tanks, empty dirty water tanks, empty dust bags or hoppers, batteries, all cords, hoses, wands, and brushes.

12 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 removable machine part taken off for this measurement must be reported with the result.

13 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).

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.

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 Gross Vehicle Weight (GVW) 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 Vinyl Composite (VCT) floor. Pneumatic tyres are to be inflated as per the manufacturers instruction.

14 Motor power – Drive motor and Brush Motor

Definition:

The rated output of motors, based on a continuous duty cycle rating, as defined by the motor manufacturer. The value is stated in output 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 this value for the relevant motor.

15 Solution Flow Rate

Definition:

The amount of solution (water only) sprayed or dispensed to the brushes at the highest flow setting. The value is reported in litres per minute (gallons per minute).

Intent:

This parameter is intended to indicate the maximum continuous solution flow rate during normal operation.

Measurement Constraints:

Solution Flow Rate is measured with the solution tank at its full useful capacity. If the flow rate is variable, the maximum value shall be reported along with the note that it is variable.

16 Sound Pressure Level

Definition:

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

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 Machines 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.

The measurement shall be made with the machine operating on composite tile flooring with a brush or pad as recommended for use on that specific machine.

Users are reminded of the requirements of European Directives (where relevant) such

as Directive 2000/14/EC: Noise Emission in the Environment by Equipment for use Outdoors.

17 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 achieved. The measurement shall be made with the machine at its Gross Vehicle Weight (GVW), as defined in these definitions, plus a standard operator weight. The measurement shall be made according to IEC Publication 60335-2-72.

18 Speed – Working Mode

Definition:

The working speed of the machine travelling in a straight line, 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:

Working Mode Speed is measured after acceleration to the working speed is achieved. The measurement shall be made with the machine at its Gross Vehicle Weight (GVW), with operator, as defined in these definitions and in IEC Publication 60335-2-72. The machine speed and machine loading is the load condition related to the rated electrical current, as defined in IEC 60335-2-72, Clause 10.

19 Tank Capacity – Solution Tank and Recovery Tank

Definition:

The maximum functional volume that a tank may hold in normal operation (i.e. filled to the stated 'fill-line'). The value is reported in litres (gallons) and shall be specified as Recovery or Solution Tank Capacity.

Intent:

This parameter is intended to indicate the useful volume of the respective tank.

Measurement Constraints:

The solution volume is the volume of solution that can be dispensed in normal operation, and the recovery volume is the volume of wastewater that can be recovered in normal operation.

20 Maximum Vacuum

Definition:

The difference from ambient pressure created by the machine. The value is reported in pascals (inches of water).

Intent:

This parameter is intended to be an indication of the vacuum capability of the machine under sealed flow conditions.

Measurement Constraints:

Vacuum is to be measured as given in IEC 60335-2-69 and IEC 60312.

All requirements shall apply with the following clarifications/exceptions:

- The squeegee hose will be treated as the vacuum hose, and be directly connected to the Plenum Chamber as described.
- For battery-powered machines, tests will be conducted with a power supply that can regulate the voltage to +/- 2.5 % of the rated voltage.
- Maximum Vacuum Lift (Closed orifice on Plenum Chamber) shall be reported.

21 Vibration Levels

Values should be quoted as per the UK implementation of the Physical Agencies Directive.