

## Technical Recommendation

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Date 27 August 2021

# Electromagnetic compatibility (EMC)

## Relevant standards for commercial cleaning machines

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## Foreword

This document has been prepared by the Technical Committee of the European Cleaning Machines Association EUnited Cleaning, which represents the leading European manufacturer of commercial cleaning machines.

I.E., by this Technical Recommendation the European cleaning machines industry defines requirements and recommends measures in addition to existing European and international standards. Cleaning machines manufacturers which are associated in EUnited Cleaning declare to comply with this Technical Recommendation.

## Introduction

With the use of more electronic devices in areas where cleaning machines operate, there is a need to ensure that cleaning machines are provided with adequate immunity to external electromagnetic fields. Furthermore, as more cleaning machines are fitted with electrical and electronic devices, there is a need to ensure that emission of electromagnetic fields from the cleaning machines meets acceptable limits.

High frequency electrical disturbances emerge during the normal operation of many parts of the cleaning machines and systems; they are generated within a large frequency range with different electrical characteristics. Furthermore, electrostatic discharges are relevant to cleaning machines.

With respect to those technical requirements, this document identifies these international standards which shall be used by manufacturers of professional cleaning machines to meet adequate electromagnetic compatibility of their products. These standards provide test methods and acceptance criteria which are correct for cleaning machines considering the specific characteristics and the operating parameters of this machinery.

## 1 Scope

This document applies for cleaning machines under the scope of the international standards of IEC SC 61J 'Electrical motor-operated cleaning appliances for commercial use' and of CEN TC 197/WG 5 'High-pressure water jet machines', used in residential, commercial, light industry and industrial environment.

This document does not cover:

- cleaning machines intended for use outside the electromagnetic environments specified in the standards mentioned in Cl. 4, e.g. special customer demands;
- cleaning machines intended for use on public areas with a maximum speed exceeding 25 km/h;
- interaction between systems on the cleaning machines.

## 2 Normative references

This document refers to European and international standards. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. The dated standards only reflect their latest edition during the time this document was published (May 2021).

IEC 60335-2-29:2016+A1:2019, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers*

EN 60335-2-29:2019, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers*

IEC 60335-2-67:2021, *Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment and floor cleaning machines, for industrial and commercial use*

EN 60335-2-67:2012, *Household and similar electrical appliances – Safety – Part 2-67: Particular requirements for floor treatment and floor cleaning machines, for industrial and commercial use*

IEC 60335-2-68:2021, *Household and similar electrical appliances – Safety – Part 2-68: Particular requirements for spray extraction appliances, for industrial and commercial use*

EN 60335-2-68:2012, *Household and similar electrical appliances – Safety – Part 2-68: Particular requirements for spray extraction appliances, for industrial and commercial use*

IEC 60335-2-69:2021, *Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for industrial and commercial use*

EN 60335-2-69:2012, *Household and similar electrical appliances – Safety – Part 2-69: Particular requirements for wet and dry vacuum cleaners, including power brush, for industrial and commercial use*

IEC 60335-2-72:2021, *Household and similar electrical appliances – Safety – Part 2-72: Particular requirements for automatic machines for floor treatment for commercial and industrial use*

EN 60335-2-72:2012, *Household and similar electrical appliances – Safety – Part 2-72: Particular requirements for automatic machines for floor treatment for commercial and industrial use*

IEC 60335-2-79:2021, *Household and similar electrical appliances – Safety – Part 2-79: Particular requirements for high pressure cleaners and steam cleaners*

EN 60335-2-79:2012, *Household and similar electrical appliances – Safety – Part 2-79: Particular requirements for high pressure cleaners and steam cleaners*

IEC 61000-3-2:2018/AMD1:2020, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions*

IEC 61000-3-3: IEC 61000-3-3:2013/AMD1:2017, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current  $\leq 16$  A*

IEC 61000-3-11:2017, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems*

EN 61000-3-11:2017, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems*

IEC 61000-3-12:2011, *Electromagnetic compatibility (EMC) – Part 3-12: Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current  $> 16$  A and  $\leq 75$  A per phase*

EN 61000-3-12:2011, *Electromagnetic compatibility (EMC) – Part 3-12: Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current  $> 16$  A and  $\leq 75$  A per phase*

IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

EN IEC 61000-6-2:2019, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

EN 61000-6-3:2007, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

CISPR 12:2007/AMD1:2009, *Vehicles, boats, and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of off-board receivers*

CISPR 14-1:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

CISPR 14-2:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity*

EN 1829:2021, *High pressure water jet machines – Safety requirements*

EN 55012:2007+A1:2009, *Vehicles, boats and internal combustion engine driven devices – Radio disturbance characteristics – Limits and methods of measurement for the protection of receivers except those installed in the vehicle/boat/device itself or in adjacent vehicles/boats/devices*

EN 55014-1:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

EN 55014-2:2020, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity*

### **3 Relation between machine types and EMC standards**

For the following appliances under the scope of the listed safety standards, the standards for electromagnetic disturbance (emission) and immunity are considered to fulfil the requirements for the electromagnetic compatibility of these appliances.

Different standards might apply to one product group. The distinction is made on the basis of the intrinsic properties of the product. The intrinsic properties are described in the "Remark" column. An empty field describes all products except those that are described in a separate field belonging to the product group. Fields that belong to the same Product group are divided by a dashed line.

International Standards:

Product group	Remarks	Safety standard	Low frequency phenomena <sup>1</sup>	Electro-magnetic disturbance	Electro-magnetic immunity
<b>Chargers</b>	stand-alone <b>chargers</b> <sup>2</sup>	<b>IEC 60335-2-29</b>	IEC 61000-3-2 IEC 61000-3-3	CISPR 14-1 <sup>3</sup>	CISPR 14-2
	on-board <b>chargers</b> (built in, contacted separately)	<b>IEC 60335-2-72</b>			
<b>Polishing machines</b>	powered by combustion engine or battery powered traction drive	<b>IEC 60335-2-67</b>		CISPR 12	
	<b>Spray extraction appliances</b>	powered by combustion engine	<b>IEC 60335-2-68</b>	IEC 61000-3-2 IEC 61000-3-3	
				CISPR 12	
<b>Vacuum cleaners</b>		<b>IEC 60335-2-69</b>	IEC 61000-3-2 IEC 61000-3-3	CISPR 14-1 <sup>3</sup>	
<b>Sweeping and scrubbing machines</b>	powered by combustion engine or battery powered traction drive	<b>IEC 60335-2-72</b>		CISPR 12	IEC 61000-6-2 <sup>3</sup>
	<b>High-pressure cleaners</b>	<b>IEC 60335-2-79 or EN 1829-1</b>	IEC 61000-3-2 IEC 61000-3-3	CISPR 14-1 <sup>3</sup>	CISPR 14-2
combustion engine powered				CISPR 12	

<sup>1</sup> Relevant only for mains-operated products; normally, the itemised appliances which are connected to the public supply system have a rated current of less than 16 A; otherwise, IEC 61000-3-11 and -12 have to be considered

<sup>2</sup> The term stand-alone chargers include chargers which are attached to a machine but not built in

<sup>3</sup> If applicable due to table 1 - table 4 of IEC 61000-6-2

European Standards:

Product group	Remarks	Safety standard	Low frequency phenomena <sup>1</sup>	Electro-magnetic disturbance	Electro-magnetic immunity
<b>Chargers</b>	stand-alone <b>chargers</b> <sup>2</sup>	<b>EN 60335-2-29</b>	EN 61000-3-2 EN 61000-3-3	EN 55014-1	EN 55014-2
	on-board <b>chargers</b> (built in, contacted separately)	<b>EN 60335-2-72</b>			
<b>Polishing machines</b>	powered by combustion engine or battery powered traction drive	<b>EN 60335-2-67</b>		EN 55012	
<b>Spray extraction appliances</b>		<b>EN 60335-2-68</b>	EN 61000-3-2 EN 61000-3-3	EN 55014-1	
	powered by combustion engine			EN 55012	
<b>Vacuum cleaners</b>		<b>EN 60335-2-69</b>	EN 61000-3-2 EN 61000-3-3	EN 55014-1	
<b>Sweeping and scrubbing machines</b>	powered by combustion engine or battery powered traction drive	<b>EN 60335-2-72</b>		EN 55012	EN 61000-6-2 <sup>3</sup>
<b>High-pressure cleaners</b>		<b>EN 60335-2-79 or EN 1829-1</b>	EN 61000-3-2 EN 61000-3-3	EN 55014-1	EN 55014-2
	combustion engine powered			EN 55012	

<sup>1</sup> Relevant only for mains-operated products; normally, the itemised appliances which are connected to the public supply system have a rated current of less than 16 A; otherwise, EN 61000-3-11 and -12 have to be considered

<sup>2</sup> The term stand-alone chargers include chargers which are attached to a machine but not built in

<sup>3</sup> If applicable due to table 1 - table 4 of EN 61000-6-2

NOTE Many areas are not homogeneous for their EMC classification; for example hospitals and airports have areas with different levels of classifications, for areas outside the generic standard definitions special rules may be applicable.