



Netherlands Food and Consumer
Product Safety Authority
*Ministry of Agriculture,
Nature and Food Quality*

Investigation design Hoverboards

In response to a number of incidents, the Netherlands Food and Consumer Product Safety Authority (NVWA) will be carrying out an investigation into hoverboards and their charging equipment in 2018. Based on consultation with regulators in other member states and the European Commission*, hoverboards must comply with the Machinery (Commodities Act) Decree (Wma) / Machinery Directive (2006/42/EC). The charging equipment must comply with the Electrical Equipment (Commodities Act) Decree (WEM) / Low Voltage Directive (2014/35/EU).

There is no European harmonised standard dealing specifically with hoverboards. In addition to the European harmonised standard EN 60335-1:2012 + AC:2014, which is designated in accordance with Article 4 of the Machinery (Commodities Act) Decree, source documents** will be used for interpretation purposes in the investigation into compliance with legal requirements. For the charging equipment (charger), the requirements are set out in the European harmonised standard** EN 61558-2-16:2009 + A1:2013***. This standard is designated in accordance with Article 7, preamble and(a), of the Electrical Equipment (Commodities Act) Decree. The investigation will primarily focus on the safety of the battery pack in the hoverboard and the electrical insulation in the charging equipment. In addition, for the hoverboard the relevant parts of the technical file will be assessed, as well as the instructions for safe use and any markings on the hoverboard itself.

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Charging equipment:

Item for investigation	Reference and performance requirement	Test method	Execution
Testing of the electrical strength of the insulation between primary and secondary	Directive 2014/35/EU Annex I, point 1(c) and point 2, preamble and (d) and/or (a) EN 61558-2-16, clause 18.3: - The insulation between primary and secondary must be adequate. There must be no breakdown of the insulation.	EN 61558-2-16 clause 18.3	Executing a high-voltage test in accordance with the test voltage prescribed in the standard
CE marking on hoverboard	WEM Article 8 and Directive 2014/35/EU Art. 16 and 17. - The electrical equipment (charger) bears a CE marking.	Visual assessment	Assessing whether the CE marking has been affixed in accordance with the WEM and Directive

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Hoverboard:

Item for investigation	Reference and performance requirement	Test method	Execution
Lithium-ion cells assembled to form a battery; safety circuit of the battery	Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.5.1 and/or point 1.5.5 and/or point 1.5.6 and/or point 1.5.7 EN 62133-2 clause 5.6 and Annex A, partly in light of UL 2272 clause 16.1 • Safety circuit of the battery (current, voltage, temperature and any other parameter required for safety).	EN 62133-2 clause 5.6 and Annex A, partly in light of UL 2272 clause 16.1	Assessing the presence and/or measurements in accordance with the standard: <ul style="list-style-type: none"> • Voltage limitation to prevent overcharging of the cells; • Voltage limitation to prevent excessive discharging of the cells; • Cut-off switch (detects when charging current falls below a set value, and switches off the charging); • Temperature limitation;
Parts in contact with wiring shall be smooth and free from sharp edges	Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.5.1 and/or point 1.5.5 and/or point 1.5.6 and/or point 1.5.7 EN 60335-1 clause 23.1, partly in light of	Visual assessment	Assessing whether the parts in contact with wiring are smooth and free from sharp edges in

	<p>UL 2272 clause 10.2</p> <ul style="list-style-type: none"> The parts in contact with wiring must be sufficiently smooth and free from sharp edges. 		compliance with the standard
Fire resistance of the housing	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.5.1 and/or point 1.5.6.</p> <p>EN 60335-1 clause 30.2.3, partly in light of UL 2272 clause 7.2</p> <ul style="list-style-type: none"> The housing of the hoverboard and/or battery pack must have sufficient fire resistance. 	EN 60335-1 clause 30.2.3, EN 60695-2-11 Clause 9 and 10	Glow-wire test at 750°C on the housing of the hoverboard and/or battery pack. If the 750°C test is satisfactory, a glow-wire test at 850°C will be performed.
The fixing of the conductors; particularly in the battery pack	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.5.1 and/or point 1.5.5 and/or point 1.5.6 and/or point 1.5.7</p> <p>EN 62368-1 clause 4.6 partly in light of UL 2272 clause 10.2</p> <ul style="list-style-type: none"> The fixing of the conductors must be sufficiently reliable. 	EN 62368-1 clause 4.6	In accordance with the standard, a visual assessment of the reliability of the fixing of the conductors, measurement, and in the event of doubt, application of a force of 10N
Manufacturer's name	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.7.3, partly in light of point 1.7.1</p> <ul style="list-style-type: none"> The business name and the full address of the manufacturer and, where applicable, his authorised representative 	Visual assessment	Assessing whether the business name and the full address of the manufacturer and, where applicable, his authorised representative are stated on the machine
Markings on hoverboard	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.7.3, partly in light of point 1.7.1</p> <p>EN 60335-1 clause 7.1</p> <ul style="list-style-type: none"> Rated voltage Symbol for nature of supply Model or type reference 	Visual assessment	Assessing whether the required markings is present in compliance with the standard
Instructions for safe use	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.7.4.1 and/or point 1.7.4 and/or point 1.7.1</p>	Visual assessment	Assessing whether the instructions for safe use (both in the manual and

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	<p>EN 60335-1 clause 7.12</p> <ul style="list-style-type: none"> Instructions for use must be provided with the machine so that the machine can be used safely. Instructions for use may be marked on the machine as long as they are visible in normal use 		on the hoverboard) are present
Language of the instructions for safe use	<p>Wma Article 3a(1)(a) in light of the provisions of Directive 2006/42/EC Annex I, point 1.7.4.1(a) and (b) and/or point 1.7.1</p> <p>EN 60335-1 clause 7.13</p> <ul style="list-style-type: none"> The instructions shall be written in the language of the country in which the machine is to be sold. 	Visual assessment	Assessing whether warnings and instructions for safe use are written in the Dutch language
CE marking on hoverboard	<p>Wma Article 6(1) and Directive 2006/42/EC Annex I, point 1.7.3 and Annex III</p> <ul style="list-style-type: none"> A CE marking has been affixed to each machine and is clearly legible. 	Visual assessment	Assessing whether the CE marking has been affixed in accordance with the Wma and Directive
<p>The EC Declaration of Conformity contains the following information:</p> <ul style="list-style-type: none"> The business name and full address of the manufacturer and, where applicable, his authorised representative; The name and address of the person authorised to compile the technical file; who must be established in the Community; Description and identification of machine, including generic name, model, type and commercial name; A sentence expressly declaring that the machine fulfils all the relevant provisions of the Machinery Directive; A reference to the harmonised technical standards used, as referred to in Article 7(2) (of the Directive); 	<p>Wma Article 3a(1)(d) and Directive 2006/42/EC Annex II, Part 1(A)</p> <ul style="list-style-type: none"> Accessibility of the EC Declaration of Conformity 	Visual assessment	Assessing the presence of the EC Declaration of Conformity and of the information specified in the "Item for investigation" column.

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<ul style="list-style-type: none"> • A reference to other harmonised technical standards and specifications used; • Date of the declaration; • The identity and signature of the person empowered to draw up the declaration on behalf of the manufacturer or his authorised representative. 			
<p>The technical file must contain the following elements:</p> <ul style="list-style-type: none"> • Information from the manufacturer about the lithium-ion cells used in the battery pack, specifying the current, voltage, temperature and any other parameter required for safety; • Information about the lithium-ion cells used in the battery pack, from which it can be concluded that the cells comply with the EN 62133 standard or any other equivalent standard; • Complete and detailed drawings, accompanied by any calculation notes, test results, certificates, etc., from which it can be established whether the independent safety circuit (BMS) for the lithium-ion cells used in the battery pack will ensure that under both normal and single-fault conditions the cells will remain within the specified operating range in terms of current, voltage and temperature; 	<p>Wma Article 3a(1)(b) and Directive 2006/42/EC Annex VII(A)</p> <ul style="list-style-type: none"> • The accessibility of the relevant parts of the technical file. 	<p>Visual assessment</p>	<p>Assessing the presence of the technical file and of the elements specified in the "Item for investigation" column.</p>

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- The description of the protective measures implemented to eliminate identified hazards of lithium-ion cells or to reduce known risks;
- A test report which sets out the results of the assessment and/or tests carried out on the battery pack by the manufacturer or by a body chosen by the manufacturer or his authorised representative. A safety analysis of the battery pack including a failure analysis of the safety circuit must form part of this report.

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* See Page 500 of the "Consolidated Minutes of the Machinery Working Group" (https://ec.europa.eu/growth/sectors/mechanical-engineering/machinery_en)

** A complete list of the European harmonised standard(s) to be applied, designated standards and source documents is set out below:

- Safety of power transformers, power supplies, reactors and similar products – Part 1: General requirements and tests
EN 61558-1:2005
EN 61558-1/A1:2009
EN 61558-1/C1:2008
- Safety of power transformers, power supplies, reactors and similar products for supply voltages up to 1100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units
EN 61558-2-16:2009
EN 61558-2-16/A1:2013
- Audio/video, information and communication technology equipment - Part 1: Safety requirements
EN 62368-1:2014
- Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems
EN 62133-2:2017
- Household and similar electrical appliances – safety - Part 1: General requirements
EN 60335-1:2012
EN 60335-1:2012/AC:2014
EN 60335-1:2012/A11:2014
- Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)
EN 60695-2-11:2014
- Standard for safety, Electrical Systems for Personal E-Mobility Devices
ANSI/CAN/UL 2272:2016

*** In the investigation, the publication of IEC 61558-1:2017 will be taken into account.

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