SLOVENSKI STANDARD
SIST EN 12895:2015+A1:2019

01-november-2019

Vozila za talni transport - Elektromagnetna združljivost - Dopolnilo A1

Industrial trucks - Electromagnetic compatibility

Flurförderzeuge - Elektromagnetische Verträglichkeit

Chariots de manutention - Compatibilité électromagnétique

Ta slovenski standard je istoveten z: **EN 12895:2015+A1:2019**

ICS:

33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general
53.060	Industrijski tovornjaki	Industrial trucks

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EUROPEAN STANDARD

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English Version

Industrial trucks - Electromagnetic compatibility

Chariots de manutention - Compatibilité électromagnétique

Flurförderzeuge - Elektromagnetische Verträglichkeit

This European Standard was approved by CEN on 17 July 2015 and includes Amendment 1 approved by CEN on 12 February 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 12895:2015+A1:2019) has been prepared by Technical Committee CEN/TC 150 “Industrial trucks - Safety”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 12 February 2019.

This document supersedes A1 EN 12895:2015 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

A1 The main changes compared to the previous version are:

- updated normative references;
- new Annex ZA;
- minor typographic corrections. A1

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative A1 Annex ZA, which is A1 an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

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

High frequency electrical disturbances emerge during the normal operation of many parts of the industrial trucks and systems. They are generated within a large frequency range with different electrical characteristics.

Electrostatic discharges are relevant to industrial trucks.

The test methods and acceptance criteria included in this document are suitable for industrial trucks in view the specific characteristics and the operating parameters of this machinery; the tests have been designed to reflect the construction of industrial trucks.

Two approaches are described to achieve compliance:

— complete truck tests;

— electrical/electronic systems with the components in the same configuration as in the truck.

In some situations trucks can be foreseen to be used in environments where the level of electromagnetic disturbances are likely to exceed the test levels within the scope of this European Standard. In these situations, levels and/or frequencies outside the specified test parameters will need to be applied. In addition, many areas are not homogeneous for their EMC classification; for example, hospitals and airports have areas with different levels of classifications, for the areas outside the generic standard definitions special rules can be applicable.

1 Scope

This European Standard is applicable to industrial trucks, regardless of the power source (called only trucks) as defined in [A1] ISO 5053-1:2015 [A1], and their electrical/electronic systems when used in residential, commercial, light industry and industrial environments (specified in EN 61000-6-3:2007 and EN 61000-6-2:2005).

This European Standard specifies:

— the requirements and the limit values for electromagnetic emission and immunity to external electromagnetic fields;

— the procedure and criteria for testing trucks and their electrical/electronic systems.

This European Standard is not applicable to:

— non-stacking low-lift straddle carriers;

— stacking high-lift straddle carriers;

— any pedestrian propelled trucks, excepted those which are equipped with load handling devices which have electrical powered lifting devices;

— trucks intended for use in the public domain[1)] with maximum speed exceeding 30 km/h;

— positioning system of driverless industrial trucks;

— interaction between systems on the trucks;

— interference to on-board radio equipment;

— equipment connected to AC-mains which is only used when the truck is not being operated (e.g. on board charger).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[A1] EN 55012:2007[2)], *Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of off-board receivers* [A1]

[A1] EN 55016-1-1:2010[3)], *Specification for radio disturbance and immunity measuring apparatus and methods — Part-1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus (CISPR 16-1-1:2010)* [A1]

[A1] EN 55016-1-4:2010[4)], *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-4: Radio disturbance and immunity measuring apparatus — Antennas and test sites for radiated disturbance measurements (CISPR 16-1-4:2010)* [A1]

1) For trucks used in the public domain, other specific European Directives and national requirements are to be applied.

[A1] 2) This document is impacted by the amendment EN 55012:2007/A1:2009. [A1]

[A1] 3) This document is impacted by the amendments EN 55016-1-1:2010/A1:2010 and EN 55016-1-1:2010/A2:2014. [A1]

!A1► EN 55016-2-3:2017, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements* ◄A1

!A1► EN 61000-4-2:2009 ◄A1, *Electromagnetic compatibility (EMC) — Part 4-2: Testing and measurement techniques — Electrostatic discharge immunity test (IEC 61000-4-2)*

!A1► EN 61000-4-3:2006[5] ◄A1, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)*

!A1► EN 61000-4-8:2010 ◄A1, *Electromagnetic compatibility (EMC) — Part 4-8: Testing and measurement techniques — Power frequency magnetic field immunity test (IEC 61000-4-8)*

EN 61000-6-2:2005, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2:2005)*

!A1► EN 61000-6-3:2007[6] ◄A1, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3:2006)*

!A1► EN ISO 3691-1:2015 ◄A1, *Industrial trucks — Safety requirements and verification — Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks (ISO 3691-1:2011)*

!A1► ISO 5053-1:2015, *Industrial trucks - Terminology and classification - Part 1: Types of industrial trucks* ◄A1

3 Terms and definitions

For the purposes of this document, the terms and definitions given in applicable parts of EN ISO 3691 and the following apply.

3.1
test sample
truck and/or electrical/electronic system, electrical machines, system configuration for subjecting to type test

Note 1 to entry: Motors and generators are examples of electrical machines.

Note 2 to entry: The system configuration is set up with maximum cable and harness lengths.

3.2
electrical/electronic system
electrical/electronic component(s) or a set of components intended to be part of a machine together with any associated electrical connections and wiring, that performs one or more specialized functions and operates on its own

Note 1 to entry: Also referred to as system.

!A1► 4) This document is impacted by the amendments EN 55016-1-4:2010/A1:2012 and EN 55016-1-4:2010/A2:2017. ◄A1

!A1► 5) This document is impacted by the amendments EN 61000-4-3:2006/A1:2008 and EN 61000-4-3:2006/A2:2010. ◄A1

!A1► 6) This document is impacted by the amendment EN 61000-6-3:2007/A1:2011. ◄A1

3.3
narrowband emission
emission that has a bandwidth less than that of a measuring apparatus or receiver

Note 1 to entry: The bandwidth set at 9 kHz from 0,15 MHz - 30 MHz and 120 kHz above 30 MHz.

Note 2 to entry: Electrical components will radiate emissions of narrow- or broadband type.

3.4
broadband emission
emission that has a bandwidth greater than that of a measuring apparatus or receiver

Note 1 to entry: The bandwidth set at 9 kHz from 0,15 MHz - 30 MHz and 120 kHz above 30 MHz.

Note 2 to entry: High voltage ignition system will radiate broadband emissions.

4 Requirements

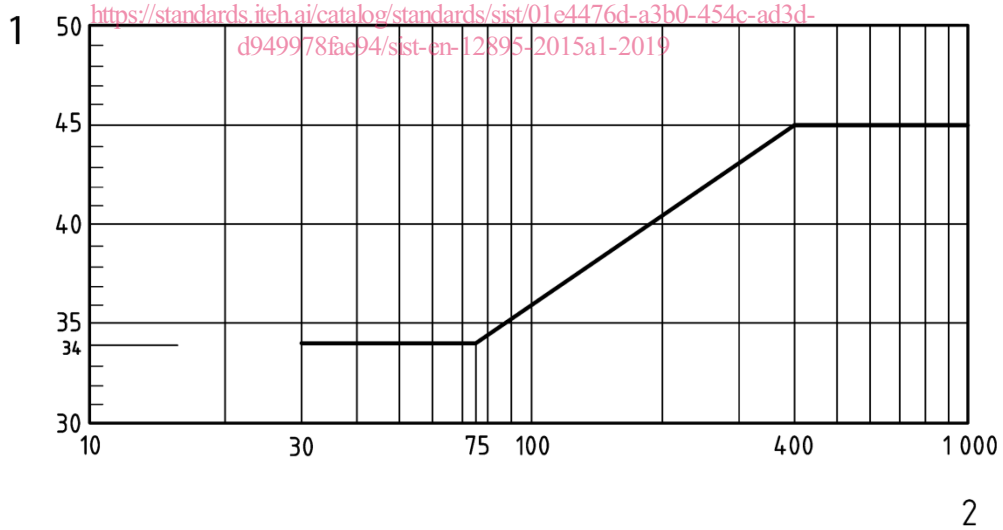
4.1 Emission

For trucks/systems the limit values for the electric field at 10 m distance from the truck with an antenna height of 3 m shall be in accordance with Figure 1.

30 MHz to 75 MHz 34 dB µV/m

75 MHz to 400 MHz 34 dB µV/m to 45 dB µV/m increasing in direct proportion with the frequency

400 MHz to 1 000 MHz 45 dB µV/m



Key

1 electric field (dB µV/m)

2 frequency (MHz)

Figure 1 — Maximum limits of electromagnetic emissions

For trucks that can be connected to the AC-mains network while operational, in addition to the above the limits stated in A1 Table 1 of EN 61000-6-3:2007 A1 shall be met.

4.2 Immunity

For trucks/systems the immunity to electromagnetic environments shall be above or equal to the limit values specified in Table 1 when tested in accordance to the test methods specified in Table 1.

Table 1 — Immunity - Enclosure port

	Environmental Phenomena	Limit values	Units	Normative references	Test in accordance with clause
1. Truck					
1.1	Electromagnetic field: - Frequency - Strength - Amplitude modulated	 27 – 1 000 20 80	 MHz V/m (unmodulated,rms) % AM (1 kHz)	A1 EN 61000-4-3:2006 A1	5.3
1.2	Electromagnetic field: - Frequency - Strength - Amplitude modulated	 >1,0 – 2,0 3 80	 GHz V/m (unmodulated,rms) % AM (1 kHz)	A1 EN 61000-4-3:2006 A1	5.3
1.3	Electromagnetic field: - Frequency - Strength - Amplitude modulated	 > 2,0 – 2,7 1 80	 GHz V/m (unmodulated,rms) % AM (1 kHz)	A1 EN 61000-4-3:2006 A1	5.3
1.4	Electrostatic discharge: - Charge voltage	 8 Contact 15 Air discharge	 kV (330Ω - 150pF)	A1 EN 61000-4-2:2009 A1 (Level 4)	5.4
2. Components test					
2.1	Magnetic field: - Frequency - Time period - Strength	 0 3 1 000	 Hz s A/m (1A/m≈ 1.257 µT)	Test arrangement according to A1 EN 61000-4-8:2010 A1	5.5
2.2	Magnetic field: - Frequency - Time period - Strength	 50 3 30	 Hz s A/m (1A/m ≈ 1.257 µT)	Test arrangement according to A1 EN 61000-4-8:2010 A1	5.5

For trucks/systems that can be connected to the AC-mains network, in addition to the above, the limits stated in Table 4 of EN 61000-6-2:2005 apply.

In practice, in the range 27 MHz to 80 MHz it can be difficult to reach uniformity of the field over the whole area where the truck/system is placed; it should be ensured however that all the critical parts are at least submitted to a field of 20 V/m. The substitution method may be used with the radiating antenna repositioned at 1,5 m intervals.

NOTE Substitution method is to calibrate the field strength without test item and to record the corresponding forward power. After that calibration, the test item will be set up and the immunity test will start with the forward power already recorded.

5 Tests

5.1 General

The conformity with the limit values shall be verified. The tests specified below are simplified tests without load; tests for all the possible working conditions are not practical for technical and economic reasons.

Testing shall be performed in accordance with 5.2 to 5.5.

One of the following approaches shall be taken to achieve compliance:

— complete truck test:

  — this test shall be performed on a single test sample (type test);

— system test:

  — the system may be tested separated from the truck. The installation of the system in the truck shall use the same components and harness physically and electrically to those tested.

The test sample/system shall be in operating condition. For the tests it might be necessary to change the normal operating condition. If test sample/systems are designed to operate with different nominal voltages, they shall be tested in the worst case condition.

The test sample/system shall be representative of the series production.

Complete systems may be used without the need for additional tests if they are certified to be within the limits of this standard. If the installation differs significantly from the installation instructions of the systems manufacturer, the truck/test sample shall be tested.

NOTE Examples of complete systems are internal combustion engines and electrical/electronic modules.

All test results, the test procedure and the mode of operation during the test shall be recorded accurately in the test report.

5.2 Emission test of electromagnetic fields

5.2.1 General

The emissions of all function/units of the test sample/systems shall be tested in accordance with 5.2.3, 5.2.4, 5.2.5 and 5.2.6 . The systems test may be performed separately or in any combination.

The emission values shall conform to the limit values specified in 4.1.