INTERNATIONAL STANDARD

ISO 22199

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Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission

Compatibilité électromagnétique — Norme pour la famille de produits: ascenseurs, escaliers mécaniques et trottoirs roulants — Émission

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 22199 was prepared by Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*.

This second edition cancels and replaces the first edition (ISO 22199:2006), which has been technically revised.

Introduction

ISO 22199 is a type-C standard as stated in ISO 12100-1. When provisions of a type-C standard are different from those which are stated in type-A or type-B standards, the provisions of the type-C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of the type-C standard.

This International Standard is based on European Standard EN 12015:2004.

EN 12015 specifies new requirements to control the emissions below 30 MHz of the drive to machine/motor connection and mains electricity supply harmonic emissions and voltage fluctuations. The previous edition of this International Standard addressed these requirements. However, as CISPR 11 and CISPR 14-1 have been revised since the publication of the previous edition of this International Standard, the technical requirements of this International Standard are also being revised.

The requirements of this International Standard have been specified so as to ensure a level of electromagnetic emission that causes minimal disturbance to other equipment. The levels, however, do not cover the following cases:

a) where the probability of an occurrence likely to produce emissions in excess of those which are normally experienced is extremely low, e.g. the emergency stopping of a lift, escalator or passenger conveyor under a fault condition;

b) where highly susceptible apparatus is used in the close proximity of the equipment covered by this International Standard, in which case further measures might have to be taken to

   1) reduce the electromagnetic emission to below the levels specified in this International Standard, or

   2) increase the immunity of the affected apparatus.

The emission limits given are on the basis that equipment of the product family range is installed both indoors and outdoors in all types of building, involves the switching of heavy currents and high inductive loads and, generally, is connected to a low-voltage system.

The following explains the rationale for the revision of this International Standard.

Harmonic emission requirements stated by EN 12015 were initially developed on limits defined by a draft version of IEC/TS 61000-3-4 and IEC 77A/169/CDV, which were at that time the only documents (technical reports) available for harmonic emission above 16 A, applicable to three-phase equipment.

In 2000, a harmonic emission standard was created to cover the range of equipment from 16 A to 75 A, namely IEC 61000-3-12. IEC/TS 61000-3-4 remains valid as a technical report for current above 75 A, but it has not been modified or converted into an International Standard, as required by IEC rules.

IEC 61000-3-12 states different limits compared to those stated by EN 12015, which consequently have become obsolete and not consistent with new harmonized limits. The modifications in this edition of this International Standard are the following.

a) Important changes

   1) Requirements to control the emissions below 30 MHz of the drive to machine/motor connection are introduced. The emission limits are independent of the magnitude of the conducted current. Limits and test method are those given in CISPR 14-1. Regarding other ports, the radiated tests above 30 MHz cover the cable connections and there are no known problems below 30 MHz.

2) Requirements to control mains electricity supply harmonic emissions and voltage fluctuations are introduced.

NOTE The radiation measurements in Table 1 have been harmonized with CISPR 11.

3) The term “installation” has been changed to “system”. This is because official interpretation defines fixed installations as not being covered by the conformity assessment requirements of the electromagnetic compatibility (EMC) Directive, which is valid for apparatus and systems. This International Standard is applicable to the apparatus and assembly of apparatus of lifts and escalators and assembly into systems.

b) Environmental issues

1) Lifts, escalators and moving walks are systems whose apparatus and assembly of apparatus are distributed (and some of which move) throughout the building. The definition in EMC terms of the use of the building (residential or industrial) cannot be predetermined or assumed to be fixed. Therefore, to cover requirements in all cases, no differentiation between environments has been made and a single set of limits has been maintained. This set of high-frequency limits is based on the industrial limits of IEC 61000-6-4 and is known to be above the usual limits for the residential environment. This is justified by the experience that systems in compliance with this International Standard have not been known to cause EMC interference with regard to mains and radiated emissions above 30 MHz.

2) Regarding conducted limits, these are also based on the fact that the supply cabling is separated from other building supplies at least up to the point of common coupling (PCC). Additionally, system wiring is segregated in accordance with the manufacturer's specifications.

3) Concerning radiated emission limits above 30 MHz, the lift, escalator or moving walk area is separated, to a large extent, from domestic appliances.

4) All the limits used take into account that systems have to comply with the safety protection requirements regarding earth leakage currents. The application of more stringent limits than have been shown to be adequate would require the use of larger filters (both inductance and capacitance). The use of these will increase the susceptibility of the system to low electricity mains supply conditions and increase earth leakage currents. There is also an increase in power dissipation in the filter, causing (in the general case) increased energy consumption, additional ventilation and cooling requirements for the building. This is especially valid for higher duty systems:

— limits for 5th, 7th harmonic are higher in IEC 61000-3-12:2004, Table 3;

— limits for 11th, 13th harmonic are higher in EN 12015;

— limits for total harmonic distortion (THD) are higher in IEC 61000-3-12:2004, Table 3;

— limits for partial weighted harmonic distortion (PWHD) are higher in IEC 61000-3-12:2004, Table 3;

— no more limits for even harmonics above 12th order because the overall distortion is taken into account in THD and PWHD values in IEC 61000-3-12:2004, Table 3;

— no more limits for odd harmonic orders because the overall distortion is taken into account in THD and PWHD values in IEC 61000-3-12:2004, Table 3;

— no more limits for individual harmonic currents below 1 % in IEC 61000-3-12:2004, 4.2;

— limits for short duration referred to harmonic for the first 10 s during switching on or off are not taken into account in IEC 61000-3-12:2004, 4.2.3.

5) Harmonic limits in EN 12015 are referred to a short-circuit power, $R_{sce} = 250$, which was taken as an average value for lift, escalator and moving walk application (see EN 12015:2004, 4.3); for this reason, harmonic limits should be compared with values referred to $R_{sce} = 250$ in IEC 61000-3-12.

6) Elevator, escalator and moving walk are considered to be a three-phase balanced system when operating at rated current; for this reason, Table 3 of IEC 61000-3-12:2004 should be considered.

7) The limits given in this International Standard recognize that the product family covers a total range of lifts, escalators and moving walks used in residential buildings, offices, hospitals, hotels, industrial plants, etc. and that lifts, escalators and passenger conveyors are deemed to have their own dedicated power supply and be connected with the consent of the supply authority to a low impedance source.

The related EMC product family standard for immunity is ISO 22200.

Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission

1 Scope

This International Standard specifies the emission limits and test conditions for lifts, escalators and passenger conveyors permanently installed in buildings.

NOTE These limits, however, might not provide full protection against disturbances caused by radio and television reception, when such equipment is used within distances given in Table 1.

For conducted phenomena and harmonic distortion, this International Standard is applicable to equipment intended to be connected to low-voltage systems interfacing with the public supply at the low-voltage level. It is not applicable to equipment intended to be connected only to private low-voltage systems interfacing with the public supply only at the medium- or high-voltage level. Where the equipment is intended to be connected only to private systems, it is advisable that the manufacturer state this in the product documentation. Limits of interference within private systems can be negotiated between the affected parties.

2 Normative references

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

CISPR 11, *Industrial, scientific and medical (ISM) radio-frequency equipment — Electromagnetic disturbance characteristics — Limits and methods of measurement*

CISPR 14-1:2002, *Electromagnetic compatibility — Requirements for household appliances, electric tools and similar apparatus — Part 1 : Emission*

IEC 61000-3-11, *Electromagnetic compatibility (EMC) — Part 3-11: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems — Equipment with rated current ⩽ 75 A and subject to conditional connection*

IEC 61000-3-12:2004, *Electromagnetic compatibility (EMC) — Part 3-12: Limits — Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ⩽ 75 A per phase*

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

IEC 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments*

IEC 60050-161, *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 61000-6-3, IEC 61000-6-4 and IEC 60050-161 and the following apply.

3.1 Terms and definitions

3.1.1
system
lift, escalator or moving walk comprising assembly of apparatus with electrical and electronic equipment and interconnections

See Figures 1 and 2.

3.1.2
assembly of apparatus
arrangement of interconnected apparatus, which can be tested together

See Figures 1 and 2.

3.1.3
apparatus
assembly of components with an intrinsic function as defined by its manufacturer

See Figures 1 and 2.

NOTE Safety components defined by Annex IV of Directive 95/16/EC (the Lifts Directive) are considered as apparatus.

3.1.4
root-mean-square
r.m.s
effective value of the current

3.1.5
total harmonic distortion
k_T
THD
ratio of the r.m.s value of the harmonics to the r.m.s value of the fundamental

NOTE THD, k_T, is calculated from Equation (1):

$$k_T = \sqrt{\sum_{n=2}^{40} \left(\frac{I_n}{I_1} \right)^2} \quad (1)$$

where

I_n is the r.m.s value of the current of the nth harmonic;

I_1 is the r.m.s value of the fundamental current.

3.1.6
partial weighted harmonic distortion
k_{PW}
PWHD
ratio of the r.m.s value of a selected group of higher order harmonics (here beginning from the 14th harmonic), weighted with the harmonic order n, to the r.m.s value of the fundamental

NOTE PWHD, k_{PW}, is calculated from Equation (2):

$$k_{PW} = \sqrt{\sum_{n=14}^{40} n \left(\frac{I_n}{I_1}\right)^2} \quad (2)$$

where

I_n is the r.m.s value of the current of the nth harmonic;

I_1 is the r.m.s value of the fundamental current.

3.1.7
balanced three-phase system
system connected to the three phases and designed in such a way that, for rated conditions, the r.m.s value of the current in each of the three phases differs by not more than 20 %

NOTE The neutral conductor is not used as a current-carrying conductor under normal operating conditions.

3.1.8
point of common coupling
PCC
point in the public mains network which is nearest to the system and to which other equipment may be connected

3.1.9
short-circuit power
S_{sc}
value of the three-phase short-circuit power calculated from nominal voltage of the system, U_n, and impedance, Z, at PCC

NOTE This is given by Equation (3):

$$S_{sc} = \frac{U_n^2}{Z} \quad (3)$$

3.1.10
rated apparent power
S_{equ}
value calculated from the phase-to-phase voltage, U_i, and the rated r.m.s line current, I_{equ}, of the apparatus/assembly of apparatus

NOTE This is given by Equation (4):

$$S_{equ} = \sqrt{3} \times U_i \times I_{equ} \quad (4)$$

3.1.11
short-circuit ratio
R_{sce}
ratio of the short-circuit power of the source to the apparent power of the load(s)

NOTE For apparatus/assembly of apparatus connected to a three-phase electricity supply, it is equal to:

$$R_{sce} = \frac{S_{sc}}{S_{equ}} \quad (5)$$