IEC 63281-2-1

Edition 1.0 2024-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

e-Transporters –
Part 2-1: Safety requirements and test methods for personal e-Transporters

e-Transporteurs –
Partie 2-1: Exigences de sécurité et méthodes d'essai relatives aux e-Transporteurs de personnes



IEC 63281-2-1:2024-02(en-fr)



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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E-TRANSPORTERS –

Part 2-1: Safety requirements and test methods for personal e-Transporters

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IEC 63281-2-1 has been prepared by IEC technical committee 125: e-Transporters. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
125/91/FDIS	125/93/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63281 series, published under the general title *e-Transporters*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

This document has been developed to cope with the rapidly evolving personal e-Transporters. Personal e-Transporters have become common in public spaces and roads, some of which can reach speeds of 25 km/h or even higher, and the applications and global market size are expected to grow significantly. In order to protect the safety of persons and public facilities, besides basic safety requirements, comprehensive safety requirements and test methods such as riding safety for people and for e-Transporters are also considered. At the time of writing, this document provides general safety requirements and corresponding test methods for personal e-Transporters, which are convenient for manufacturers and test departments to use.

Standardization of electrically powered transport devices covered by the following TCs are excluded from this document:

- IEC TC 69,
- ISO TC 149,
- ISO TC 22.

E-TRANSPORTERS –

Part 2-1: Safety requirements and test methods for personal e-Transporters

1 Scope

This document specifies safety requirements and test methods for personal e-Transporters.

This document is applicable to electrically powered personal e-Transporters (PeTs) which are used in private and public areas, where the speed control and/or the steering control is electric/electronic.

The PeT can have provisions for transport of cargo and can be for private or commercial (including sharing service) use.

This document is not applicable for electric vehicles (EVs), such as electrically power assisted cycles (EPACs), e-bikes, mopeds, motorcycles and passenger cars.

This document does not apply to:

- PeTs that are considered as toys;
- PeTs that are intended for competition;
- PeTs that are intended for medical care;
- PeTs that have a rated voltage of more than 100 V DC or 240 V AC;
- PeTs without an on-board driving operator.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-11, *Environmental testing – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14:2023, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

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

IEC 60335-2-114:2022, *Household and similar electrical appliances – Safety – Part 2-114: Particular requirements for personal e-Transporters*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

ISO 2248, *Packaging – Complete, filled transport packages – Vertical impact test by dropping*

ISO 6742-1, *Cycles – Lighting and retro-reflective devices – Part 1: Lighting and light signalling devices*

ISO 6742-2, *Cycles – Lighting and retro-reflective devices – Part 2: Retro-reflective devices*

ISO 12100:2010, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 14878:2015, *Cycles – Audible warning devices – Technical specification and test methods*

EN 17128:2020, *Light motorized vehicles for the transportation of persons and goods and related facilities and not subject to type-approval for on-road use – Personal light electric vehicles (PLEV) – Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
audible warning device
AWD
device designed for the purpose to warn people by an audible signal

Note 1 to entry: Including all types of technologies (i.e. bells, horns, electronic audible warning device).

[SOURCE: ISO 14878:2015, 3.3]

3.2
battery pack
energy storage device that includes cells or cell assemblies normally connected with cell electronics, power supply circuits and overcurrent shut-off device, including electrical interconnections, interfaces for external systems

Note 1 to entry: See A.2 of ISO 12405-4:2018 for further explanations.

Note 2 to entry: Examples of external systems are cooling, voltage class B, auxiliary voltage class A and communication.

[SOURCE: ISO 12405-4:2018, 3.2]

3.3
battery system
energy storage device that includes cells or cell assemblies or battery pack(s) as well as electrical circuits and electronics

Note 1 to entry: See A.3.2 and A.3.3 of ISO 12405-4:2018 for further explanations. Battery system components can also be distributed in different devices within the vehicle.

Note 2 to entry: Examples of electronics are the BCU and contactors.

[SOURCE: ISO 12405-4:2018, 3.3]

3.4
brake
part of the braking system where the forces opposing the movement of the e-Transporter are developed

[SOURCE: IEC 63281-1:2023, 3.16]

3.5
braking system
combination of parts consisting of the control, transmission, and brake, whose function it is to progressively reduce the speed of a moving e-Transporter, bringing it to a halt

Note 1 to entry: The braking system can have the function to keep the e-transporter stationary when halted.

Note 2 to entry: The electric motor can be a part of the system.

[SOURCE: IEC 63281-1:2023, 3.17]

3.6
charging of a battery
operation during which a secondary cell or battery is supplied with electric energy from an external circuit which results in chemical changes within the cell and thus the storage of energy as chemical energy

[SOURCE: IEC 60050-482:2004, 482-05-27]

3.7
deck
platform supporting the mass of the user standing during use

[SOURCE: EN 17128:2020, 3.40]

3.8
enclosure
housing affording the type and degree of protection suitable for the intended application

[SOURCE: IEC 60050-195:2021, 195-02-35]

3.9
electrically power assisted cycle
EPAC
cycle, equipped with pedals and an auxiliary electric motor, which cannot be propelled exclusively by means of this auxiliary electric motor, except in the walk assistance mode

[SOURCE: ISO/TS 4210-10:2020, 3.2]

3.10
e-Transporter
electrically powered transport device for use on public roads or in public spaces which provides solutions for transporting either passengers or goods, or both

Note 1 to entry: The device can be manually controlled, have automated functions, or be autonomous.

[SOURCE: IEC 63281-1:2023, 3.2]

3.11
folding system
electrical or mechanical system enabling the e-Transporter to be folded in order to change from the configuration of use (unfolded) to the configuration of storage (folded)

[SOURCE: IEC 63281-1:2023, 3.8]

3.12
footrest
surface provided to support the feet during a seating intended use

[SOURCE: EN 17128:2020, 3.41]

3.13
intended use
use of a PeT in accordance with the information for use provided in the instructions

[SOURCE: ISO 12100:2010, 3.23, modified – For the purposes of a PeT, original "machine" has been deleted and "PeT" has been added.]

3.14
leakage
escape of liquid or gas except for venting

[SOURCE: ISO 6469-1:2019, 3.15]

3.15
locking device
mechanical component that maintains part(s) of the vehicle erected in the position of use or storage (e.g., latch(es), hooks, over centre lock...) which could be deactivated or activated by action(s) on the operating device

[SOURCE: EN 17128:2020, 3.13]

3.16
locking mechanism
assembly of components consisting of one or more locking device(s) and one or more operating device(s)

[SOURCE: EN 17128:2020, 3.12]

3.17
operating device
part of the locking mechanism(s) designed to be activated by the user through one or several intentional action(s)

[SOURCE: EN 17128:2020, 3.14, modified – "positive" has been deleted and "intentional" has been added.]

3.18
passenger car
vehicle designed and constructed primarily for the carriage of persons and their luggage, their goods, or both, having not more than a seating capacity of eight, in addition to the driver, and without space for standing passengers

[SOURCE: ISO 26262-1:2018, 3.107]

3.19
personal e-Transporter
PeT
e-Transporter that is primarily designed for transporting person(s)

Note 1 to entry: Household appliances are excluded.

[SOURCE: IEC 63281-1:2023, 3.3, modified – Note 1 to entry has been added.]

3.20
public space
place that is accessible to the public whether it is in the public domain or privately owned

Note 1 to entry: Examples are roads, cycle tracks, sidewalks, public squares, parks, stations, airports, hotels, hospitals, restaurants, etc.

[SOURCE: IEC 63281-1:2023, 3.1]

3.21
self-balancing personal e-Transporter
inherently unstable personal e-Transporter that dynamically stabilizes itself in at least one direction (pitch) using a control system

[SOURCE: IEC 63281-1:2023, 3.6, modified – The word "personal" has been added to the term and to the definition.]

3.22
warning indicators and signals
visual or audible device to

a) inform users of the safety status of the e-Transporter
b) alert third parties to the presence of the e-Transporter

Note 1 to entry: Examples of a visual or audible device to inform users of the safety status of the e-Transporter include lights or beeping sounds to indicate a function is working correctly, or lights or beeping sounds which operate to indicate a malfunction or condition which may become serious or which is immediately serious.

Note 2 to entry: Examples of a visual or audible device to alert third parties to the presence of the e-Transporter include, lights or reflectors which make the e-Transporter more easily visible, or an audible device to alert third parties to the presence of the e-Transporter.

[SOURCE: IEC 63281-1:2023, 3.15]

4 Risk assessment

If examination of the PeT shows that hazards not fully addressed in Clause 6 to Clause 10 in this document can arise, then a risk assessment is required. It shall be carried out and documented to achieve at least a tolerable risk by an iterative process described in the Clause 4 of ISO 12100:2010.