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Electric mopeds and motorcycles — Terminology and classification

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TECHNICAL REPORT

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Electric mopeds and motorcycles - Terminology and classification

Cyclomoteurs et motocycles électriques ¿ Terminologie et classification

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Foreword

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The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 38, *Motorcycles and mopeds*.

TECHNICAL REPORT **ISO/TR 13062:2015(E)**

Electric mopeds and motorcycles - Terminology and classification

1 Scope

This Technical Report establishes a vocabulary of terms and the related definitions used in ISO/TC 22/SC 38 standards. These terms are specific to the electric propulsion systems of electrically propelled mopeds and motorcycles.

2 Terms and definitions

2.1 Complete motorcycle/moped

2.1.1 Type of Electric motorcycle and electric moped

2.1.1.1
motorcycle
two-wheeled motor-driven vehicle or three-wheeled motor-driven vehicle whose unladen weight does not exceed 400 kg

Note 1 to entry: *Mopeds* (2.1.1.2), as defined in 2.4, are not included in this definition.

[SOURCE: ISO 3833:1977, 3.5]

2.1.1.2
moped
two-wheeled or three-wheeled motor-driven vehicle with a maximum design speed not exceeding 50 km/h

Note 1 to entry: If the driving motor is an engine, its displacement or equivalent *capacity* (2.3.3.2) must not exceed 50 cm^3.

[SOURCE: ISO 3833:1977, 3.4]

2.1.1.3
electric vehicle
electrically propelled vehicle
EV
vehicle with one or more electric drive(s) for vehicle propulsion

[SOURCE: ISO 13063:2012, 3.19]

2.1.1.4
battery-electric vehicle
BEV
electric vehicle (2.1.1.3) with only a *traction battery* (2.3.1.3) as the power source for vehicle propulsion

Note 1 to entry: The abbreviation BEV is often shortened to EV .

[SOURCE: ISO 13063:2012, 3.6]

2.1.1.5
hybrid electric vehicle
HEV
vehicle with at least one *RESS* (2.3.1.1) and one fuelled power source for vehicle propulsion

EXAMPLE ICE or fuel cell systems are typically types of fuelled power sources.

[SOURCE: ISO 13063:2012, 3.22]

2.1.1.6
externally chargeable hybrid-electric vehicle
HEV (2.1.1.5) with *RESS* (2.3.1.1) that is intended to be charged from an external electric energy source

Note 1 to entry: Externally chargeable HEVs are widely known as plug-in HEVs (PHEVs).

[SOURCE: ISO/TR 8713:2012, 2.34, modified]

2.1.1.7
fuel cell hybrid-electric vehicle
FCHEV
electrically propelled vehicle (2.1.1.3) with an *RESS* (2.3.1.1) and a fuelcell system as power source for vehicle propulsion

[SOURCE: ISO/TR 8713:2012, 2.36]

2.1.1.8
electric motorcycle
electrically propelled motorcycle
motorcycle (2.1.1.1) driven by electric motor with two or three wheels

2.1.1.9
electric moped
electrically propelled moped
moped (2.1.1.2) driven by electric motor with two or three wheels

2.1.2 Construction and components

2.1.2.1 Propulsion and driving device

2.1.2.1.1
auxiliary electric system
on-board vehicle system, other than for vehicle propulsion, which operates on electric energy

[SOURCE: ISO 13063:2012, 3.1]

2.1.2.1.2
propulsion system
combination of on-board power source for vehicle propulsion and power train

[SOURCE: ISO/TR 8713:2012, 2.56]

2.1.2.1.3
electric power train
power train, consisting of electric drive and drive train

[SOURCE: ISO/TR 8713:2012, 2.25]

2.1.2.1.4
hybrid power train
power train of an *HEV* (2.1.1.5), consisting of a fuelled power source and an *electric power train* (2.1.2.1.3)

[SOURCE: ISO/TR 8713:2012, 2.43]

2.1.2.1.5
drive direction control
device physically actuated by the rider for selecting the driving direction of the road vehicle (forward or backward)

EXAMPLE A lever or a push-button switch.

[SOURCE: ISO 13063:2012, 3.13]

2.1.2.2 Electric devices and components

2.1.2.2.1
live part
conductor or *conductive part* (2.1.2.2.2) intended to be electrically energized in normal use

[SOURCE: ISO 13063:2012, 3.25]

2.1.2.2.2
conductive part
conductor
part capable of conducting electric current

[SOURCE: ISO 13063:2012, 3.9]

2.1.2.2.3
exposed conductive part
conductive part (2.1.2.2.2) of the electric equipment that can be touched by a test finger according to IPXXB after removing *barriers* (2.1.3.3.7)/*enclosures* (2.1.3.3.8) that can be removed without using tools and that is not normally live, but which may become live under fault conditions

Note 1 to entry: *Protection degrees* (2.1.3.3.18) (e.g. IPXXB) are defined in ISO 20653.

[SOURCE: ISO 13063:2012, 3.21]

2.1.2.2.4
electrical chassis
conductive parts (2.1.2.2.2) of a vehicle that are electrically connected and whose potential is taken as reference

[SOURCE: ISO 13063:2012, 3.15]

2.1.2.2.5
electric power system
electric circuit, containing electric power sources

EXAMPLE Fuel cell stacks, batteries.

[SOURCE: ISO 13063:2012, 3.17]

2.1.2.2.6
isolation-resistance monitoring system
system which periodically or continuously monitors the *isolation resistance* (2.1.3.3.10) between *live parts* (2.1.2.2.1) and the electric chassis or *exposed conductive parts* (2.1.2.2.3)

[SOURCE: ISO 13063:2012, 3.23]

2.1.3 Performance

2.1.3.1 Drivability

2.1.3.1.1
range at 80% maximum speed
total distance the vehicle can cover when running at 80 % *maximum speed* (2.1.3.1.4)

Note 1 to entry: For the relevant test procedure, see ISO 13064-2:2012, 9.1.

[SOURCE: ISO 13064-2:2012, 3.5]

2.1.3.1.2
reference range
distance covered by an *electrically propelled vehicle* (2.1.1.3) over a designated test sequence on a fully charged *traction battery* (2.3.1.3), to the end of the test sequence as defined by the end of test sequence criteria

Note 1 to entry: The reference range is usually expressed in kilometers (km).

[SOURCE: ISO 13064-1:2012, 3.2]

2.1.3.1.3
reference energy consumption
quantity of electric energy from the mains needed to charge the *traction battery* (2.3.1.3), divided by the distance covered after the vehicle has been driven through the specified test sequence

Note 1 to entry: The reference energy consumption is usually expressed in watt-hours per kilometer (Wh/km).

[SOURCE: ISO 13064-1:2012, 3.1]

2.1.3.1.4
maximum speed
highest average speed which the vehicle can maintain twice over a distance of 200 m

Note 1 to entry: For the relevant test procedure, see ISO 13064-2:2012, 9.3.

[SOURCE: ISO 13064-2:2012, 3.6]

2.1.3.1.5
acceleration ability
shortest time required to accelerate the vehicle from standstill over a given distance

Note 1 to entry: For the relevant test procedure, see ISO 13064-2:2012, 9.5.

[SOURCE: ISO 13064-2:2012, 3.7]

2.1.3.1.6
hill starting ability
maximum slope on which the vehicle can start moving over a minimum distance of 10 m

Note 1 to entry: For the relevant test procedure, see ISO 13064-2:2012, 9.6.

[SOURCE: ISO 13064-2:2012, 3.8]

2.1.3.1.7 Efficiency

2.1.3.1.7.1
direct determination of efficiency
determination of the efficiency from direct measurement of active input power and active output power

[SOURCE: IEC 60050, 411-53-10]

2.1.3.1.7.2
indirect determination of efficiency
determination of the efficiency from the measurements of the power loss

[SOURCE: IEC 60050, 411-53-11]

2.1.3.1.8
speed uphill
highest average speed which the vehicle can maintain on a given slope over a distance of 200 m

Note 1 to entry: For the relevant test procedure, see ISO 13064-2:2012, 9.7.

[SOURCE: ISO 13064-2:2012, 3.9]

2.1.3.2 Braking

2.1.3.2.1
regenerative braking
braking with conversion of kinetic energy into electric energy for charging the *RESS* (2.3.1.1)

[SOURCE: ISO/TR 8713:2012, 2.64]

2.1.3.3 Protection against electric shock

2.1.3.3.1
maximum working voltage
highest value of a.c. voltage (rms) or of d.c. voltage which may occur in an electric system under any normal operating conditions according to manufacturers' specifications, disregarding transients

[SOURCE: ISO 13063:2012, 3.26]

2.1.3.3.2
voltage class A
classification of an electric component or circuit as belonging to voltage class A, if its *maximum working voltage* (2.1.3.3.1) is ≤30 V a.c. or ≤60 V d.c., respectively

[SOURCE: ISO 13063:2012, 3.33]

2.1.3.3.3
voltage class B
classification of an electric component or circuit as belonging to voltage class B, if its *maximum working voltage* (2.1.3.3.1) is (>30 and ≤1 000) V a.c. or (>60 and ≤1 500) V d.c., respectively

[SOURCE: ISO 13063:2012, 3.34]

2.1.3.3.4
electric shock
physiological effect resulting from an electric current passing through a human body

[SOURCE: ISO 13063:2012, 3.18]

2.1.3.3.5
balance of electric power system
remaining portion of an *electric power system* (2.1.2.2.5) when the power sources are disconnected

EXAMPLE Fuel cell stacks, batteries.

[SOURCE: ISO 13063:2012, 3.2]

2.1.3.3.6
potential equalization
electric connections of *exposed conductive parts* (2.1.2.2.3) of the electric equipment to minimize differences in potential between these parts

[SOURCE: ISO 13063:2012, 3.27]

2.1.3.3.7
barrier
part providing protection against *direct contact* (2.1.3.3.12) from any usual direction of access

[SOURCE: ISO 13063:2012, 3.3]

2.1.3.3.8
enclosure
part providing protection of equipment against *direct contact* (2.1.3.3.12) from any direction

[SOURCE: ISO 13063:2012, 3.20]

2.1.3.3.9
basic protection
protection against *direct contact* (2.1.3.3.12) with *live parts* (2.1.2.2.1) under fault-free conditions

[SOURCE: ISO 13063:2012, 3.5]

2.1.3.3.10
isolation resistance
resistance between *live parts* (2.1.2.2.1) of voltage class B electric circuit and the electric chassis or *exposed conductive parts* (2.1.2.2.3) as well as the voltage class A system

[SOURCE: ISO 13063:2012, 3.24]

2.1.3.3.11
creepage distance
shortest distance along a surface of a solid insulating material between two *conductive parts* (2.1.2.2.2)

[SOURCE: ISO 13063:2012, 3.10]

2.1.3.3.12
direct contact
contact of persons with *live parts* (2.1.2.2.1)

[SOURCE: ISO 13063:2012, 3.11]

2.1.3.3.13
indirect contact
contact of persons with an *exposed conductive part* (2.1.2.2.3) made live by a fault of the *basic insulation* (2.1.3.3.14) of a *live part* (2.1.2.2.1)

2.1.3.3.14
basic insulation
insulation applied to *live parts* (2.1.2.2.1) for protection against *direct contact* (2.1.3.3.12) under fault-free conditions

Note 1 to entry: Basic insulation does not necessarily include isolations used exclusively for functional purposes.

[SOURCE: ISO 13063:2012, 3.4]

2.1.3.3.15
supplementary insulation
independent insulation applied in addition to *basic insulation* (2.1.3.3.14) for protection against *electric shock* (2.1.3.3.4) in the event of a failure of the basic insulation

[SOURCE: ISO 13063:2012, 3.31]

2.1.3.3.16
double insulation
insulation system comprising both *basic insulation* (2.1.3.3.14) and *supplementary insulation* (2.1.3.3.15)

[SOURCE: ISO 13063:2012, 3.12]

2.1.3.3.17
reinforced insulation
insulation of *live parts* (2.1.2.2.1) for protection against *electric shock* (2.1.3.3.4) equivalent to *double insulation* (2.1.3.3.16)

Note 1 to entry: Reinforced insulation does not imply that the insulation shall be a homogeneous piece. The reinforced insulation may comprise several layers which cannot be tested individually as supplementary or *basic insulation* (2.1.3.3.14).

[SOURCE: ISO 13063:2012, 3.30]

2.1.3.3.18
protection degree
protection provided by a *barrier* (2.1.3.3.7)/*enclosure* (2.1.3.3.8) related to the contact with *live parts* (2.1.2.2.1) by a test probe, such as a test finger (IPXXB), a test rod (IPXXC), or a test wire (IPXXD)

Note 1 to entry: Protection degrees (e.g. IPXXB, IPXXC, or IPXXD) are defined in ISO 20653.

[SOURCE: ISO 13063:2012, 3.28]

2.1.3.4 Mass

2.1.3.4.1
complete battery-electric moped (motorcycle) kerb mass
total unladen mass of the battery-electric moped (*motorcycle*) (2.1.1.1), including traction batteries, cooling liquid, window-washer fluid, lubricating oil, tool kit, spare wheel (if mandatory), and on-board charger and portable charger or part of it, if provided as standard equipment by the manufacturer

[SOURCE: ISO 13064-2:2012, 3.1]

2.1.3.4.2
test mass of a battery-electric vehicle
complete battery-electric vehicle kerb mass increased by a uniform figure of 75 kg, which represents the mass of a rider

[SOURCE: ISO 13064-2:2012, 3.3]

2.1.3.4.3
maximum design total mass
maximum vehicle mass as specified by the battery-electric moped (*motorcycle*) (2.1.1.1) manufacturer

[SOURCE: ISO 13064-2:2012, 3.2]

2.2 Electric motor and controller

2.2.1 General

2.2.1.1
electric machine
energy transducer that can transform electric energy into mechanical energy or vice versa

Note 1 to entry: The term “electric machine” is also used for synchronous compensators and torque motors.

[SOURCE: IEC 60050, 151-13-39]

2.2.1.2
(rotating) generator
rotating electric machine intended to transform mechanical energy into electric energy

[SOURCE: IEC 60050, 151-13-40]

2.2.1.3
traction motor
electric motor driving one or more axles

[SOURCE: IEC 60050, 811-12-01]

2.2.2 Types of electric motors

2.2.2.1
series motor
motor with excitation provided by a winding connected in series with the armature winding

[SOURCE: IEC 60050, 811-12-13]

2.2.2.2
shunt motor
motor with excitation provided by a winding connected in parallel with the armature winding

[SOURCE: IEC 60050, 811-12-14]

2.2.2.3
synchronous induction motor
cylindrical rotor synchronous motor with a secondary coil winding similar to that of a slip-ring induction motor which is used for both starting and excitation

[SOURCE: IEC 60050, 411-33-04]

2.2.2.4
synchronous motor
alternating current motor in which the speed of the motor is in a fixed ratio with the frequency of the current supplied

[SOURCE: IEC 60050, 811-12-24]

2.2.3 Components of controller

2.2.3.1
converter
on-board portion of the traction battery charger and traction battery controller management system that conditions the off-board electrical energy for delivery to the energy storage

2.2.3.2
electric energy converter
device for changing one or more characteristics associated with electric energy

Note 1 to entry: Characteristics associated with energy are, for example, voltage, number of phases, and frequency including zero frequency.

[SOURCE: IEC 60050, 151-13-36]

2.2.3.3
inverter
electric energy converter (2.2.3.2) that changes direct electric current to single-phase or polyphase alternating currents

[SOURCE: IEC 60050, 151-13-46]

2.2.3.4
rectifier
electric energy converter (2.2.3.2) that changes single-phase or polyphase alternating electric currents to unidirectional current

[SOURCE: IEC 60050, 151-13-45]

2.2.3.5
dc/dc converter
DC/DC converter
electronic device that conditions dc electrical energy from the on-board energy storage for use by an auxiliary system operating on direct current

2.2.4 Performance parameters

2.2.4.1
rated power
conventional value of apparent power establishing a basis for the design of a transformer, a shunt reactor or an arc-suppression coil, the manufacturer's guarantees, and the tests determining a value of the rated current that may be carried with rated voltage applied under specified conditions

Note 1 to entry: Both windings of a two-winding transformer have the same rated power, which by definition, is the rated power of the transformer. For multi-winding transformers, the rated power for each of the windings may differ.

[SOURCE: IEC 60050, 421-04-04]

2.2.4.2
maximum output power
maximum electrical power that can be taken from the apparatus

[SOURCE: IEC 60050, 426-11-23]

2.2.4.3
rated torque
torque the motor develops at its shaft end at rated output and speed

[SOURCE: IEC 60050, 411-48-05]

2.2.4.4
locked-rotor torque
smallest measured torque the motor develops at its shaft end with the rotor locked over all its angular positions at rated voltage and frequency

[SOURCE: IEC 60050, 411-48-06]

2.2.4.5
voltage control
method of speed control in which the voltage applied to the motors is varied by means of a generator, transformer, or electronic power convertor supplying a variable output voltage

[SOURCE: IEC 60050, 811-30-06]

2.2.4.6
current control
current which flows in a control winding of a transductor

[SOURCE: IEC 60050, 431-02-03]

2.2.4.7
frequency control
method of controlling motor speed enabling several speeds, or a continuous range of speeds, to be obtained by varying the supply frequency

[SOURCE: IEC 60050, 811-30-07]

2.2.4.8
motor characteristic
statement of the speed, current, torque (or tractive effort), and power output of a motor operating under various specified conditions

[SOURCE: IEC 60050, 811-13-01]

2.2.4.9
steady-state load characteristic
relation between the power absorbed by a load and the voltage or frequency at the load terminals under steady-state operating conditions

[SOURCE: IEC 60050, 603-04-14]

2.2.4.10
transient load characteristic
relation between the power absorbed by a load and the voltage or frequency under transient-state operating conditions

[SOURCE: IEC 60050, 603-04-15]

2.3 Battery

2.3.1 General

2.3.1.1
rechargeable energy storage system
RESS
system that stores energy for delivery of electric power and which is rechargeable

EXAMPLE Batteries, capacitors.

[SOURCE: ISO 6469-1:2009, 3.16]

2.3.1.2
battery
one or more cells fitted with devices necessary for use, for example, case, terminals, marking, and protective devices

[SOURCE: IEC 60050, 482-01-04]

2.3.1.3
traction battery
collection of all *battery packs* (2.3.2.1.2) that are electrically connected, for the supply of electric power to the electric drive and to the conductively connected *auxiliary electric system* (2.1.2.1.1), if any

[SOURCE: ISO 6469-3:2011, 3.29]

2.3.1.4
rated capacity
supplier's specification of the total number of ampere hours that can be withdrawn from a fully charged *battery pack* (2.3.2.1.2) or system for a specified set of test conditions, such as discharge rate, temperature, and discharge cut-off voltage

[SOURCE: ISO 12405-1:2011, 3.12]

2.3.2 Structure and components

2.3.2.1 Structure

2.3.2.1.1
battery cell
basic rechargeable energy storage device, consisting of electrodes, electrolyte, container, terminals, and usually separators, that is a source of electric energy obtained by direct conversion of chemical energy

[SOURCE: ISO/TR 8713:2012, 2.7]

2.3.2.1.2
battery pack
mechanical assembly comprising *battery cells* (2.3.2.1.1) and retaining frames or trays, and possibly components for battery management

[SOURCE: ISO/TR 8713:2012, 2,10]

2.3.2.1.3
battery control unit
BCU
electronic device that controls or manages or detects or calculates electric and thermal functions of the *battery system* (2.3.2.1.4) and that provides communication between the battery system and other vehicle controllers

[SOURCE: ISO/TR 8713:2012, 2.8]

2.3.2.1.4
battery system
energy storage device that includes cells or cell assemblies or *battery pack(s)* (2.3.2.1.2) as well as electrical circuits and electronics

EXAMPLE *BCU* (2.3.2.1.3), contactors.

Note 1 to entry: Battery system components can also be distributed in different devices within the vehicle.

[SOURCE: ISO/TR 8713:2012, 2.11]

2.3.3 Specifications and performance

2.3.3.1
state of charge
SOC
available *capacity* (2.3.3.2) in a *battery pack* (2.3.2.1.2) or system

Note 1 to entry: State of charge is expressed as a percentage of *rated capacity* (2.3.1.4).

[SOURCE: ISO 12405-1:2011, 3.16]

2.3.3.2
capacity
total number of ampere-hours that can be withdrawn from a battery under specified conditions

[SOURCE: ISO/TR 8713:2012, 2.12]

2.3.3.1 Density

2.3.3.3.1
energy density
amount of stored energy related to the *battery pack* (2.3.2.1.2) or system volume

Note 1 to entry: Expressed in Wh/l.

Note 2 to entry: The *battery pack* (2.3.2.1.2) or system includes the cooling system, if any, to the point of a reversible attachment of the coolant lines or air ducts, respectively.

[SOURCE: ISO/TR 8713:2012, 2.30]

2.3.3.3.2
specific energy
amount of stored energy related to the *battery pack* (2.3.2.1.2) or system mass

Note 1 to entry: Expressed in Wh/kg.

Note 2 to entry: The battery pack or system shall include the cooling system, if any, to the point of a reversible attachment of the coolant lines or air ducts, respectively. For liquid cooled systems, the coolant mass inside the battery pack or system shall be included.

[SOURCE: ISO/TR 8713:2012, 2.66]

2.3.3.4 Efficiency

2.3.3.4.1
coulombic efficiency
Ah efficiency
efficiency of the *battery* (2.3.1.2) based on electricity (Coulomb) for a specified charge/discharge procedure, which is expressed by output electricity divided by input electricity

[SOURCE: ISO/TR 8713:2012, 2.18]

2.3.3.4.2
energy efficiency
Wh efficiency
efficiency of the *battery* (2.3.1.2) based on energy, for a specified charge/discharge procedure, which is expressed by output energy divided by input energy

[SOURCE: ISO/TR 8713:2012, 2.31]

2.4 Charger

2.4.1 General

2.4.1.1
charger
set of equipment to condition the power of the external electric energy source for charging the *RESS* (2.3.1.1)

[SOURCE: ISO/TR 8713:2012, 2.15]

2.4.1.2
rated frequency
frequency at which the transformer or reactor is designed to operate

[SOURCE: IEC 60050, 421-04-03]

2.4.1.3
ripple voltage
alternating voltage component of the voltage on the DC side of a *converter* (2.2.3.1)

[SOURCE: IEC 60050, 551-17-27]

2.4.1.4
ripple current
alternating current component of the charging current on the DC side of a *charger* (2.4.1.1)

[SOURCE: IEC 60050, 551-17-27, modified]

2.4.2 Charging mode

2.4.2.1
constant current charge
charge during which the electric current is maintained at a constant value regardless of the battery voltage or temperature

[SOURCE: IEC 60050, 482-05-38]

2.4.2.2
constant voltage charge
charge during which the voltage is maintained at a constant value regardless of charge current or temperature

[SOURCE: IEC 60050, 482-05-49]

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[12] ISO 13064-2, *Battery-electric mopeds and motorcycles — Performance — Part 2: Road operating characteristics*

[13] ISO 23274-1, *Hybrid-electric road vehicles — Exhaust emissions and fuel consumption measurements — Part 1: Non-externally chargeable vehicles*

[14] ISO 23274-2, *Hybrid-electric road vehicles — Exhaust emissions and fuel consumption measurements — Part 2: Externally chargeable vehicles*

[15] ISO 23828, *Fuel cell road vehicles — Energy consumption measurement — Vehicles fuelled with compressed hydrogen*

[16] ISO/TR 8713, *Electrically propelled road vehicles — Vocabulary*

[17] IEC 60050, *International Electrotechnical Vocabulary*

[18] IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

[19] IEC 60417, *Graphical Symbols for Use on Equipment*

[20] IEC 60884-1, *Plugs and socket-outlets for household and similar purposes — Part 1: General requirements*

[21] IEC 60947-2, *Low-voltage switchgear and control gear — Part 2: Circuit-breakers*

[22] IEC 61851-1, *Electric vehicle conductive charging system — Part 1: General requirements*

[23] IEC 62196-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets — Conductive charging of electric vehicles — Part 1: General requirements*

[24] IEC 62660-1, *Secondary lithium-ion cells for the propulsion of electric road vehicles — Part 1: Performance testing*

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