BS ISO 23274-1:2019

BSI Standards Publication

Hybrid-electric road vehicles — Exhaust emissions and fuel consumption measurements

Part 1: Non-externally chargeable vehicles

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National foreword

This British Standard is the UK implementation of ISO 23274-1:2019. It supersedes BS ISO 23274-1:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/69, Electric vehicles.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Hybrid-electric road vehicles — Exhaust emissions and fuel consumption measurements —

Part 1: Non-externally chargeable vehicles

Véhicules routiers électriques hybrides — Mesurages des émissions à l'échappement et de la consommation de carburant —

Partie 1: Véhicules non rechargeables par des moyens externes

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 37, *Electrically propelled vehicles*.

This second edition cancels and replaces the first edition (ISO 23274-1:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the content of ISO/TR 11955:2008, *Hybrid-electric road vehicles —Guidelines for charge balance measurement* was merged with this document as Annex D.

A list of all parts in the ISO 23274 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Hybrid-electric road vehicles — Exhaust emissions and fuel consumption measurements —

Part 1: Non-externally chargeable vehicles

1 Scope

This document specifies a chassis dynamometer test procedure to measure the exhaust emissions and the electric energy and fuel consumption for the vehicles.

This document applies to vehicles with the following characteristics:

— vehicles classified as passenger cars or light duty trucks, as defined in the relevant regional applicable driving test (ADT) standard;

— the nominal energy of the rechargeable energy storage system (RESS) is at least 2 % of the total energy consumption over an ADT;

— internal combustion engine (ICE) only using liquid fuels (for example, gasoline and diesel fuel).

NOTE In the case of the vehicles with ICE using other fuel [for example, compressed natural gas (CNG), liquefied petroleum gas (LPG), hydrogen], this document can apply except the measurement of consumed fuel; otherwise the measurement method for those using the corresponding fuel can apply.

This document proposes procedures for correcting the measured emissions and fuel consumption of hybrid-electric vehicles (HEVs), in order to obtain the values when the state of charge (SOC) of the RESS does not remain the same between the beginning and the end of an ADT.

It can also be applied to measurement procedures for exhaust emissions and fuel consumption of externally chargeable HEVs when a vehicle is not externally charged and operated only in the charge sustaining (CS) state, as described in ISO 23274-2.

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.

ISO 10521 (all parts), *Road vehicles — Road load*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 8713 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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3.1
applicable driving test
ADT
single driving test schedule which is specified for a relevant region

Note 1 to entry: Chassis dynamometer test schedules for a relevant region are the Worldwide Light-duty Test Cycle (WLTC) or the Urban Dynamometer Driving Schedule (UDDS), for example.

3.2
charge balance of RESS
change of charge in the *RESS* (3.10) during fuel consumption measurement

Note 1 to entry: Normally expressed in ampere hours (Ah).

3.3
coulomb efficiency
Ah efficiency
efficiency of the battery, based on electricity in coulomb for a specified charge/discharge procedure, expressed by output electricity divided by input electricity

3.4
energy balance of RESS
ΔE_{RESS}
change of *RESS* (3.10) energy state during an *applicable driving test* (3.1)

Note 1 to entry: Normally expressed in watt hours (Wh).

Note 2 to entry: For practical use, the energy balance of RESS is approximated by multiplying the *charge balance of RESS* (3.2) in ampere hours (Ah) by the nominal voltage in volts (V).

3.5
energy efficiency
Wh efficiency
efficiency of the battery, based on energy for a specified charge/discharge procedure, expressed by output energy divided by input energy

3.6
externally chargeable HEV
HEV (3.7) with a *RESS* (3.10) that is intended to be charged from an external electric energy source

Note 1 to entry: External charge for the purpose of conditioning of the RESS is not included.

Note 2 to entry: Externally chargeable HEVs are widely known as plug-in HEVs (PHEVs).

3.7
hybrid-electric vehicle
HEV
vehicle with both a *RESS* (3.10) and a fuelled power source for propulsion

EXAMPLE Internal combustion engine or fuel cell systems are typical types of fuelled power sources.

3.8
non-externally chargeable HEV
HEV (3.7) with a *RESS* (3.10) that is not intended to be charged from an external electric energy source

3.9
rated capacity
supplier's specification of the total number of ampere hours that can be withdrawn from a fully charged battery pack or system for a specified set of test conditions such as discharge rate, temperature and discharge cut-off voltage

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3.10
rechargeable energy storage system
RESS
rechargeable system that stores energy for delivery of electric energy for the electric drive

EXAMPLE Batteries or capacitors.

3.11
regenerative braking
braking with conversion of kinetic energy into electric energy for charging the *RESS* (3.10)

3.12
state of charge
SOC
available capacity of a *RESS* (3.10) or RESS subsystem expressed as a percentage of *rated capacity* (3.9)

4 Test conditions and instrumentation

4.1 Test conditions

4.1.1 General

For test conditions, 4.1.2 to 4.1.4 apply. Otherwise, the test conditions of the relevant regional ADT standards apply.

4.1.2 Ambient temperature

Tests shall be conducted at ambient temperature of (25 ± 5) °C.

4.1.3 Vehicle conditions

4.1.3.1 Vehicle conditioning

Prior to testing, the test vehicle with RESS shall be stabilized as specified by the manufacturers, or the mileage shall be accumulated to above 3 000 km and less than 15 000 km.

4.1.3.2 Vehicle appendages

Vehicles shall be tested with normal appendages (mirrors, bumpers, etc.). When the vehicle is on the dynamometer, certain items (e.g. hub caps) should be removed for safety reasons, where necessary.

4.1.3.3 Vehicle test mass

The vehicle test mass shall be selected in accordance with the relevant regional ADT standards.

4.1.3.4 Tyres

4.1.3.4.1 General

The correctly rated tyres as recommended by the vehicle manufacturer shall be used.

4.1.3.4.2 Tyre pressure

The vehicle tyres shall be inflated to the pressure specified by the vehicle manufacturer in accordance with the test chosen (track or chassis dynamometer).

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