TECHNICAL REPORT

ISO/TR 11954

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Fuel cell road vehicles — Maximum speed measurement

Véhicules routiers à pile à combustible — Mesure de la vitesse maximale

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Foreword

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In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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ISO/TR 11954 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 21, *Electrically propelled road vehicles*.

Introduction

Fuel cell vehicles (FCV) include the following types:

— pure fuel cell vehicles (PFCV), in which the fuel cell system is the only on-board energy source for propulsion and auxiliary systems,

— fuel cell hybrid electric vehicles (FCHEV), in which the fuel cell system is integrated with an on-board rechargeable energy storage system (RESS) for electric energy supply to propulsion and auxiliary systems.

FCHEV design options include the following:

a) externally chargeable or non-externally chargeable;

b) rechargeable energy storage system (RESS): battery or capacitor;

c) driver-selected operating modes: if FCHEV has no driver-selected operating mode, it has only an FCHEV mode.

Table 1 shows the classification of FCHEV.

Table 1 — FCHEV classification

	Chargeability	Operating mode
FCHEV	externally chargeable	FCHEV mode
		EV mode
	non-externally chargeable	**FCHEV mode**
		EV mode

This Technical Report is applicable to PFCV and to non-externally chargeable FCHEV with FCHEV mode only (see shaded boxes in Table 1).

Fuel cell road vehicles — Maximum speed measurement

1 Scope

This Technical Report describes test procedures for measuring the maximum road speed of fuel cell passenger cars and light duty trucks which use compressed hydrogen and which are not externally chargeable, in accordance with national or regional standards or legal requirements.

2 Terms and definitions

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

2.1
rechargeable energy storage system
RESS
system that stores energy for delivery of electric energy and that is rechargeable

EXAMPLE Batteries, capacitors.

2.2
RESS state of charge
RESS SOC
residual capacity of RESS available to be discharged

NOTE RESS state of charge is normally expressed as a percentage of full charge.

2.3
fuel cell hybrid electric vehicle operation mode
FCHEV operation mode
mode of an FCHEV in which both RESS and fuel cell system are used sequentially or simultaneously for vehicle propulsion

NOTE The fuel cell system can also charge the RESS during propulsion or standstill.

2.4
maximum speed
highest average speed that the vehicle can maintain throughout a specified test

2.5
test mass
mass of a vehicle prepared for a defined test procedure

3 Parameters, units and accuracy of measurements

Table 2 shows parameters and their units and accuracy.

Table 2 — Parameters, units and accuracy of measurements

Parameter	Unit	Accuracy
Time	s	± 0,1 s
Distance	m	± 0,1 %
Air temperature	°C or K	± 1 °C or ± 1 °K
Air pressure	kPa	± 1 kPa
Speed	km/h	± 1 % or ± 0,1 km/h whichever is greater
Mass	kg	± 0,5 %

4 Descriptions

4.1 General

The maximum speed of the vehicle should be measured in accordance with the descriptions in this clause.

4.2 Preparation of the vehicle

The configuration of the vehicle and its attitude should be as determined by the manufacturer. In addition, the vehicle should be clean, the windows and air entries should be closed and only the accessories necessary for the operation of the vehicle for the purposes of the test should be in use. The viscosity of the oils for the mechanical moving parts and the tyre pressures (for operation under full load at maximum speed) should conform to the specifications of the vehicle manufacturer.

The running in of the transmission and tyres should be carried out in accordance with the manufacturer's instructions.

The fuel used should be the commercial grade for the type of vehicle tested or, in the event of a dispute, one of those prescribed in ISO/TS 14687-2.

4.3 Track characteristics

4.3.1 General

The measurements should be taken on a straight track (see 4.3.2) and/or a loop track (see 4.3.3). The surface of the track should be hard, smooth, clean and dry, and should give good adhesion.

4.3.2 Measurement on straight track

4.3.2.1 Lengths

The length, L, in metres, should be selected in relation to the precision of the apparatus and the method used for measuring the time, t, of the run, in seconds, so that the actual speed can be determined to within ± 1 %. The length of the measuring zone should be at least 1 000 m. The length actually used for the measurement should be recorded in the test report.