

ASSOCIATION STANDARD

T/CSAE 76-2018

**Rapid evaluation and test methods for energy recovery
effectiveness of regenerative braking for battery electric
vehicles**

(English Translation)

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Foreword

This standard is based on GB/T 1.1-2009 "Standardization Work Guide Part 1. Standard Structure and Compilation" Read on.

1 Scope

This standard specifies the rapid evaluation and test methods for the energy recovery efficiency of regenerative braking of pure electric vehicles.

This standard is applicable to the rapid evaluation of braking energy recovery efficiency in the research and development phase of regenerative braking systems. It is applicable to rechargeable energy storage systems.

Pure electric passenger car for power battery.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this file. For dated documents, the latest edition (including all amendments) applies to this document.

GB/T 19596 electric vehicle terminology GB/T 18384.1 Electric Vehicle Safety Requirements Part 1. Vehicle Rechargeable Energy Storage System (REESS) QC/T 1089 Electric vehicle regenerative braking system requirements and test methods GB/T 18386 electric vehicle energy consumption rate and driving range test method GB 21670 Passenger car brake system technical requirements and test methods Evaluation and test method for energy recovery rate of regenerative braking of T/CSAE 44 pure electric passenger car JJF 1221 Chassis Dynamometer Calibration Specification for Automotive Exhaust Contaminant Detection GB/T 12534 General rules for road test methods GB/T 18385 electric vehicle dynamic performance test method GB 18352.5-2013 Light vehicle pollutant emission limits and measurement methods (China stage 5)

3 Terms and definitions

The definitions of GB/T 19596-2017 and GB/T 18384.1-2015, as well as the following terms and definitions, apply to this document. For the sake of use, some of the terms and definitions in GB/T 19596-2017 and GB/T 18384.1-2015 are repeated below.

3.1 Pure electric vehicle battery electric vehicle

A motor driven motor powered by electrical energy. The driving energy of the motor is derived from the vehicle rechargeable energy storage system.

Or other energy storage devices.

[GB/T 19596-2017, definition 3.1.1.1]

3.2 Rechargeable energy storage system rechargeable energy storage system (REESS)

An energy storage system that can be charged and provides electrical energy, such as batteries and capacitors.

[GB/T 18384.1-2015, definition 3.1] 2T/CSAE 76 -.2018

3.3 Regenerative braking regenerative braking

When the car is taxiing, slowing down or going downhill, the kinetic energy and potential energy during the driving process are converted or partially converted into vehicle-mounted rechargeable energy storage.

The braking energy of the system is stored up.

[GB/T 19596-2017, definition 3.1.3.1.2]

3.4 The energy of motor regeneration regenerated energy by the motor when the car is coasting, slowing down or going downhill, the motor works in the state of regeneration.

3.5 Vehicle recoverable energy recyclable energy of vehicle

When the car is taxiing, decelerating or going downhill, the total change in kinetic energy of the car removes air resistance, rolling resistance, slope resistance and vehicle interior.

The energy remaining after the energy consumed by the frictional resistance.

3.6 Energy recovery efficiency

An indicator reflecting the energy recovery level of the regenerative braking system, which can be used for braking energy recovery efficiency or regenerative braking for energy economy.

Contribution rate to evaluate.

Note: Rewrite QC/T 1089-2017, definition 3.5.

3.7 Brake energy recovery efficiency braking energy recovery efficiency

When a car taxis, decelerates, or goes downhill, the energy that the motor regenerates is a percentage of the vehicle's recoverable energy.

3.8 Contribution rate of energy economy

The energy recovered during car taxiing, deceleration or downhill, and then used in car operation accounts for the total consumption of the car during the entire driving process.

The percentage of energy.

4 Test method for energy recovery efficiency of regenerative braking of pure electric vehicles

4.1 General

The following method describes the test method for the energy recovery efficiency of regenerative braking of pure electric vehicles.

4.2 Test equipment

The test equipment includes a vehicle data acquisition system, a temperature measuring instrument, a voltage sensor, a current sensor, a counterweight device, and the like. in order to Use external equipment to measure the voltage and current of the rechargeable energy

storage system and provide an appropriate, safe, accessible connection on the vehicle point. Table 1 specifies the parameters, units and accuracy of the test measurements.

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Table 1 Requirements for measurement parameters, units and accuracy

Measurement parameter	unit	accuracy	resolution	Time s	± 0.1	0.1	Temperature °C	± 1	1
Speed	km/h	$\pm 1\%$	0.2	Mass	kg	$\pm 0.5\%$	1	Voltage	V
									$\pm 0.1\%$ FS
									0.1
									Current
									A
									$\pm 0.1\%$ FS
									0.1

4.3.1 Vehicle conditions

The test vehicle shall be loaded according to the technical requirements of each test.

Tires should be selected from the type required by the manufacturer as the original fitting, and the maximum test load and maximum test of the tire recommended by the manufacturer.

The tire inflation pressure corresponding to the speed is inflated. The viscosity of the lubricating oil for mechanical moving parts should meet the manufacturer's specifications.

The lighting, signalling, and ancillary equipment on the vehicle should be turned off unless required for testing and vehicle daytime operation.

Except for the drive application, all energy storage systems should be filled to the maximum values specified by the manufacturer (electrical, hydraulic, pneumatic, etc.).

The test driver shall operate the power battery at normal operating temperatures in accordance with the operating procedures recommended by the vehicle manufacturer.

Before the test, the test vehicle shall be driven for at least 300km with a rechargeable energy storage system installed on the vehicle. [GB/T 18386-2017 4.3.2] at the beginning of the test, the tire should be cold and at a specified pressure corresponding to the actual load of the wheel when the vehicle is stationary. [GB 21670-2008 5.1.2.6]

4.3.2 Test quality of electric vehicles

The sum of the quality of the whole vehicle and the additional quality required for the test of the electric vehicle is 100kg. [GB/T 18386-2017 4.3.1]

4.3.3 Regenerative braking system status requirements

The vehicle regenerative braking system includes a friction braking system and an electric braking system, and the state of the regenerative braking system should meet GB 21670-2008 Relevant content for friction braking systems and electric regenerative braking systems as specified in 4, 5 and Appendix D. [T/CSAE 44-2015 5.1.3]