SURFACE VEHICLE RECOMMENDED PRACTICE

J3007™ MAY2026

Issued 2014-02
Revised 2026-05

Superseding J3007 FEB2014

Top Speed Test Procedure for Electric Motorcycles

RATIONALE

The proposed changes to SAE J3007 include: remove minimum cold soak and restrict firmware/software to “customer setting.” SAE J3007 has not explicitly stated that installing a performance-enhancing firmware/software be prohibited. No custom firmware/software or parameters can be set to alter the top speed performance of the vehicle. Any electronic speed limiting settings must be set at values that can be configured by the ultimate customer.

Section 6.2 cold soak and time was specified for testing. This section intends to prohibit testing at an “optimal” battery temperature. Since top speed does not rely on battery capacity as a range test would, an “optimal” battery temperature may not significantly (±2%) change a vehicle’s top speed. The minimum soak period (6 hours) has been removed.

FOREWORD

This SAE Recommended Practice establishes a test track-based procedure for determining the top speed of electric motorcycles under standardized operating conditions representing a smooth, level roadway at an altitude of 200 m (656 feet) above sea level and an ambient temperature of 20 °C (68 °F). A unique feature of the procedure is the use of a correction factor to account for air density that allows top speed to be measured under a wide range of atmospheric conditions and altitudes.

INTRODUCTION

This maximum speed test procedure was designed to avoid unnecessary conflicts with the “maximum design speed” measurement procedure for two- and three-wheel vehicles contained in Directive 95/1/EC of the European Parliament and the Council of the European Union while simultaneously addressing certain problems with the European procedure. Foremost among the problems with the European procedure are the relatively wide tolerances provided for atmospheric pressure and temperature, which allow for significant variations in measured top speed.

The SAE J3007 procedure was also designed to be used by a broader range of motorcycles. The definition of “motorcycle” that applies to Directive 95/1/EC specifically excludes certain types of vehicles that are covered by SAE J3007, including vehicles with a maximum design speed not exceeding 6 km/h; vehicles intended for pedestrian control; vehicles intended for use by the physically handicapped; vehicles intended for use in competitions or off-road; and motorcycles with a maximum design speed of 45 km/h or less. To provide a more inclusive test procedure, this procedure uses SAE J213 to define a motorcycle.

SAE Executive Standards Committee Rules provide that: “This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user.”

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2026 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, or used for text and data mining, AI training, or similar technologies, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: **Tel: 1-877-606-7323 (U.S. and Canada only)**
Tel: 1-724-776-4970 (outside U.S. and Canada)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/J3007_202605/

Document Sharing Hub
Full document details: SAE J3007 MAY2026 Top Speed Test Procedure for Electric Motorcycles

The vehicle preparation provisions of this procedure exclude elements that are inapplicable to electric vehicles, such as requirements for fuel supply and ignition settings to be in accordance with the manufacturer's specifications. There is also no reference to an engine break-in period. Instead, provisions have been incorporated to address issues unique to electric vehicles, such as battery preconditioning. The battery preconditioning provision is patterned after a similar provision contained in a previously developed range test procedure for electric motorcycles (refer to SAE J2982).

In recognition of a practice common with motorcycles powered by internal combustion engines, a provision has been added that provides for the removal of detachable luggage, such as saddlebags or a top case, when determining top speed. Consistent with the European test procedure, it is specified that accessories not required for high-speed driving may be switched off.

Specifications for the operator are more flexible than provided by Directive 95/1/EC in that ballast can be used to achieve the minimum operator weight and no maximum is specified for operator weight and height. Provisions of Directive 95/1/EC regarding operator attire have been supplemented to require that operators of unenclosed vehicles wear a helmet, boots, and gloves, in addition to a riding suit. Unlike in Directive 95/1/EC, it is also specified that the operator weight is to include all apparel worn by the operator.

Specifications for the test track/roadway are similar to the provisions of Directive 95/1/EC but specified more precisely with respect to grade and curvature. The grade for unidirectional testing is specified to be a maximum of 0.5% (rather than 1%) to ensure that the effect of grade on measured top speed will typically be no greater than 1%.

The requirement in Directive 95/1/EC for speed measurement to be based on elapsed time over a measured distance is replaced with a more general requirement for speed to be measured with a system that is demonstrated to be accurate to within 1 mph (1.6 km/h). Radar, laser (Lidar), and onboard GPS measurements are specifically identified as acceptable options.

As noted in the foreword, a unique feature of the procedure is the use of a correction factor to account for air density that allows top speed to be measured under a wide range of atmospheric conditions. Under the provisions of Directive 95/1/EC, top speed may be measured over a fairly broad range of conditions for atmospheric pressure, temperature, relative humidity, and wind speed. However, a typical motorcycle that will achieve 100 mph when the low end of the atmospheric pressure range is combined with the high end of the temperature range will achieve only 92.5 mph when the low end of the temperature range is combined with the high end of the pressure range. Allowable variations in humidity and wind speed further increase the possible variation in test results.

In SAE J3007, an air density correction factor developed by the Motorcycle Industry Council and reviewed by the SAE Motorcycle Technical Steering Subcommittee is used to simultaneously broaden the allowable range of atmospheric conditions under which top speed may be measured while substantially decreasing the possible variation in test results. The use of this correction factor is possible for electric vehicles because, unlike with vehicles powered by internal combustion engines, power output is not affected by air density and temperature. For a vehicle with a specific frontal area, aerodynamic drag coefficient, and maximum drive wheel power, top speed is primarily determined by air density. (For a typical motorcycle, 94% of the power required to achieve 100 mph is associated with aerodynamic drag and aerodynamic drag is directly proportional to air density.) As a result, the effect of changes in air density on the top speed of electric vehicles can be calculated with some precision using the following equation:

$$v_{norm} = v_{meas} \times \frac{\sqrt[3]{\rho_{meas}}}{1.0545}$$

In the above equation, ρ_{meas} is the air density during the top speed test in kg/m^3, v_{meas} is the measured top speed, and v_{norm} is the calculated top speed under standard conditions with the correction factor applied. Derivation of the above equation is explained in the Addendum.

In addition to the air density correction factor, the adjustment and reporting requirements of this test procedure provide for the application of a wind speed correction factor.

Documents
Document Sharing Hub
Full document details: SAE J3007 MAY2026 Top Speed Test Procedure for Electric Motorcycles

1. SCOPE

This SAE Recommended Practice incorporates a track-based test procedure that produces a representative value for vehicle top speed when operating on a level paved road with a fully charged battery.

1.1 Purpose

This document provides testing procedures for determining a representative top speed of electric motorcycles.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), www.sae.org.

SAE J213 Motorcycle Classifications

SAE J2982 Riding Range Test Procedure for On-Highway Electric Motorcycles

2.1.2 Motorcycle Industry Council Publications

Available from Motorcycle Industry Council, 2 Jenner Street, Suite 150, Irvine, CA 92618-3806, Tel: 949-727-4211, www.mic.org.

MIC Recommended Practice, Top Speed Test Procedure for Electric Motorcycles (September 7, 2012)

3. DEFINITIONS

3.1 ELECTRIC MOTORCYCLE

An electric motorcycle is a motorcycle as defined by SAE J213 that is propelled exclusively by electric motors energized by storage batteries with no onboard source of battery charging other than a regenerative braking system.

3.2 TOP SPEED

Starting with a fully charged battery, the top speed in kilometers per hour (km/h) or miles per hour (mph) is the maximum speed that can be achieved on level surface under specified atmospheric conditions when a sufficient length of roadway has been provided to allow the vehicle to reach its maximum speed.

3.3 CHARGE-DISCHARGE CYCLE

“Charge-discharge cycle” shall have the same meaning as specified in SAE J2982. Alternatively, “charge-discharge cycle” shall mean the process involving the vehicle battery being fully recharged following discharge to the point that a warning message is displayed advising the operator to recharge the battery as soon as possible.

4. TEST FACILITIES, EQUIPMENT, AND INSTRUMENTATION

4.1 Test Track/Roadway

4.1.1 Road Surface

The roadway or test track surface shall be smooth asphalt or concrete and must be clean and dry.

Documents
Document Sharing Hub
Full document details: SAE J3007 MAY2026 Top Speed Test Procedure for Electric Motorcycles

4.1.2 Grade

If the testing is performed on a track with travel in only one direction, the portion of the track where the vehicle speed is measured must have an absolute value of grade of not more than 0.5%. If the testing is performed in both directions, the maximum grade shall be 1.5%. The maximum grade for the portion of the roadway used to accelerate the vehicle to maximum speed shall also be an absolute value of positive (uphill) 1.5% and cannot be negative (downhill) unless maximum speed can be achieved with some initial portion of the roadway being a positive (uphill) grade of more than 1.5%.

4.1.3 Curvature

The portion of the roadway over which speed is measured shall have less than 1 degree of curvature, where the degree of curvature is defined as the central angle which subtends a 100-foot (30.48-m) arc. Portions of the roadway before or after the speed measurement section may have greater curvature. For curved roadways, it is recommended that the superelevation (banking) of the roadway be used to counteract the centrifugal force associated with the speed at which the roadway is traversed to the extent that side friction is insufficient for safe vehicle operation.

4.1.4 Length

The portion of the roadway or track over which the maximum speed is measured must be at least 50 m in length. An additional portion of roadway or track at both ends of the minimum 50-m segment must be of sufficient length to allow for a speed measurement immediately prior to and immediately after the speed measured in the minimum 50-m segment. The minimum length of these two roadway segments will depend on the length required to achieve the minimum measurement accuracy for the speed measurement technology used.

4.2 Atmospheric Conditions

4.2.1 Wind Speed

Wind speed shall be measured using an anemometer with steady-state accuracy of ±1 m/s over the range of allowable wind speeds. No testing shall be conducted during periods of time when the wind speed measured at the test site is varying by more than 1 m/s during the period of time that the vehicle speed is actually being measured. For bidirectional testing, maximum wind speed allowable without the use of a correction factor shall be 3 m/s. For unidirectional testing, the maximum wind speed allowable shall be 1 m/s.

4.2.2 Temperature

Testing may be conducted at any temperature equal to or greater than 5 °C. Temperature at the time of the speed measurement must be measured with an accuracy of ±0.5 °C.

4.2.3 Atmospheric Pressure

Testing may be conducted at any atmospheric pressure; however, the atmospheric pressure at the time of the speed measurement must be measured with an accuracy of ±10 millibars.

4.2.4 Relative Humidity

Testing may be conducted at any level of relative humidity provided the atmospheric conditions are clear and dry. The relative humidity at the time of the speed measurement must be measured with an accuracy of ±2%.

Documents
Document Sharing Hub
Full document details: SAE J3007 MAY2026 Top Speed Test Procedure for Electric Motorcycles