SAE INTERNATIONAL

SURFACE VEHICLE RECOMMENDED PRACTICE

J2951 JAN2014

Issued 2011-11
Revised 2014-01

Superseding J2951 NOV2011

Drive Quality Evaluation for Chassis Dynamometer Testing

RATIONALE

To provide standardized metrics for evaluating drive quality on emissions and fuel economy tests. This document has been revised to include a new drive rating metric and typical driver capability ranges.

FOREWORD

It is generally recognized that the manner in which a vehicle is driven during a chassis dynamometer test can impact emissions and fuel economy results. The speed vs. time tolerances used to validate a test do limit this impact, but even within these constraints drive-related effects can be significant contributors to test variability. This document provides drive quality metrics intended to enable improved monitoring and characterization of driver-related variability.

TABLE OF CONTENTS

SAE Technical Standards Board 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 © 2014 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/J2951_201401

Not for Resale, 06/12/2014 12:28:20 MDT

1. SCOPE

This SAE Recommended Practice establishes uniform procedures for evaluating conformity between the actual and target drive speeds for chassis dynamometer testing utilizing standard fuel economy and emissions drive schedules.

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 issues of the SAE and the Code of Federal Regulations (CFR) publications shall apply.

United States Environmental Protection Agency, Specifications for Electric Chassis Dynamometers, Attachment A, RFP C100081T1, 1991.

Not for Resale, 06/12/2014 12:28:20 MDT

2.1.1 SAE Publications

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

SAE J2263 Road Load Measurement Using Onboard Anemometry and Coastdown Techniques

SAE J2264 Chassis Dynamometer Simulation of Road Load Using Coastdown Techniques

SAE J1711 Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles, Including Plug-in Hybrid Vehicles

2.2 CFR Publications

The CFR is available from the Superintendent of Documents, U.S. Government Printing Office, Mail Stop: SSOP, Washington, DC, 20402-9320, http://www.gpoaccess.gov/cfr/index.html.

40 CFR Part 86 Control of Air Pollution from New and In-Use Motor Vehicles and New and In-Use Motor Vehicle Engines; Certification and Test Procedure

40 CFR Part 600 Fuel Economy of Motor Vehicles

3. DEFINITIONS

3.1 ETW CLASS (EQUIVALENT TEST WEIGHT)

Test mass dictated by U.S. Code of Federal Regulations that is assigned to represent a class of test vehicles (40 CFR § 86.129-80). ETW is a weight class, and is not necessarily equal to the as-tested weight of a vehicle.

3.2 DYNAMOMETER SET INERTIA (M_{SET})

The setting that specifies the inertia that is to be simulated by the dynamometer. The M_{SET} equals ETW for regulatory testing using 2WD chassis dynamometers. For testing on a 4WD chassis dynamometer, M_{SET} equals 98.5% of ETW.

3.3 EFFECTIVE TEST MASS (M_E)

Effective Test Mass (M_E) is the sum of 1) the dyno-simulated inertia (M_{SET}) and 2) the effective inertia of the vehicle components (e.g. wheels, axles) that are rotated on the dynamometer. This value describes the total inertial load acting on the vehicle system, and is required to calculate the inertial component of cycle energy.

For light-duty vehicles the effective inertia of the rotating components, per axle, may be estimated by taking 1.5% of the ETW. However vehicles with other than single, normal-sized wheels, such as dual-wheel trucks, may require specific estimation or determination of the effective mass of the rotating drivetrain components. Using 1.5% of ETW per axle, and the defintion of M_{SET} above, gives the following equation for determining the effective test mass for both 2WD and 4WD dynamometer testing:

$$M_E = 1.015 \cdot ETW \quad \text{(Eq. 1)}$$

3.4 Dyno Target Coefficients: F_x (F_0, F_1 and F_2)

Target coefficients describe the total force (tire, drivetrain and aerodynamic drag) acting on a vehicle during an on-road coastdown. These coefficients are developed from track data (and/or equivalent analytical methodology), corrected to standard conditions, and possibly adjusted to account for differences between vehicle weight as tested on the track and weight represented by an ETW class assigned for dynamometer testing.

--`,,,``,,`,,,,```,,`,,,,`,`,,``-`-`,,`,,`,`,,`---

Not for Resale, 06/12/2014 12:28:20 MDT