



SURFACE VEHICLE RECOMMENDED PRACTICE

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Tire Pressure and Temperature Monitoring Systems for Trailers under 26000 Pounds GVWR

RATIONALE

The field of application of this document is trailer tire installed on trailers under 26000 pounds gross vehicle weight rating (GVWR).

Normal tire maintenance procedures must be followed regardless of whether a tire pressure monitoring system (TPMS) is used or not. Tire pressure adjustments must be performed even in the absence of any TPMS indication in order to have the optimum tire performance. A TPMS acts only as an aid to the driver detecting pressure and temperature changes during operation.

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NOTICE

This document was created using SAE J2848-1_202303 as a template. The requirements and testing protocols from SAE J2848-1_202303 were used extensively in this document and are in many cases similar or identical.

1. SCOPE

This SAE Recommended Practice defines the system and component functions, measurement metrics, and testing methodologies for evaluating the functionality and performance of tire pressure systems for use on trailers under 26000 pounds GVWR within the known operating environments.

This document is applicable to all towed trailers under 26000 pounds GVWR. Examples of towed trailers are recreational vehicle travel trailers and fifth wheels, utility trailers, cargo trailers, livestock trailers, flatbed trailers, boat trailers, and snowmobile trailers. These trailers can be equipped with one, two, or three axles with each axle supporting either two or four tires.

These systems are recommended to address all tires in service as originally installed on a trailer by the OEM. This recommended practice can also be applied to external TPMS that also cover tow vehicles and trailers simultaneously.

This document will focus on tire pressure systems of the monitoring type.

1.1 Purpose

The systems for the monitoring of tire pressure defined herein are vehicle systems. The design approach taken is expected to support the purpose and performance objectives of a monitoring type system, and to function within the operating environment and design configuration of the vehicle itself.

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The TPMS system is intended to communicate to the driver or vehicle maintainer – (1) a warning of the loss of inflation gas in the tire/wheel assembly based upon the sensed level of pressure in the tire/wheel assembly, or the sensed parameters which directly correlate to the actual loss of inflation gas in the tire/wheel assembly, and (2) an indication when the system itself is not capable of providing a warning concerning the loss of inflation gas.

Monitoring systems are bounded by their sensing, analyzing, and communicating capabilities. These systems have no requirement or capability to alter the tire pressure itself. The maintenance function remains the sole responsibility of the driver/vehicle maintainer.

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 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1113/1	Electromagnetic Compatibility Measurement Procedures and Limits for Components of Vehicles, Boats (up to 15 m), and Machines (Except Aircraft) (16.6 Hz to 18 GHz)
SAE J1113/2	Electromagnetic Compatibility Measurement Procedures and Limits for Vehicle Components (Except Aircraft)—Conducted Immunity, 15 Hz to 250 kHz—All Leads
SAE J1113/3	Conducted Immunity, 250 kHz to 400 MHz, Direct Injection of Radio Frequency (RF) Power
SAE J1113/4	Immunity to Radiated Electromagnetic Fields - Bulk Current Injection (BCI) Method
SAE J1113/11	Immunity to Conducted Transients on Power Leads
SAE J1113/12	Electrical Interference by Conduction and Coupling - Capacitive and Inductive Coupling via Lines Other than Supply Lines
SAE J1113/13	Electromagnetic Compatibility Measurement Procedure for Vehicle Components - Part 13: Immunity to Electrostatic Discharge
SAE J1113/21	Electromagnetic Compatibility Measurement Procedure for Vehicle Components - Part 21: Immunity to Electromagnetic Fields, 30 MHz to 18 GHz, Absorber-Lined Chamber
SAE J1113/22	Electromagnetic Compatibility Measurement Procedure for Vehicle Components—Part 22—Immunity to Radiated Magnetic Fields
SAE J1113/24	Immunity to Radiated Electromagnetic Fields; 10 kHz to 200 MHz—Crawford TEM Cell and 10 kHz to 5 GHz—Wideband TEM Cell
SAE J1113/25	Electromagnetic Compatibility Measurement Procedure for Vehicle Components—Immunity to Radiated Electromagnetic Fields, 10 kHz to 1000 MHz—Tri-Plate Line Method
SAE J1113/26	Electromagnetic Compatibility Measurement Procedure for Vehicle Components—Immunity to AC Power Line Electric Fields
SAE J1113/27	Electromagnetic Compatibility Measurements Procedure for Vehicle Components - Part 27: Immunity to Radiated Electromagnetic Fields - Mode Stir Reverberation Method

SAE J1113/42 Electromagnetic Compatibility—Component Test Procedure—Part 42—Conducted Transient Emissions

SAE J1455 Recommended Environmental Practices for Electronic Equipment Design in Heavy-Duty Vehicle Applications

SAE J2721 Recommended Corrosion Test Methods for Commercial Vehicle Components

SAE J2848-1_202303 Tire Pressure Monitoring Systems - for Medium and Heavy Duty Highway Vehicles

2.1.2 Code of Federal Regulations (CFR) Publications

Copies of these documents are available online at <https://www.ecfr.gov>.

47 CFR Part 15 Radio Frequency Devices

2.2 Related Publications

The following publications are provided for informational purposes only and are not required as part of this SAE Technical Report.

2.2.1 SAE Publications

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

SAE J551/1 Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15 m), and Machines (16.6 Hz to 18 GHz)

SAE J560 Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable

SAE J1211 Handbook for Robustness Validation of Automotive Electrical/Electronic Modules

SAE J1587 Electronic Data Interchange Between Microcomputer Systems in Heavy-Duty Vehicle Applications

SAE J1939 Serial Control and Communications Heavy-Duty Vehicle Network - Top-Level Document

SAE J2334 Laboratory Cyclic Corrosion Test

SAE J2402 Road Vehicles - Symbols for Controls, Indicators, and Tell-Tales

SAE J2657 Tire Pressure Monitoring Systems for Light Duty Highway Vehicles

Greenly, C. and Beverly, J., "Concerns Related to FMVSS No. 138 "Tire Pressure Monitoring Systems" and Potential Implementation of a Similar Standard on Commercial Vehicles," SAE Technical Paper 2005-01-3517, 2005, <https://doi.org/10.4271/2005-01-3517>.

2.2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B117 Salt Spray (Fog) Testing

2.2.3 Tire and Rim Association Publications

Available from Tire and Rim Association, Inc., 4000 Embassy Parkway, Suite 390, Akron, OH 44333, www.us-tra.org.

Tire and Rim Association Year Book

2.2.4 ETRTO Publications

Available from European Tyre and Rim Technical Organisation, Secretariat, Av. Brugmann, 32/2, B-1060 Brussels, Belgium, Tel: +32-2-344-40-59, www.etrto.org.

ETRTO Standards Manual

2.2.5 JATMA Publications

Available from the Japanese Automobile Tire Manufacturers Association, Inc., No. 33 Mori Bldg. 8th Floor, 3-8-21 Toranomon, Minato-Ku, Tokyo, Japan 105-0001, Tel: 81-3-3435-9094, www.jatma.or.jp.

JATMA Year Book

2.2.6 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ISO 7000 Graphical symbols for use on equipment—Index and synopsis

ISO 2575 Road Vehicles—Symbols for controls, indicators and tell-tales

ISO CAN 11992 (specified TPMS messages for tractor/trailer communication)

ISO/IEC 2575:2004 Road vehicles. Symbols for controls, indicators and tell-tales

2.2.7 Federal Publications

2.2.7.1 FMCA Publications

Available from Federal Motor Carrier Safety Administration, United States Department of Transportation, 1200 New Jersey Avenue, SE, Washington, DC 20590, Tel: 1-800-832-5660, www.fmcsa.dot.gov.

FMCSA-PSV-04-002 Commercial Vehicle Tire Condition Sensors (Dec. 2003)

FMCSA-PSV-007-001 Tire Pressure Monitoring and Maintenance Systems Performance Report (Jan. 2007)

2.2.7.2 FCC Publications

Available from Federal Communications Commission, 45 L Street NE, Washington, DC 20554, Tel: 1-888-225-5322, www.fcc.gov.

FCC Part 15

2.2.7.3 NHTSA Publications

Available from National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE, Washington, DC 20590, Tel: 1-888-327-4236, <https://www.nhtsa.gov/>.

Title 49 Code of Federal Regulations Federal Motor Vehicle Safety Standards

3. DEFINITIONS

3.1 BASELINE TEMPERATURE

The temperature condition when the tire's contained inflation gas, the tire's interior structure, and the adjacent ambient air temperature are the same.

3.2 STANDARD TIRE MOUNTING

The action of assembling a tire and its specified wheel by button-holing the tire's beads over the wheel's flanges using a mechanized, rotating bead bar, or manual mounting tools.

3.3 SPECIFIED SERVICE PRESSURE (SSP)

The "cold" pressure level for a tire/wheel assembly defined by the vehicle manufacturer or tire manufacturer for the intended service conditions (load, speed, etc.) of a given vehicle.

3.4 OPERATIONAL SERVICE PRESSURE (OSP)

The actual pressure level of the tire/wheel assembly at any point during service whether at ambient or at elevated temperature due to rolling under load.

3.5 SELF-DIAGNOSTIC

A device function by which an analysis of system readiness can occur resulting in a positive or negative outcome.

3.6 TIRE PRESSURE SYSTEM (TPS)

A group of interacting components whose purpose is to measure and/or maintain, directly or through other parameters which correlate to pressure, the pressure level of the tire/wheel assembly.

3.7 TIRE PRESSURE MONITORING SYSTEM (TPMS)

A tire pressure system fitted to a vehicle which (1) senses pressure directly or indirectly, and possibly temperature, or able to evaluate the variation of pressure over time, (2) does not restore the measured pressure to its specified level, and (3) signals when the threshold(s) has (have) been exceeded and passes this information along to the driver.

3.8 LOW PRESSURE THRESHOLD

A change of pressure (ΔP) indicating an actual loss of inflation gas from the tire/wheel assembly, or a change in parameter(s) which directly relate(s) to the actual loss of inflation gas, which serves as a trigger for issuing a warning in tire pressure monitoring systems.

3.9 MINIMUM ACTIVATION PRESSURE (MAP)

A gauge pressure reading below the SSP which serves as a trigger for issuing a warning in tire pressure monitoring systems.

3.10 HUMAN MACHINE INTERFACE (HMI)

The device(s) which serve to bring about an understanding or communication between a human and a machine concerning the status of the monitored parameter(s). Examples of these devices could be a graphical display unit or a cellular phone containing an application to display the required parameters.

3.11 WARNING

Any indication to the driver to inform them that one or more tire/wheel assembly(s) of the vehicle is now in a situation where an immediate corrective action is necessary concerning pressure.