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SURFACE VEHICLE RECOMMENDED PRACTICE

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Tire Pressure Systems - Maintenance (ATIS) Type For Medium and Heavy Duty Highway Vehicles

RATIONALE

Today the world of mobility is served extensively by tires which are pneumatic in design. To function correctly these tire designs need pneumatic pressure to derive their performance characteristics - optimum tread wear, fuel economy, ride quality, or fatigue life - hence the value of keeping the retained pressure at design levels ranks high.

While periodic inspection and the periodic action of adjusting the inflation pressure while a vehicle is at rest has been the norm for maintaining pressure, the need to hold tire inflation pressures closer to their design targets over time, even while operating a vehicle on the open road at highway speeds, becomes apparent. The minimum performance capabilities recommended in the following document support these needs.

Within the medium and heavy-duty vehicle industry, the equipment supplier community has responded to the need to maintain inflation pressure, by developing various tire pressure systems which automatically re-inflate the tire/wheel assemblies even while operating on the highway. Because these systems do not require any intervention or action by the operator, operators will eventually come to rely upon these systems to maintain tire inflation pressure. It is therefore important that all marketed systems provide an adequate level of performance to assure continued in-service safety.

Tires and wheels are integral components of tire pressure systems. The system attributes for tire pressure systems described herein assume an appropriate fitment of tire and wheel for each application, and that these tire pressure systems are not dependent on the performance or physical characteristics of the tire or wheel components. The substitution of one tire/wheel assembly for another tire/wheel assembly of another configuration, appropriate for the vehicle system, shall not render the tire pressure system inoperative, so long as it provides a pneumatic chamber for the inflation gas.

Under SAE document J2848-1, the system functions and performance expectations for tire pressure monitoring systems have been established**.** The subject document (SAE J2848-2) addresses tire pressure maintenance systems for which it is essential that the performance and communications to the driver be consistent with that established for tire pressure monitoring systems (see Figure 1).

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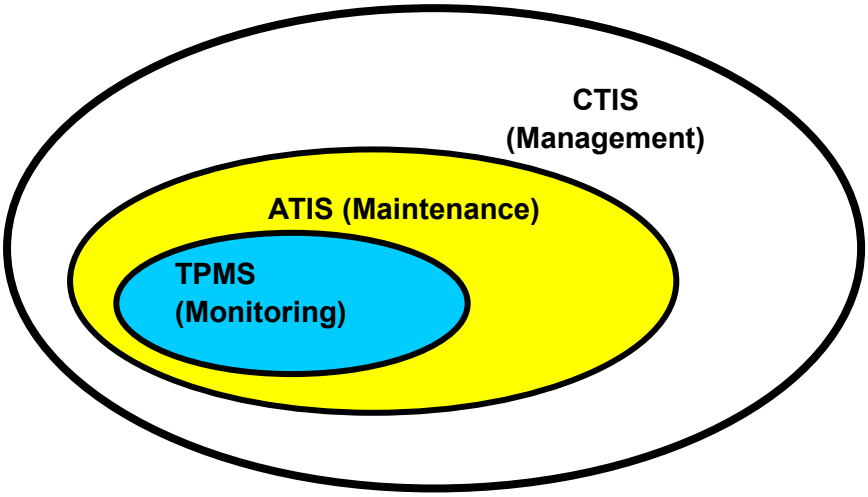

FIGURE 1 - RELATIONSHIP OF TIRE PRESSURE SYSTEMS

While tire pressure maintenance systems do not relieve the driver of his immediate responsibility to take the recommended maintenance action, these systems must still keep the driver informed of the status of the pressure level and make him aware when the system applied is no longer performing its intended function.

This document incorporates the attributes of pressure maintenance systems into the management of tire inflation pressure while retaining the alerts and warnings so vitally important to the driver.

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1. SCOPE

This SAE Recommended Practice defines the system and component functions, measurement metrics, and testing methodologies for evaluating the functionality and performance of ground vehicle tire pressure maintenance (ATIS) systems (systems which automatically restore the inflation pressure to its specified level), and recommended maintenance practices for these systems within the known operating environments.

These systems are recommended to address all serviceable tires as originally installed on a vehicle by the OEM and/or specialty vehicle manufacturer, and for the aftermarket (including replacement or spare parts) are recommended (but optional) to address all tire/rim combinations installed after initial vehicle sale or in-use dates.

This document is applicable to all axle and all wheel combinations for the following vehicle types - single unit powered vehicles exceeding 7257 kg (16 000 lb) gross vehicle weight rating (GVWR), and multi-unit vehicle combinations, up to three towed units, which use an SAE J560 connector for power and/or communication, or equivalent successor connector technology. For combination vehicles including two or more trailers, the dolly axles are also included. The included vehicles can be newly manufactured vehicles or existing vehicles, fitted with air or hydraulic braking systems.

SPECIAL NOTE: Equipment known as ‘dual tire equalizers’ are commonly used with this category of vehicles. When employing an ATIS system, dual tire equalizers systems are not recommended as they run counter to the purpose of the maintenance system.

NOTE: The following systems are not being addressed in this edition of the subject document.

1. The management system types and more mature/complex versions of maintenance and management types, to include on-board reporting/storage/retrieval data/control capabilities, will be addressed separately by future changes/additions to this document series.

2. Tire pressure monitoring systems - These systems have been addressed under SAE J2848-1.

1.1 Purpose

The installed systems for the maintenance of tire inflation pressure defined herein are on-board vehicle systems only. The maintenance type systems described herein may be controlled mechanically, electronically, and/or a combination of both, and should include sensing, restoring, and indicating/communicating, and recording (when specified by the OEM or user) capabilities. The design approach taken is expected to support the purpose and performance objectives of such a maintenance type system, and to function within the intended operating environment and design configuration of the vehicle itself.

The tire pressure system of the maintenance (ATIS) type is intended to (1) restore the tire’s lost inflation gas, measured as inflation pressure, relative to the SSP (specified service pressure) under each operational stage; (2) maintain the specified service pressure level for the typical range of ambient conditions; and (3) provide the driver with indications of low uncorrected pressure(s) and system malfunction.

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 724-776-4970 (outside USA), www.sae.org.

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

SAE J1609 Air Reservoir Capacity Performance Guide - Trucks and Buses

SAE J1939 Recommended Practice for a Serial Control and Communications Vehicle Network

SAE J2334 Laboratory Cyclic Corrosion Test

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

SAE J2721 Recommended Corrosion Test Methods for Commercial Vehicle Components

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

2.1.2 ASTM Publication

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 B 117 Salt Spray (Fog) Testing

2.1.3 Federal Publications

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

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

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

2.2 Related Publications

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

2.2.1 The Tire and Rim Association Publication

Available from The Tire and Rim Association, 175 Montrose West Avenue, Suite 150, Copley, OH 44321, Tel: 330-666-8121, www.us-tra.org.

Tire and Rim Year Book

2.2.2 ETRTO Publication

Available from The 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

2.2.3 JATMA Publication

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

JATMA Year Book

2.2.4 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.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/IEC 2575:2004 Road vehicles. Symbols for controls, indicators and tell-tales

2.2.5 ATA Publication

Available from American Trucking Associations Headquarters, 950 North Glebe Road, Suite 210, Arlington, VA 22203-4181, Tel: 703-838-1700, www.truckline.com.

ATA/TMC RP-235A Guidelines for Tire Inflation Pressure Maintenance (2008)

2.2.6 Federal Publications

Available from Federal Communications Commission, 445 12th Street, SW, Washington, DC 20554, Tel: 1-888-225-5322, www.fcc.gov.

47 CFR Part 15 Telecommunications – Federal Communications Commission - Radio Frequency Devices

Available from the Federal Register, National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590, www.nhtsa.dot.gov.

Title 49 Code of Federal Regulations Federal Motor Vehicle Safety Standards - Part 571

FMVSS 101 Controls and Displays

FMVSS 120 Tire Selection and Rims - Tire selection and rims for motor vehicles with a GVWR of more than 4,536 kilograms (10,000 pounds).

FMVSS 105 Hydraulic and Electric Brake Systems

FMVSS 135 Light Vehicle Brake Systems

FMVSS 121 Air Brake Systems

3. DEFINITIONS

3.1 Terms

3.1.1 Baseline Temperature

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

3.1.2 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.

3.1.3 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.

3.1.4 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.

3.1.5 Self Diagnostic

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

3.1.6 Tire Pressure System

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

3.1.7 'ATIS'

A generic term for tire pressure systems of the maintenance type which when fitted to a vehicle (1) sense the drop in gauge pressure level in a tire/wheel assembly directly or indirectly, (2) provide a one-way flow of inflation gas into each assembly, and (3) restore the gauge pressure reading to the specified level.

3.1.8 Low Pressure (re-inflate) Threshold

A change of pressure (▲P) relative to the OSP indicating an actual loss of inflation gas from the tire/wheel assembly, or as a change in a parameter(s) which directly relate(s) to the actual loss of inflation gas, which serves as a trigger for activating the installed tire pressure system's response.

3.1.9 Minimum Activation Pressure (MAP)

A gauge pressure reading below the SSP which serves as a trigger for activating the installed tire pressure system's response, and defines the low pressure threshold regardless of the actual loss of inflation gas.

3.1.10 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).

3.1.11 Cold Tire Inflation Pressure

Tire pressure at the prevailing ambient temperature, in the absence of any pressure build-up due to tire usage.

3.1.12 Quasi-stationary

Vehicle creeping forward at very low speed, causing at least one full revolution of each installed tire/wheel assembly.

3.1.13 Gross Vehicle Weight Rating (GVWR)

Means the value specified by the manufacturer as the loaded weight of a single motor vehicle.

3.1.14 Gross Combination Weight Rating (GCWR)

Means the value specified by the manufacturer as the maximum loaded weight of a combination (articulated) motor vehicle.

3.1.15 Lockout

System function whereby the re-inflate system is isolated from the brake pressure supply reservoir preventing a further reduction in the pressure level of this reservoir.

3.2 Symbols and Abbreviations

DUT - Device Under Test

ATIS - Tire Pressure Maintenance System

TPMS - Tire Pressure Monitoring System

SSP - Specified Service Pressure

OSP - Operational Service Pressure

HMI - Human Machine Interface

MAP - Minimum Activation Pressure

FMVSS - Federal Motor Vehicle Safety Standards

FMCSA - Federal Motor Carrier Safety Administration

4. TIRE PRESSURE SYSTEMS - MAINTENANCE TYPE

4.1 General System Requirements

4.1.1 The ATIS system is a system mechanically or sensor activated by a demand for compressed air in one or more of the tire/wheel assemblies, vehicle rolling and optionally, vehicle stationary.

4.1.2 The ATIS system should be capable of restoring the lost inflation gas (adding of compressed gas) to each tire/wheel assembly of the power unit, trailer, or dolly unit so equipped, without negative effects to any other air-powered systems or accessories on each vehicle so equipped.

4.1.3 Even with a ATIS system installed, one must still be able to manually check, inflate, or deflate each tire/wheel assembly, and have access to the inflation valves without the use of non-traditional tools, and certainly not specialty tools, or adapters.

4.1.4 While the ATIS system may be self-responding, these systems should still have the capacity (1) to indicate to the operator a low pressure condition in any of the tire/wheel assemblies connected to the air system and (2) to warn the operator of any continuous pressure drawn-down condition but not later than the point of system isolation from the supply reservoir. This indicator circuit may be activated by either turning the ignition “ON” in the case of the power unit, or by making a power connection in the case of a trailer or dolly unit, or may use a combination of vehicle power and self-power.

4.1.5 The ATIS system when installed on any one of the following vehicle types - single unit powered vehicles exceeding 7257 kg (16 000 lb) gross vehicle weight rating (GVWR), and/or trailers (with dolly axles as applicable) which use an SAE J560 connector for inter-vehicular power and/or communication, or equivalent successor inter-vehicular connector technology - should be capable of maintaining all axle and all wheel combinations.

4.1.6 The ATIS system should contain one or more air check valve(s) (1) which are capable of isolating the re-inflate system from each rapid pressure loss assembly, and from an assembly during the action of tire/wheel change-out, (2) which are capable of isolating the air brake system reservoir (where appropriate) from the re-inflate system to meet the criteria of 49 CFR Part 571.121 (FMVSS 121), 49 CFR 393 Subpart C, and 49 CFR 393.207, and (3) with sufficient safeguards to prevent back flow into the applicable truck or bus, prime mover (tractor), and/or trailer vehicle air system.

4.1.7 The vehicle compressed air supply which is used to re-inflate the tire/wheel assembly should supply ‘clean, dry’ air to the ATIS system, and will have sufficient capability to operate the ATIS system as intended by the system manufacturer to support the volume demand of the fitted tire/wheel assemblies. (On legacy vehicles, a pressure step-up or booster unit may be required.)

4.1.8 With regard to a system’s function, the tire pressure system manufacturer should specify accuracy, nominal level/reading, and normal operational range for included components and make such information available for all users. Ultimately, the accuracy of the system components should be sufficient to keep the inflation pressure within the specified pressure range.

4.1.9 The tire pressure system sampling rates and sensor capabilities should be sufficient to support the communication requirements at the HMI (see Section 5).

4.1.10 The ATIS system should be configured to add inflation gas, but, by definition, is not required to reduce the inflation pressure .

4.1.11 If used, the wired or wireless communication link between a power unit and trailer(s), should perform to the guidelines delineated in SAE J2848-1.

4.1.12 If used, the link between a wireless pressure sensor and its receiving module should perform to the guidelines of SAE J2848-1.

4.1.13 The specified service pressure (SSP), or reference pressure, is determined in cooperation with the vehicle OEM or specialty manufacturer and the tire manufacturer, based on the vehicle capacity, the maximum applied axle or wheel position loads, and operating conditions. For reference purposes only, an industry accepted method for determining the appropriate specified service pressure has been documented in the American Trucking Association’s TMC RP-235: Guidelines for Tire Inflation Pressure Maintenance.

4.1.14 The ATIS system should have the capability to allow the initialization and adjustment of the system’s set point for the SSP in the field by authorized personnel. On the other hand, should the system be disabled by error or through tampering, the ATIS should provide to the driver an indication that the reinflation system has been isolated from the supply reservoir.

4.1.15 The ATIS system should have the flexibility of design such that the removal or replacement of a tire/wheel assembly can be accomplished in a safe manner and will not render the system inoperative.

4.1.16 For operators who use nitrogen inflation upon initially filling each tire, it is acceptable to top-off such assemblies using compressed air from the ATIS system should authorized personnel so desire.

4.1.17 The typical operational conditions and configurations for which ATIS systems should function properly (during either the sensing or the re-inflate mode) are outlined below:

a. Speed - The tire pressure system should function installed in a vehicle while rolling at any vehicle design speed when sufficient air pressure is available, and optionally, while resting stationary.

b. Road Surfaces - The tire pressure system should function installed in vehicles operating on all improved road surfaces, unless specified otherwise.

c. Maneuvers - The tire pressure system should function during all safe driving maneuvers.

d. Loading - The tire pressure system should function properly across the full loading range of the powered vehicle, and the full loading range of the trailer unit(s) per the vehicle manufacturers' recommended limits.

e. Temperature - The tire pressure system should function when properly installed and used as intended on vehicles specified under 4.1.6 operating in ambient temperatures ranging from -40 °C (-40 °F) to 55 °C (131 °F), and under the full range of system operating temperatures when supplied with clean, dry air.

4.2 Advanced System Requirements

Should the installed ATIS system be a full featured electronic system (sensor within every wheel assembly initiating a re-inflation action, communication on the dashboard of the ongoing status of the maintenance system, wireless communications, etc.), refer to SAE J2848-1 for the associated system functions, measurement metrics, and testing methodologies.

4.3 Component Performance Requirements - Valves, Sensors, Regulators, Control Modules, etc.

4.3.1 Environmental

It is the intent that electronic device(s) and mechanical components that are mounted in/on the tire/wheel environment or on the vehicle should be sufficiently robust, with typical design safety factors, and 'hardened' by design, be capable of successfully completing all the tests - thermal cycling, thermal shock, humidity, altitude, mechanical shock, drop, mechanical vibration, and combinations of these conditions.

The recommended test method for these conditions is defined in SAE J1455. The functionality of the device(s) under test (DUT) should be verified before and after testing. Additionally, each DUT should be visually inspected for damage before and after testing. Unless otherwise specified, each DUT must be at ambient atmospheric pressure, relative humidity, and temperature unless specified otherwise for each test.

4.3.2 Corrosion

The identification of potential physical contaminates, and the mitigation/elimination of their corrosive effects is critical to both performance and longevity of all tire pressure systems and related hardware. Depending on system type, the design and performance of the system components must be addressed in regards to potential system contaminants: for example, power connections; sensing units; component attachment points/locations; inflation supply and source, and check valves.

The recommended test methodology for physical contaminates is to apply the laboratory conditions for corrosive events and cycles, and the chemical mixtures (solutions) as defined in SAE J2721.

4.3.3 Proof Pressure

Though the service pressure for most tire pressure systems is as specified on the tire placard, there are instances when the device can be exposed to pressure levels above those listed. For pressure sensing devices, it is important that these devices continue to function even after exposure to elevated pressures, and that the device itself does not fail compromising the ability of the tire/wheel assembly to hold pressure.

A recommended test method is to attach the DUT to a pressure vessel. Pressurize the vessel to not less than 150 psig unless superceded by a higher maximum working pressure by the vehicle OEM. Maintain the applied pressure for 30 min, then release to ambient atmospheric pressure, and immediately test for functionality once pressure and temperature are stable.

5. TIRE PRESSURE SYSTEM

The tire pressure system, maintenance type, should employ a design-for-use approach to make its operation self-directed. In other words, the human-machine-interface envelope should require as little operator inputs as may be economically viable within state-of-the-art technology, in order to mitigate or eliminate the potential for intentional and unintentional errors and/or vehicle operator-induced/maintainer-induced damage.

5.1 System HMI Characteristics

5.1.1 Warning Devices

The ATIS system should be capable of communicating a warning to the driver**,** and continue to warn until the pressure has been restored, for the following conditions.

a. a low pressure condition, namely whenever the pressure level in any tire/wheel assembly drops below the system's MAP,

b. any continuous pressure drawn-down condition but not later than the point of system isolation from the supply reservoir, namely the minimum pressure for brake system operation.

5.1.2 A single driver warning device is desirable, however, lacking such an arrangement, each additional unit (trailer or dolly) should have at least an external warning device visible to the driver.

5.1.3 The minimum configuration of the device for communicating a warning to the driver should be a panel with optical telltale(s) which communicate by their operational mode(s) a low pressure condition, or the isolation of the re-inflation system from the supply reservoir. Regardless of the design solution, the telltale must illuminate whenever the system is not at rest, i.e., flowing or attempting to flow compressed air to a tire/wheel assembly.

5.1.4 Location

The indicator panel should always be available for the driver's viewing. Whether available on the dashboard or other location within the cab, or on the exterior of the trailer, the location is optional.

5.1.4.1 If a dashboard display option is selected, this communication must be marked appropriately for the system installed, and carry different action (manual) instructions than that of a tire pressure monitoring system.

5.1.4.2 If a trailer display option is selected, this communication must be visibly available to the driver/operator for each trailer pulled, even if multiple trailers are involved.

5.2 System Performance Thresholds

5.2.1 The response thresholds for a tire pressure system of the maintenance type are defined as follows (see also 4.1.13 for the SSP):

a. The minimum activation threshold for the re-inflate function should not be less than 97% of the tire's specified service pressure (SSP).

b. The optimum activation threshold for the re-inflate function is 97% of the tire's operational service pressure (OSP) in its operational state (OSP-3% curve).

c. The re-inflate function should de-activate no later than the pressure level associated with the operational service pressure (OSP) in its operational state (OSP curve).

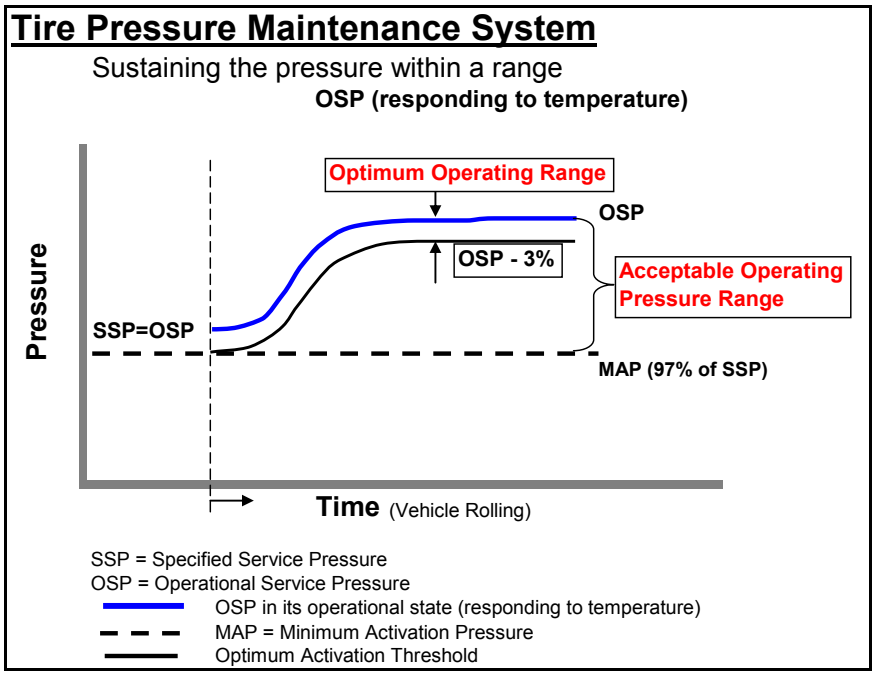

FIGURE 2 - MAINTENANCE SYSTEM OPERATING RANGE

5.3 Controls, Symbols, Switches

5.3.1 If the use of an ATIS system switch or button requires the driver to first consult his owners manual, a sticker on the display or a message on one of the first display screens upon activation should direct him accordingly.

5.4 Owner's Manual Information

5.4.1 For each system installed, it is essential that a full set of instructions and explanations be made available to the Operator in the Owners Manual. This information should include the type of system applied to each unit (tractor or power vehicle), its function, how to interpret the data panel display, and necessary system maintenance actions. This information should be specific to and accompany each vehicle, or trailer unit.

5.4.2 Even with an ATIS system installed, it is incumbent upon the operator or fleet maintenance responsible to conduct a check of the inflation pressure of each assembly and to restore the inflation pressure to the specified level, prior to operating the vehicle on the highway.

6. ATIS SYSTEM - PERFORMANCE DEMONSTRATION

The demonstration of the response and performance of a ATIS system should be specified in the OEM test plan in relation to the vehicle type or vehicle combination. In the event that no OEM test plan has been specified, the procedure defined below may be used. This procedures is structured to validate that the system as designed and used as intended meets or exceeds the defined response characteristics of this specification, namely, (1) can communicate at the driver/operator indicator panel a condition of low pressure in a tire/wheel assembly(ies) or the isolation of the re-inflation system from the supply reservoir, and (2) maintains the inflation pressure within the acceptable operating pressure range.

Regardless of test method used, appropriate safety procedures and safety equipment must be utilized.

6.1 Vehicle Test (Power Unit, Trailers, Dollies)

6.1.1 Test Setup

The test vehicle should be equipped with an operationally ready ATIS system, and if the test vehicle is a trailer, with the trailer attached to a power unit and all associated connections made.

a. Set the tire pressure to the operational service pressure for the vehicle(s) under test. Condition the vehicle for 1 h outdoors - stationary, and tires shaded. The ambient temperature should not vary more than 20 °F (11.11 °C) over the test interval.

b. Reset the tire pressures. Consider the tire stabilized if within ±1 psi after 10 min.

c. If applicable, conduct a reset of the ATIS system in accordance with the instructions specified in the vehicle owner's manual.

d. With the vehicle stationary and beginning with the ignition locking system in the "Lock" or "Off" position, turn the ignition to the "On" or "Run" position.

e. Allow the on-board compressed air system to reach its operational pressure level, and then command a release of the brakes on the trailer allowing the flow of compressed air to the tire pressurization system.

6.1.2 Test – Vehicle Stationary

Phase I - The steps of Phase I should be conducted one tire/wheel assembly at a time, and with the vehicle stationary. If the ATIS system does not function with the vehicle stationary proceed to 6.1.3.

a. Release pressure from one tire/wheel assembly on each supply branch of the ATIS system of each included vehicle (power unit, trailer, dolly) under test. Reduce the pressure to a gauge reading of 95% of the SSP.

b. If the re-inflate system has not activated for each assembly under test on or before a gauge pressure reading of 95% of SSP, discontinue any further testing.

c. If the re-inflate system has activated, record the pressure level of each deflated tire/wheel assembly at the point for which the system activates, and note whether the indicator panel message lamp (dash or external mount) has been activated, and remains activated, as long as the re-inflate system is active.

d. At the point that the re-inflate system de-activates, record the gauge pressure of the re-inflated tire/wheel assembly, and note whether the indicator panel message lamp has been de-activated.

e. At the end of each test sequence: (1) validate that the system's performance meets the threshold criteria specified in this document, and (2) validate that the information displayed on the indicator panel has communicated the system's response to the demand for inflation pressure. If the criteria has not been met, discontinue any further testing.

Phase II - The steps of Phase II should be conducted one tire/wheel assembly at a time.

a. Release pressure from one tire/wheel assembly of each included vehicle (power unit, trailer, dolly) under test at a rate greater than the system's ability to restore pressure. Keep the pressure release valve open for the duration of this test.

b. If the re-inflate system has not activated for each assembly under test on or before a gauge pressure reading of 95% of SSP, discontinue any further testing.

c. If the re-inflate system has activated, record the pressure level of each deflating tire/wheel assembly at the point for which the system activates, and note whether the indicator panel message lamp (dash or external mount) has been activated, and remains activated, as long as the re-inflate system is active.

d. At the point that the re-inflate system has been isolated from the supply reservoir, record the gauge pressure of the tire/wheel assembly, record the gauge pressure level of the supply reservoir, and note whether the indicator panel message lamp remains on.

e. Stop releasing pressure from the test assembly. Allow the system to restore the pressure to the specified level.

f. At the end of each test sequence: (1) validate that the system's performance meets the threshold criteria specified for supply reservoir isolation, and (2) validate that the information displayed on the indicator panel has communicated the system's status. If the criteria has not been met, discontinue any further testing.

6.1.3 Test: Vehicle Rolling Test (for re-inflate systems which only function while rolling)

Phase I

a. Begin driving the vehicle. Achieve a speed of at least 25 mph.

b. Release pressure from one tire/wheel assembly on one supply branch of the ATIS system of one of the included vehicles (power unit, trailer, dolly) under test. Reduce the pressure to a gauge reading of 95% of the SSP.

c. If the re-inflate system has not activated for each assembly under test on or before a gauge pressure reading of 95% of SSP, discontinue any further testing.

d. If the re-inflate system has activated, record the pressure level of the deflated tire/wheel assembly at the point for which the system activates, and note whether the indicator panel message lamp (dash or external mount) has been activated, and remains activated, as long as the re-inflate system is active.

e. At the point that the re-inflate system de-activates, record the gauge pressure of the re-inflated tire/wheel assembly, and note whether the indicator panel message lamp has been de-activated.

f. Repeat the steps of a. through e. for each tire/wheel assembly on each supply branch of the ATIS system of each included vehicle (power unit, trailer, dolly) under test.

g. At the end of each test sequence: (1) validate that the system's performance meets the threshold criteria specified in this document, and (2) validate that the information displayed on the indicator panel has communicated the system's response to the demand for inflation pressure. If the criteria has not been met, discontinue any further testing.

Phase II - The steps of Phase II should be conducted one tire/wheel assembly at a time.

a. Begin driving the vehicle. Achieve a speed of at least 25 mph.

b. Release pressure from one tire/wheel assembly of the vehicle (power unit, trailer, or dolly) under test at a rate greater than the system's ability to restore pressure. Keep the pressure release valve open for the duration of this test.

c. If the re-inflate system has not activated for the assembly under test on or before a gauge pressure reading of 95% of SSP, discontinue any further testing.

d. If the re-inflate system has activated, record the pressure level of the deflating tire/wheel assembly at the point for which the system activates, and note whether the indicator panel message lamp (dash or external mount) has been activated, and remains activated, as long as the re-inflate system is active.

e. At the point that the re-inflate system has been isolated from the supply reservoir, record the gauge pressure of the tire/wheel assembly, record the gauge pressure level of the supply reservoir, and note whether the indicator panel message lamp remains on.

f. Stop releasing pressure from the test assembly. Allow the system to restore the pressure to the specified level.

g. At the end of each test sequence: (1) validate that the system's performance meets the threshold criteria specified for supply reservoir isolation, and (2) validate that the information displayed on the indicator panel has communicated the system's status. If the criteria has not been met, discontinue any further testing.

h. Repeat the steps of a. through f. for each tire/wheel assembly on each supply branch of the ATIS system of each included vehicle (power unit, trailer, dolly) under test.

7. NOTES

7.1 Marginal Indica

A change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

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