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DEPT OF TRANSPORTATION

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Ex Parte Meeting

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Docket NHTSA-2000-8572 -13

On February 22, 2001, NHTSA met with representatives of Michelin concerning the impending rulemaking on endurance and resistance standards of tires and tire pressure monitoring systems required by the recently-enacted Transportation Recall Enhancement Accountability and Documentation (TREAD) Act.

NHTSA was represented by Joe Scott, Larry Blincoe, Steve Peirce, Joseph Kiananthra, August Burgett, Steve Wood, Riley Garrott, Ray Owings, Mike Monk, Art Carter, Chris Lash, George Soodoo, and Nancy Bell. Michelin was represented by Steve Padula, Prashant Prabhu, Patrick Raheer, and Michael Fanning.

Michelin representatives presented and discussed the highlights of its Endurance Certification Test proposal and its Tire Pressure Monitoring System (TPMS) proposal. Michelin's TPMS proposal has been submitted to the above-mentioned docket and Michelin's Endurance Certification Test proposal has been submitted to docket NHTSA-2000-8011.

Tire Pressure Monitoring Standards



LTPWS/TPMS and Global Safety

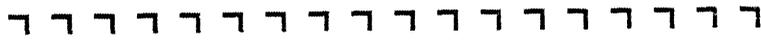


MICHELIN



➤ Rapid Air Loss ---- Run-Flat Systems/TPMS

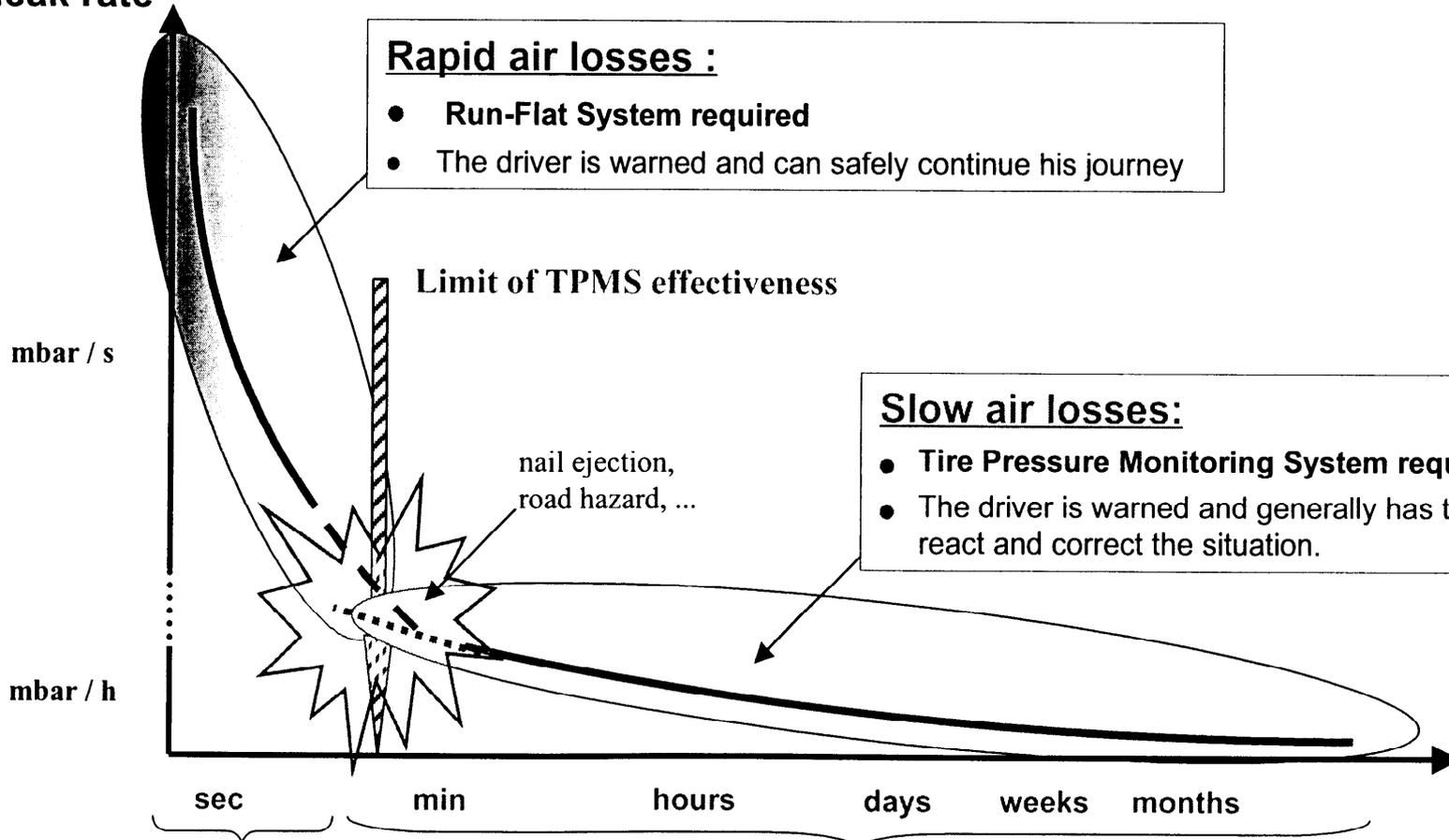
➤ Slow Air Loss ---- TPMS



Pressure Losses



Tire leak rate



Rapid air losses :

- Run-Flat System required
- The driver is warned and can safely continue his journey

Limit of TPMS effectiveness

Slow air losses:

- Tire Pressure Monitoring System required
- The driver is warned and generally has time to react and correct the situation.

15 % of all pressure losses

85 % of all pressure losses

Time to flat condition

LTPWS Minimum Specifications



➤ **Functionality**

- ◆ Inform driver when any (one or more) tire pressure is below standard
- ◆ Deliver pertinent information easily understood by driver
- ◆ Assume maximum operating conditions (ex. load & speed) when this information not available
- ◆ Automatically reset (or easily resettable by driver) after pressure adjustment
- ◆ Perform efficiently for full life of tires and vehicle

LTPWS Minimum Specifications



➤ **Standard Tire/Wheel Assemblies**

- ◆ TPMS to indicate one tire is **underinflated** when actual inflation pressure of **any** tire falls below the placard pressure specified by the vehicle manufacturer
- ◆ TPMS to indicate one tire is **significantly underinflated** when actual inflation pressure of **any** tire falls below the minimum pressure specified by the tire industry standardizing body to carry the vehicle maximum load (or actual load) or 150 kPa (22 psi), whichever is larger.

➤ **Run-Flat Systems**

- ◆ Three warnings to be set:
 1. When any tire is **underinflated**
 2. When any tire is **significantly underinflated**
 3. When the run-flat capacity of any tire starts being used

Pressure Monitoring - Solutions



Direct Pressure Measurement

- Measures pressure directly from the tire interior cavity
- Allows the driver to know the actual pressure in the tire
- Minimizes chances of false alarm

Indirect Pressure Estimation

- Estimates tire pressure from the variation in tire rolling circumference compared to some reference.
 - Cannot detect when all four tires are low due to natural pressure loss over time
 - In an alarm situation there is no corroborating information for the driver to allow him to judge the severity of the situation. False alarms are more possible.
- Based upon what we know of these systems today, they are not suitable



For many decades, major tire manufacturers have been actively participating in the development of Tire Pressure Monitoring Systems and related standards; there is a real need for TPMS minimum specifications for standard tire and/or Run-Flat Systems.

These proposed specifications are a new contribution in that field.

➤ **LTPWS / TPMS and global safety :**

With a view toward improving automotive safety, the work on TPMS needs to be directed at tire pressure drops, including slow and rapid air losses.

While a TPMS addresses most of the slow air losses and their consequences, it is not effective in case of rapid air loss; this has led major tire manufacturers to develop Run-Flat Systems.

TPMS will then be used with standard tire/wheel assemblies or as part of Run-Flat Systems and this will lead to different sets of specifications. The TPMS minimum specification should not exclude use with Run-Flat Systems.

Cost is a key issue in implementation. These minimum TPMS specifications are aimed at achieving safety. Implementation issues are addressed separately.

➤ **Liability and effectiveness :**

A LTPWS / TPMS is only an aid to the decision providing a signal to the driver in the case where a slow tire pressure decrease has not been previously detected and compensated by a pressure adjustment ; that, nevertheless, does not allow operating the tire outside of areas specified by the tire industry standardizing bodies : TRA, ETRTO, JATMA, ...

This document has been established taking the following principles into account :

- safety of the tire and the user cannot be compromised,
- tire standards that define the condition for a tire to be safely used exist and must be respected,
- in the absence of information to the contrary, maximum load and maximum speed conditions of the tire must be assumed.

➤ **System approach :**

Safety will improve because of the system and not because of various components installed independently.

The system :

- collects information, transmits it, processes it and delivers pertinent and useful data to the driver when needed,
- includes sensors, transmitters, processing unit, transmission / application software and display,
- can be easily mounted / dismounted and serviced by professionals,
- can be easily used and delivers information drivers can easily understand,
- lasts as long as the vehicle with appropriate maintenance,
- ...

➤ **Evolution :**

The minimum specification should prepare to accept more sophisticated developments such as :

- drivers will be educated,



- new technologies will allow smarter functionality,
- Run-Flat Systems will replace std tire/wheel/LTPWS assemblies,
- vehicle performances will evolve with more sophisticated systems : ESP, "X by wire", ...
- ...

➤ **LTPWS minimum specification :**

◆ **Functionality :**

The system must :

- inform the driver when the pressure of any tire (one or more) is below that authorized by applicable standard.
note : applicable standard are generally referring to using "cold pressures".
- deliver pertinent information that can be easily understood by the driver, whether he has been specifically trained or not,
note : rough pressure/temperature data are not considered pertinent by themselves.
- assume maximum operating conditions (such as load and speed) when this information is not available,
note : maximum loads are often different for front and rear tires
- automatically reset (or be easily resetable by driver) after pressure adjustment,
- perform efficiently during the full life of tires and vehicle, in all types of normal driving and environmental conditions.
This includes reading only the tire data of that specific vehicle and providing notice when TPMS maintenance is needed.

For standard tire/wheel assemblies,

- a TPMS is to indicate that one tire is **underinflated** when the actual inflation pressure of any tire (one or more) falls below the placard pressure specified by the vehicle manufacturer.
- a TPMS is to indicate that one tire is **significantly underinflated** when the actual inflation pressure of any tire (one or more) falls below the minimum pressure specified by tire industry standardizing bodies (TRA, ETRTO, JTMA, etc) required to carry the vehicle maximum load, or actual load if measured by onboard systems or 150 kPa (22 PSI), whichever is larger.

For Run-Flat Systems, three warnings are to be set on :

- a first when any tire (one or more) is **underinflated** as defined above,
- a second when any tire (one or more) is **significantly underinflated** as defined above,
- a third when the run-flat capacity of any tire (one or more) starts being used