

ETRMA GUIDELINE

Tyres for passenger cars and light commercial vehicles Method for stabilizing evaporative emissions of a new tyre

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Foreword

ETRMA is the European Tyre and Rubber Manufacturers Association: the voice of the tyre and rubber goods producers to the EU Institutions. Its activities focus on support the tyre and rubber innovative industry and cooperate with the legislators to create an enabling environment that will help the industry achieve the following goals. Promoting the principles of better regulation: ensuring that policymaking is science-based and, once in implementation, effectively enforced.

ETRMA contributes meaningfully to the legislative developments and anticipates the impact of future initiatives on the industry, through recognized scientific research. ETRMA is also as needed developing guidelines to support the industry in becoming an even more innovative, competitive, responsible and sustainable sector across Europe and beyond.

Through the ETRMA experts working groups, ETRMA is periodically reviewing the procedure like this document, as needed and linked to relevant regulatory procedures evolutions at European and/or at UN level.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ETRMA is not responsible for identifying any or all such patent rights. Details of any patent rights eventually identified during the development of the documents will be referred therein. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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1 Introduction

Any vehicle tyre is usually emitting unstable and higher level of evaporative emissions soon after the manufacturing process. These emissions are decaying during the normal tyre storage and use during the months following the manufacturing, until reaching a stable level.

Whole vehicle evaporative emissions standards and regulatory methodologies are historically aiming at reducing vehicle evaporative emissions of the fuel system along with the entire life span of the vehicle, including during the refuelling operations (only scope of regulations on evaporative emissions).

Nonetheless, evaporative emissions may also be emitted by non-fuel components of the vehicle such as tyres and/or plastics or other rubber parts. Tyre emissions have been always accounting for a negligible part with respect to a threshold set for a SHED (Sealed Housing for Evaporative Determination) of a whole vehicle. With the continuous tightening over time of fuel system evaporative emission thresholds, those emissions not pertinent to the fuel system and outside the regulatory scope, have the potential to influence the measurements, if the stabilization procedures are not evolving over time as well.

In general, SHED testing procedures of a whole vehicle are already considering a pre-conditioning phase and a background stabilization phase. When approaching the need of more accurate SHED measurements on the fuel system emissions performances, the current practice of a pre-conditioning phase and a background stabilization phase is not always taking into account the tyre stabilization decay curve and the proper conditions to prevent influencing the vehicle SHED measurements objectives by the tyre emissions.

The tyre emissions are obviously not related to the fuel system nor with the refuelling operations, while, as mentioned, are continuously decreasing over time. The method for stabilizing the evaporative emissions of new tyres for passenger cars and light commercial vehicles described in this document is meant to identify the tyre preparation undergoing prior to a SHED or other evaporative emission test when mounted on a vehicle, to reduce the variability of the vehicle fuel system evaporative emissions performance measurement. In general, tyres cannot be considered stabilized before 3000 km run-in.

2 Scope

This document specifies a basic method for stabilizing the emissions of new tyres for passenger cars and light commercial vehicles, as a preparatory phase before measuring evaporative emissions by using the SHED (Sealed Housing for Evaporative Determination) or equivalent, either as a single tyre, a set of tyres, or when mounted on a vehicle undergoing evaporative emissions measurements.

This document applies to all passenger car tyres including T-type temporary-spare tyres (i. e. tyres conforming to ISO 4001-1 or UN regulation no. 30) and to tyres for light commercial vehicles (i. e. tyres conforming to ISO 4209-1 or UN regulation no. 54 and marked with "C" or "LT").

3 Normative references

The following documents are referred to in the text. The latest edition of the referenced document applies.

- ISO 4000-1, Passenger car tyres and rims (metric series) — Part 1: Tyres.
- ISO 4209-1, Truck and bus tyres and rims (metric series) – Part 1: Tyres
- ISO 4223-1, Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres.
- UN regulation no. 30 - Uniform provisions concerning the approval of pneumatic tyres for motor vehicles and their trailers.
- UN regulation no. 54 – Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4223-1 Definitions of some terms used in the tyre industry -- Part 1: Pneumatic tyres, in ISO 4000-1, Passenger car tyres and rims (metric series) — Part 1: Tyres, in ISO 4209-1, Truck and bus tyres and rims (metric series) – Part 1: Tyres and the following apply.

4.1 evaporative emissions
hydrocarbon vapours lost from the fuel system of a motor vehicle during parking and immediately before refuelling of a sealed fuel tank, also referred as VOC
Evaporative emissions do not include hydrocarbon vapours emitted through the tailpipe as part of exhaust gases. Hydrocarbon vapours can be also emitted at the beginning by newly manufactured tyres and, not being within the above definition, can influence the measurement of such evaporative emissions if the tyres are not stabilized.

4.2 test tyre
the tyre undergoing to the stabilization procedure

4.3 set of tyres
set of four (4) test tyres plus spare tyre if applicable

4.4 test chamber
ventilated and temperature-controlled chamber used to stabilize a test tyre or a set of tyres

The test chamber can be either a walk-in chamber or of a size sufficient for containing the set of tyres.

5 Procedure methodology

5.1 Evaporative emissions stabilization method for tyres

The tyre stabilization is obtained by heating tyres, which may be mounted on a rim, for a fixed period in controlled ambient conditions.

Before testing, tyres should be cleaned and tyre labels should be removed.

The “relative” evaporative emission level of the stabilized tyres mounted on the vehicle shall be evaluated through a SHED (Sealed Housing for Evaporative Determination) or equivalent test: this procedure is outside the scope of this document.

5.2 Procedure Equipment

The procedure refers to one set of tyres. The stabilization procedure shall be performed inside a test chamber with the following features:

- the ventilation system shall ensure sufficient air circulation to avoid VOC saturation in the chamber;
- the temperature control shall be capable of maintaining the temperature at $70^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

5.3 Tyres

The procedure is intended for newly manufactured tyres that were produced not less than 2 weeks and not more than 12 weeks before the start of the procedure, as determined by the week of manufacture marked on the sidewall, recorded at the start of the procedure. Tyres with higher age from production or tyres having performed run-in can also be further stabilized according to this procedure.

5.4 Procedure

5.4.1 Execution

Set the temperature to 70°C .

Once the target temperature has been reached, position the tyres vertically and not touching each other inside the test chamber.

Conduct the stabilization for 5 weeks without interruption.

Remove the tyres from the chamber and wait until the tyres have reached the ambient temperature prior to proceeding to any SHED test.

5.4.2 Boundary conditions

Although this procedure is non-destructive and does not affect the overall tyre characteristics and performances, at temperatures exceeding 50°C , certain forms of deterioration might be accelerated sufficiently to affect the ultimate service life. Therefore, it is recommended not to use tyres stabilized according to this procedure for any other purpose than for vehicle SHED or equivalent measurements.

Moist conditions should be avoided. Care must be taken to ensure no condensation occurs. Whenever possible, tyres should be stored inside a cool, dry and aerated area.

Bibliography

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[2] *UN Global Technical Regulation No. 19 (2020) (EVAPorative emission test procedure for the Worldwide harmonized Light vehicle Test Procedure (WLTP EVAP)) – Amendments 1 to 3 (9 October 2020)*.

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[5] *European Commission (2020), Commission Regulation (EU) 2017/1151 of 1 June 2017 supplementing Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Commission Regulation (EC) No 692/2008. Consolidated text of 25.01.2020.*

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