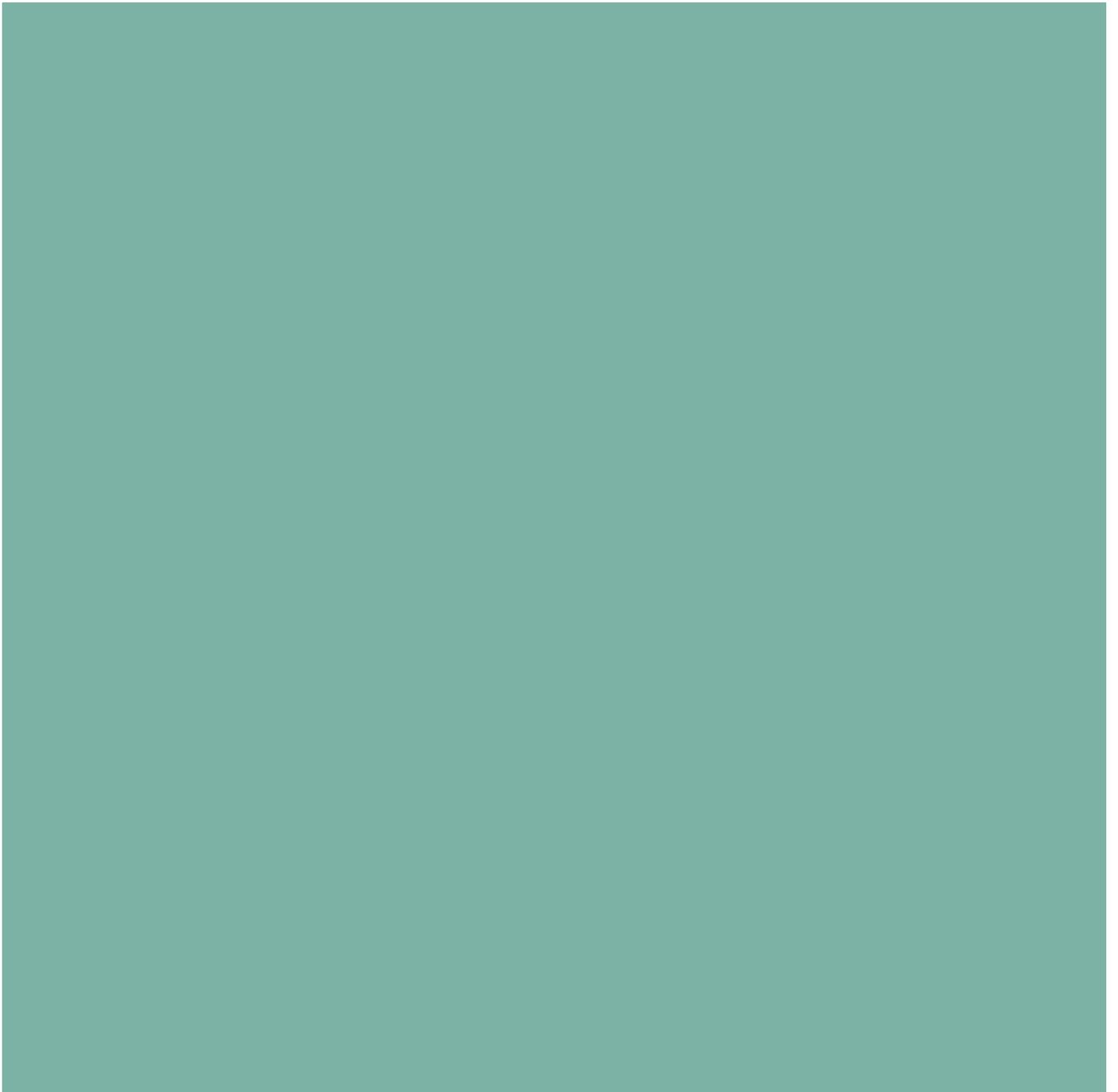




Driver & Vehicle
Standards
Agency

Electronic Braking Performance Monitoring System

Industry Standard Specification



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- Axscend
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Electronic Braking Performance Monitoring System (EBPMS)

Industry Standard Specification

Background and scope

Vehicle operators and drivers have a legal obligation to ensure their vehicles are roadworthy at all times when operating on public highways. The Driver & Vehicle Standards Agency (DVSA) produce a document called 'Guide to Maintaining Roadworthiness' which outlines best practice for the maintenance of commercial vehicles. Including a recommended testing regime for commercial vehicle braking performance and in particular trailers for which this document has been compiled.

The Guide states **“It is strongly advised that a calibrated roller brake tester (RBT) is used at each safety inspection”** and **“it is also best practice to test the vehicle or trailer in a laden condition”**.

The specification defined within this document describes a system that overcomes many of the difficulties and limitations of the current service brake guidance for trailers in GB.

Confirmation of the performance of an EBPMS shall be established against the requirements defined within this specification by a competent person(s) or body.

While still providing a system defined herein as an Electronic Brake Performance Monitoring System (EBPMS) it is recommended that appropriate elements should, where possible employ at least the same, similar or equivalent methodologies as those described in ISO 21069.

The requirements specified within this document have been developed based on existing known technologies. It may be necessary to review the content to take into consideration further developments or in the light of experience gained.

Section 1: Definitions

For the purposes of this specification the following definitions shall apply:

- 1.1 “**Electronic Braking Performance Monitoring System (EBPMS)**” means a system that enables the braking performance of a commercial vehicle to be monitored and recorded during everyday operation under a plurality of operating conditions. EBPMS autonomously collects Braking Event Data during every Braking Event and analyses the data over time to produce a Braking Performance Value.
- 1.2 “**Braking Event**” means a period of time during which the service braking system generates a retarding force in response to a driver demand and ends when the driver demand is reduced or a minimum speed has been reached.
- 1.3 “**Braking Event Data**” means a series of readings taken before, during or after a braking event including but not limited to change in vehicle speed, Demand Pressure, Axle/Bogie Load, Time/Date Stamp and Road Gradient/Angle.
- 1.4 “**Braking Performance Value**” means a value, based upon continuous sampling of data whilst the vehicle is in operation, indicative of the service braking performance of the vehicle and expressed as a braking rate relative to the maximum static axle/bogie load for a given demand pressure.
- 1.5 “**Demand Pressure**” means the pressure related to the level of service braking required by a driver actuating the braking system. In the case of a pneumatically braked trailer this is the signal transmitted to the coupling head either electronically or pneumatically.
- 1.6 “**Axle/Bogie Load**” means the vertical static reaction (force) of the road surface in the contact area on the wheel(s) of the axle(s) derived from suspension characteristics.
- 1.7 “**Time/Date Stamp**” means the time and date associated with at least the Braking Event Data.
- 1.8 “**Road Gradient/Angle**” means the angle of the road relative to horizontal in the direction of travel.
- 1.9 “**Braking Performance Report**” means a report which shall include the Braking Performance Value, a means of identifying the vehicle it relates to, a calculated margin of error and the date range to which the Braking Performance Value applies. The Braking Performance Report shall also indicate if the Braking Event Data does not enable a valid Braking Performance Value to be produced.
- 1.10 “**95% Confidence Interval**” means the probability that a Braking Performance Value will fall between an upper and lower bound of a Margin of Error e.g. the Braking Performance Value has a 95% probability of encompassing the actual braking performance.
- 1.11 “**Margin of Error**” means the maximum expected difference (within the Confidence Interval) between the braking performance of a commercial vehicle and the Braking Performance Value. It can be considered the Margin of Error is half the width of the Confidence Interval and thus there is a probability of 95% that the vehicles braking performance is within the Margin of Error.
- 1.12 “**Least Squares**” means a statistical method used to determine a line of best fit by minimising the sum of squares created by a mathematical function. A “square” is determined by squaring the distance between a data point and the regression line.
- 1.13 “**Vehicle Operator**” means a person(s) legally responsible for the operation of the vehicle, as defined by operator licensing.

Section 2: Requirements specification

An Electronic Braking Performance Monitoring System shall:

- 2.1 Provide a Braking Performance Value for a given time period; using Braking Event Data and a plurality of Braking Events
- 2.2 The Braking Performance Value shall be derived using valid statistical analysis techniques (such as Least Squares), the results shall:
 - a) Be reported with a statistical 95% Confidence Interval
 - b) Have a statistical Margin of Error of less than 3%
 - c) Utilise Braking Event Data in a manner that minimises the effect of Braking Events, which includes Braking Event Data that could have a negative influence on the validity of the Braking Performance Value.
 - d) Compensate for the effect of gravity on the Braking Event Data when a Braking Event occurs on an incline.
- 2.3 The Braking Performance Value shall not:
 - a) Utilise inappropriate Braking Event Data, including but not limited to that generated during ABS cycling, or which includes inappropriate Demand Pressures or speeds or changes in speed.
 - b) Indicate a value where the Demand Pressure required to achieve said value cannot be supplied by the towing vehicle.
- 2.4.1 The Electronic Braking Performance Monitoring System shall include the following functionality:
 - a) To alert the vehicle operator by an appropriate means e.g. email, SMS etc, when a vehicle appears to be braking at a rate below its minimum prescribed in service braking performance.
 - b) To provide the vehicle operator with the ability to produce a Braking Performance Report.
 - c) To provide the vehicle operator with access to a system that allows historical Braking Performance Reports to be viewed for up to 36 months in the past and shall be verifiable as a true record.
 - d) The Braking Performance Report shall include supporting information indicating how the above requirements are fulfilled.
- 2.5. Any change to the Electronic Braking Performance Monitoring System that impacts on the performance of the system relative to this specification shall be declared.

Section 3:

Confirmation of Fulfilment of the Requirements

To gain acceptance of the Electronic Braking Performance Monitoring System an information document shall be made available which will include at least the following¹:

3.1. General

- a) Name of manufacturer
- b) System name
- c) Identification of unit(s)
- d) System variants
- e) Software version
- f) Explanation of the basic function and/or philosophy of the system to achieve the requirements of paragraph 2 above

3.2 Applications

- a) A list of vehicle types on which the Brake Performance Monitoring System may be installed.
- b) Any limitations in application or installation

3.3 Environmental Protection

The manufacturer shall define what measures have been taken to ensure the Electronic Braking Performance Monitoring System is compatible with the environment to which it will be subject during normal operation of the vehicle.

3.4 Verification of Function

The Information Document shall include results from practical test which demonstrate that the EBPMS is capable of differentiating between different levels of braking performance on a single trailer.



Note:

Different levels of braking performance may be realised by adjustment of the EBS braking parameters or by a change to the brake actuation.

¹ The Information Document shall only include information that is not of a confidential nature. However, to gain acceptance of the EBPMS it may be necessary to discuss confidential intellectual property, in such cases this remains the property of the EBPMS manufacturer and confidentiality shall always be respected.

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