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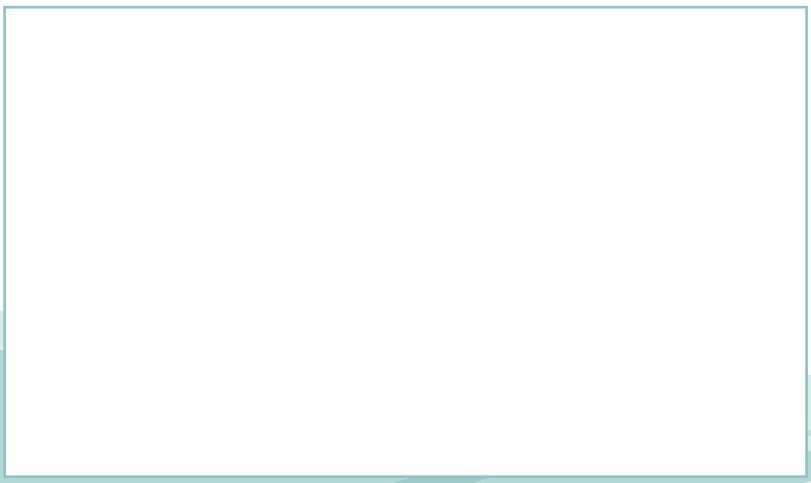
Järnvägar – Mätning av hjul- och axellaster –
Del 3: Godkännande och verifiering av mätstationer i fält för fordon i trafik

Railway applications – Measurement of vertical forces on wheels and wheelsets –
Part 3: Approval and verification of on track measurement sites for vehicles in service



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This Technical Report is not a Swedish Standard. This document contains the English language version of CEN/TR 15654-3:2019, edition 1.

Upplysningar om sakinnehållet i detta dokument lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om nationell och internationell standard.

Information about the content of this document is available from the SIS, Swedish Standards Institute, telephone +46 8 555 520 00. Standards may be ordered from SIS, who can also provide general information about national and international standards.

Dokumentet är framtaget av kommittén för Järnvägar, SIS/TK 254.

Har du synpunkter på innehållet i det här dokumentet, vill du delta i ett kommande revideringsarbete eller vara med och ta fram standarder inom området? Gå in på www.sis.se - där hittar du mer information.

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 15654-3

May 2019

ICS 45.060.01

English Version

Railway applications - Measurement of vertical forces on wheels and wheelsets - Part 3: Approval and verification of on track measurement sites for vehicles in service

Applications ferroviaires - Mesurage des forces verticales à la roue et à l'essieu - Partie 3 : Approbation et vérification des sites de mesure en voie des véhicules en service

Bahnanwendungen - Messung von vertikalen Rad- und Radsatzkräften - Teil 3: Zulassung und Prüfung von gleisseitigen Messeinrichtungen für Fahrzeuge im betrieblichen Einsatz

This Technical Report was approved by CEN on 15 April 2019. It has been drawn up by the Technical Committee CEN/TC 256.

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European foreword

This document (CEN/TR 15654-3:2019) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document is the third part of the EN 15654 series, *Railway applications — Measurement of vertical forces on wheels and wheelsets*, which consists of the following parts:

— *Part 1: On-track measurement sites for vehicles in service*;

— *Part 2: Test in workshop for new, modified and maintained vehicles*;

— *Part 3: Approval and verification of on track measurement sites for vehicles in service* [this CEN/TR].

This document describes the acceptance and verification of devices defined in Part 1.

Introduction

This document has been developed to provide approval and verification procedures to ensure that measurement systems according to EN 15654-1 meet the functional and metrological characteristics. The goal is to achieve metrologically traceable and reproducible measurement results.

1 Scope

This document is related to EN 15654-1, *Railway applications — Measurement of vertical forces on wheels and wheelsets — Part 1: On-track measurement sites for vehicles in service*, which lays down minimum technical requirements and the metrological characteristics of a system for measuring and evaluating a range of vehicle loading parameters during operation in service.

The aim of this document is to describe approval and verification procedures to validate the functional and metrological characteristics of measurement systems and confirm them over time.

The goal is to obtain the comparability and reproducibility of measurement results under different boundary conditions. To minimize the number of tests, the approval and verification procedures are divided into:

— type approval,

— initial verification,

— in-service verification.

The accuracy class of a measurement system depends on the measurement device, vehicle and track characteristics. Test procedures covering these influences are described to ensure reproducibility in all networks.

The procedures described in this document do not impose any restrictions on the design of measurement sites, on the types of vehicles that can be monitored, or on which networks or lines the measuring system can be installed.

The annexes include examples for test procedures, calculation of maximum permissible errors and statistical test methods.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15654-1:2018, *Railway applications — Measurement of vertical forces on wheels and wheelsets — Part 1: On-track measurement sites for vehicles in service*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
calibration
operation that establishes a relationship between the reference value and the indicated measurement result from the device under test

Note 1 to entry: The reference value is a quantity value with known uncertainties provided by measurement standards.

Note 2 to entry: The indicated measurement result is the quantity with associated measurement uncertainties.

Note 3 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Note 4 to entry: Calibration should not be confused with adjustment of a measuring system, often mistakenly called “self-calibration”, nor with verification of calibration (see [2]).

Note 5 to entry: Often, the first step alone in the above definition is perceived as being calibration.

Note 6 to entry: Calibration in general involves comparison against a known standard to determine how closely measurement system output matches the reference over the expected range of operation [based on GUIDE TO METEOROLOGICAL INSTRUMENTS AND METHODS OF OBSERVATION (WMO-No. 8), Part III, Chapter 4].

[SOURCE: OIML V 2-200:2012, 2.39]

3.2
adjustment
process carried out on a measuring instrument in order to provide indications corresponding to given values of the quantity

3.3
verification
conformation through provision of objective evidence that specified requirements have been fulfilled

3.4
approval
formal conformation of compliancy with the requirements of the present standard

3.5
reference value
reading from a measurement device with known measurement uncertainty and metrological traceability

3.6
measurement uncertainity
non-negative parameter characterizing the dispersion of the quantity values being attributed to a measurand, based on the information used

[SOURCE: ISO/IEC Guide 99:2007, 2.26]

4 Overview

To minimize the number of necessary tests, the approval and verification procedures are divided into:

— type approval test,

— initial verification,

— in-service verification.

Figure 1 gives an overview of the approval and verification tests, test coverage and actions if verficiation is outside accuracy class.

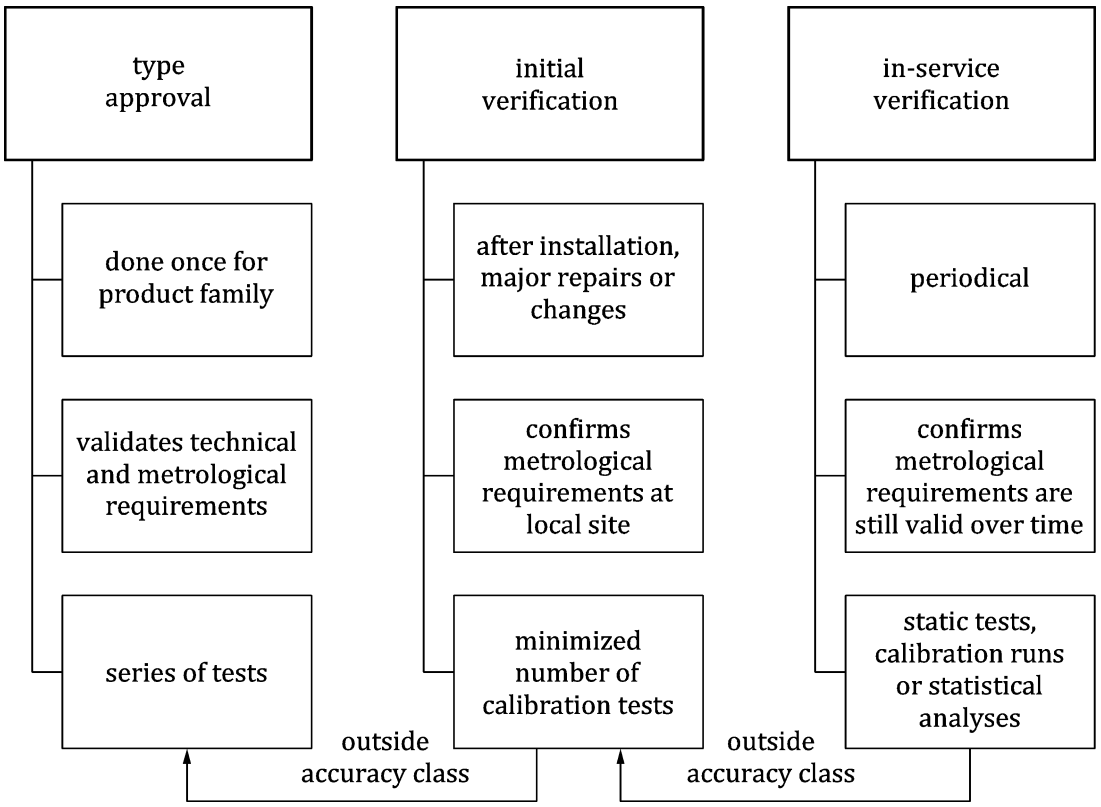

Figure 1 — Overview of approval and verification tests and actions verficiation is outside accuracy class

The purpose of the type approval is to validate the technical requirements and metrological performance characteristics (e.g. accuracy classes) under a variety of operating conditions. It is carried out once for a product family and consists of a series of lab and on-site tests.

The initial verification is performed on site after installation, after major repairs to the measuring system, after track maintenance that can influence the metrological characteristics.

It is carried out to confirm that, after initial setup, the measuring system is functioning within the defined metrological characteristics.

The in-service verification is performed periodically to confirm that the measuring system is functioning within the defined metrological characteristics. This can be achieved by static mass or force, by dynamic test runs or by statistical analysis of vehicle groups which are regularly operated on the site.

If the calibration results from in-service verification or initial verification are outside the accuracy class, corrective actions (e.g. tamping of the track) should be taken (see Annex A). If after the corrective actions, the results are still outside the accuracy class then suitable tests adopted from the type approval procedure should be carried out to determine the real on-site accuracy class for the data to be reported.

Running speed typically influences the accuracy classes. It is difficult to run at constant and defined speeds. In general, a tolerance of ±5 km/h to the required test speed is acceptable.

Speed variation above a certain level due to acceleration or deceleration can affect results. The device should be able to recognize when these levels have been exceeded during operation of the site and set the accuracy class on the digital output (XML) to “0” to indicate that the results are outsite the tested metrological characteristics.