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Railway applications – Track – Track geometry quality – Part 3: Measuring systems – Track construction and maintenance machines

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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN 13848-3

April 2009

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English Version

**Railway applications - Track - Track geometry quality - Part 3:
Measuring systems - Track construction and maintenance
machines**

Applications ferroviaires - Voie - Qualité géométrique de la
voie - Partie 3 : Systèmes de mesure - Engins de travaux et
de maintenance de la voie

Bahnanwendungen - Oberbau - Qualität der Gleisgeometrie
- Teil 3: Messsysteme - Gleisbau- und
Instandhaltungsmaschinen

This European Standard was approved by CEN on 19 March 2009.

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Contents	Page
Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Symbols and abbreviations	6
5 Track geometry measuring system fitted on track construction and maintenance machines	6
5.1 General description	6
5.2 Environmental conditions.....	8
5.3 Track features input	9
5.4 Data localisation	9
5.5 Measuring system/device	9
5.6 Data processing	11
5.7 Data output	11
5.8 Data storage	11
6 Testing of track geometry measuring and recording system	12
6.1 Introduction	12
6.2 Calibration	12
6.3 Validation by field tests.....	12
6.4 Routine validation.....	15
Annex A (normative) Parameters measured by track construction and maintenance machine	16
A.1 Introduction	16
A.2 Track gauge.....	16
A.3 Longitudinal level	17
A.4 Cross level.....	18
A.5 Alignment	19
A.6 Twist.....	20
Annex B (informative) Principles of measurement	21
B.1 General Description.....	21
B.2 Longitudinal level and alignment.....	21
B.3 Track gauge.....	21
B.4 Cross level.....	22
B.5 Twist.....	22
Annex C (normative) Description of field tests: values to be respected.....	23
C.1 General.....	23
C.2 Repeatability.....	23
C.3 Reproducibility.....	24
Bibliography	25

Foreword

This document (EN 13848-3:2009) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

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

This European Standard is one of the series EN 13848 "*Railway applications – Track – Track geometry quality*" as listed below:

Part 1: Characterisation of track geometry

Part 2: Measuring systems – Track recording vehicles

Part 3: Measuring systems – Track construction and maintenance machines

Part 4: Measuring systems – Manual and lightweight devices

Part 5: Geometric quality levels

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1 Scope

This European Standard specifies the minimum requirements that shall be met by measuring systems fitted on track construction and maintenance machines to give an evaluation of track geometry quality when measuring one or more of the parameters described in EN 13848-1. It does not seek to prescribe which parameters are to be measured, since these depend upon the measuring capabilities of the machine and the purpose for which the machine or its measuring system is used.

It also sets out the acceptable differences from EN 13848-1 when using track construction and maintenance machines to measure track geometry. It applies to track geometry measuring systems which are fitted to track construction and maintenance machines from one year after the date of implementation of this standard.

2 Normative references

The following referenced documents are indispensable for the application 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 13848-1:2003+A1:2008, *Railway applications – Track – Track geometry quality – Part 1: Characterisation of track geometry*

EN 13848-2:2006, *Railway applications – Track – Track geometry quality – Part 2: Measuring systems – Track recording vehicles*

ENV 13005:1999, *Guide to the expression of uncertainty in measurement*

3 Terms and definitions

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

3.1

track construction and maintenance machine

self propelled or hauled machine/vehicle designed to construct track, maintain track and/or improve the quality of track and which is equipped with track geometry measuring systems. Also referred to as “machine” in this European Standard

3.2

machine

same as “track construction and maintenance machine” (3.1)

3.3

sensor

device which detects, measures and translates characteristics of track geometry into quantities that can be used for further data processing

3.4

measuring direction

course between two points on a track, independent of orientation of the machine; between two given points A and B, there are two opposite directions: A to B and B to A

3.5

orientation

physical positioning of a vehicle, e.g. a track construction and maintenance machine, with regards to which end of the vehicle is leading or trailing

3.6

repeatability

degree of agreement between the values of successive measurements of the same parameter made under same conditions, within a short period of time, where the individual measurements are carried out on the same section of track using the same measurement and interpretation methods, subject to the following:

- a) similar speed
- b) same measuring direction
- c) same machine/vehicle orientation
- d) similar environmental conditions

3.7

reproducibility

degree of agreement between the values of successive measurements of the same parameter made under varying conditions, within a short period of time, where the individual measurements are carried out on the same section of track using the same measurement and interpretation methods, subject to one or more of the following:

- a) variation of speed
- b) different measuring directions
- c) different machine/vehicle orientations
- d) different environmental conditions

3.8

validation

set of tests for determining if the measuring system of a track construction and maintenance machine complies with the requirements of this standard

3.9

calibration

set of procedures for adjusting the measuring devices of track construction and maintenance machines in order to meet the requirements of this standard

3.10

event

record of a track or line-side feature that can be either technical, physical or natural

3.11

localisation

information required to locate events and the measured track geometry

3.12

reference track

track with known characteristics, to allow adequate testing of the track geometry measuring and recording system

3.13

transfer function

refer to EN 13848-2:2006 (Annex A)

3.14

resolution

refer to EN13848-1 (3.1.8)

3.15

uncertainty

refer to ENV 13005:1999 (2.3.5)

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

Table 1 — Symbols and abbreviations

No.	Symbol	Designation	Unit
1	<i>D1</i>	Wavelength range $3\text{ m} < \lambda \leq 25\text{ m}$	m
2	<i>D2</i>	Wavelength range $25\text{ m} < \lambda \leq 70\text{ m}$	m
3	<i>D3</i>	Wavelength range $70\text{ m} < \lambda \leq 150\text{ m}$ for longitudinal level Wavelength range $70\text{ m} < \lambda \leq 200\text{ m}$ for alignment	m
4	<i>Lo</i>	Lower limit of wavelength range <i>D1</i> , <i>D2</i> , <i>D3</i>	m
5	<i>Lu</i>	Upper limit of wavelength range <i>D1</i> , <i>D2</i> , <i>D3</i>	m
6	λ	Wavelength	m
7	<i>ℓ</i>	Twist base-length	m

5 Track geometry measuring system fitted on track construction and maintenance machines

5.1 General description

This standard concerns only the track geometry measuring systems installed on the machines used to measure the parameters described in EN 13848-1. It does not cover the other measurement systems; for example those used for the tamping process.

For the purpose of this standard, the track geometry measuring system fitted on machines is divided into several units as represented in Figure 1 below.

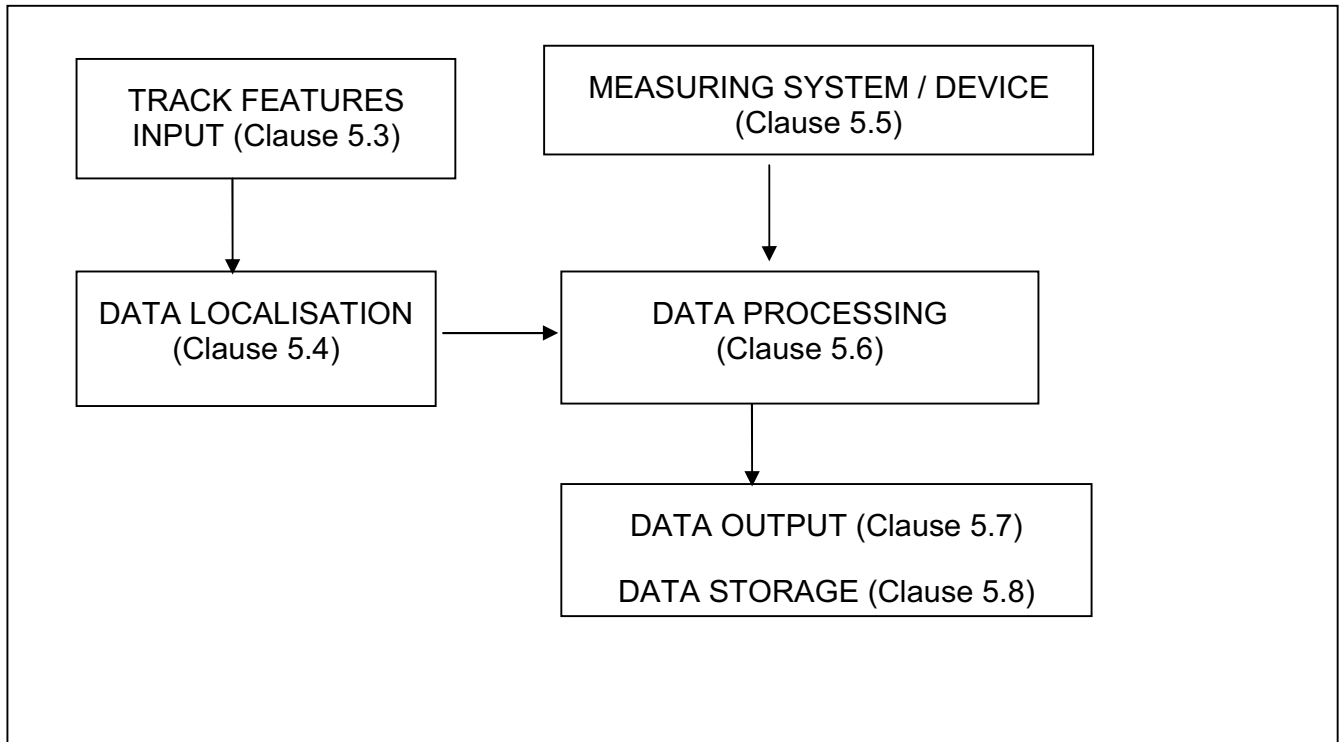


Figure 1 — Track geometry measuring system

The track geometry measuring system installed on a machine is intended to:

- a) measure track geometry parameters;
- b) measure the distance run by the machine during measuring operations;
- c) associate these two measurements in order to set up a precise location and process the measured data, preferably on board, in order to analyse the track geometry parameters;
- d) record these parameters on paper and store them on computer readable media.

The track geometry measuring system shall produce reliable results under normal operating conditions of the machine.

The results of the above system can and have been used for track quality monitoring and safety assurance with respect to track geometry on track sections where maintenance works have been or will be carried out.

This standard takes account of the capabilities of the equipment on existing machines in its requirements and as a consequence some of the requirements of EN 13848-1 have been relaxed.

There is no requirement for a machine to measure all the parameters listed in EN 13848-1. However, the parameters to be measured and their processing shall at least meet the requirements stated in Annex A.

NOTE The track construction and maintenance machines fleet in Europe is much larger than the track recording car fleet, by a factor of 10 – 20. In many cases, although this is not their main function, these machines are used for track geometry measurement.

The track geometry measurement should be made on a loaded track as defined in EN 13848-1. Since the load of the recording trailer affects the measurement, both the load and its distribution shall be constant.