

# SVENSK STANDARD

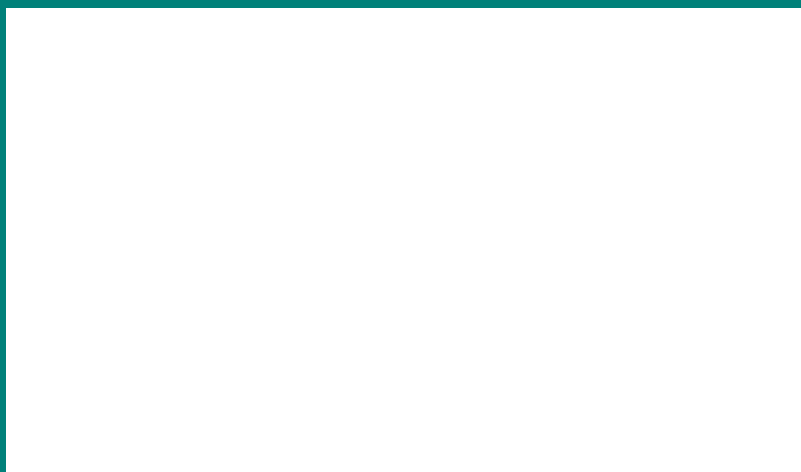
## SS-EN 13848-3:2009

Fastställt/Approved: 2009-05-04  
Publicerad/Published: 2009-06-09  
Utgåva/Edition: 1  
Språk/Language: engelska/English  
ICS: 93.100

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### **Järnvägar – Spår – Spårlägeskvalitet – Del 3: Mätssystem – Maskiner för spårbyggnation och spårunderhåll**

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



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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13848-3**

April 2009

ICS 93.100

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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COMITÉ EUROPÉEN DE NORMALISATION  
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## 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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.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*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

## 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.

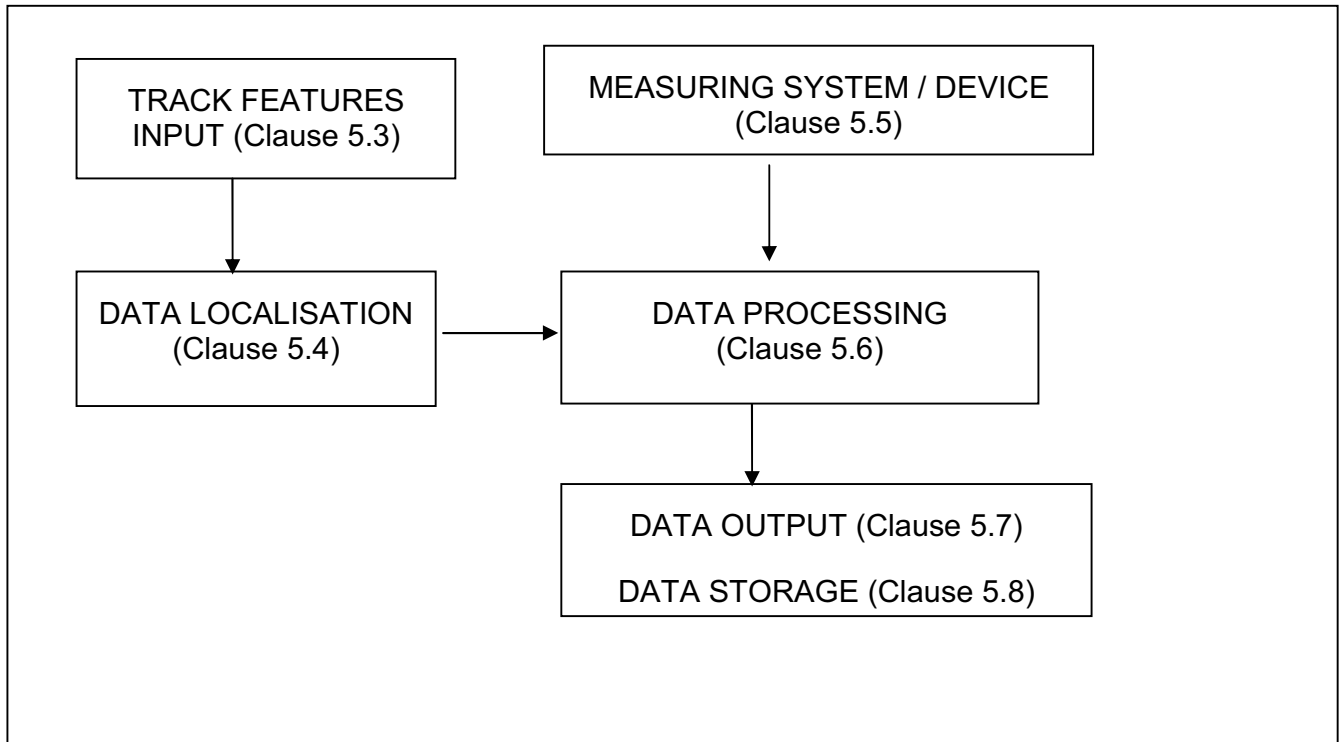
**Table 1 — Symbols and abbreviations**

| 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<br>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   | $\lambda$ | Wavelength                                                                                                                                                        | m    |
| 7   | $\ell$    | 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.