
Železniške naprave - Zgornji ustroj - Kakovost tirne geometrije - 4. del: Merilni sistemi - Ročne in lahke naprave

Railway applications - Track - Track geometry quality - Part 4: Measuring systems - Manual and lightweight devices

Bahnanwendungen- Oberbau - Qualität der Gleisgeometrie - Teil 4: Messsysteme - Handgeführte und leichte Vorrichtungen

Applications ferroviaires - Voie - Qualité géométrique de la voie - Partie 4: Systèmes de mesure - Dispositifs manuels et de faible poids

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et de faible poids

Bahnanwendungen - Oberbau - Qualität der Gleisgeometrie
- Teil 4: Messsysteme - Handgeführte und leichte
Vorrichtungen

This European Standard was approved by CEN on 5 November 2011.

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EN 13848-4:2011 (E)

Foreword

This document (EN 13848-4:2011) 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of an identical text or by endorsement, at the latest by June 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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 – Plain line;
- Part 6: Characterisation of geometric quality.

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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, Croatia, 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 part of this European Standard specifies the minimum requirements that shall be met by measuring systems fitted on track geometry measuring trolleys and manually operated devices to give an evaluation of track geometry quality when measuring one or more of the parameters described in EN 13848-1:2003+A1:2008. It sets out the acceptable differences from EN 13848-1:2003+A1:2008 when using track geometry measuring trolleys and manually operated devices to measure track geometry.

It applies to all track geometry measuring systems fitted to track geometry measuring trolleys and manually operated devices 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*

EN 13848-5:2008+A1:2010, *Railway applications – Track – Track geometry quality – Part 5: Geometric quality levels – Plain line*

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3 Terms and definitions

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

3.1

track geometry measuring trolley (TGMT)

trolley designed for measuring one or more track geometry parameters, having the following characteristics:

- self-propelled, hauled or moved by human force;
- portability (capability to be placed readily on or off the track manually or by other means);
- capability of measuring from standstill to the maximum permissible speed of the trolley;
- having wheels which do not load the track as defined in Clause 5 of EN 13848-1:2003+A1:2008.

3.2

manually operated device (MOD)

hand tool designed for measuring track gauge and/or cross level at standstill

3.3

sensor

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

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3.4 measuring direction
course between two points on a track, independent of orientation of the TGMT. 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 TGMT, with regards to which end of the TGMT is leading or trailing

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

- similar speed;
- same measuring direction;
- same TGMT orientation;
- 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 self-same measurement device and interpretation methods, subject to one or more of the following:

- variation of speed;
- different measuring directions;
- different TGMT orientations, if TGMT is designed to measure in both orientations;
- different environmental conditions.

3.8 validation
set of tests for determining whether the TGMT or MOD complies with the requirements of this standard

3.9 calibration
set of procedures for adjusting the TGMT or MOD 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 Annex A of EN 13848-2:2006

3.14**resolution**

smallest change in the value of a quantity to be measured which produces a detectable change in the indication of the measuring instrument

3.15**uncertainty**

refer to ENV 13005:1999, 2.3.5

3.16**re-colouring**

algorithm which converts one signal into a different signal. It is used in EN 13848 series to convert a chord measurement signal into a $D1$, $D2$ or $D3$ measurement signal

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	$D1$	Wavelength range $3\text{ m} < \lambda \leq 25\text{ m}$	m
2	$D2$	Wavelength range $25\text{ m} < \lambda \leq 70\text{ m}$	m
3	$D3$	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	L_o	Lower limit of wavelength range $D1$, $D2$, $D3$	m
5	L_u	Upper limit of wavelength range $D1$, $D2$, $D3$	m
6	λ	Wavelength	m
7	l	Twist base-length	m
8	TGMT	Track geometry measuring trolley	
9	MOD	Manually operated device	

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5 Track geometry measuring system fitted on trolleys or on manually operated devices

5.1 Introduction

This standard concerns only the track geometry measuring systems installed on trolleys or on manually operated devices used to measure one or more of the parameters described in EN 13848-1:2003+A1:2008.

5.2 General description

5.2.1 General description: TGMT

For the purposes of this document, the track geometry measuring system fitted on TGMTs is divided into several units as represented in Figure 1 below:

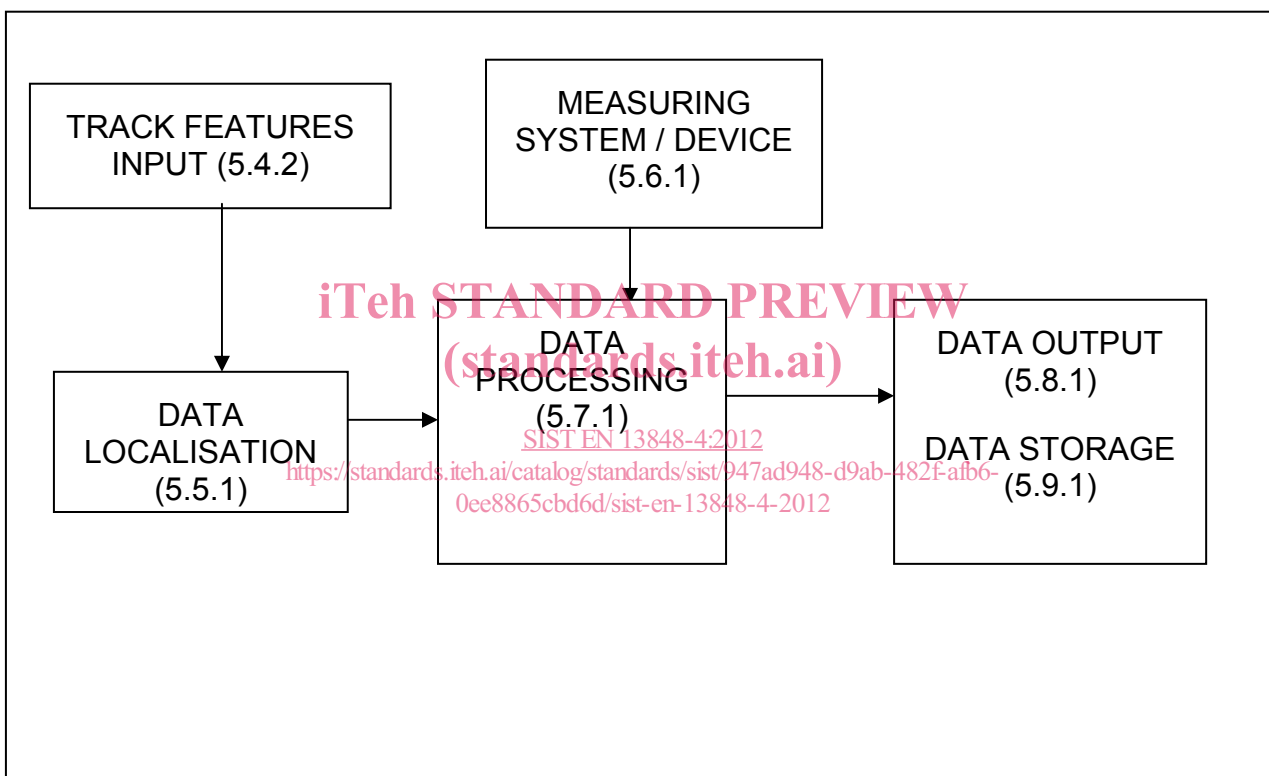


Figure 1 — TGMT Track geometry measuring system

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

- measure track geometry parameters;
- measure the longitudinal distance between measuring operations;
- associate the precise location to the measured data;
- process the measured data, preferably on site, in order to analyse the track geometry parameters;
- record these parameters on computer readable media or on paper.

The results of the above system can be 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 TGMTs in its requirements and as a consequence some of the requirements of EN 13848-1:2003+A1:2008, e.g. loaded track, have been relaxed.

There is no requirement for a TGMT to measure all parameters. The parameters to be measured and their processing shall at least meet the requirements stated in Annex A.

Contrarily to the measuring systems fitted to track recording vehicles, the measuring systems fitted to TGMTs are not required to measure in both TGMT orientations.

The computer system shall be suitable for outdoor use and be of a type which would be suitable for rail-bound machines. It shall represent widely- used and supported technologies.

5.2.2 General description: MOD

For the purposes of this document, the track geometry measuring system fitted on MODs is divided into several units as represented in Figure 2 below:

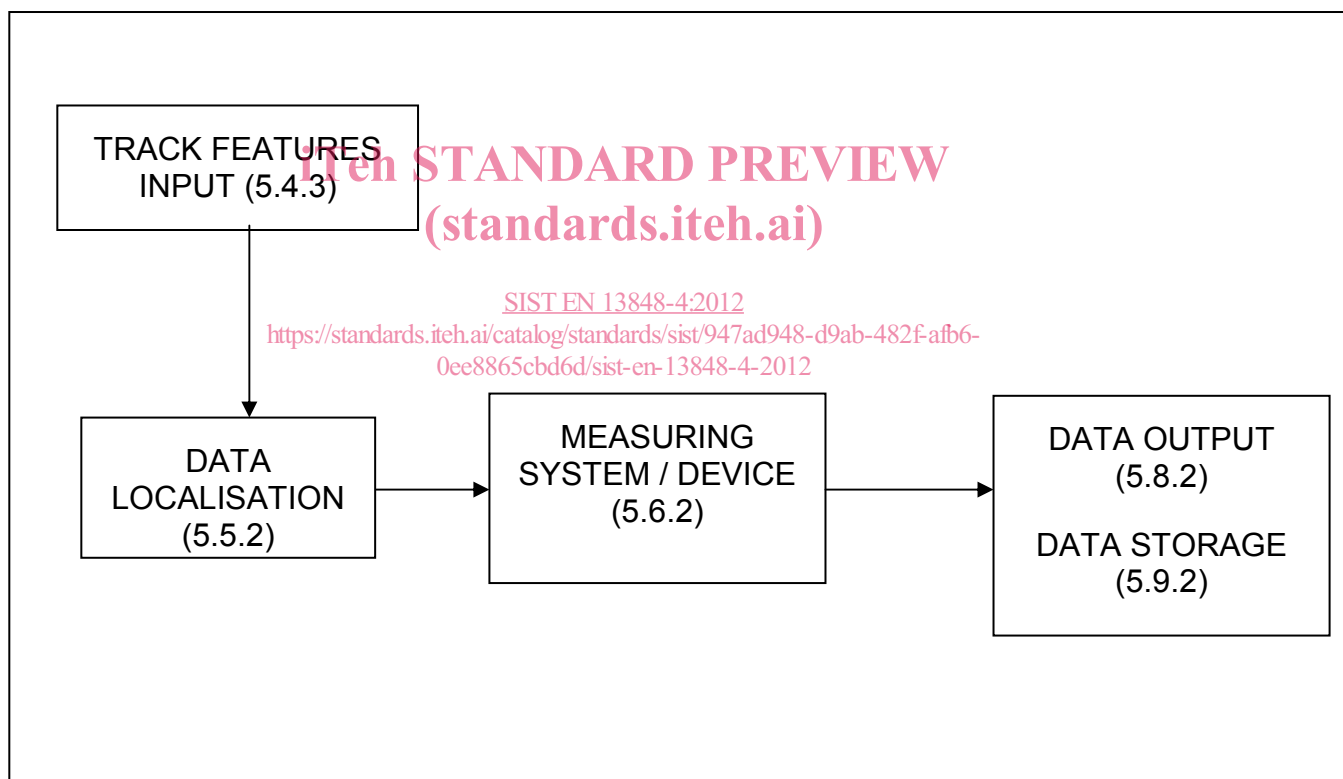


Figure 2 — MOD Track geometry measuring system

The track geometry measuring system of a MOD is intended to:

- measure at least one track geometry parameter;
- associate the precise location to the measured data, when data storage is included.

The results of the above system can be 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.

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This standard takes account of the capabilities of the MODs in its requirements and therefore some of the requirements of EN 13848-1:2003+A1:2008, e.g. loaded track, have been relaxed.

There is no requirement for a MOD to measure all parameters. The parameters to be measured and their processing shall at least meet the requirements stated in Annex A.

5.3 Environmental conditions**5.3.1 Introduction**

All the measuring devices fitted on a TGMT or MOD shall comply with the environmental conditions specified below.

5.3.2 Climatic conditions

Appropriate climatic conditions shall be taken into account in the design. These include:

- ambient temperature;
- condensation;
- precipitation;
- ambient relative humidity.

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5.3.3 Operating conditions

Appropriate operating conditions especially during transport, assembly and operation shall be taken into account in the design. These include:

- grease on the rail;
- reflection condition of the rail;
- characteristic light conditions;
- dust, water and snow;
- safety requirements (laser beam or conductor rail, for example);
- user friendliness;
- vibrations and shocks;
- electromagnetic environment;
- compatibility with signalling and communication systems.

5.4 Track features input**5.4.1 General**

The track features input supports the data localisation. The requirements for TGMTs and MODs are described below.