BS EN 13231-4:2013

BSI Standards Publication

Railway applications — Track — Acceptance of works

Part 4: Acceptance of reprofiling rails in switches and crossings

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National foreword

This British Standard is the UK implementation of EN 13231-4:2013.

The UK committee submitted a negative vote at the Enquiry and Formal Vote stages of this standard, principally on the basis that the standard provides inadequate guidance regarding the measurements to be taken and acceptance criteria to be applied for the reprofiling of switch rails and rails within the crossing area. The proposed acceptance criteria, which are based on those for plain line, are not appropriate for the far more complicated reprofiling that is undertaken in switch and crossing work.

The UK participation in its preparation was entrusted to Technical Committee RAE/2, Railway Applications — Track.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Bahnanwendungen - Oberbau - Abnahme von Arbeiten - Teil 4: Abnahme von Reprofilierungsarbeiten in Weichen und Kreuzungen

This European Standard was approved by CEN on 1 March 2013.

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Foreword

This document (EN 13231-4:2013) 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of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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 document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This European Standard is one of the series EN 13231, *Railway applications — Track — Acceptance of works*, as listed below:

— *Part 1: Works on ballasted track — Plain line*;

— *Part 2: Works on ballasted track — Switches and crossings*;

— *Part 3: Acceptance of reprofiling rails in track*;

— *Part 4: Acceptance of reprofiling rails in switches and crossings*;

— *Part 5: Procedures for rail reprofiling in plain line, switches, crossings and expansion devices* (currently being elaborated).

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1 Scope

This European Standard lays down the technical requirements and the measurements to be made for the acceptance of work for reprofiling longitudinally and/or transversely the heads of railway rails in switches, crossings and expansion devices.

For acceptance purposes two classes of longitudinal profile and three classes of transverse profile tolerance are defined.

It applies to reprofiled vignole railway rails and associated switch rails 46 kg/m and above.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13231-3:2012, *Railway applications — Track — Acceptance of works — Part 3: Acceptance of reprofiling rails in track*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13231-3:2012 apply.

For the definitions of measurement instruments also, see EN 13231-3:2012.

4 Longitudinal profile

4.1 Principle

Measurements are made using either a reference instrument, or an approved instrument, see EN 13231-3:2012, Annex A or Annex B. The approved instruments shall be verified according to EN 13231-3:2012, Annex D.

Approved instruments do not offer the same accuracy as reference instruments but are generally adequate for the purpose of demonstrating compliance with the requirements of this standard.

NOTE An example of an approved instrument is the type of system used for routine measurements on reprofiling trains. Some of the systems used for routine measurements on reprofiling trains fall into this category.

In accordance with current practice, limits are set on the magnitude of the irregularities that can remain in track after a reprofiling operation. It is recognised, however, that it can be uneconomic to achieve 100 % compliance with these, particularly where isolated top faults, such as wheelburn, exist prior to reprofiling. Two classes are therefore offered, differentiated by the percentage of the reprofiled track meeting the specified criteria. Where isolated top faults exist, class 2 offers a lower cost option compared to class 1 as it will be achieved with fewer passes. However a larger number of isolated non-compliant zones will remain in the reprofiled site.

Class 1 also includes limits for very short (10 mm to 30 mm) and very long (300 mm to 1 000 mm) wavelength residual irregularities; these are not included in class 2. Where corrugations in these wavebands are required to be removed it will also be necessary to specify class 1.

4.2 Measurements required

The longitudinal profile of the finished re-profiled rail in switches and crossings shall be recorded either with machine mounted or manual measuring systems, either a reference instrument or an approved instrument. Where independent verification is required a reference instrument shall be used. All measurements undertaken in order to demonstrate compliance with 4.3 shall be recorded.

Generally continuously working systems are to be used. In this case the rail containing the frog shall be measured only in "Zone G", see Figure 1, the opposite rail shall be measured in the total ground length. If such a system is out of order or not available recording details shall be settled in the contract.

NOTE For measurements in the wavelength range (10 mm to 30 mm), at present it is unlikely that instruments other than reference instruments will have sufficient accuracy.

Longitudinal profile measurements shall be made within a distance of 15 mm laterally on the rail from the rail crown for producing the traced profile.

It is recommended that a digital form of the traced profile, the primary profile, be used for subsequent analysis.

The measurements can be undertaken immediately after work or at the latest within 8 days of reprofiling or after the track has carried 0,3 MGT (Million Gross Tons) of traffic.

4.3 Acceptance criteria for longitudinal profile

4.3.1 General

The acceptance of reprofiled sites shall be on the basis of percentage of irregularities shown in Table 1.

4.3.2 Peak-to-peak value

The percentage of any site in which the peak-to-peak value exceeds the value specified in Table 1 shall be calculated.

The primary or traced profile shall be processed to provide a filtered profile within each of the wavelength ranges given in Table 2.

Table 1 — Acceptance criteria for longitudinal profile expressed in terms of allowable percentages of exceeding for continuous measuring

Wavelength range (mm)	10 to 30	30 to 100	100 to 300	300 to 1 000
Class 1	5 %	5 %	5 %	5 %
Class 2	No requirement	10 %	10 %	No requirement

Table 2 — Acceptance criteria for peak-to-peak limits

Wavelength range (mm)	10 to 30	30 to 100	100 to 300	300 to 1 000
Limit of peak-to-peak values (mm)	± 0,010	± 0,010	± 0,015	± 0,075

The classification concerns the total length (Zones F, G and H in Figure 1) of the rail opposite the frog and Zone G only of the rail containing the frog.

No exceedances are allowed for manual measurements.

5 Transverse profile

5.1 Principle

Measurements are made using either a reference instrument, see EN 13231-3:2012, 3.16 or an approved instrument, see EN 13231-3:2012, 3.2. Approved instruments do not offer the same accuracy as reference instruments but in general they are adequate for the purpose of demonstrating compliance with the requirements of this standard.

Reprofiling can be undertaken for a variety of reasons. Where reprofiling is undertaken purely for the removal of corrugation, there may be less need for the rail to be reprofiled with precision. In other cases, it may be necessary for the reprofiled rail to match closely the ideal profile, represented by the reference rail, see EN 13231-3:2012, 3.22. A range of classes is therefore included to enable the client to specify the level of precision that is appropriate for the site to be reprofiled.

NOTE Where reprofiling is undertaken to improve conicity, class Q, see 5.4, is likely to be appropriate.

The match between the reprofiled rail and the profile of the reference rail is determined by aligning the two at two points and measuring maximum difference between them, see EN 13231-3:2012, Figure 1. For straight track, these points of alignment generally approximate to the highest point of the rail and the gauge point. On the high rail of curves this method is not applicable if side wear has occurred and an alternative method of alignment is therefore used.

5.2 Areas in crossings which are limited for reprofiling

The areas where the switchblade touches stock rail (Zone F shown in Figure 1) and the frog area (Zone H shown in Figure 1) cannot be reprofiled completely. The infrastructure manager can define applicable restrictions.

5.3 Measurements required

The transverse profile of each finished, reprofiled rail shall be measured using either a reference instrument or an approved instrument. Where independent verification is required a reference instrument shall be used, whereby measurements of each rail shall be made at an interval of not less than 10 m throughout the reprofiling site. A deviation of 0,1 mm between the reference instrument and approved instrument would be acceptable according to EN 13231-3:2012, Annex B.

All measurements undertaken in order to demonstrate compliance with 5.3 shall be recorded.

The measurements can be undertaken immediately after work or at the latest within 8 days of reprofiling or after the track has carried 0,3 MGT (Million Gross Tons) of traffic.

NOTE It is preferable for measurements to be made immediately after re-profiling.

After reprofiling rails in switches and crossings and rail expansion devices specific measurements are required for running safety.

5.4 Acceptance criteria for the transverse profile

Each measured profile shall be aligned with the appropriate reference rail so that the reference points A and B_1, or A and B_2 according to EN 13231-3:2012, Figure 1, on the reference rail coincide with points on the measured profile. The alignment shall be undertaken without rotation of either profile.

Reference points A and B_2 shall be used on side-worn rails and A and B_1 elsewhere.

The percentage of measurements in which the range of deviation is less than 0,6 mm, 1,0 mm and 1,7 mm shall be calculated and shall not be less than the values given in Table 3 for the class specified.

When continuously working measurement systems are used the rail containing the frog shall be measured only in "Zone G", see Figure 1, and only if this area is longer than 30 m. The opposite rail shall be measured in the total ground length.

With spot-checks systems one recording per rail shall be made in front (measurement points 1 and 2) of the switch, one in the centre of the intermediate rail (measurement points 3 and 4 for the main track and - if applicable - measurement points 5 and 6) and one at the end of the switch (measurement points 7 and 8 and - if applicable - measurement points 9 and 10), see Figure 2. In this case no exceedances are allowed.

Table 3 — Minimum proportion of measurements within the specified range

Range of deviation (mm)	0,6	1,0	1,7
Class Q	90 %	95 %	98 %
Class R	No requirement	85 %	98 %
Class S	No requirement	No requirement	75 %

The maximum positive deviations shall be specified, e.g. for the range of deviation 0,6 mm: +0,3 mm/-0,3 mm, +0,2 mm/-0,4 mm.

The tolerance zone width tends towards 0 at the reference points, at the field side only negative tolerances are allowed in the reprofiling zone.

6 Material removal

See EN 13231-3:2012, Clause 6.

7 Surface roughness

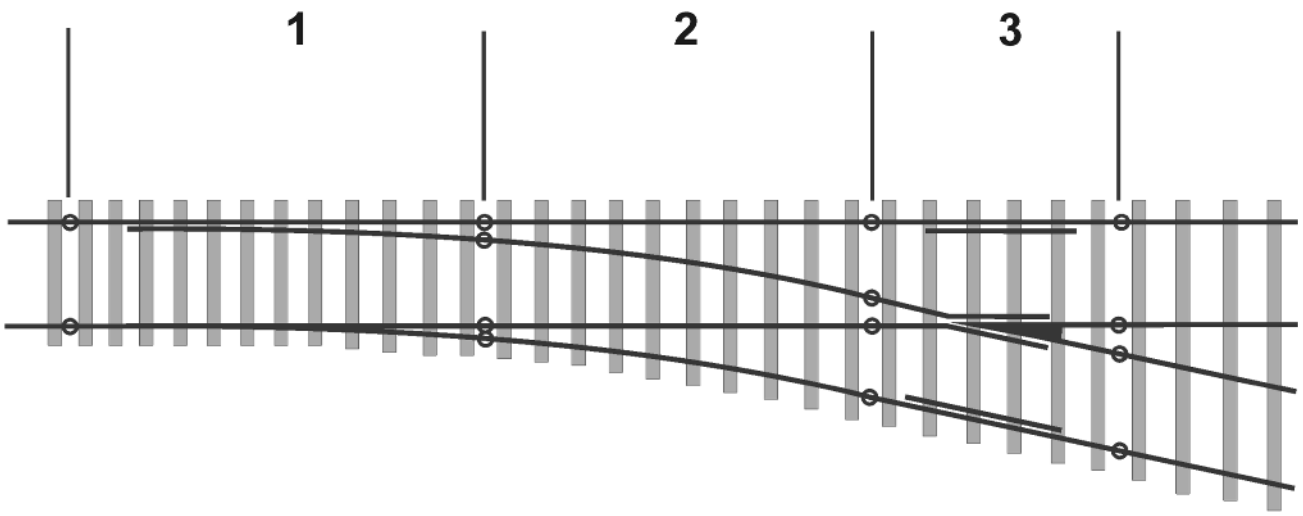
See EN 13231-3:2012, Clause 7.

8 Visual appearance: acceptance criteria

See EN 13231-3:2012, Clause 8.

9 Acceptance documentation

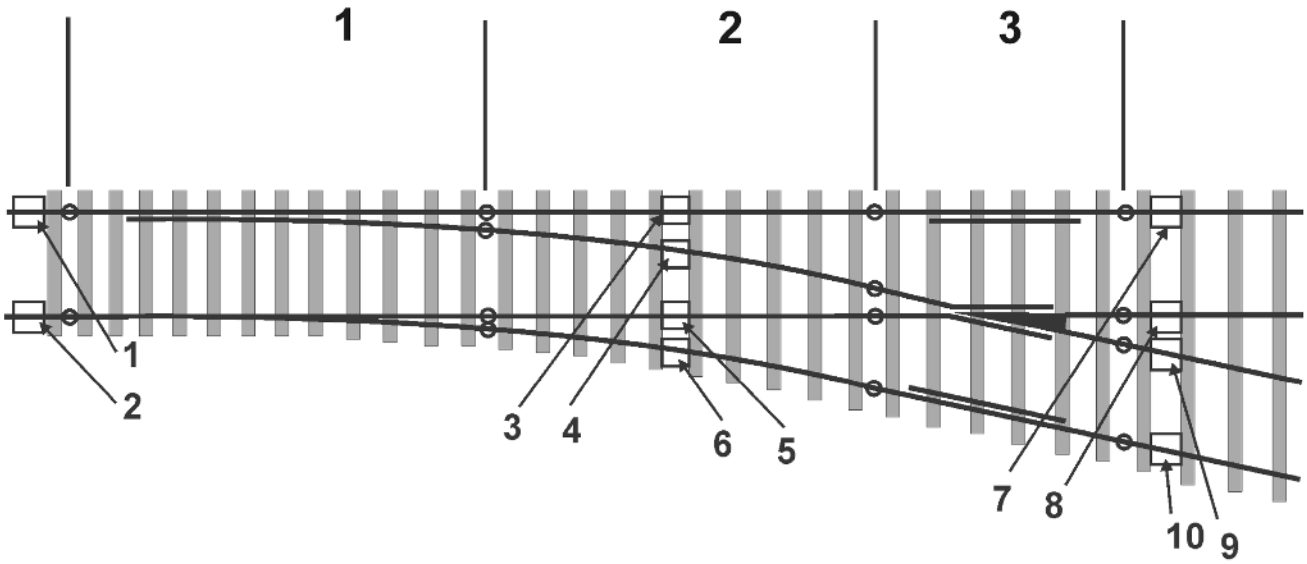
For the documentation, see EN 13231-3:2012, Annex E.



Key

○ welding/joint
1 zone F
2 zone G
3 zone H

Figure 1 — Reprofiling zones in switches



Key

○ welding/joint
1 zone F
2 zone G
3 zone H
1 to 10 on the lower side of the figure measuring points

NOTE Point 1 is always on the left facing the switch towards the frog.

Figure 2 — Measuring points for transverse profile for hand-measuring systems in switches

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