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NORME EUROPÉENNE
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prEN 13232-4

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English Version

Railway applications - Track - Switches and crossings for Vignole rails - Part 4: Actuation, locking and detection

Applications ferroviaires - Infrastructure - Appareils de
voie - Partie 4: Manœuvre, blocage et contrôle

Bahnanwendungen - Oberbau - Weichen und
Kreuzungen für Vignolschienen - Teil 4: Umstellung,
Verriegelung und Lageprüfung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 13232-4:2020) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13232-4:2005+A1:2011.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2016/797/EU.

For relationship with EU Directive 2016/797/EU, see informative Annex ZA, which is an integral part of this document.

This series of standards “*Railway applications – Track – Switches and crossings for Vignole rails*” covers the design and quality of switches and crossings in flat bottomed rail. The list of Parts is as follows:

- *Part 1: Definitions*
- *Part 2: Requirements for geometric design*
- *Part 3: Requirements for wheel/rail interaction*
- *Part 4: Actuation, locking and detection*
- *Part 5: Switches*
- *Part 6: Fixed common and obtuse crossings*
- *Part 7: Crossings with moveable parts*
- *Part 8: Expansion devices*
- *Part 9: Layouts*

Part 1 contains terminology used throughout all parts of this series. Parts 2 to 4 contain basic design guides and are applicable to all switch and crossing assemblies. Parts 5 to 8 deal with particular types of equipment including their tolerances. These use Parts 1 to 4 as a basis. Part 9 defines the geometric and non-geometrical acceptance criteria for inspection of layouts.

prEN 13232-4:2020 (E)**1 Scope**

This document determines the interface between moveable parts and the actuation, locking and detection equipment, and defines the basic criteria for switches and crossing with moveable parts in respect of the interface.

It concerns:

- rules, parameters and tolerances for alternative positions of the moveable parts;
- criteria and limits for the forces which move and restrain the moveable parts.

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.

prEN 13232-3:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 3: Requirements for wheel/rail interaction*

prEN 13232-5:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 5: Switches*

prEN 13232-6:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 6: Fixed common and obtuse crossings*

prEN 13232-7:2020, *Railway applications – Track – Switches and crossings for Vignole rails – Part 7: Crossings with moveable parts*

3 Terms and definitions

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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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 General**3.1.1****customer**

term used to define one party involved in using the EN as the technical basis for a transaction: the Operator or User of the equipment, or the Purchaser of the equipment on the User's behalf

3.1.2**supplier**

term used to define one party involved in using the EN as the technical basis for a transaction: the Body responsible for the use of the EN in response to the Customer's requirements

3.1.3**actuation system**

system that ensures the correct movement of the moveable parts of the switch and crossing

Note 1 to entry: The actuation system includes the rods, links and actuators needed to ensure the operation.

Note 2 to entry: The actuation system may be either electric, hydraulic, manual, etc.

3.1.4**locking device**

device that ensures the moveable part of the switches and crossings stays in the desired position

Note 1 to entry: It guarantees the correct position of the moveable part during the passage of the vehicle.

3.1.5**detection device**

device that enables the verification of the correct positioning of the moveable part of the switch and crossing

Note 1 to entry: It enables the signalling to decide whether safe train passage can be guaranteed.

3.1.6**trailability**

ability of actuator and locking systems to permit the trailing of the switches and crossings by a vehicle

3.1.7**trailable devices (as non-standard operation)**

devices which permit trailing as a non-standard operation

Note 1 to entry: Parts of the switch may be slightly damaged.

Note 2 to entry: The switches and crossings will only be released for further operation after full inspection of switch and actuator.

3.1.8**trailable devices (as standard operation)**

devices which permit trailing at a defined maximum speed as a standard operation

Note 1 to entry: The actuator and locking system permits the trailing of the switches and crossings by a vehicle, without damaging any part of it.

3.1.9**non-trailable devices**

devices which do not permit the trailing of the switches and crossings by a vehicle

3.1.10**single drive**

drive operated at one position, i.e. the switch toe

3.1.11**multiple drives**

drives operated at more than one position. In this case there may be either single or multiple locking

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3.1.12**non-lubricated slide baseplates**

no lubrication on the slide baseplates is required to ensure the correct actuation of the switch and crossing

Note 1 to entry: This can be ensured by special baseplates, roller systems or other devices.

3.1.13**lubrication free actuator and locking system**

no lubrication is required to ensure the correct actuation and locking of the switch and crossing

3.1.14**switches and switch diamond crossings – closed position**

switch rail is applied to its corresponding stock rail

3.1.15**switches and switch diamond crossings – open position**

switch rail stands away from its corresponding stock rail by a defined distance (switch toe opening)

3.1.16**common crossings with moveable parts – closed position**

running edge (of main line or branch line) is not interrupted

3.2 Actuation forces

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3.2.1**actuation force**

F_a
maximum value of the force, applied by the actuator in order to operate the moveable parts of the switches and crossings (see Figure 1)

Note 1 to entry: This force is measured at the interface between actuator and the throwing or locking device.

3.2.2**actuator capacity**

F_{cap}
maximum force the actuator can provide (see Figure 1)

3.2.3**negative force**

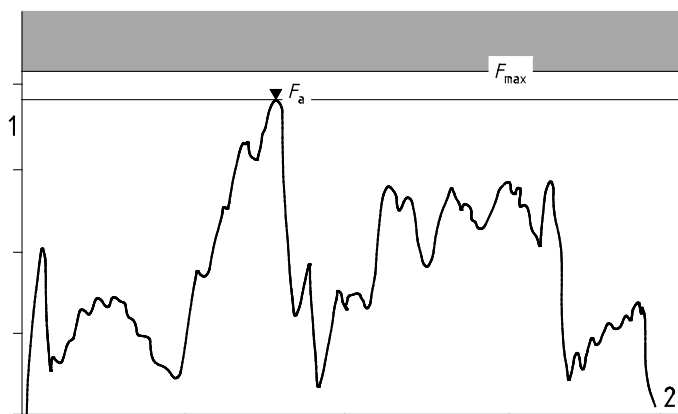
F_{neg}
force needed to keep the moveable part at its closed position

3.2.4**retaining force**

F_R
force, provided by the actuator to keep the moveable parts in their positions, during vehicle passage

3.2.5**locking force**

F_L
force the locking device guarantees and applies to the moveable parts in order to keep them at their locked position



Key

- 1 Actuation force
- 2 Displacement

Figure 1 — Actuation forces

3.3 Geometrical parameters

3.3.1

distance block gap

d_{stud}

stud gap

d_{stud}

gap between the stud (distance block) supporting surface and the corresponding surface of the moveable part (i.e. switch rail, point rail, wing rail)

3.3.2

longitudinal displacement

displacements which may occur in the switch and crossing area due to thermal, acceleration and braking forces

Note 1 to entry: These forces can create differential displacement between the various components of the switch or crossing. Differential displacement between switch and stock rail is the most important with regard to the switch actuation, locking and detection system.

3.3.2.1

switches: differential toe tip displacement (y)

longitudinal displacement between the switch rail and the corresponding stock rail. It may be indicated by a reference point placed on the stock rail

3.3.2.2

switches: differential displacement at the heel block (z)

longitudinal displacement between the switch rail and the corresponding stock rail, at the switch heel

3.3.2.3

crossings with moveable parts: differential displacement

longitudinal displacement between point or switch rail and the corresponding housing (wing rail)

Note 1 to entry: This displacement is defined at the nose point. In order to be able to measure the swing nose or switch toe displacement, a reference point may be placed on the wing rail

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3.3.3

maximum gap of closed switch rail d_{gap}

maximum permissible parallel distance between the two machined contact faces of the switch and stock rail to give detection

Note 1 to entry: A different value applies in front of the first detection position (d_{gap1}) than in the rest of the machined area (d_{gap2}). See Figures 2 and 3.

Note 2 to entry: The same definition applies in principle to crossings with moveable parts.

3.3.4

maximum gap at closed switch toe d_{toe}

maximum permissible horizontal distance between the two machined contact faces of the switch and stock rail to give safe operation

Note 1 to entry: The dimension is defined at the switch toe. This basic dimension is taken into account during switch point design to avoid derailment.



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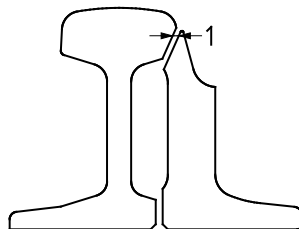
Key

- 1 d_{gap} (either d_{gap1} or d_{gap2})
- 2 d_{toe}

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Figure 2 — Gap of closed switch rail

**Key**

- 1 d_{gap} or d_{toe}

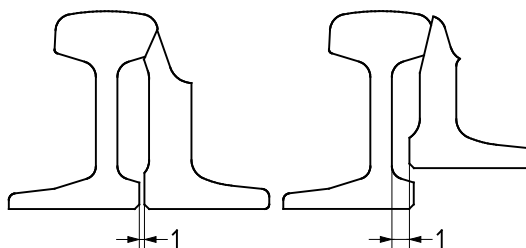
Figure 3 — Maximum gap of closed switch rail

3.3.5

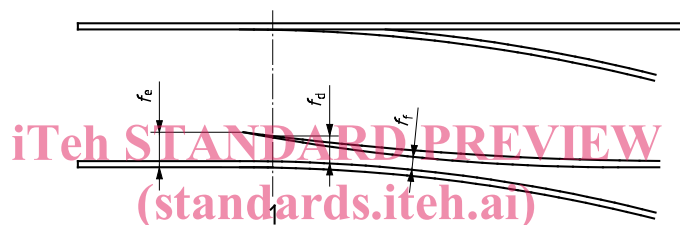
foot clearance d_{foot}

distance between the foot of the switch rail and the nearest part of the stock rail or any other component (bolt, heaters etc.) fixed to it, ensuring clearance between both is maintained (see Figure 4)

Note 1 to entry: The clearance may be required to accommodate additional equipment (e.g. heaters, cable connections).

**Key**1 d_{foot} **Figure 4 — Foot clearance****3.3.6****toe movement** f_p

movement of the toe, when moved by the actuator. It is the distance between open and closed position at the toe (see Figure 5)

**Key**

1 Actuation position

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Figure 5 — Opening and flangeway**3.3.7****opening at the drive position** f_a

movement of the switch rail at the drive position

Note 1 to entry: This movement is less than the toe movement (see also Figure 5)

3.3.8**neutral switch rail position** f_N

position of the switch rail, if no external effort is applied to it

Note 1 to entry: The neutral position may be considered to be at the first drive position. The same principle applies to crossings with moveable parts.

3.3.9**actuator movement** f_a

movement of the actuator rod