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Železniške naprave - Zgornji ustroj - Kretnice in križišča - 4. del: Postavljalna naprava in kontrola lege ostrice

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

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

Applications ferroviaires - Voie - Appareils de voie - Partie 4: Manoeuvre, blocage et contrôle

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 13232-4:2005) 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of an identical text or by endorsement, at the latest by March 2006, and conflicting national standards shall be withdrawn at the latest by March 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this European Standard.

This series of standards “Railway applications – Track – Switches and crossings” covers the design and quality of switches and crossings in flat bottom rails. 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 the European Standard.

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 functional and geometrical dimensions and tolerances for layout assembly.

The following terms are used within to define the parties involved in using the EN as the technical basis for a transaction:

CUSTOMER The operator or user of the equipment, or the purchaser of the equipment on the user's behalf.

SUPPLIER The body responsible for the use of the EN in response to the customer's requirements.

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

1 Scope

This European Standard determines the interface between moveable parts and the actuation, locking and detection equipment, and defines the basic criteria of 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 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 13232-1:2003, *Railway applications – Track – Switches and crossings – Part 1: Definitions*

prEN 13232-9, *Railway applications – Track – Switches and crossings – Part 9: Layouts*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13232-1:2003 and the following apply.

3.1 General

3.1.1
actuation system
system that ensures the correct movement of the moveable parts of the switch and crossing. The actuation system includes the rods, links and actuators needed to ensure the operation. The actuation system may be either electric, hydraulic, manual etc.

3.1.2
locking device
device that ensures the moveable part of the switches and crossings stays in the desired position. It guarantees the correct position of the moveable part during the passage of the vehicle

3.1.3
detection device
device that enables the verification of the correct positioning of the moveable part of the switch and crossing. It enables the signalling to decide whether safe train passage can be guaranteed

3.1.4
trailability
ability of actuator and locking systems to permit the trailing of the switches and crossings by a vehicle. There are two different trailing devices – trailable devices and non-trailable devices

3.1.4.1
trailable devices
- devices which permit trailing as non-standard operation

In this case, parts of the switch may be slightly damaged. The switches and crossings will only be released for further operation after full inspection of switch and actuator.

- devices which permit trailing as standard operation.

  In this case the actuator and locking system permits the trailing of the switches and crossings by a vehicle, without damaging any part of it.

  In both cases the maximum trailing speed is defined

3.1.4.2
non-trailable devices
devices which do not permit the trailing of the switches and crossings by a vehicle

3.1.5
single or multiple drives

3.1.5.1
single drive
drive operated at one position, i.e. the switch toe

3.1.5.2
multiple drives
drives operated at more than one position. In this case there may be either single or multiple locking

3.1.6
lubrication free switch operation

3.1.6.1
non-lubricated slide baseplates
no lubrication on the slide baseplates is required to ensure the correct actuation of the switch and crossing. This can be assured by special baseplates, roller systems or other devices

3.1.6.2
lubrication free actuator and locking system
no lubrication is required to ensure the correct actuation and locking of the switch and crossing

NOTE Track lubrication may still be required, for other reasons.

3.1.7
open and closed position

3.1.7.1
switches and switch diamond crossings – closed position
switch rail is applied to its corresponding stock rail

3.1.7.2
switches and switch diamond crossings – open position
switch rail stands away from its corresponding stock rail by a defined distance (switch toe opening)

3.1.7.3
common crossings with moveable parts – closed position
running edge (of main line or branch line) is not interrupted

NOTE An open position does not exist.

3.2 Actuation forces

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).

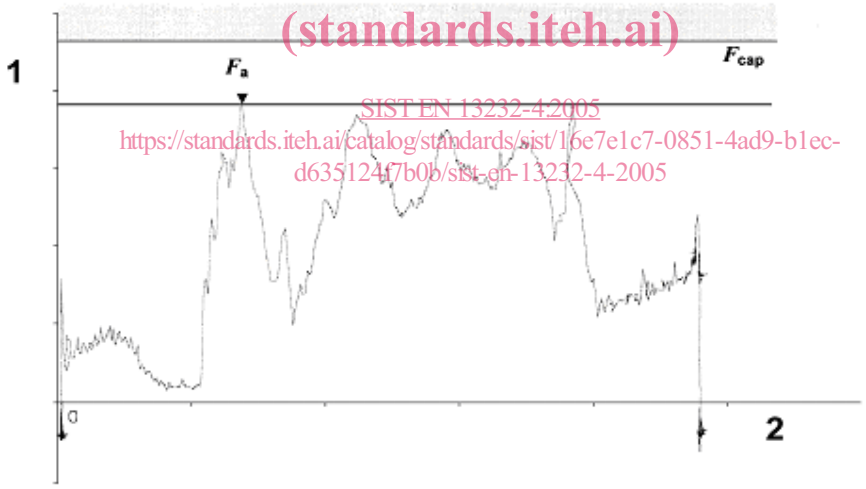
This force is measured at the interface between actuator and the throwing or locking device

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

3.3.2
longitudinal displacement

NOTE longitudinal displacements may occur in the switch and crossing area due to thermal, acceleration and braking forces. These forces can create differential displacement between the various components of the switch or crossing

3.3.2.1
switches
differential displacement between switch and stock rail is the most important with regard to the switch actuation, locking and detection system. These displacements will be defined in two main places:

a) differential toe tip displacement (y)

   This is the differential longitudinal displacement between the switch rail and the corresponding stock rail. In order to be able to measure the switch toe displacement, a reference point will be placed on the stock rail.

b) differential displacement at the heel block (z)

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

3.3.2.2
crossings with moveable parts
differential displacement between point or switch rail and the corresponding housing (wing rail) is the most important with regard to the actuation, locking and detection system. 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 will be placed on the wing rail

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. 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.

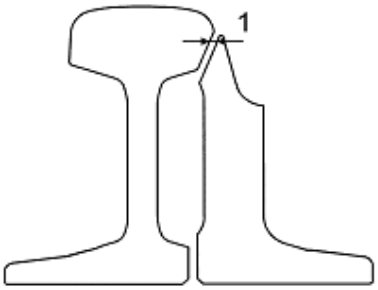
The same definition applies in principle to crossings with moveable parts

3.3.4
maximum gap at switch toe, d_{toe}
maximum permissible horizontal distance between the two machined contact faces of the switch and stock rail to give safe operation. The dimension is defined at the switch toe. This basic dimension is taken into account during switch point design to avoid derailment

Key

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

Figure 2 — Gap of closed switch rail



Key

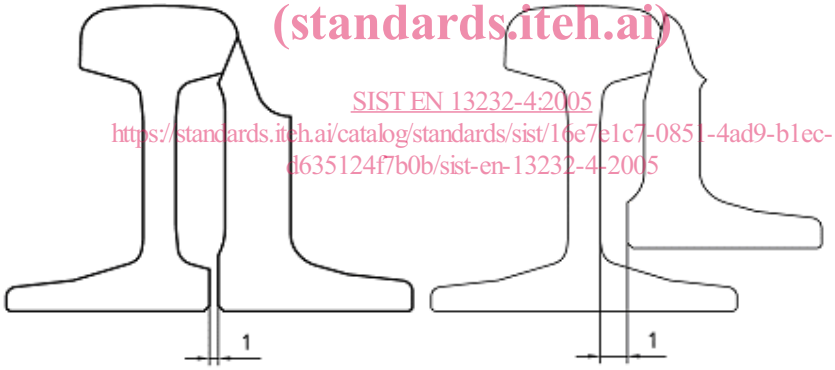
1 d_{gap} or d_{toe}

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)

For additional equipment (e.g. heaters, cable connections) this clearance has to be maintained.

Longitudinal displacements are taken into account.

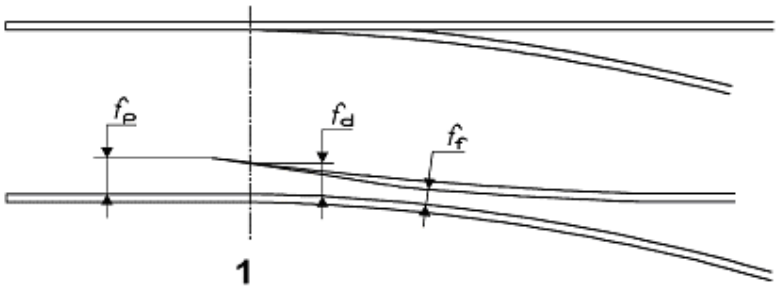


Key

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

Figure 5 — Opening and flangeway

3.3.7
opening at the drive position, f_d
movement of the switch rail at the drive position. 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.

The neutral position is verified 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

3.3.10
minimum flangeway, f_f
see EN 13232-1:2003, 7.4.6 and Figure 59. (See also Figure 5.)

This dimension is measured at the gauge reference plane

3.3.11
track gauge, *G*
see EN 13232-1:2003, 2.11 and Figure 5. (See also Figure 6.)

This dimension is measured at the gauge reference plane

4 Design criteria

4.1 Parameters required

The designer of the switches and crossings shall take into account all parameters that may influence the design. The following minimum information is required for the design of the switch panel or moveable crossing.

- Minimum flangeway (f_f);
- trailability;