Nederlandse

Ontwerp

norm

NEN-EN 13232-4

Railtoepassingen - Bovenbouw - Wissels en kruisingen voor Vignole rails - Deel 4: Bediening, vergrendeling en detectie

Publicatie uitsluitend voor commentaar

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

juni 2014
ICS 93.100

Commentaar vóór 2014-10-05

Zal vervangen NEN-EN 13232-4:2005+A1:2011

Als Europees normontwerp is gepubliceerd: prEN 13232-4:2014,IDT

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 13232-4 rev

June 2014

ICS 93.100

Will supersede EN 13232-4:2005+A1:2011

English Version

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

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

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

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Ref. No. prEN 13232-4 rev:2014 E

Contents

Foreword

This document (prEN 13232-4:2014) 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 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 functional and geometric 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.

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 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.

prEN 13232-1:2013, *Railway applications – Track – Switches and crossings for Vignole rails – Part 1: Definitions*

prEN 13232-3:2014, *Railway applications – Track – Switches and crossings for Vignole rails – Part 3: Requirements for wheel/rail interaction*

prEN 13232-5:2014, *Railway applications – Track – Switches and crossings for Vignole rails – Part 5: Switches*

prEN 13232-6:2014, *Railway applications – Track – Switches and crossings for Vignole rails – Part 6: Fixed common and obtuse crossings*

prEN 13232-9:2014, *Railway applications – Track – Switches and crossings for Vignole rails – Part 9: Layouts*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 13232-1:2013 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 1 to entry: 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 1 to entry: 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).

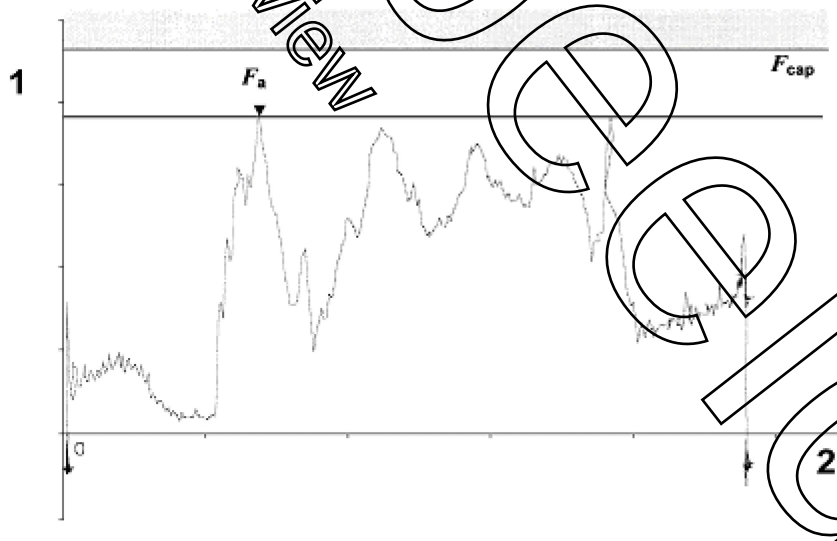
This force is measured at the interface between actuator and the throwing or locking device

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 1 to entry: 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

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