BS EN 13232-8:2023

BSI Standards Publication

Railway applications — Track — Switches and crossings for Vignole rails

Part 8: Expansion devices

bsi.

National foreword

This British Standard is the UK implementation of EN 13232-8:2023. It supersedes BS EN 13232-8:2007+A1:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RAE/2/-/9, Railway applications - Switches & Crossings - Performance & Acceptance.

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

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European foreword

This document (EN 13232-8:2023) 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of an identical text or by endorsement, at the latest by April 2024, and conflicting national standards shall be withdrawn at the latest by April 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13232-8:2007+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 geometric and non-geometrical acceptance criteria for inspection of layouts.

This document has been prepared under a standardisation request addressed to [the relevant ESO] by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

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Introduction

An expansion device is a device that permits longitudinal relative rail movement of two adjacent rails, while maintaining correct guidance and support.

These longitudinal movements may be required in:

a) interrupted continuously welded rail (CWR);

b) structure movement;

c) or a combination of both.

1 Scope

This document

— establishes a working terminology for expansion devices, for their constituent parts and for the types

— specifies the minimum manufacturing requirements for expansion devices and their constituent parts

— formulates codes of practice for inspection and tolerances

— defines the method by which expansion devices and their parts should be identified.

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.

EN 13146-1:2019, *Railway applications - Track - Test methods for fastening systems - Part 1: Determination of longitudinal rail restraint*

EN 13232-1:2023, *Railway applications – Track — Switches and crossings for Vignole rails – Part 1: Definitions*

EN 13232-2:2023, *Railway applications – Track — Switches and crossings for Vignole rails – Part 2: Requirements for geometric design*

EN 13232-3:2023, *Railway applications – Track – Switches and crossings for Vignole rails – Part 3: Requirements for wheel/rail interaction*

EN 13232-9:2023, *Railway applications – Track – Switches and crossings for Vignole rails – Part 9: Layouts*

EN 13715:2020, *Railway applications – Wheelsets and bogies – Wheels – Wheels tread*

EN 13674-1:2011+A1:2017, *Railway applications – Track – Rail - Part 1: Vignole railway rails 46 kg/m and above*

EN 13674-2:2019, *Railway applications – Track – Rail- Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above*

3 Terms and definitions

For the purpose of this document the terms and definitions given in EN 13232-1:2023 and the following 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 definitions

3.1.1
hand of half set
identifies the left hand or right hand half set of the adjustment or expansion switch when viewed standing in the centre of the track and facing the tips of the inside rails or switches

Note 1 to entry: With check rails, there may be two LH or two RH half sets, see Figure 6, or opposite hand half sets.

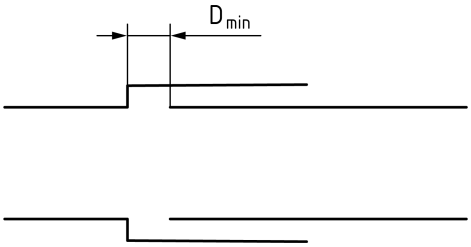
Note 2 to entry: See 3.2.1 for definition of adjustment switch.

Note 3 to entry: See 3.2.2 for definition of expansion switch.

3.1.2
expansion capacity C
maximum permissible relative longitudinal movement between the two rails, where:

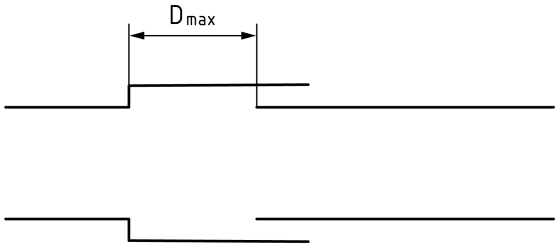
$$C = D_{max} - D_{min}$$

Note 1 to entry: See Figures 1 and 2.



Key
D_{min} minimum gap

Figure 1 — Closed position



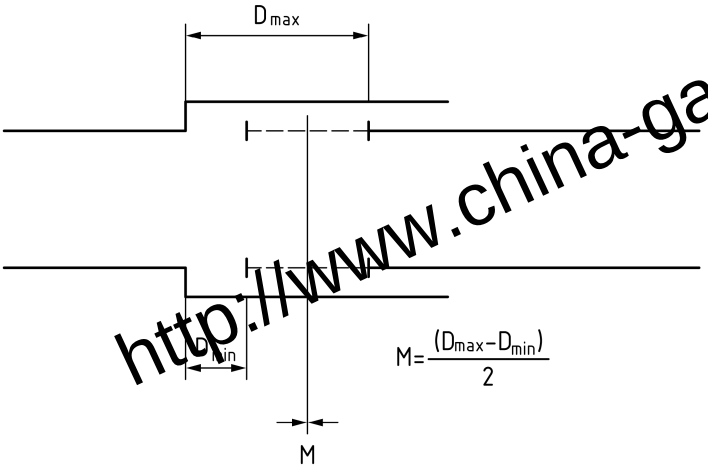
Key
D_{max} maximum gap

Figure 2 — Open position

3.1.3
relative displacement rail / support
maximum permissible relative longitudinal movement between the rail (switch or stock rail) and the corresponding support (base plate or bearer)

3.1.4
mean position
position where the expansion capacity and the relative displacement of rails are half way, and the bearers are in their nominal position (See Figure 3)

3.1.5
design position
nominal position where the expansion capacity and the relative displacement of rails are half way, especially where shrinkage of concrete structures, for example, will shift the mean position



Key

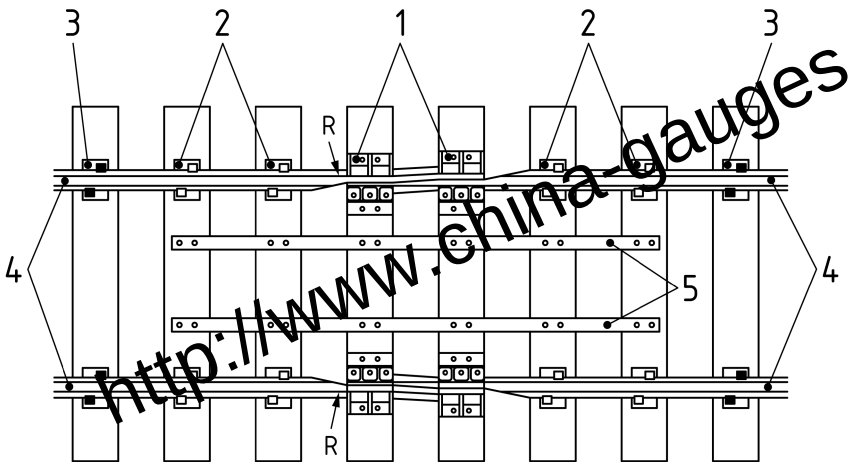
D_{min}	minimum gap
D_{max}	maximum gap
M	mean position

Figure 3 — Mean position

3.2 Main types of expansion devices

3.2.1
adjustment switch
expansion device with interruption of the running edge sometimes called bayonet type

3.2.1.1
adjustment switch without check rails (both sides moveable)



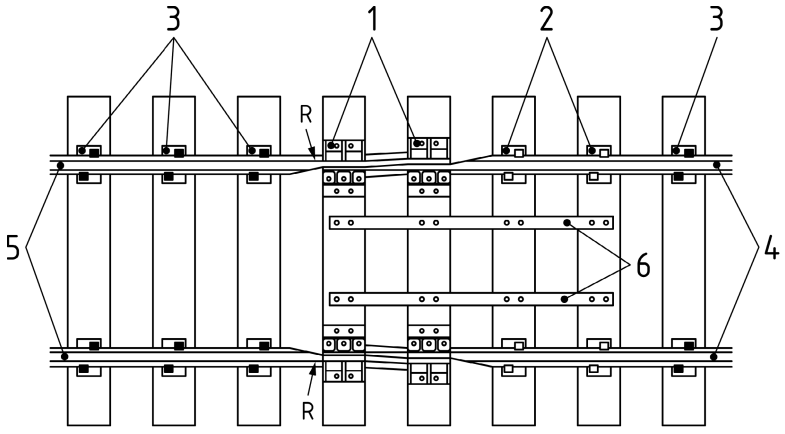
Key

1	slide chair	4	moveable rails
2	low restrain fastening	5	bearer straps
3	standard fastening	R	reference point

Figure 4 — Adjustment switch – Both sides moveable

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.1.2
adjustment switch without check rails with one side moveable



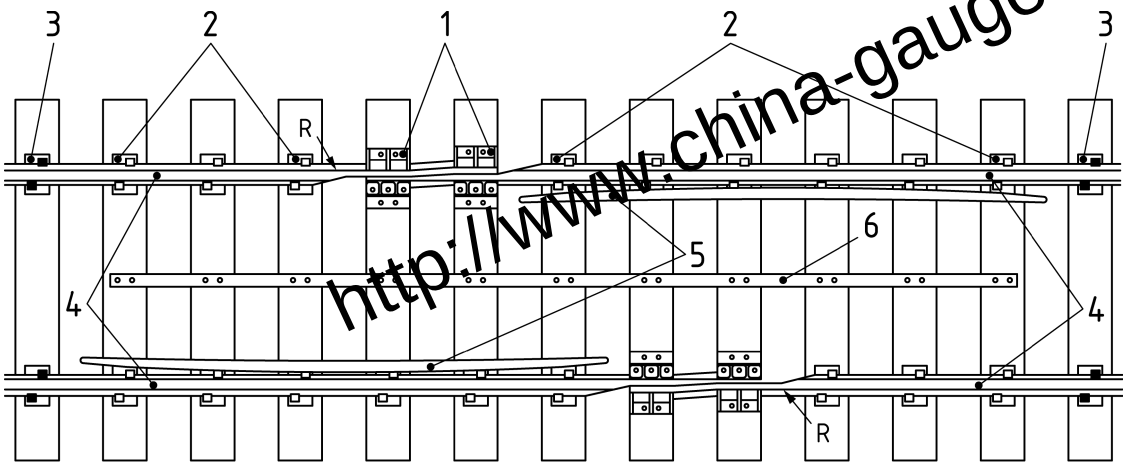
Key

1	slide chair	5	fixed rails
2	low restrain fastening	6	bearer straps
3	standard fastening	R	reference point
4	moveable rails		

Figure 5 — Adjustment switch – One side moveable

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.1.3
adjustment switch with check rails with both sides moveable



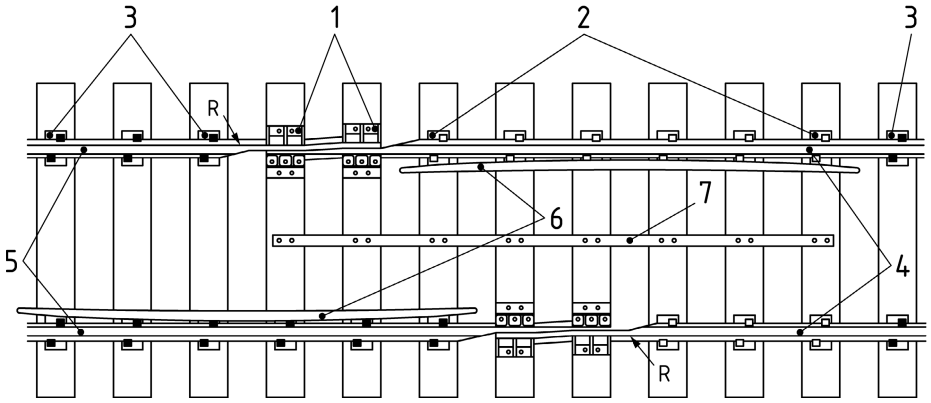
Key

1	slide chair	5	check rails
2	low restrain fastening	6	bearer strap
3	standard fastening	R	reference point
4	moveable rails		

Figure 6 — Adjustment switch with check rails – Both sides moveable

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.1.4
adjustment switch with check rails with one side moveable



Key

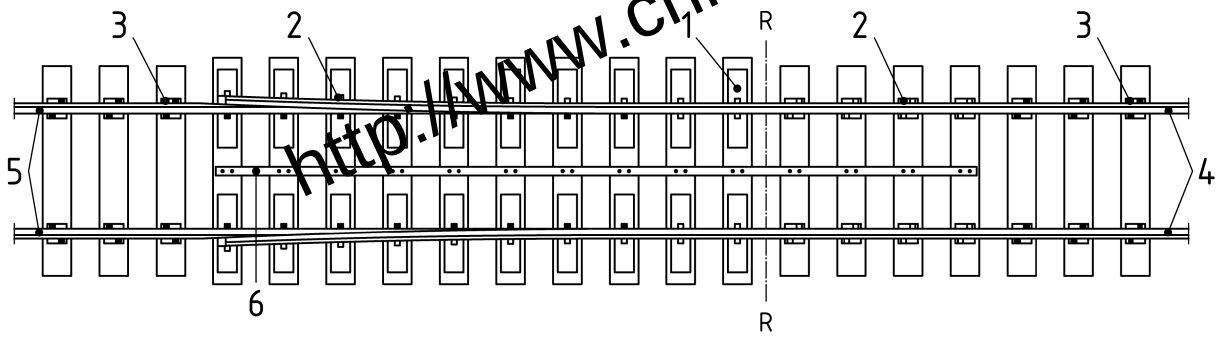
1	slide chair	5	fixed rails
2	low restrain fastening	6	check rails
3	standard fastening	7	bearer strap
4	moveable rails	R	reference point

Figure 7 — Adjustment switch with check rails – One side moveable

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.2
expansion switch
expansion device without interruption of the running edge, with or without change of gauge

3.2.2.1
expansion switch with moveable stock rails
this arrangement allows for retention of the track gauge dimension



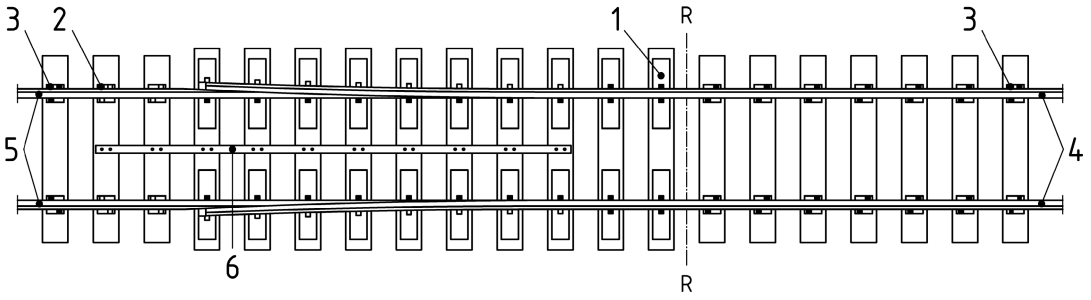
Key

1	slide chair	5	fixed switch rails
2	low restrain fastening	6	bearer strap
3	standard fastening	R	reference point
4	moveable stock rails		

Figure 8 — Expansion switch – Moveable stock rails

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.2.2
expansion switch with moveable switch rails
this arrangement does not allow for retention of the track gauge dimension



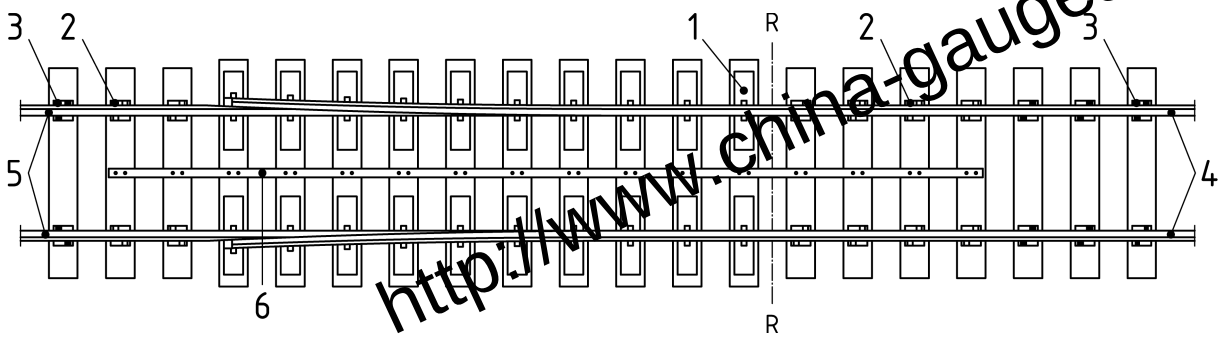
Key

1	slide chair	5	moveable switch rails
2	low restrain fastening	6	bearer strap
3	standard fastening	R	reference point
4	fixed stock rails		

Figure 9 — Expansion switch – Moveable switch rails

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

3.2.2.3
expansion switch both sides moveable
this arrangement does not allow for retention of the track gauge dimension



Key

1	slide chair	5	moveable switch rails
2	low restrain fastening	6	bearer strap
3	standard fastening	R	reference point
4	moveable stock rails		

Figure 10 — Expansion switch – Both sides moveable

Note 1 to Entry Low restraint fastenings are not always used and therefore not mandatory, the figure illustrates the location of the low restraint fastening for the situations where they are used. See also 4.2.1.2

4 Design

4.1 Design inputs

The following information shall be supplied by the customer to the supplier:

— axle load;

— gross annual tonnage;

— train speed;

— nominal track gauge;

— direction of traffic;

— track geometry.

In addition the customer shall decide:

— the type of expansion device to be applied;

— the expansion capacity of the expansion device as well as the maximum displacement rail/support. If the latter is not provided, it shall be estimated to be half the expansion capacity of the device;

— the basic rail section and grade;

— the rail inclination to be applied through the expansion device;

— the fastening system to be applied;

— the nominal support spacing;

— type of support structure, e.g. bearer, slab track;

— special requirements, e.g. limits of vertical and horizontal end rotations, limits of local vertical and horizontal radii of track, limits of uplift movements on rail supports adjacent to the gap between the structure and the abutment or between the structures.

The following elements shall be agreed between customer and supplier:

— the special rail profiles to be applied for the construction (if applicable);

— the constructional length;

— the machining details of the rail sections;

— the maximum support spacing in service.

4.2 Design rules

4.2.1 General rules

4.2.1.1 Support panel

In the case where one side is moveable, a number of bearers shall be restrained from moving when laid on ballast. This is normally a minimum of four bearers. The incoming rails may, for example, have low resistance fastenings on the restrained bearers to permit movement of the moveable rails.

All restrained bearers shall be linked to each other. This can be achieved by the use of a bearer strap, guard rail, continuous base plate etc.

In the case when both sides are moveable, the bearers shall be restrained from moving by means of a steel strap. This is to ensure bearer distance does not change and prohibits the bearers from moving from their nominal position during operation and/or maintenance.

4.2.1.2 Fastenings

The fastenings are dependent on the application of the expansion device; therefore the rail fastenings shall be specified by the customer.

Where low restraint fastenings are used the fastening restraint shall in any case be smaller than the longitudinal restraint of the bearer in the ballast. The creep resistance shall be between 0 and 5 kN per base plate. This resistance shall be checked in accordance with EN 13146-1:2019.

4.2.1.3 Slide chairs

The slide chair shall permit the movement of one or both rails, while offering guidance to the switch and/or stock rail depending on the type used, with resistance in the range 0 to 5 kN. The resistance shall be checked in accordance with EN 13146-1:2019.

4.2.1.4 Movement capacity of expansion device

The expansion device shall allow for the maximum movement of each rail end, according to the expected range of rail temperature and the type of rail fastenings used within the 100 m of track each side of the device.

In the case of a prototype the total longitudinal resistance shall be demonstrated as described in 6.1.

For curved expansion devices the maximum force may be higher. The limiting force shall be supplied by the customer.

4.2.1.5 Special requirements

Achievable maximum bearer spacing or vertical and horizontal angular rotations may exceed existing limits for stress in rails. Special measures such as reinforcing of rails by fishplates, ancillary load distributing rails, auxiliary beams and elastic supports may be used to reduce the stress in the rail or to accommodate vertical and horizontal angular rotations.

4.2.2 Wheel/rail interaction

Functional and safety dimensions and wheel/rail interaction shall be considered during the design as described in EN 13232-3:2023 and EN 13232-9:2023.

Lateral movement of the switch toe due the longitudinal movement shall be considered to avoid secant contact (See EN 13232-3:2023).

4.2.3 Specific rules

4.2.3.1 Adjustment switches with interruption of the running edge

Wheel transfer areas shall be machined to match the original rail section on the running edge.

Attention shall be drawn to the false flange clearance machining or worn wheel ramps on the non-running side of the rail.

This construction type leads to a gap in the running edge. With wheels in accordance with EN 13715:2020 and UIC 510-2 the maximum permitted gap is 200 mm. If this gap becomes larger then check rails are required.

A reference point shall be made on the external bayonet in the vicinity of the internal bayonet, in order to check the relative position of both rails.

4.2.3.2 Expansion switches

A detailed geometry plan shall be drawn in accordance to EN 13232-2:2023.

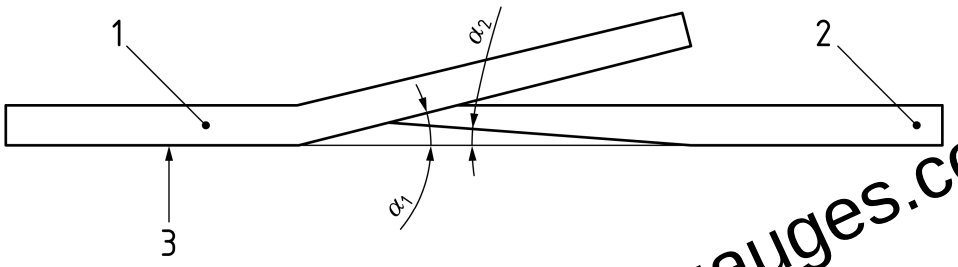
Track gauge may vary as a consequence of the construction type.

Switch rail only moves: track gauge variation occurs.

Stock rail only moves: track gauge variation does not normally occur.

Both switch and stock rail move: track gauge variation occurs but is normally not as big as when only switch rail moves.

These variations in track gauge shall be considered during the design process, in particular the possibility of under gauging at the switch rail toes. The effect on the resultant angle of attack may be increased due to α_1 and α_2 depending on the direction of traffic (see Figure 11). Predominantly on curved track this shall be taken into account. The angle of attack shall be restricted as described in EN 13232-9:2023.



Key

1 stock rail
2 switch rail
3 running edge

Figure 11 — Angles of attack

Attention shall be drawn to machining the top of the stock rail end to accommodate false flange clearance or worn wheel ramps.

4.2.3.3 Reference points

A reference point shall be made at the stock rail in the vicinity of the tongue tip in order to check the relative position of both rails.

The actual position shall be checked by reference points. The mean position is used for design and acceptance. Reference points, marked on the adjustment or expansion switch, are also used for installation.

In the case of expected major asymmetrical movements, e.g. shrinkage of concrete structures, the mean or neutral position shall be a defined “design position”.

4.3 Performance requirements

The performance criteria of expansion devices shall be based on information given by the customer. The design and selection of type of expansion devices will be influenced by capacity, guidance, gauge variation due to longitudinal movement and site conditions. Information supplied in 4.1 and 4.2 shall be used in the selection of the type of expansion devices and their design.

4.4 Materials

The grade and specification of the rails to be used shall be specified by the customer. Unless the customer defines otherwise, the rail material and profile shall conform to EN 13674-1:2011+A1:2017 and EN 13674-2:2019. The materials of fabricated base plates, blocks etc. shall be specified using the respective European Standard. In the absence of a European Standard, the materials shall be defined by their mechanical and chemical characteristics.

Materials for other components, including cast manganese steel, pads, insulators, special slide surfaces etc., shall be agreed between customer and supplier.

4.5 Design output

4.5.1 Detailed component drawings

The individual components should be illustrated on the detailed drawings. These drawings shall contain the following information:

— machining profiles;

— sets, bending details;

— position of the running edge and machining reference plane;

— drillings including the pertinent tolerances;

— surface markings;

— material.

4.5.2 Assembly documents

As a result of the design, the supplier shall prepare the assembly documents in accordance with the information given in EN 13232-9:2023.

In addition these documents shall contain gauge modifications of the expansion device when the rail components move to their extreme limits.

5 Tolerances and inspection

5.1 General

The following section defines the tolerances of the critical dimensions, which shall be verified. These tolerances are based on workshop temperatures or a predefined temperature specified by the customer.

If the customer imposes restrictions on the tolerances given in the following, they shall be stated in the tender documents.

5.2 Tools and instruments

The customer may request drawings/details of tools/measuring instruments for verification. Drawings/details shall be submitted on request for approval. All tools/instruments shall be made available by the supplier on request.

For inspection of the components, adequate measuring instruments shall be used, depending on the geometry of the component and on the required accuracy. The appropriate measuring instruments shall be agreed between customer and supplier.

It is the supplier's responsibility to guarantee dimensional accuracy and to ensure that the inspection is carried out with the appropriate measuring instruments.

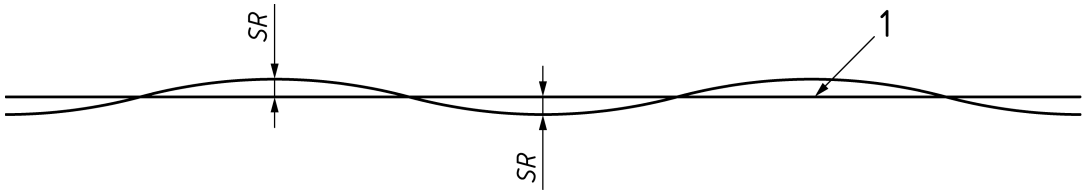
5.3 Critical dimensions

5.3.1 Adjustment switch (bayonet type)

The applicable dimensions set out in Table 1, Table 2 and Table 3 shall be verified with the expansion device in its mean position as part of the inspection process and a record will be kept for inspection by the customer on request. Any sharp edges shall be de-burred.

Table 1 — Rail (fixed and/or moveable)

Variable	Description	Tolerance
Not shown	Total length of rail	±3 mm up to 24 m length ±4 mm greater than 24 m
SR	Alignment of the running edge (straight) (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Alignment of the running edge (curves) (Figure 13 / 14)	±1 mm and 0,5 mm/1 500 mm
IM	Inclination of the machined contact surface (Figure 15)	±0,5°
Not shown	Diameter of fishbolt hole	+1 mm / −0,5 mm
Not shown	Hole position relative to fishing surface	±1 mm
Not shown	Hole position relative to end of rail	±1,5 mm (for temporary fishplating ±3 mm)
Not shown	Chamfer of the hole	min. 0,5 mm
Not shown	Roughness of machined running surface areas	Ra 6,3

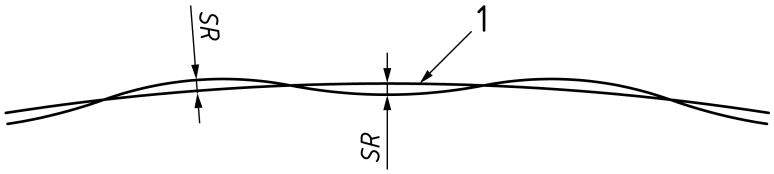


Key

1 theoretical running edge

SR course of the running edge

Figure 12 — Alignment of running edge (straight)



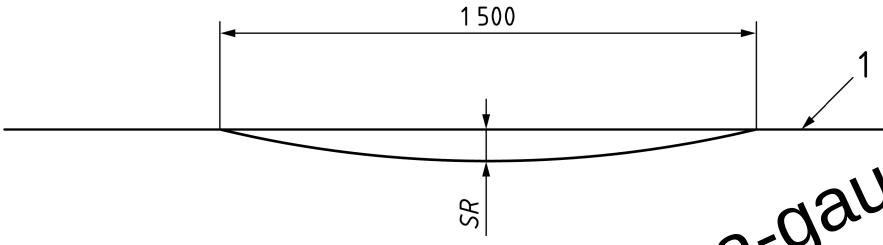
Key

1 theoretical running edge

SR course of the curve

Figure 13 — Alignment of running edge (curved)

Dimensions in millimetres

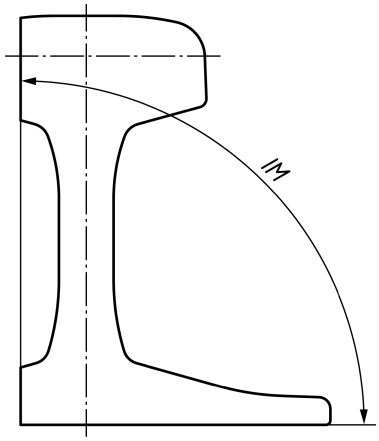


Key

1 theoretical running edge

SR course of the running edge

Figure 14 — Local straightness



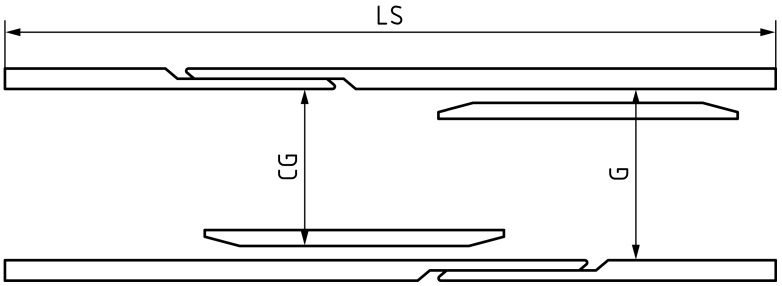
Key

IM inclination of the machined contact surface

Figure 15 — Inclination

Table 2 — Half set of adjustment switches

Variable	Description	Tolerance
LS	Constructional length (Figure 16)	±6 mm up to 24 m length ±8 mm greater than 24 m
SR	Straightness of the running edge (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Course of the curve of the running edge (Figures 13 / 14)	±1 mm and 0,5 mm/1 500 mm
GH	Gap at rail head in the parallel contact area during inspection (Figure 17)	max. 0,25 mm
GF	Gap at rail foot (Figure 17)	max. 0,5 mm
LC	Lateral clearance at the slide chair (Figure 17)	> 0 max. gap 1 mm



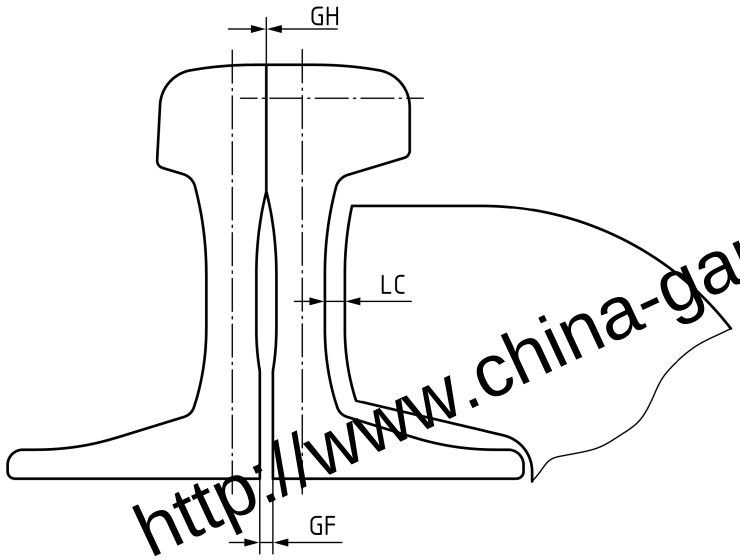
Key

G track gauge

CG check gauge

LS overall constructional length

Figure 16 — Adjustment switch parameters



Key

GH contact between rail heads
LC contact between rail and stud
GF contact between rail feet

Figure 17 — Critical dimensions for adjustment switches – Rail contact and rail/stud contact

Table 3 — Full set of adjustment switches

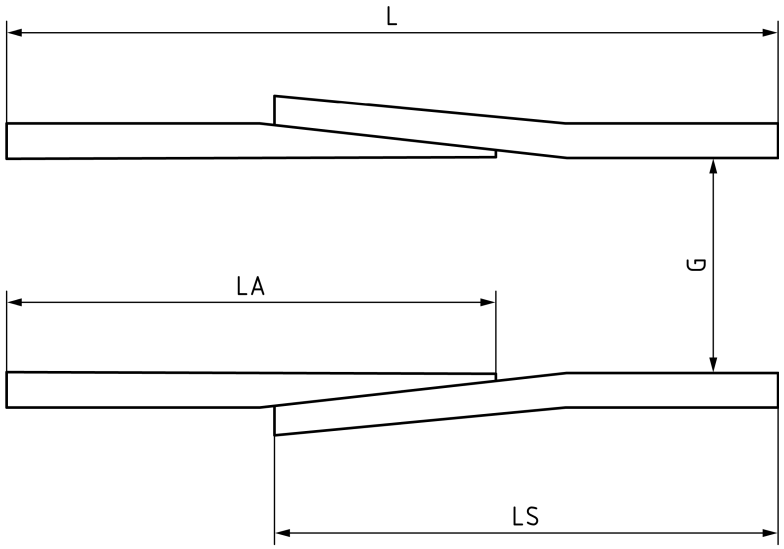
Variable	Description	Tolerance
G	Track gauge (Figure 16)	This tolerance shall be in accordance with the tolerance on the surrounding plain line track
CG	Check gauge (Figure 16)	This tolerance shall be based on functional and safety dimensions as described in EN 13232-3:2023

5.3.2 Expansion switch

The applicable dimensions set out in Table 4, Table 5, Table 6, Table 7 and Table 8 shall be verified with the expansion device in its mean position as part of the inspection process and a record will be kept for inspection by the customer on request. Any sharp edges shall be de-burred.

Table 4 — Stock rail

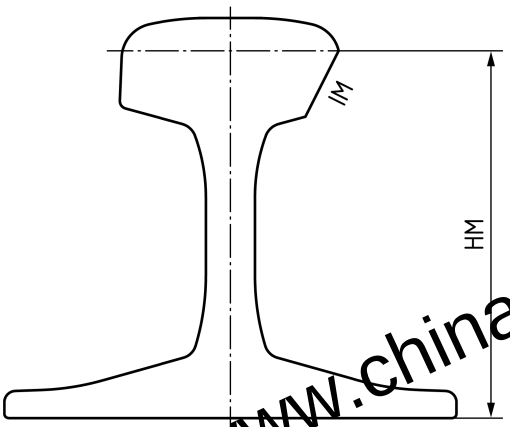
Variable	Description	Tolerance
LS	Total length of stock rail (Figure 18)	±3 mm up to 24 m length ±4 mm greater than 24 m
SR	Straightness of the running edge (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Course of the curve of the running edge (Figure 13 / 14)	±1 mm and 0,5 mm/1 500mm
HM	Height at machined area (Figure 19)	±0,5 (+ tolerance of height of rail)
IM	Inclination of the machined contact surface (Figure 19)	±0,5°
Not shown	Diameter of fishbolt hole	+1 mm / −0,5 mm
Not shown	Hole position relative to fishing surface	±1 mm
Not shown	Hole position relative to end of rail	±1,5 mm (for temporary fishplating ± 3 mm)
Not shown	Chamfer of the hole	min. 0,5 mm
Not shown	Roughness of machined running surface areas	Ra 6,3



Key

LA switch rail length
LS stock rail length
G track gauge
L overall length

Figure 18 — Expansion switch parameters



Key

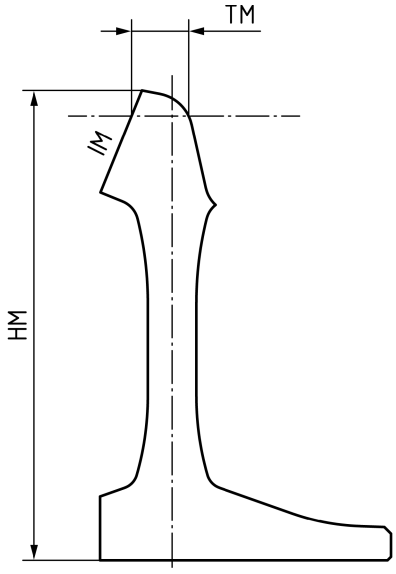
IM inclination of machined area

HR height of machined area

Figure 19 — Critical dimensions for machined rails

Table 5 — Switch rail

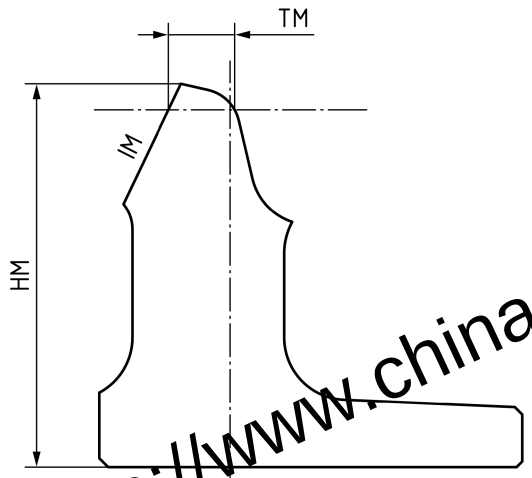
Variable	Description	Tolerance
LA	Total length of switch rail (Figure 18)	±3 mm up to 24 m length±4 mm greater than 24 m
SR	Straightness of the running edge (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Course of the curve of the running edge (Figure 13 / 14)	±1 mm and 0,5 mm/1 500 mm
HM	Height at machined area (Figure 19 / 20 / 21)	±0,5 (+ tolerance of height of rail)
TM	Thickness at machined area (minimum 3 points or every 1,5 m) (Figure 19 / 20 / 21)	±0,5 mm
IM	Inclination of the machined contact surface (Figure 19 / 20 / 21)	±0,5°
Not shown	Diameter of fishbolt hole	+1 mm / −0,5 mm
Not shown	Hole position relative to fishing surface	±1 mm
Not shown	Hole position relative to end of rail	±1,5 mm (for temporary fishplating ± 3 mm)
Not shown	Chamfer of the hole	min. 0,5 mm
Not shown	Flatness of the underside of the switch rail	1 mm
Not shown	Roughness of machined running surface areas	Ra 6,3



Key

IM inclination of machined area
HM height at machined area
TM thickness at machining reference plane

Figure 20 — Critical dimensions for machined rails – Full depth switch rails



Key

IM inclination of machined area

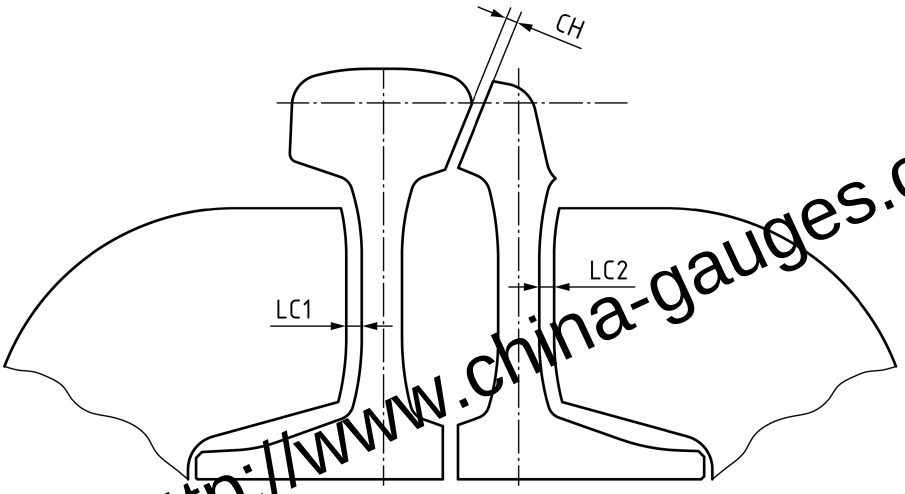
HM height at machined area

TM thickness at machining reference plane

Figure 21 — Critical dimensions for machined rails – Asymmetric switch rails

Table 6 — Forging area (if applicable)

Variable	Description	Tolerance
Not shown	Running table	0,3 mm/1 500 mm
Not shown	Running edge alignment	0,5 mm/1 500 mm
Not shown	End profile	Tolerance according to the rolled rail section
HC	Head profile (Figure 22)	An area of concavity may exist only on the opposite of the running edge. This shall not exceed 2 mm
LT	Transition length (Figure 22)	±10 %
HF	Height difference from one rail foot to the other rail foot (Figure 22)	±1 mm



Key

CH contact switch to stock rail

LC1 contact stock rail to stud

LC2 contact switch rail to stud

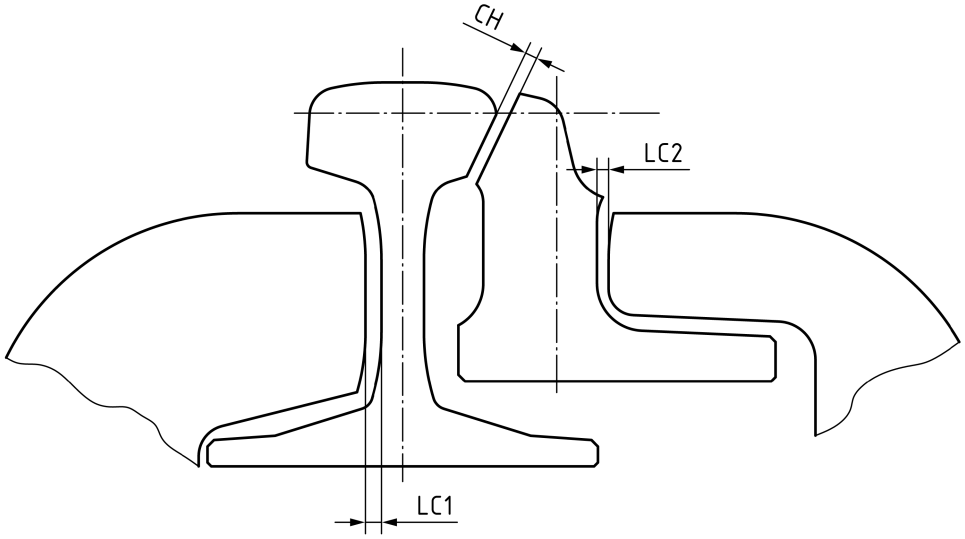
Figure 22 — Critical dimensions for expansion switch – Switch forging (transition) area

Table 7 — Half set of expansion switches

Variable	Description	Tolerance
L	Constructional length (Figure 18)	±6 mm up to 24 m length ±8 mm greater than 24 m
SR	Straightness of the running edge (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Course of the curve of the running edge (Figure 13 / 14)	±1 mm and 0,5 mm/1 500 mm
CH	Switch – stock rail contact allowance (Figure 23 / 24)	max. 0,5 mm
LC1 + LC2	Lateral clearance at the slide chairs when clamped switch and stock rail modify at (Figure 23 / 25)	+1,5 mm / +0,5 mm
CP	Maximum allowance between tongue and slide plate (Figure 25)	1 mm

Table 8 — Full set of expansion switches

Variable	Description	Tolerance
G	Track gauge (Figure 18)	This tolerance shall be in accordance with the tolerance on the surrounding plain line track



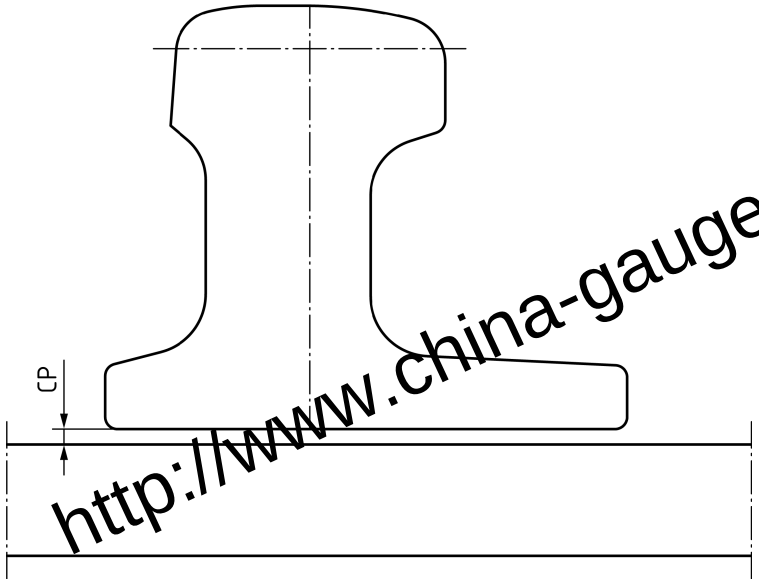
Key

CH contact switch to stock rail

LC1 contact stock rail to stud

LC2 contact switch rail to stud

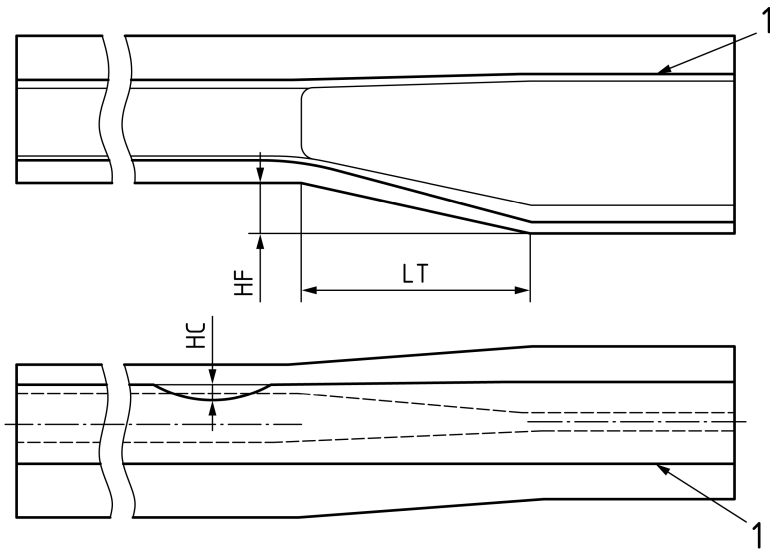
Figure 23 — Critical dimensions for expansion switches – Contact gaps



Key

CP flatness/maximum allowance between rail and base plate

Figure 24 — Critical dimensions for expansion switches – Contact gaps



Key

1 running edge

HF height difference from one rail foot to the other rail foot

LT transition length

HC head concavity

Figure 25 — Critical dimensions for expansion switches – Rail and base plate contact

5.4 Certification

All materials shall conform to the latest relevant European Standard.

In the absence of a relevant European Standard, material certification shall be in accordance with the requirements as laid down in 4.4.

The methods of examination required by the customer shall be clearly defined. Any certification required from such examination shall be stated by the customer.

5.5 Methods of examination for structural defects

The manufacturer shall demonstrate in a proper form (technical description or manufacturing plan for example) what methods of examination will be used.

This shall be agreed with the customer.

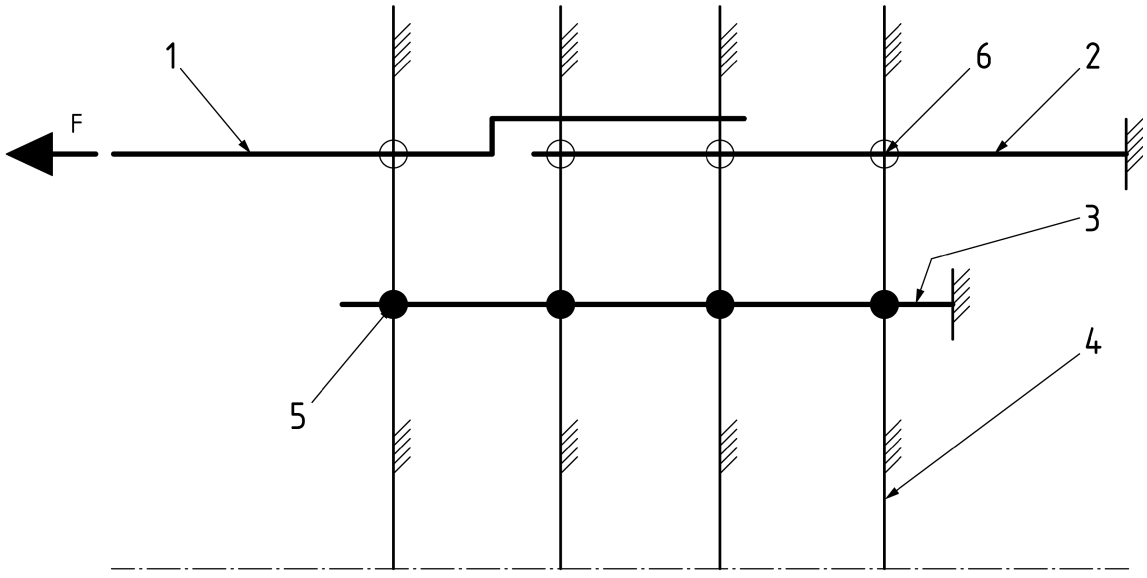
6 Testing of longitudinal forces by expansion/contraction

6.1 Test method

Half the expansion device shall be installed on a fixed support (see Figure 26). One half set shall be fixed on its bearers complete with strap, slide chairs and low restraint fastenings. In case of curved track, the minimum radius shall be applied.

The device shall be arranged in its closed position (D_{min}). See Figure 1. All sliding faces shall be greased with the standard grease that is to be used during maintenance (if applicable).

One rail shall be fixed at the heel. An increasing longitudinal force shall be applied, to the opposite rail until this rail starts to move.



Key

1	pulled rail	4	bearer (blocked)
2	blocked rail	5	fixed link
3	strap (blocked)	6	low restraint fastening
F	force		

Figure 26 — Restraint test setup

This movement of the rail shall be continued with a constant rate. The force needed shall be measured continuously. The procedure stops when the device is opened to its extreme position (D_{max}). See Figure 2.

The whole procedure shall start again in the opposite direction.

During the test the maximum force shall be recorded.

6.2 Test results

The maximum resisting force shall be documented.

7 Acceptance testing

Only when a prototype design is used, testing in accordance with 6.1 shall be required. .Site trials shall be carried out to verify that the expansion device is able to accommodate the rail-end movements. The trials shall last for not less than one year in order that the full cycle of seasons may be experienced.

8 Limits and extent of supply

The limits and extent of supply shall include all components and special plates equipped with fastenings to the limits of the support panel. Requirements for rail lengths and additional items shall be agreed between customer and supplier and shown on the assembly drawing.

9 Identification marks

Each half set of expansion device shall have an identification marking fixed on the switch rail and/or stock rail. The design of marking shall be agreed between customer and supplier.

The following information shall be marked:

— manufacturer’s mark;

— last two digits of year of manufacture;

— expansion capacity;

— unique identification number.

Other markings may be specified by the customer.

The identification marks concerning dispatch shall be agreed between customer and supplier.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive (EU) 2016/797 aimed to be covered

This European Standard has been prepared under a Commission's standardisation request "M/591 Mandate to CEN and CENELEC for Standardisation in the field of interoperability of the rail system" to provide one voluntary means of conforming to (parts of) Essential Requirements of Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on interoperability of the rail system (recast) as specified in the relevant technical specifications for interoperability (TSI).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 for infrastructure confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive as specified in the technical specifications for interoperability (TSI), and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard, Commission Regulation (EU) N° 1299/2014 concerning the technical specifications for interoperability relating to the 'infrastructure' subsystem of the rail system in the European Union* and Directive (EU) 2016/797

Essential Requirements of Directive (EU) 2016/797	Clauses of the Annex to the Technical Specification for Interoperability (TSI)	Clause/ subclauses of this European Standard	Comments
Section 3 of the Annex to the TSI indicates the correspondence between the TSI clauses and the Essential Requirements of Directive (EU) 2016/797	4.2.5.1 Design Geometry of switches and crossings	8.2.1 8.3.1 8.3.2 8.3.3 8.3.4 8.3.5 8.3.8	
	4.2.5.3 Maximum unguided length of fixed obtuse crossings	5.3.6 8.4	
	4.2.8.6 The immediate action limits for switches and crossings	8.2.1 8.3.1 8.3.2 8.3.3 8.3.4 8.3.5 8.3.8	

* **As amended by Commission Implementing Regulation (EU) 2019/776**

NOTE The Technical Specification for Interoperability (TSI) can refer to other clauses of this standard making the application of those clauses mandatory. Possible references to such clauses are found in the Appendix T to the TSI.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the products falling within the scope of this standard.

Bibliography

EN 13674 (all parts), *Railway applications - Track - Rail*

UIC 510-2, *Trailing stock: wheels and wheelsets – Conditions concerning the use of wheels of various diameters*

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