

Railway applications — Track — Switches and crossings —

Part 8: Expansion devices

ICS 45.080

National foreword

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 It supersedes BS EN 13232-8:2007, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted by Technical Committee RAE/2 Railway Applications - Track.

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

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8: Appareils de dilatation

Bahnanwendungen - Oberbau - Weichen und Kreuzungen -
Teil 8: Auszugsvorrichtungen

This European Standard was approved by CEN on 17 February 2007 and includes Amendment 1 approved by CEN on 13 September 2011.

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Foreword

This document (EN 13232-8:2007+A1:2011) 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of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

A1 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 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document. A1

This document includes Amendment 1, approved by CEN on 2011-09-13.

This document supersedes EN 13232-8:2007.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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 series of standards "*Railway applications — Track — Switches and crossings*" 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 the standard. Parts 2 to 4 contain basic design guides and are applicable to all switch and crossing assemblies. The latter parts, from 5 onwards, deal with particular types of equipment, including their tolerances. Part 9 defines the functional and geometric dimensions and tolerances for layout assemblies. These use Parts 1 to 4 as a basis.

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, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

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

These longitudinal movements may be required in:

- a) interrupted CWR (continuously welded rail);
- b) structure movement;
- c) or a combination of both.

1 Scope

This part of EN 13232 covers the following subjects: to establish a working terminology for expansion devices, for their constituent parts and for the types; to specify the minimum manufacturing requirements for expansion devices and their constituent parts; to formulate codes of practice for inspection and tolerances; to define the method by which expansion devices and their parts should be identified and traced.

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

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

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

EN 13232-9, *Railway applications — Track — Switches and crossings — Part 9: Layouts*

EN 13715, *Railway applications — Wheelsets and bogies — Wheels — Wheels tread*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General definitions

3.1.1

hand (of half set) – adjustment switch (bayonet type)

LH (left hand) half set or RH (right hand) when viewed standing in the track gauge and facing the tips of the inside rails.

With check rails, there may be two LH or two RH half sets, see Figure 6, or opposite hand half sets

3.1.2

hand (of half set) – expansion switch

LH half set or a RH half set when viewed standing in the track gauge and facing the toes of the expansion switch

3.1.3

expansion capacity C

maximum permissible relative longitudinal movement between the two rails, where:

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

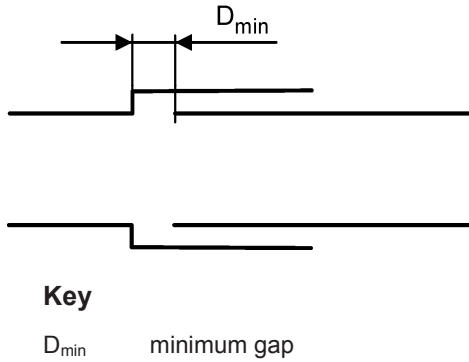


Figure 1 — Closed position

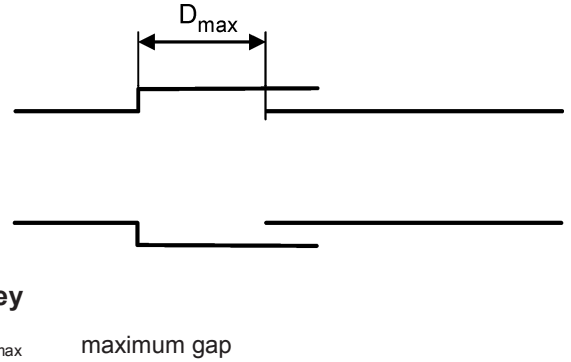


Figure 2 — Open position

3.1.4

relative displacement rail / support

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

3.1.5

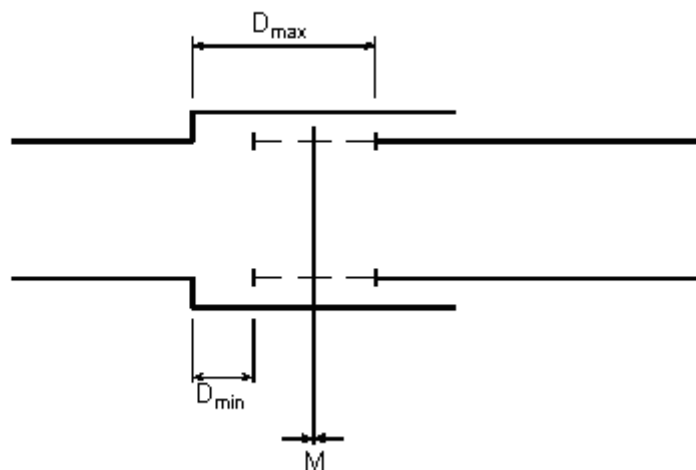
mean position

position where the expansion capacity and the relative displacement of rails are half way, and the bearers are in their nominal position

3.1.6

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



$$M = \frac{D_{\max} - D_{\min}}{2}$$

Key

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

Figure 3 — Mean position

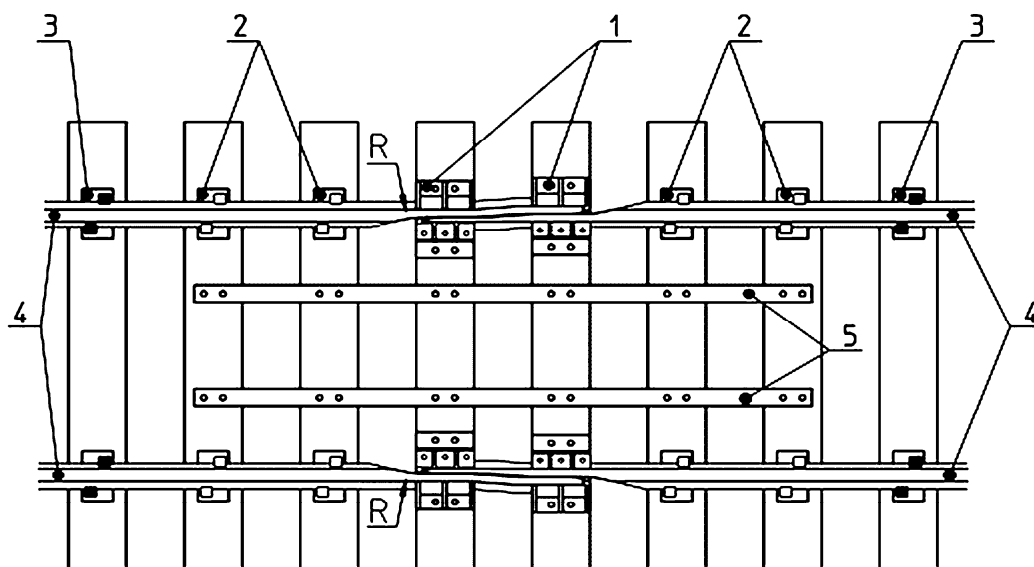
3.2 Main types of expansion devices

3.2.1

adjustment switch (bayonet type)

expansion device with interruption of the running edge

3.2.1.1 Adjustment switch without check rails (both sides moveable)

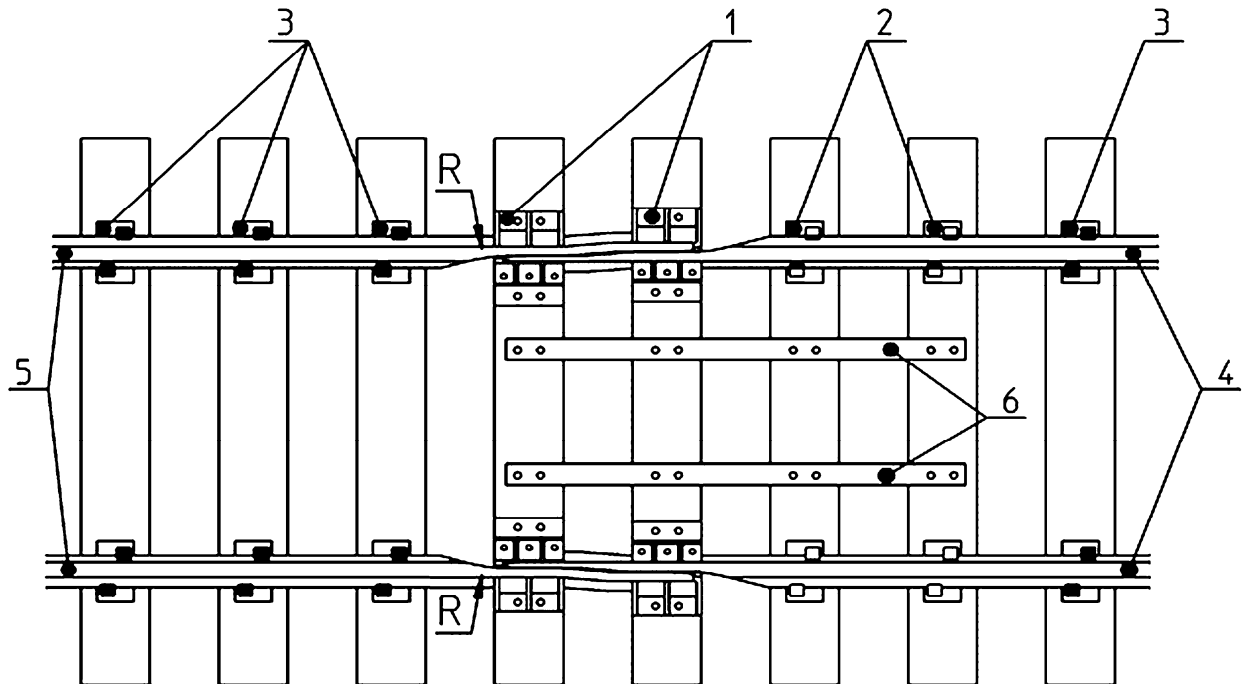


Key

- | | | | |
|---|------------------------|---|-----------------|
| 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

3.2.1.2 Adjustment switch without check rails (one side moveable)

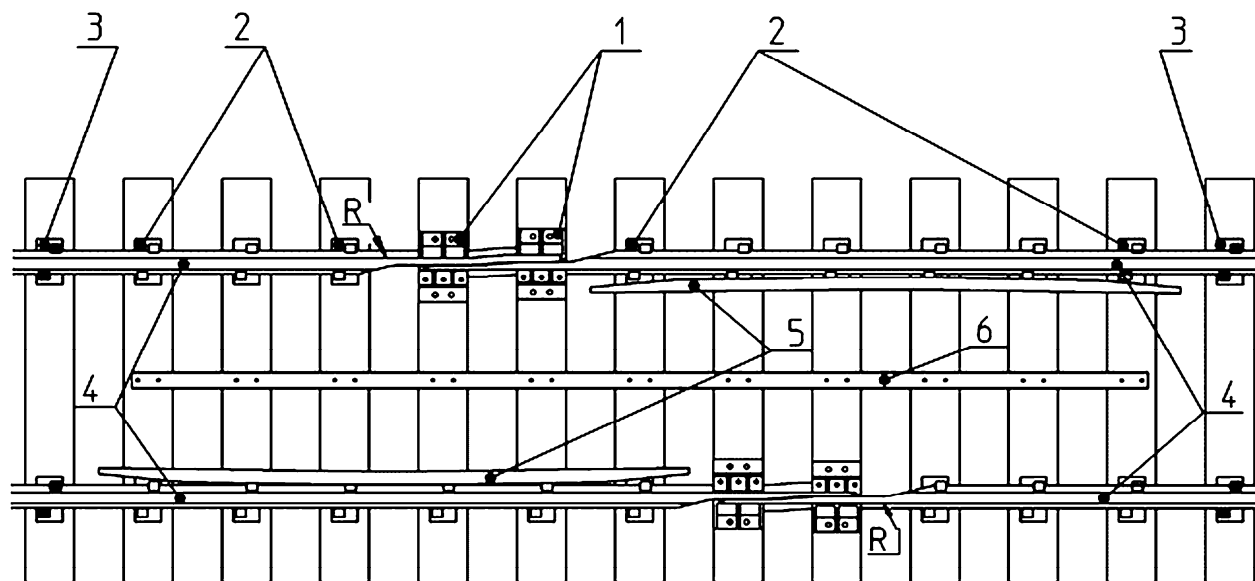


Key

- | | | | |
|---|------------------------|---|-----------------|
| 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

3.2.1.3 Adjustment switch with check rails (both sides moveable)

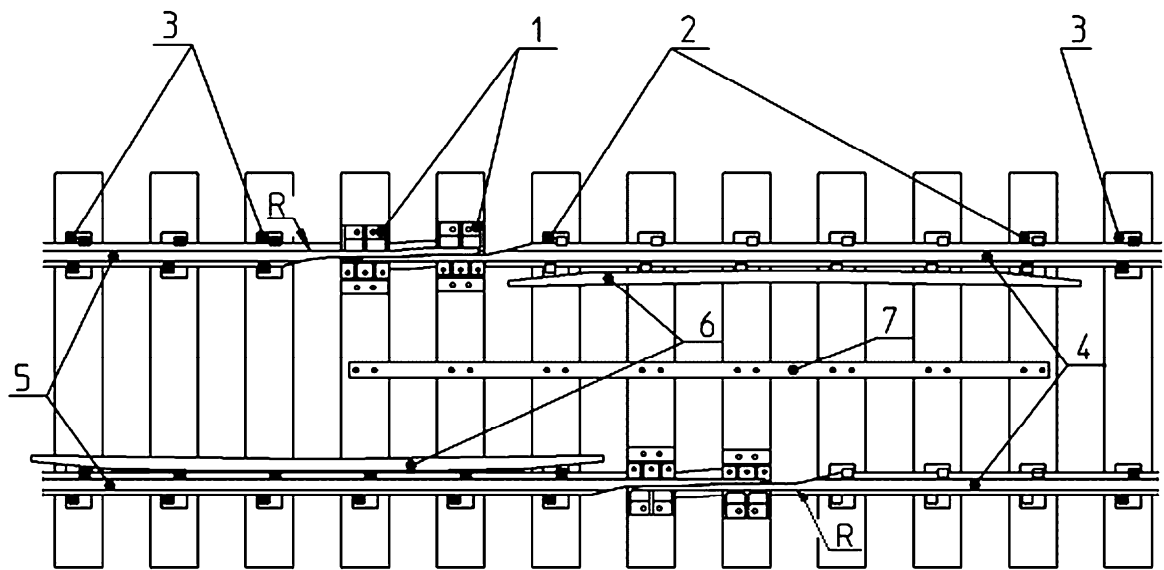


Key

- | | | | |
|---|------------------------|---|-----------------|
| 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

3.2.1.4 Adjustment switch with check rails (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 |

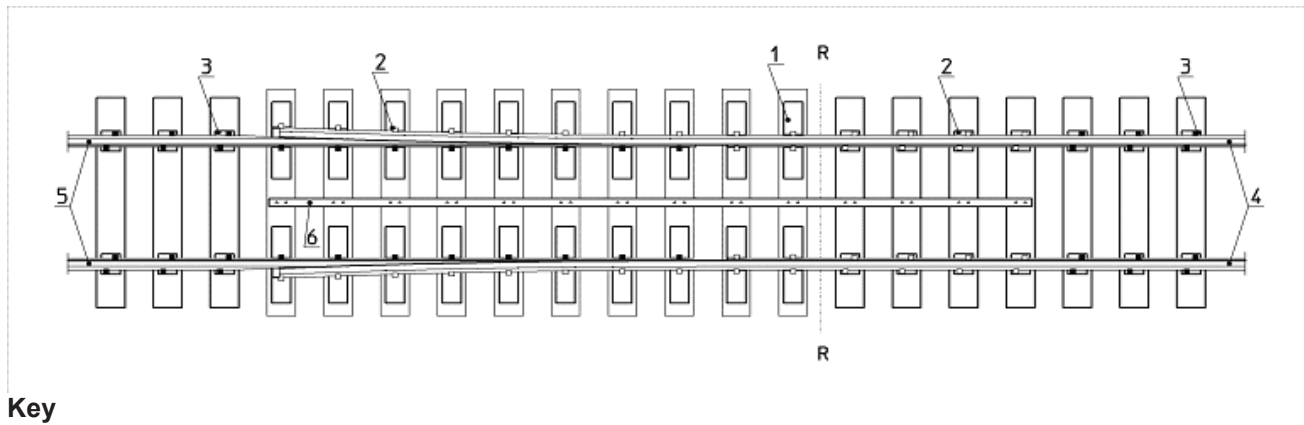
Figure 7 — Adjustment switch with check rails – one side moveable

3.2.2

expansion switch

expansion device without interruption of the running edge

3.2.2.1 Expansion switch with moveable stock rails

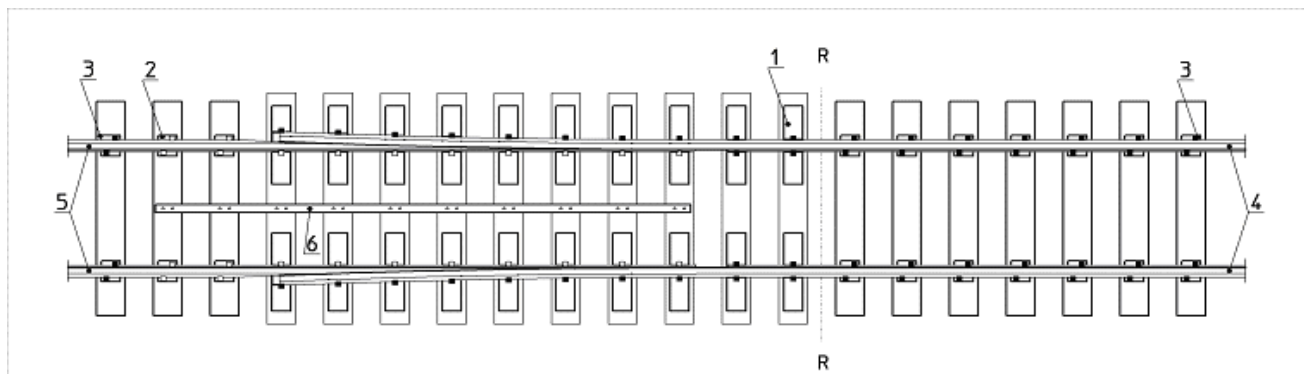


Key

- | | | | |
|---|------------------------|---|--------------------|
| 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

3.2.2.2 Expansion switch with moveable switch rails

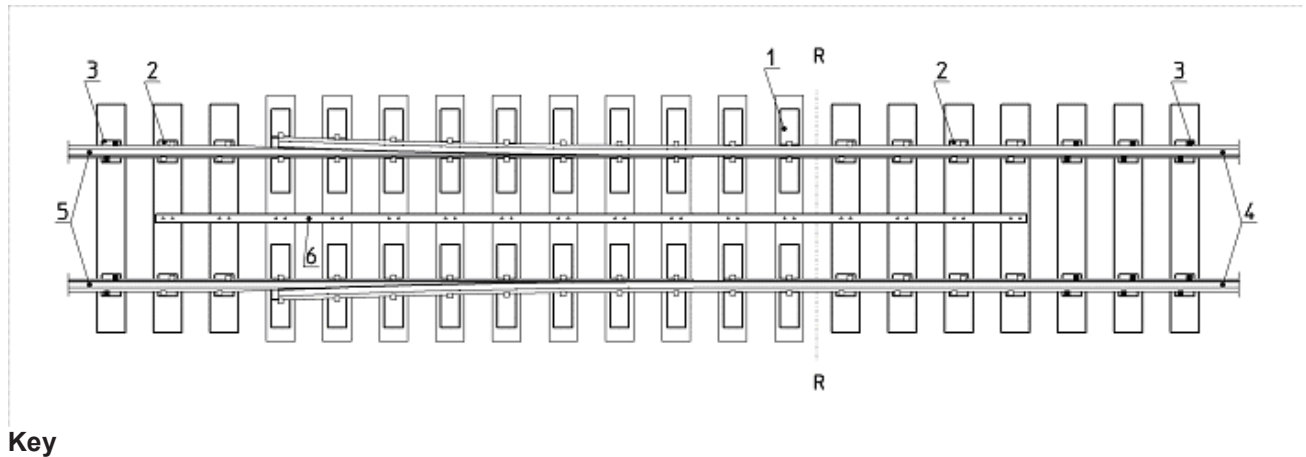


Key

- | | | | |
|---|------------------------|---|-----------------------|
| 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

3.2.2.3 Expansion switch both sides moveable



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

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 1 side is moveable, a number of bearers shall be restrained from moving. This is normally a minimum of four bearers. The incoming rails shall have low resistance fastenings on the restrained bearers to permit movement of the moveable rails.

All restrained bearers are 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 Low restraint fastenings

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.

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.

4.2.1.4 Total longitudinal resistance

The total longitudinal resistance of the expansion device shall be limited in order to permit thermal forces to be reduced at the end of the adjacent track panels.

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 and EN 13232-9.

Lateral movement of the switch toe due the longitudinal movement shall be considered to avoid secant contact.

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. If this gap becomes too large then check rails are required. With wheels in accordance with EN 13715 and UIC 510-2 the maximum permitted gap is 200 mm.

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.

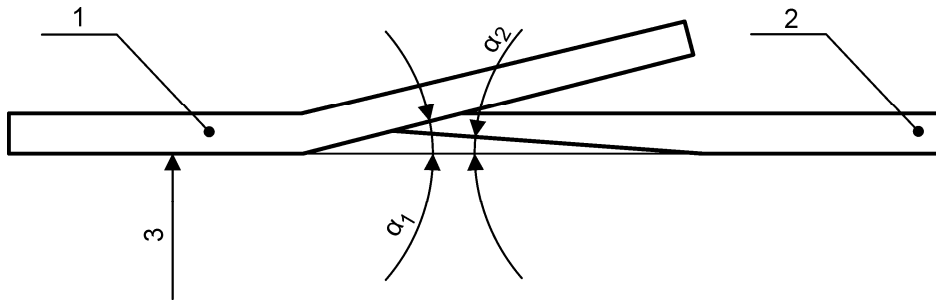
Gauge may vary as a consequence of the construction type.

Switch rail only moves: gauge variation occurs.

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

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

These variations in gauge shall be considered during the design process. 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.



Key

- 1 stock rail
- 2 switch rail
- 3 gauge

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 the relevant European Standard. The materials of fabricated base plates, blocks etc. shall be specified using the respective European Standard. In the absence of an European Standard, the materials shall be defined by their mechanical and chemical characteristics.

All bolts and other fixing devices shall be minimum Grade 5.6. All cast iron fittings shall be manufactured to minimum Grade 200. All spheroidal graphite (SG) iron fittings shall be manufactured to minimum Grade 500/7.

The use of other materials such as cast manganese, pads, insulators, special slide surfaces etc. shall be agreed between customer and supplier.

4.5 Design output

4.5.1 Detailed component plans

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.

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 manufacturer.

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

5.3 Critical dimensions

The following dimensions shall be verified with the 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.

5.4 Adjustment switch (bayonet type)

Table 1 — Rail (fixed and/or moveable)

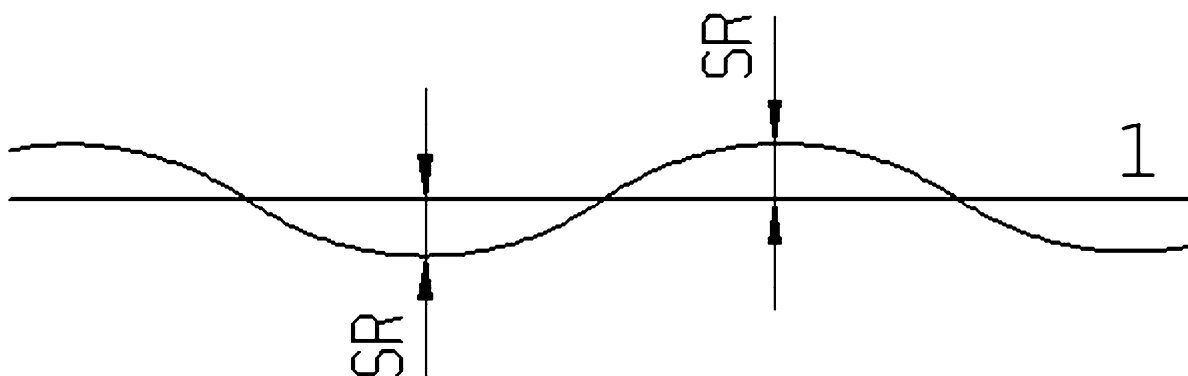
Variable	Description	Tolerance
Not shown	Total length of rail	±3 mm up to 24 m length ±4 mm greater than 24 m
SR	Straightness of the running edge (Figure 12 / 14)	±1 mm and 0,5 mm/1 500 mm
SR	Course of the curve of the running edge (Figure 13 / 14)	±1 mm and 0,5 mm/1 500 mm
IM	Inclination of the machined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

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	Close 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

Table 3 — Full set of adjustment switches

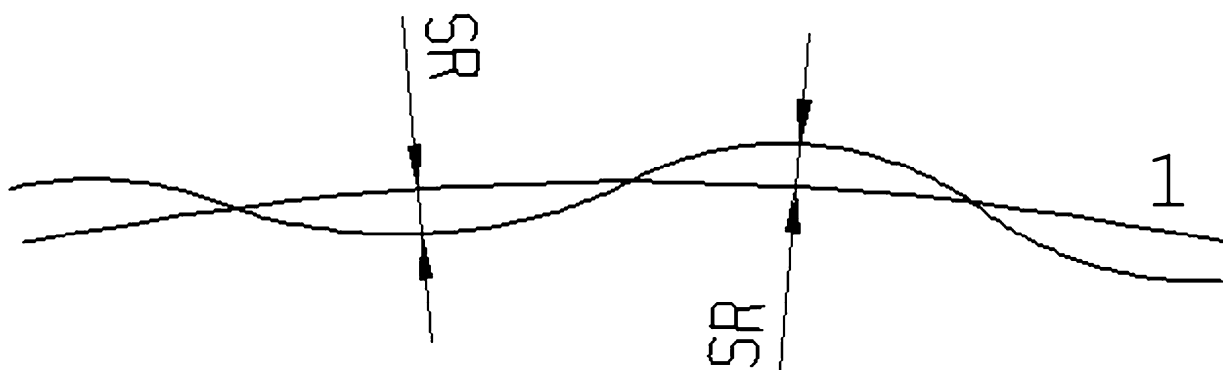
Variable	Description	Tolerance
G	Gauge (Figure 16)	This tolerance shall be in accordance with the tolerance on the surrounding plain line track
CG	Check gauge (Figure 16)	This tolerance shall be based on functional and safety dimensions as described in EN 13232-9



Key

- 1 theoretical running edge
- SR course of the running edge

Figure 12 — Alignment of running edge (straight)

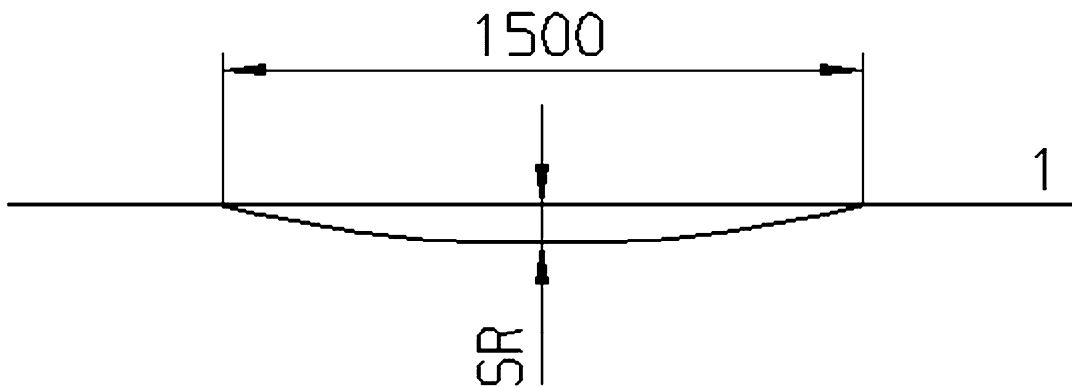


Key

- 1 theoretical running edge
- SR course of the curve

Figure 13 — Alignment of running edge (curved)

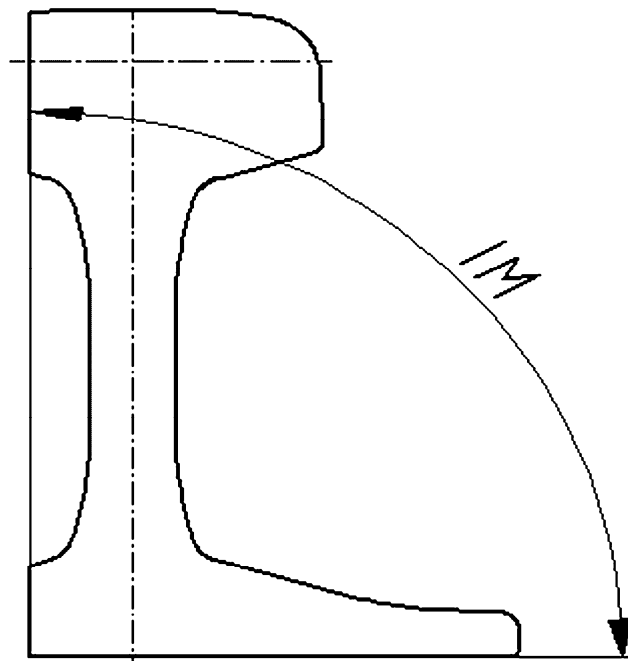
Dimensions in millimetres



Key

- 1 theoretical running edge
- SR course of the running edge

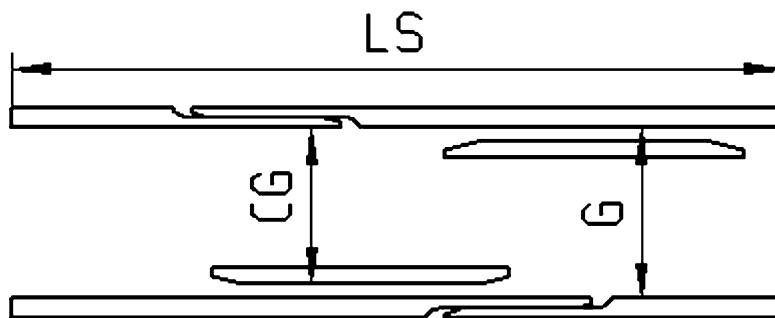
Figure 14 — Local straightness



Key

- IM inclination of the machined contact surface

Figure 15 — Inclination

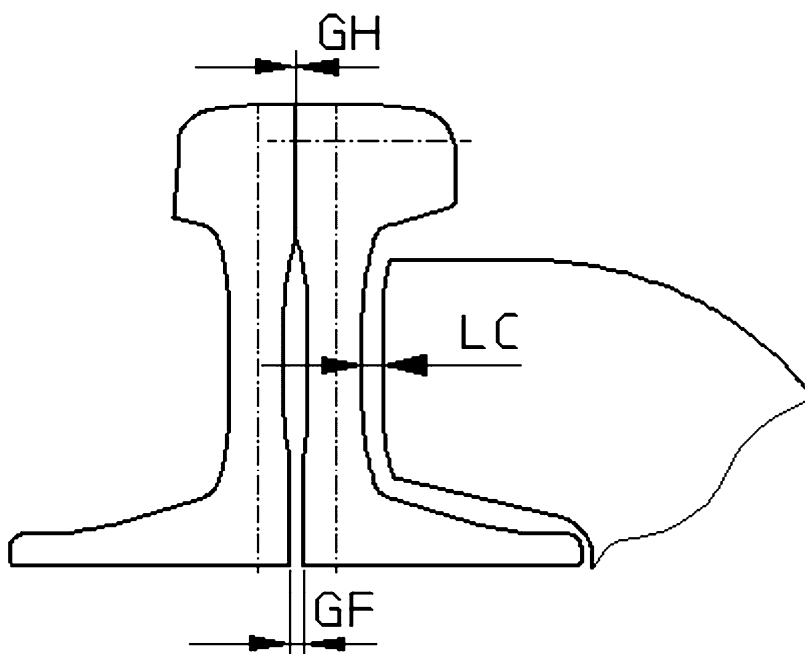


Key

G gauge
 CG check gauge

LS overall constructional length

Figure 16 — Adjustment switch parameters



Key

GH contact between rail heads
 GF contact between rail feet

LC contact between rail and stud

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

5.5 Expansion switch

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)	$\pm 0,5$ (+ tolerance of height of rail)
IM	Inclination of the machined contact surface (Figure 19)	$\pm 0,5^\circ$
Not shown	Diameter of fishbolt holes	+1 mm / -0,5 mm
Not shown	Holes position relative to fishing surface	± 1 mm
Not shown	Holes position relative to end of rail	$\pm 1,5$ mm (for temporary fishplating ± 3 mm)
Not shown	Chamfer of the holes	min. 0,5 mm
Not shown	Roughness of machined running surface areas	Ra 6,3

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)	$\pm 0,5$ (+ tolerance of height of rail)
TM	Thickness at machined area (minimum 3 points or every 1,5 m) (Figure 19 / 20 / 21)	$\pm 0,5$ mm
IM	Inclination of the machined contact surface (Figure 19 / 20 / 21)	$\pm 0,5^\circ$
Not shown	Diameter of fishbolt holes	+1 mm / -0,5 mm
Not shown	Holes position relative to fishing surface	± 1 mm
Not shown	Holes position relative to end of rail	$\pm 1,5$ mm (for temporary fishplating ± 3 mm)
Not shown	Chamfer of the holes	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

Table 6 — Forging area (if applicable)

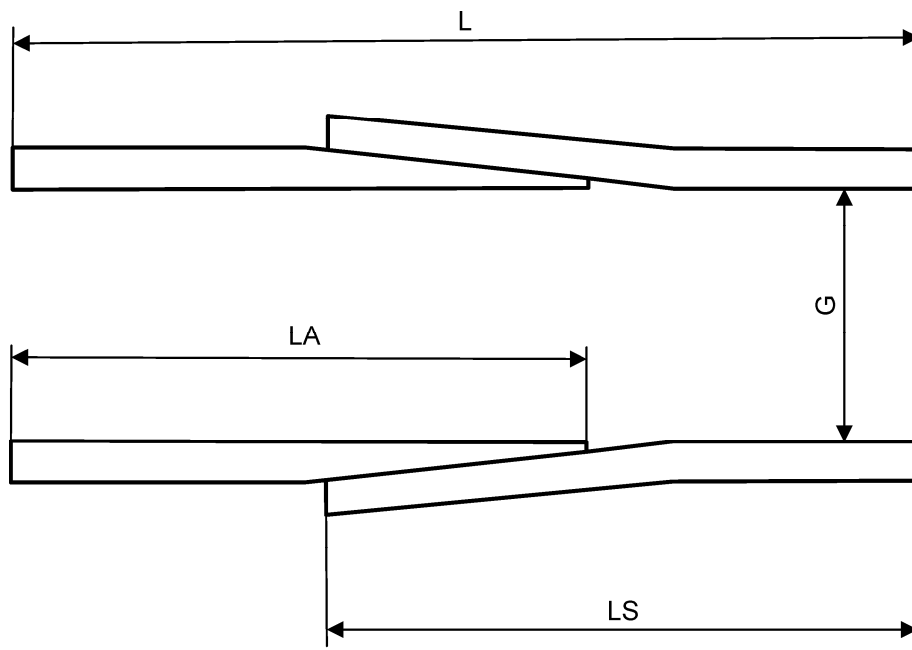
Variable	Description	Tolerance
Not shown	Running table	0,3 mm/1 500 mm
Not shown	Running edge alignment	0,5 mm/1 500 mm
Not shown	End profile	Tolerance according to the rolled rail section
HC	Head profile (Figure 25)	An area of concavity may exist only on the opposite of the running edge. This shall not exceed 2 mm
LT	Transition length (Figure 25)	±10 %
HF	Height difference from one rail foot to the other rail foot (Figure 25)	±1 mm

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 22 / 23)	max. 0,5 mm
LC 1 + LC 2	Lateral clearance at the slide chairs when clamped switch and stock rail modify at (Figure 22 / 23)	+1,5 mm / +0,5 mm
CP	Maximum allowance between tongue and slide plate (Figure 24)	1 mm

Table 8 — Full set of expansion switches

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

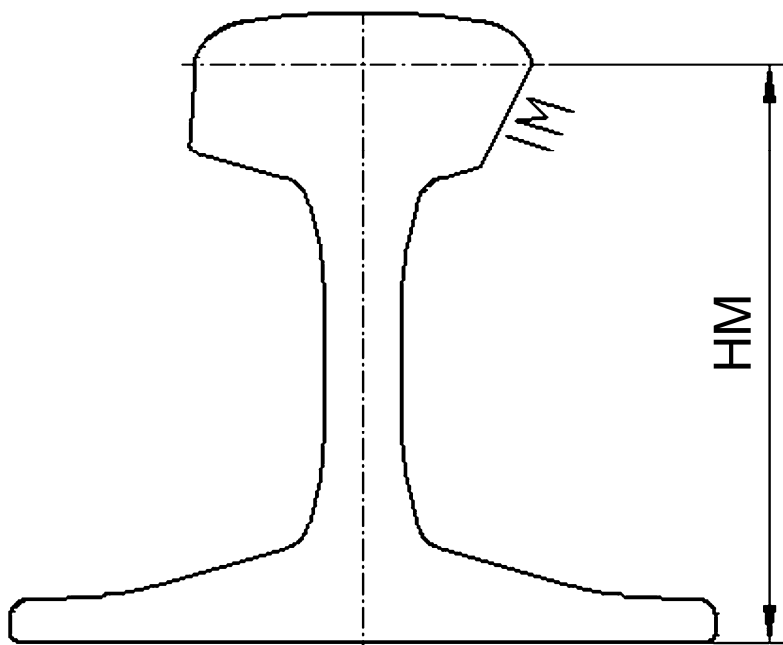


Key

LA switch rail length
 LS stock rail length

G gauge
 L overall length

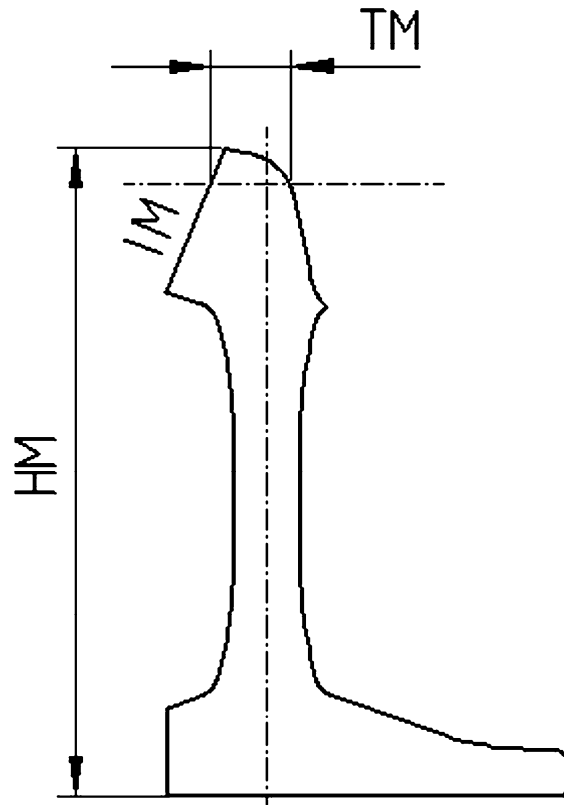
Figure 18 — Expansion switch parameters



Key

IM inclination of machined area
 HM height of machined area

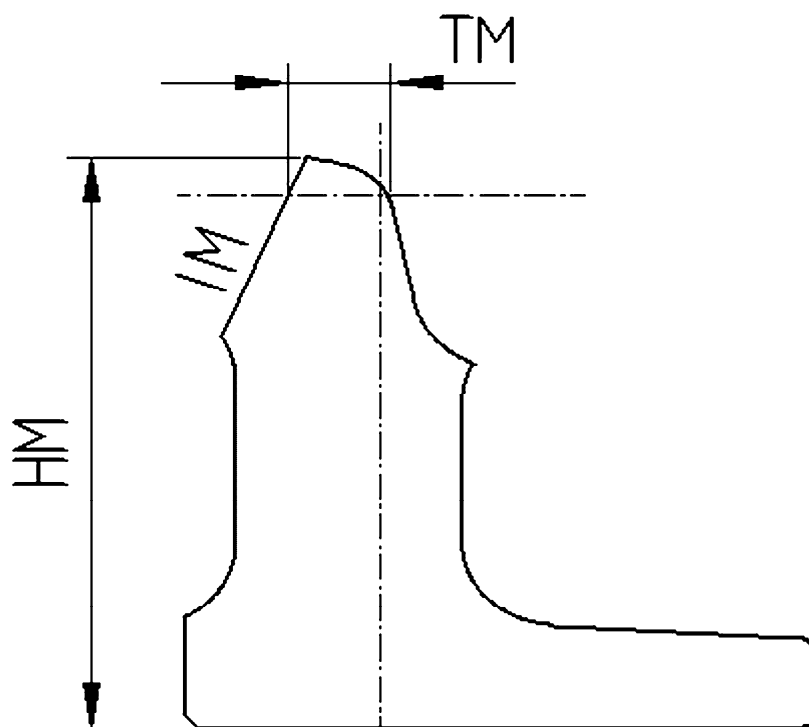
Figure 19 — Critical dimensions for machined rails



Key

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

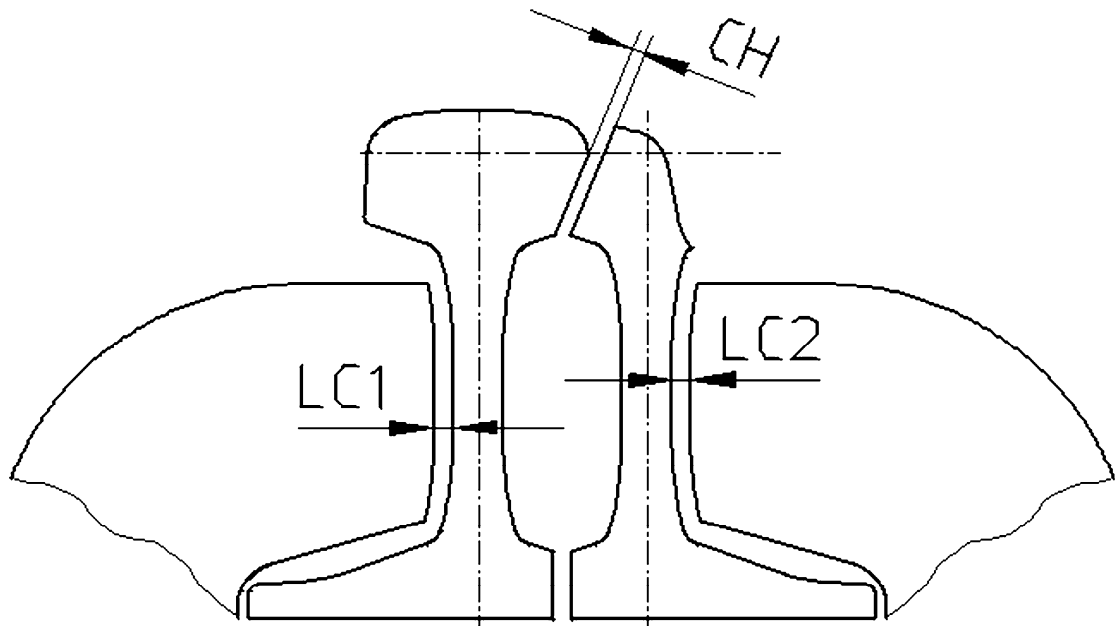
Figure 20 — Critical dimensions for machined rails – full depth switch rails



Key

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

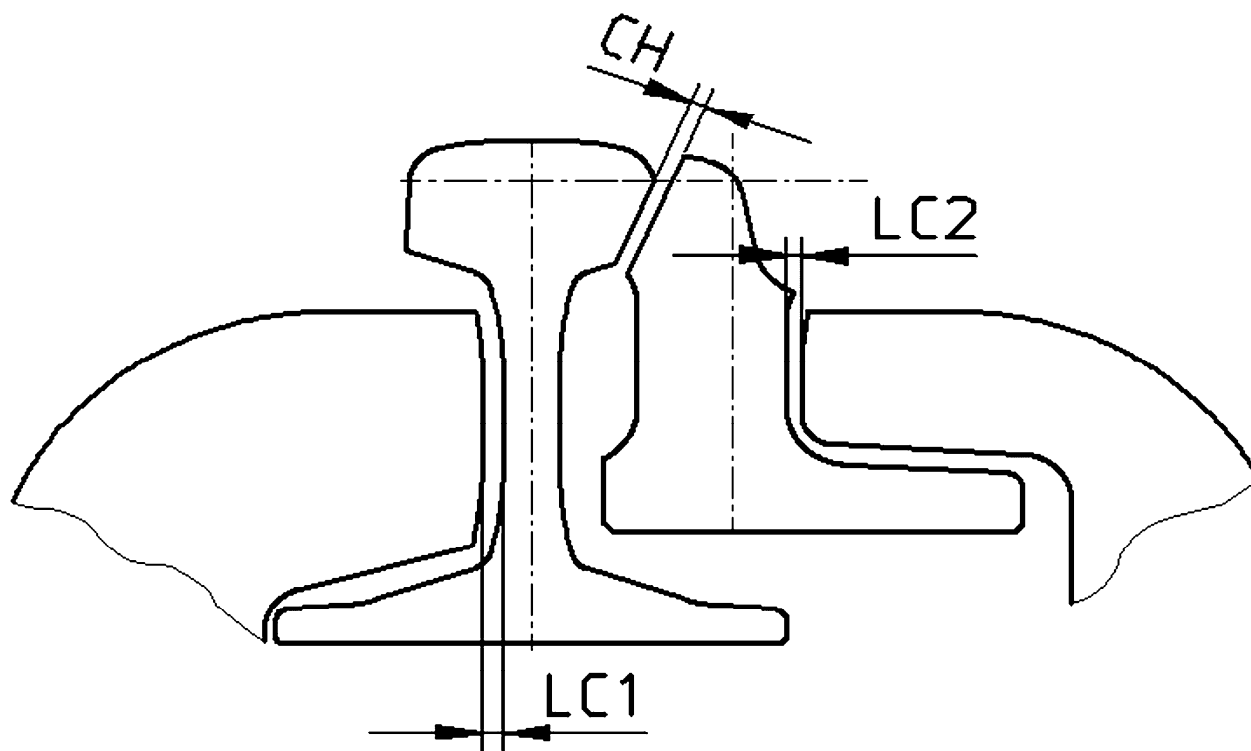
Figure 21 — Critical dimensions for machined rails – asymmetric switch rails



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 switches – contact gaps



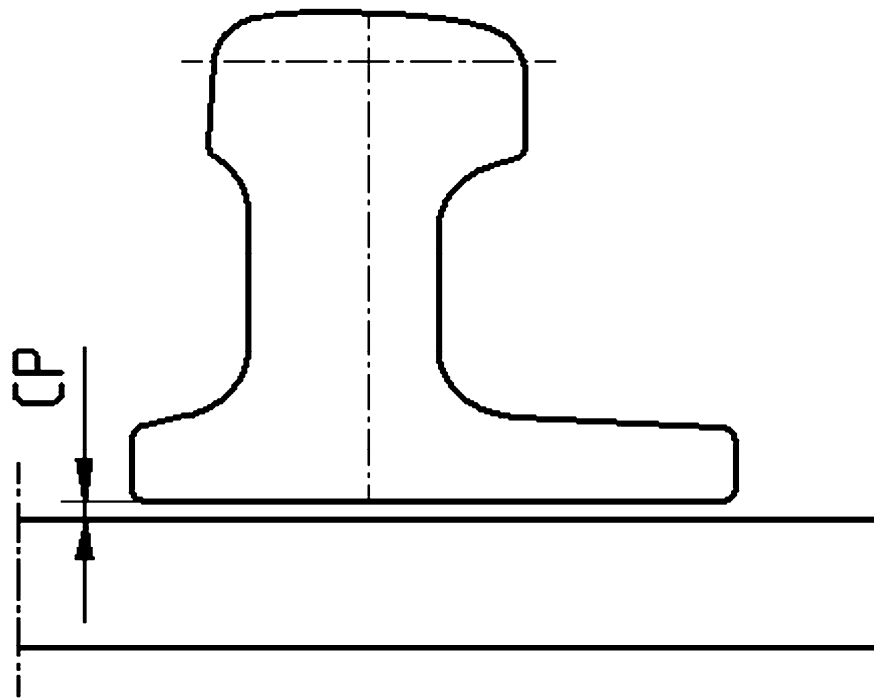
Key

CH contact switch to stock rail

LC1 contact stock rail to stud

LC2 contact switch rail to stud

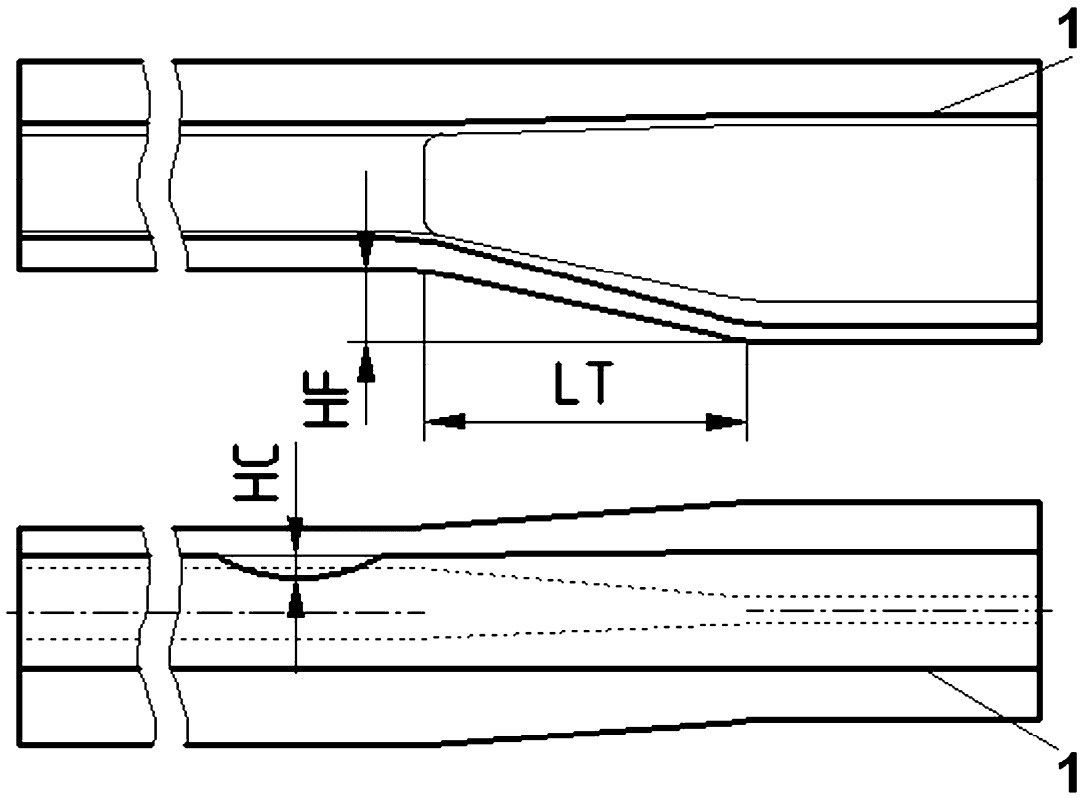
Figure 23 — Critical dimensions for expansion switches – contact gaps



Key

CP flatness/maximum allowance between rail and base plate

Figure 24 — Critical dimensions for expansion switches – rail and base plate contact



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 switch – switch forging (transition) area

5.6 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.

5.7 Methods of examination for structural defects

5.7.1 Visual

This method of examination may be used on all types of expansion devices. In the event of a defect being suspected this may be followed by one or more of the other methods of examination.

5.7.2 Dye penetrant and/or magnetic particle

Dye penetrant can be used on all types of expansion devices. Magnetic particle methods can only be used on magnetic materials and are therefore not suitable for manganese materials.

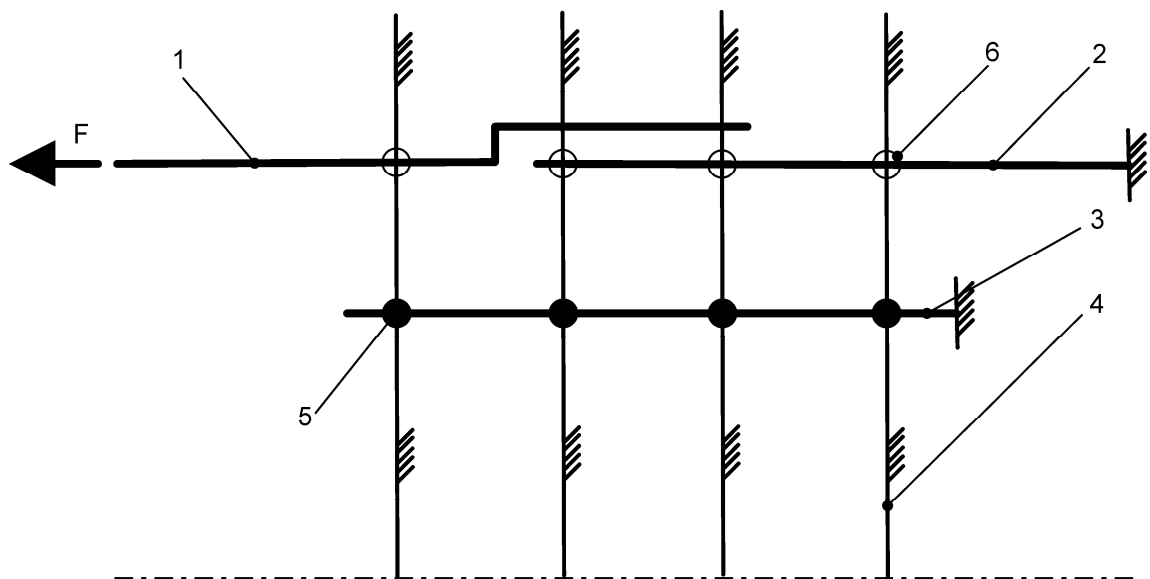
6 Longitudinal resistance testing

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 to 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 | fix 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 at its extreme position (D_{max}). See Figure 2.

The whole procedure shall start again in opposite direction.

During the test the maximum force shall be recorded.

6.2 Test results

The maximum resisting force shall be documented on a test result sheet.

7 Acceptance testing

Only when a prototype design is used, testing in accordance with 6.1 shall be required. The supplier shall perform all necessary testing to ensure that the customer can verify the prototype.

8 Limits and extent of supply

Limit 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 plan.

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 shall be specified by the customer.

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

Annex ZA (informative)

A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC

This European Standard has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the Directive 2008/57/EC¹.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 for HS Infrastructure and in Table ZA.2 for CR Infrastructure confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.


¹ This Directive 2008/57/EC adopted on 17th June 2008 is a recast of the previous Directives 96/48/EC 'Interoperability of the trans-European high-speed rail system' and 2001/16/EC 'Interoperability of the trans-European conventional rail system' and revisions thereof by 2004/50/EC 'Corrigendum to Directive 2004/50/EC of the European Parliament and of the Council of 29th April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system'.

Table ZA.1 — Correspondence between this European Standard, the HS TSI INF, published in OJEU dated 19th March 2008, and Directive 2008/57/EC

Clause(s)/ sub-clause(s) of this European Standard	Chapters/§/annexes of the TSI	Corresponding text, articles/§/annexes of the Directive 2008/57/EC	Comments
4 Design 4.1 Design inputs 4.2 Design rules 4.2.1 General rules 4.2.2 Wheel/rail interaction 5 Tolerances and inspection 5.3 Critical dimensions 5.6 Certification 6 Longitudinal resistance testing 7 Acceptance testing	4. Description of the infrastructure domain 4.2.2 Nominal track gauge 4.2.10 Track geometrical quality and limits on isolated defects 4.2.11 Rail inclination 4.2.12 Switches and crossings 4.2.13 Track resistance 4.2.14 Traffic load on structures 5. Interoperability constituents 5.3.1.1 Railhead profile Annex A – Table A1	Annex III Essential requirements 1. General requirements 1.1 Safety Clauses 1.1.1 – 1.1.2 and 1.1.3 1.2 Reliability and availability 1.5 Technical compatibility	The HS TSI INF is not directly dealing with rail expansion devices Indirect references can be found in chapter 4.2.13. - Track resistance and chapter 4.2.14 – Traffic load on structures

Table ZA.2 — Correspondence between this European Standard, the CR TSI INF published in OJEU dated 14th May 2011, and Directive 2008/57/EC

Clause(s)/ sub-clause(s) of this European Standard	Chapters/§/annexes of the TSI	Corresponding text, articles/§/annexes of the Directive 2008/57/EC	Comments
<p>4 Design</p> <p>4.1 Design inputs</p> <p>4.2 Design rules</p> <p>4.2.1 General rules</p> <p>4.2.2 Wheel/rail interaction</p> <p>5 Tolerances and inspection</p> <p>5.3 Critical dimensions</p> <p>5.6 Certification</p> <p>6 Longitudinal resistance testing</p> <p>7 Acceptance testing</p>	<p>4. Description of the infrastructure subsystem</p> <p>4.2.5.1 Nominal track gauge</p> <p>4.2.5.6 Railhead profile for plain line</p> <p>4.2.5.7 Rail inclination</p> <p>4.2.6 Switches and crossings</p> <p>4.2.7 Track resistance to applied loads</p> <p>4.2.8 Structures resistance to traffic loads</p> <p>4.2.9 Track geometrical quality and limits on isolated defects</p> <p>6. Assessment of conformity of interoperability constituents and EC verification of the subsystems</p> <p>6.2.4.7 Assessment of geometry of switches and crossings</p> <p>6.2.5.2 Assessment of track resistance for switches and crossings</p>	<p>Annex III Essential requirements</p> <p>1. General requirements</p> <p>1.1 Safety</p> <p>Clauses 1.1.1 – 1.1.2 and 1.1.3</p> <p>1.2 Reliability and availability</p> <p>1.5 Technical compatibility</p>	<p>The CR TSI INF is not directly dealing with rail expansion devices</p> <p>Indirect references can be found in chapter</p> <p>4.2.7 – Track resistance to applied loads and chapter</p> <p>4.2.8 – Structures resistance to traffic loads</p> <p>Rails, fastenings and sleepers used for short length of track for specific purposes, for example in switches and crossings, at expansion devices, transition slabs and special structures, are not considered to be interoperability constituents according to § 5.2 of the CR TSI INF</p>

WARNING — Other requirements and other EC Directives may be applicable to the product(s) falling within the scope of this standard. 

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