

Railway applications — Track — Switches and crossings —

Part 6: Fixed common and obtuse crossings

ICS 45.080

National foreword

This British Standard is the UK implementation of EN 13232-6:2005+A1:2011. It supersedes BS EN 13232-6:2005, which is withdrawn.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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Foreword

This document (EN 13232-6:2005+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of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.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 13232-6:2005.

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 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 this 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, 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.

1 Scope

The scope of this European Standard is to:

- establish a working terminology for fixed crossings and their constituent parts, and identify the main types;
- specify the different and varying ways by which crossings can be described using the following parameters:
 - geometry of the crossing;
 - types of construction;
 - design criteria;
 - manufacturing processes;
 - tolerances and inspection.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13145, *Railway applications – Track – Wood sleepers and bearers*

EN 13146 (all parts), *Railway applications – Track – Test methods for fastening systems*

EN 13230 (all parts), *Railway applications – Track – Concrete sleepers and bearers*

EN 13232-1:2003, *Railway applications – Track – Switches and crossings – Part 1: Definitions*

EN 13232-2:2003, *Railway applications – Track – Switches and crossings – Part 2: Requirements for geometric design*

EN 13232-3:2003, *Railway applications – Track – Switches and crossings – Part 3: Requirements for wheel/rail interaction*

EN 13481 (all parts), *Railway applications – Track – Performance requirements for fastening systems*

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

prEN 13803-2, *Railway applications – Track alignment design parameters – Track gauges 1 435 mm and wider – Part 2: Switches and crossings and comparable alignment design situations with abrupt changes of curvature*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13232-1:2003, 6.4, 6.5 and 7.5, and the following apply.

3.1 Parts of crossings

3.1.1 Common crossing

3.1.1.1

overall crossing length

length between the furthest wing front joint from the nose and the furthest vee joint from the nose

3.1.1.2

wing front

length of wing (rail) in front of the crossing nose

3.1.1.3

vee

part of the crossing forming the shape of a letter 'V' which forms support to the wheels

3.1.1.4

throat opening

opening at the narrowest point between the wings

3.1.1.5

throat flare

wing entry flare (front)

machining or setting of wings to give an entry flare into the throat

3.1.1.6

nose

point at which the vee commences at the level of the gauge reference plane

3.1.1.7

nose profile

profile of the nose given when a section has been taken through the crossing at the nose position

3.1.1.8

nose topping

relief machining to the top of the nose to assist in the transfer of the wheel load from the wings to the vee

3.1.1.9

wing opening

opening between the running edges at the running edge height at the wing front end

3.1.1.10

vee opening

opening between the running edges at running edge height at the furthest point of the vee from the nose

3.1.1.11

fishing recess

recess in the rail or casting profile to permit the use of fishplates to form a joint

3.1.1.12

left hand wing

wing to the left hand side of the crossing nose when facing the nose from the wing front

3.1.1.13

right hand wing

wing to the right hand side of the crossing nose when facing the nose from the wing front

3.1.1.14

point rail

rail in a built-up crossing which when machined forms the crossing nose

3.1.1.15

splice rail

rail in a built-up crossing which is spliced into the point rail, forming the crossing vee. The crossing is described as "left hand splice" or "right hand splice" depending on the splice position when the observer is facing the nose from the wing front.

3.1.1.16

wing entry flare (heel)

angle entry at the end of the flangeway gap formed to give a smooth entry of the wheel into the flangeway gap

3.1.1.17

running edge

intersection of the gauge reference plane with the inside of the rail head

3.1.1.18

crossing angle

see EN 13232-1:2003, 7.4.1

3.1.1.19

bonding (if required)

provision for the use of an electrical connection to the crossing for track circuitry

3.1.1.20

flangeway width

width of the groove formed between the wing and the vee at running edge height

3.1.1.21

flangeway depth

depth of the groove formed between the wing and the vee at the running edge height

3.1.1.22

vee block

block between the vee rails or the point and splice rails in a built-up crossing towards the heel end of the crossing

3.1.1.23

throat block

neck block

block between the wing rails at the throat position

3.1.1.24

wing front block

block between the two wing rails in front of the throat

3.1.1.25

flangeway block

block between the wing rails and vee forming the flangeway

3.1.1.26

block bolts or fasteners

mechanical device used to clamp blocks in position

3.1.1.27

web washer

washer used to give a flat suitable face for the bolt or fastener head and nut

3.1.1.28

back of wheel ramp

ramp provided to accommodate worn wheels from causing undue damage to the crossing

3.1.1.29

flange bearing (if required)

when groove depth is less than flange depth on the wheel profile. This permits the wheel to bear on its flange

3.1.1.30

wing entry ramp

ramp provided to accommodate worn wheels from causing undue damage to the crossing when a vehicle is travelling towards the nose from the heel, i.e. trailing

3.1.1.31

weld (aluminothermic, flash butt, electrode etc.)

process used for the fusion between two components

3.1.1.32

intersection of theoretical point

point at which the two running edges intersect

3.1.1.33

parallel flangeway

parallel part of the flangeway

3.1.1.34

baseplate pad width

width across baseplate pad

3.1.1.35

foot thickness

thickness of the foot

3.1.1.36

apron

plate between two rail sections at wing front or vee end

3.1.1.37

fishbolt hole

hole to permit the use of bolts when clamping rail joints using fishplates

3.1.1.38

wing wheel risers (if required)

raised part of the wing rail to lift the wheel over the crossing nose

3.1.1.39

crossing height

the crossing height from underside of base to running table

3.1.1.40

transfer area

area over which the wheel transfers its load from one running surface to another

3.1.2 Specific definitions for obtuse crossings

3.1.2.1

wing (rail)

part of the crossing with horizontal set forming the running rail support between the point rail ends

3.1.2.2

check (rail)

other part with horizontal set ensuring the guidance of the wheel between the obtuse point rails

3.1.2.3

left hand point (rail)

see EN 13232-1:2003, 6.5

3.1.2.4

right hand point (rail)

see EN 13232-1:2003, 6.5

3.1.2.5

nose

point at which the vee commences, at the level of the gauge reference plane formed by the running edge of the point rail

3.1.2.6

nose profile

profile of the nose given when a section has been taken through the crossing at the nose position

3.1.2.7

nose relief flare

entry flare to the check side of the nose to permit smooth entry of the wheel into the flangeway when travelling on the wing rail towards the point, i.e. in the trailing direction

3.1.2.8

knuckle

theoretical intersection of the running edges

3.1.2.9

check entry flare

angled entry at the end of the flangeway on the check to give a smooth entry of the wheel into the flangeway

3.1.2.10

raised check (if required)

when the check is raised above the level of the running table to give increased guidance to the wheel when passing through the knuckle area of an obtuse crossing

3.1.2.11

crossing angle

angle of the tangents to the running edges at their intersection, i.e. the knuckle

3.1.2.12

neck block

block at the knuckle of the crossing

3.1.2.13

spliced check rail (checked obtuse)

extra check rail spliced into the back of the point rail to form a vee to provide additional guidance particularly on sharp curve

3.2 Geometry

The crossings can be:

- straight;
- curve;
- double junction type;
- non-standard.

For details see EN 13232-1:2003, 6.4 and 6.5.

3.3 Construction

Crossings can be monoblock or with assembled pieces with or without welded legs. Monoblock crossings may be made by casting and/or by machining. Assembled crossings may be made of several pieces which can be cast, forged or machined and assembled together mechanically or by various types of welding.

3.4 Joints

The crossings can be joined to the adjacent track by:

- fishplates;
- fishplates for continuously welded track;
- welding;
- insulated joint.

4 Performance requirements

4.1 General

The type of construction shall be decided by the customer after discussion with the supplier.

4.2 Materials

The materials used shall be specified using the respective EN or by their mechanical and chemical characteristics in the non-existence of an EN.

The grade and specification of the rails to be used shall be specified by the customer according to EN 13674. All bolts and other fixing devices shall be minimum grade 5.6. All other blocks and fittings shall be manufactured to minimum grade 200. The use of other materials shall be agreed between customer and supplier.

4.2.1 Assembled crossings, semi-assembled/assembled monobloc

Materials used for the wheel transfer area or in some cases only the crossing nose shall be discussed between customer and supplier. These materials shall only be used with the prior consent of the customer.

4.2.2 Monobloc with or without welded legs

4.2.2.1 Cast austenitic manganese monobloc crossings

Castings shall be of an austenitic manganese steel (generally in accordance with EN, if it exists; if not, then in accordance with UIC 866-0:1985).

4.2.2.2 Other cast monobloc crossings

The material of these crossings shall be discussed between customer and supplier. These materials shall only be used with the prior consent of the customer.

4.2.2.3 Other monobloc crossings

The material and method of manufacture of these crossings shall be discussed between customer and supplier. These materials shall only be used with the prior consent of the customer.

4.3 Inclination of the running table

The running table of the crossing may be inclined or not. The inclination shall be defined by the customer with respect to the adjacent rails.

5 Design requirements

5.1 Geometric data

The following data shall be provided by the customer:

- geometry of the two intersecting gauge lines (straight, circular, clothoid etc.);
- tangent at the theoretical point;
- bearer layout at the crossing (if required);
- position of the gauge plate/check rail strut (if required);
- depth of the crossing e.g. shallow/full depth;
- rail profile;
- rail cant;
- gauge;
- check gauge;
- nose profile;
- flangeway width;

and any other interfaces with the turnout deemed to be necessary for the design of the crossing.

5.2 Rolling stock data

5.2.1 General

The minimum detail requirements according to EN 13232-2:2003 and EN 13232-3:2003 shall be taken into account.

5.2.2 Axle load and spacing

The customer shall specify the value of the maximum axle load for the line where the crossing is to be installed.

5.2.3 Maximum speed

The customer shall specify the value of the maximum speed for the main line according to prEN 13803-2.

5.3 Supports and fastenings

The relationship of the switch panel to the adjacent track and the closure panel, the fastening and supporting systems shall be agreed between supplier and customer according to EN 13230 (all parts), EN 13145, EN 13146 (all parts), EN 13481 (all parts).

It shall be specified by the customer if the crossing is to be welded to the track or joined by fishplates. In the latter case, the type and details of the fishplate to be used shall be specified by the customer, i.e. section details, length, size and number of holes, bolt centre line height above base of rail and material of fishplate.

The customer will indicate the details of fastenings to be used (direct or indirect), in the latter case the type of indirect fastenings.

5.4 Other requirements

The customer shall specify all other requirements that may have an influence on the design of the crossings, and provide all necessary data for them.

EXAMPLES Environmental conditions, electrical insulation, continuously welded rails, applied cant, special maintenance requirements.

5.5 Drawings

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

- machining details;
- sets, bending details;
- position of the running edge and machining reference plane;
- drillings including the pertinent tolerances;
- surface markings.

6 Tolerances and inspection

6.1 General

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

Any dimensions and tolerances relating to special requirements (e.g. operating systems) shall be verified.

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

6.2 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.

6.3 Critical dimensions

The following dimensions shall be verified as part of the inspection process and a record shall be kept for inspection by the customer on request. Any sharp edges shall be de-burred.

Table 1 — Common crossings (see Figures 3 to 9)

Dimensions in millimetres

Dimension	Description	Tolerance
h_1	Running table flatness	0 -1 ^a
h_2	Intermediate running table flatness (1 m length)	0,2
h_3	Underside flatness "every support, shall not deviate more than X mm from the reference plane formed between the two end bearer positions"	2
h_4	Underside transverse flatness at bearer positions. Reference plane is formed between the two outer positions of the bearing surface	1 ^a 1,5 ^b
d_5	Running edge alignment: a) Straight – permissible deviation from the theoretical running edge b) Curved – permissible deviation from calculated offset	± 1 ^c ± 1 ^c
l_6	Length, nose to wing end opening (wing front)	± 2
l_7	Length, nose to heel (vee length)	± 2
l_8	Overall crossing length	+ 2 - 3
d_9	Diameter of fishbolt holes	+ 1 - 0,5
h_{10}	Hole position relative to foot	± 1
l_{11}	Hole position relative to crossing end: a) Normal fishplating b) Temporary fishplating	± 1,5 ± 3
r_{12}	Chamfering of the holes	min. 0,5
b_{13}	Flangeway of wing flare, measured in the gauge reference plane	+ 2 - 1
b_{14}	Parallel or minimum flangeway width, measured in the gauge reference plane	+ 2 - 1
b_{15}	Throat opening, measured in the gauge reference plane	± 2
b_{16}	Straightness of the wing rails, measured in the gauge reference plane	± 1
d_{17}	Shape of vee – transverse at nose. The shape is to be controlled up to a depth of at least 25 mm. The difference to the theoretical profile has to be within a tolerance of	± 1
h_{18}	Shape of vee nose topping. The shape shall be controlled along the length of the topping. The difference to the theoretical profile has to be within	+ 2 - 1
b_{19}	Vee opening at gauge reference plane	± 1 ^a ± 2 ^b
b_{20}	Wing front opening at gauge reference plane	± 1 ^a ± 2 ^b
b_{21}	Crossing foot width at baseplate position	+ 1 - 2
b_{22}	Relative position foot edge/running edge at baseplate position	± 1
r_{23}	Radius of wing rail head, to be checked in the whole transverse area	± 2
Not shown	Maximum roughness of machined wheel contact surfaces	Ra 6,3
^a Monoblock crossings only ^b Other than monoblock crossings ^c ± 0,5 mm over 2 m		

Table 2 — Fixed obtuse crossings (see Figures 10 to 16)

Dimensions in millimetres

Dimension	Description	Tolerance
h_1	Running table flatness	0 - 1 ^a
h_2	Intermediate running table flatness (1 m length)	0,2
h_3	Underside flatness "every support, shall not deviate more than X mm from the reference plane formed between the two end bearer positions"	2
h_4	Underside transverse flatness at bearer positions. Reference plane is formed between the two outer positions of the bearing surface	1 ^a 1,5 ^b
d_5	Running edge alignment a) Straight – permissible deviation from the theoretical running edge b) Curved – permissible deviation from calculated offset	± 1 ^c ± 1 ^c
l_6	Length knuckle to end opening	± 2
l_7	Nose to knuckle	± 2
l_8	Overall crossing length	+ 2 - 3
d_9	Diameter of fishbolt holes	+ 1 - 0,5
h_{10}	Hole position relative to foot	± 1
l_{11}	Hole position relative to crossing end: a) Normal fishplating b) Temporary fishplating	± 1,5 ± 3
r_{12}	Chamfering of the holes	min. 0,5
b_{13}	Flangeway of wing flare, measured in the gauge reference plane	+ 2 - 1
b_{14}	Parallel or minimum flangeway width, measured in the gauge reference plane	+ 2 - 1
b_{15}	Knuckle opening, measured in the gauge reference plane	± 2
b_{16}	Straightness of the check rail, measured in the gauge reference plane	± 1
d_{17}	Shape of the nose transverse. The shape is to be controlled up to a minimum depth of 32 mm. The variation from the theoretical profile as to be within the tolerance of	± 1
h_{18}	Shape of vee nose topping. The shape shall be controlled along the length of the topping. The difference to the theoretical profile has to be within	+ 2 - 1
b_{19}/b_{20}	Running edge to running edge opening at gauge reference plane	± 1 ^a ± 2 ^b
b_{21}	Crossing foot width at baseplate position	+ 1 - 2
b_{22}	Relative position foot edge/running edge	± 1
r_{23}	Radius of wing rail head, to be checked in the whole transfer area	± 2
h_{24}	The difference in height between the running surface and the top surface of the check rail	+ 2 - 3
Not shown	Maximum roughness of machined wheel contact surfaces	Ra 6,3
^a Monoblock crossings only ^b Other than monoblock crossings ^c ± 0,5 mm over 2 m		

6.4 Certification

All materials shall conform to the latest relevant publication.

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

6.5 Methods of examination for structural defects

6.5.1 Visual

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

6.5.2 Dye penetrant and/or magnetic particle

Dye penetrant can be used on all types of crossing. Magnetic particle can only be used on magnetic materials and is therefore not suitable for cast austenitic manganese steel crossings.

6.5.3 Ultrasound

Ultrasound may be used on all types of crossing. There are specific conditions for use on cast austenitic manganese steel material.

6.5.4 Radiography

Radiography can be used on all types of crossing and is particularly useful to examine the internal soundness of cast metallic materials.

7 Limits and extent of supply

Limit and extent of supply shall include all components for the basic manufacture of the fixed crossings. Any requirement for additional items, such as fishplates, fishplate drilling, baseplates and clips shall be specified by the customer.

8 Identification marks

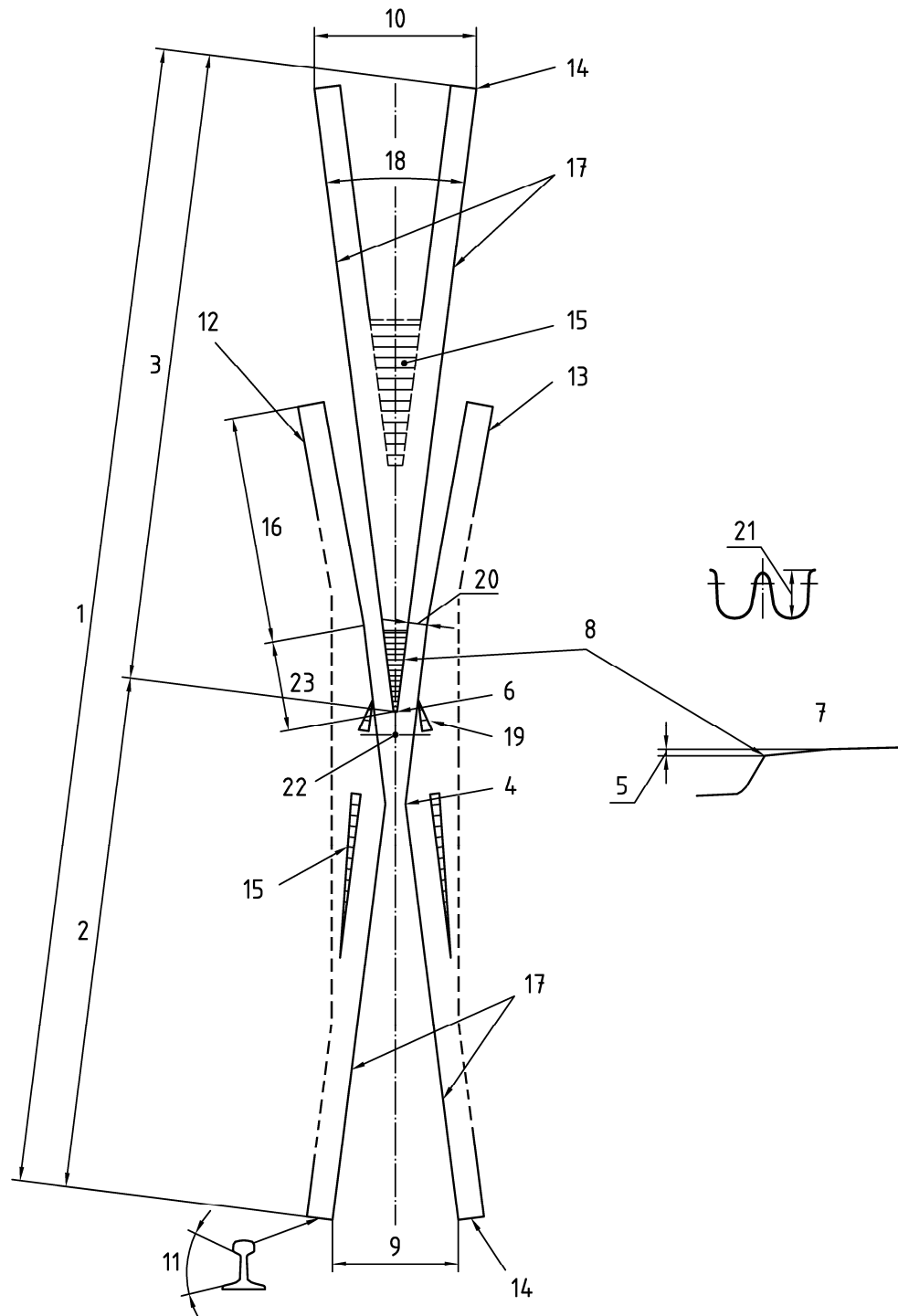
Each crossing shall have an identification marking fixed on the crossing. The design of marking shall be agreed between customer and supplier.

The following minimum information shall be marked:

- manufacturer's mark;
- last two digits of year of manufacture;
- crossing type (rail profile, geometry, left hand, right hand);
- unique identification No.

Other markings shall be specified by the customer.

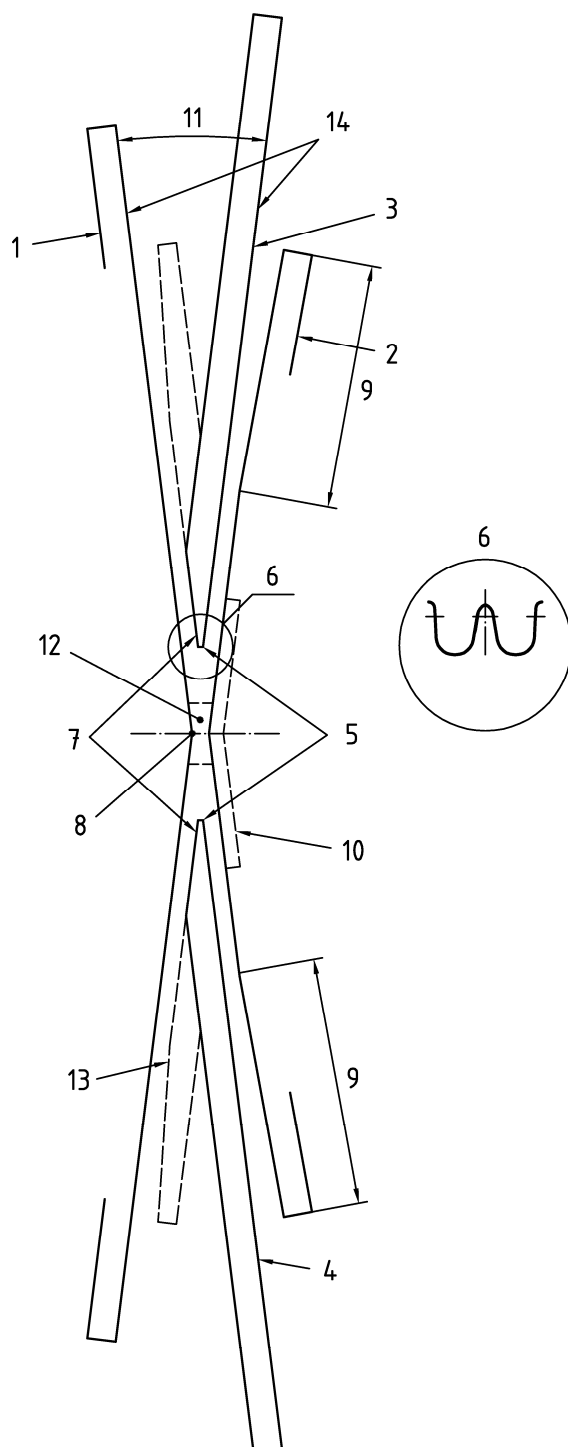
The identification marks concerning dispatch shall be agreed between customer and supplier.



Key

- | | | |
|---------------------|----------------------------------|--------------------------------------|
| 1 Overall length | 9 Wing front opening | 17 Running edges |
| 2 Wing front | 10 Vee opening | 18 Crossing Angle |
| 3 Vee | 11 Fishing recess | 19 Wing entry ramp |
| 4 Throat opening | 12 Left hand wing | 20 Flangeway width |
| 5 Elevation of nose | 13 Right hand wing | 21 Flangeway depth |
| 6 Nose | 14 Bolted point or weld position | 22 Intersection or theoretical point |
| 7 Nose profile | 15 Back of wheel ramp | 23 Parallel flangeway |
| 8 Nose topping | 16 Wing entry flare | |

Figure 1 — Common crossing

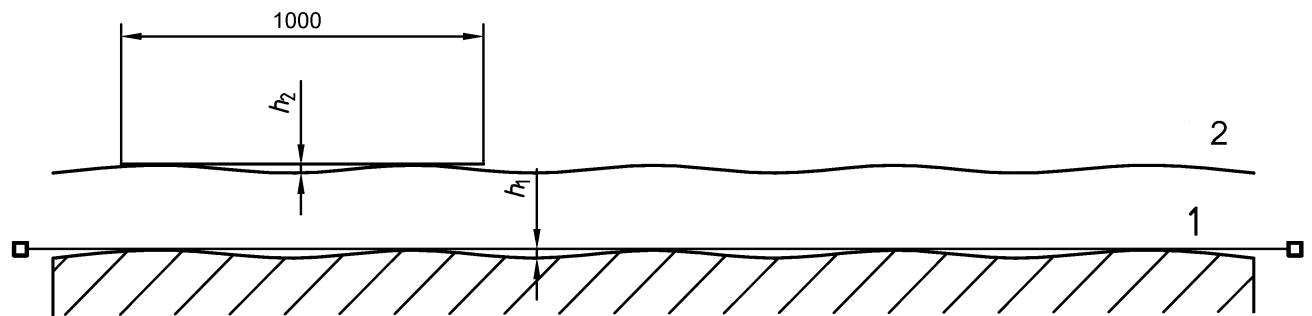


Key

1	Wing (rail)	6	Nose profile	11	Crossing angle
2	Check (rail)	7	Nose relief flare	12	Neck block
3	Left hand point (rail)	8	Knuckle	13	Spliced check rail
4	Right hand point (rail)	9	Check entry flare	14	Running edges
5	Nose	10	Raised check (if required)		

Figure 2 — Obtuse crossing

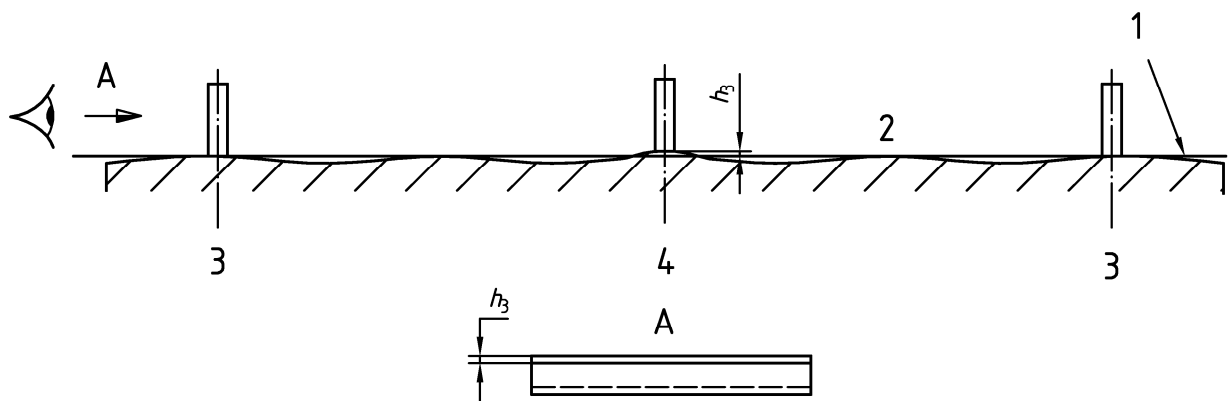
Dimensions in millimetres



Key

- | | | | |
|---|-----------------|-------|--|
| 1 | Reference plane | h_1 | Running table flatness |
| 2 | Top surface | h_2 | Running table flatness (over 1 000 mm) |

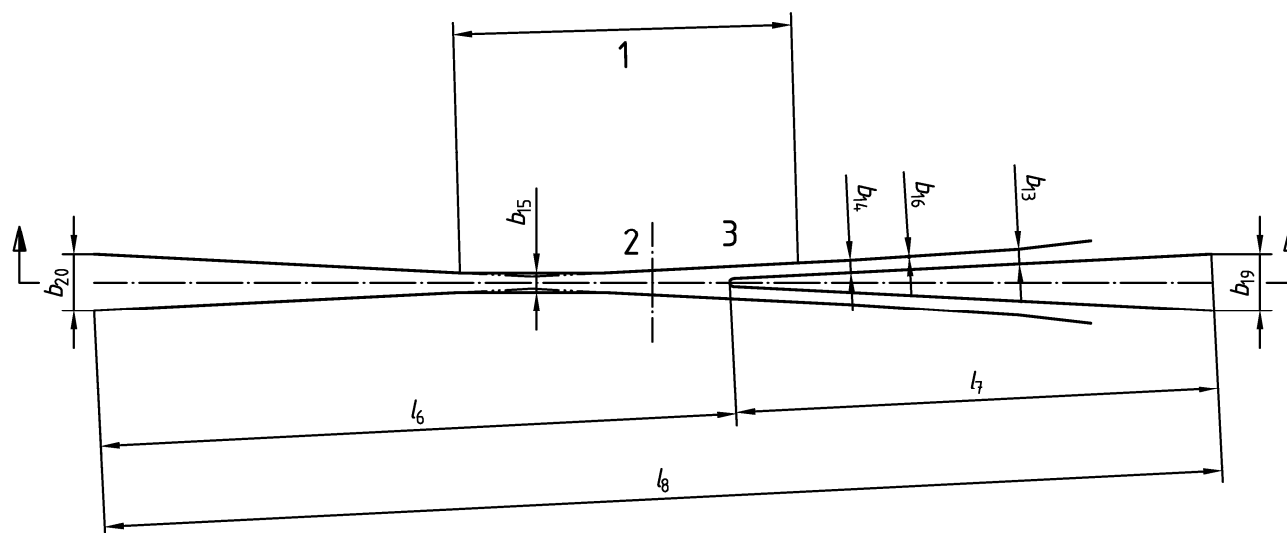
Figure 3 — Critical dimensions for common crossing – top surface



Key

- | | | | |
|-------|--------------------|---|-------------------------------|
| 1 | Reference plane | 3 | End bearer position |
| 2 | Bottom surface | 4 | Intermediate bearer positions |
| h_3 | Underside flatness | | |

Figure 4 — Critical dimensions for common crossing – bottom surface

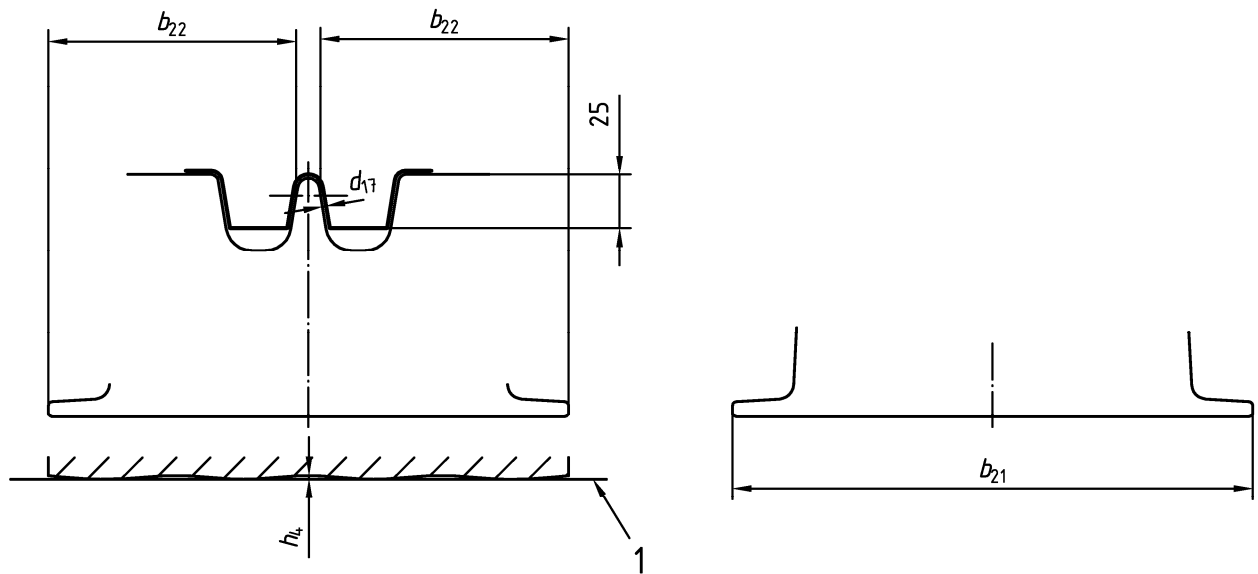


Key

1	Transfer area	b_{14}	Flangeway, parallel
2	Intersection point	b_{15}	Throat opening
3	Nose	b_{19}	Vee opening
b_{16}	Straightness of wing rails	l_6	Length, nose to wing end opening (wing front)
b_{20}	Wing front opening	l_7	Length, nose to heel (vee length)
b_{13}	Flangeway, wing flare	l_8	Overall crossing length

Figure 5 — Critical dimensions for common crossing – openings and lengths

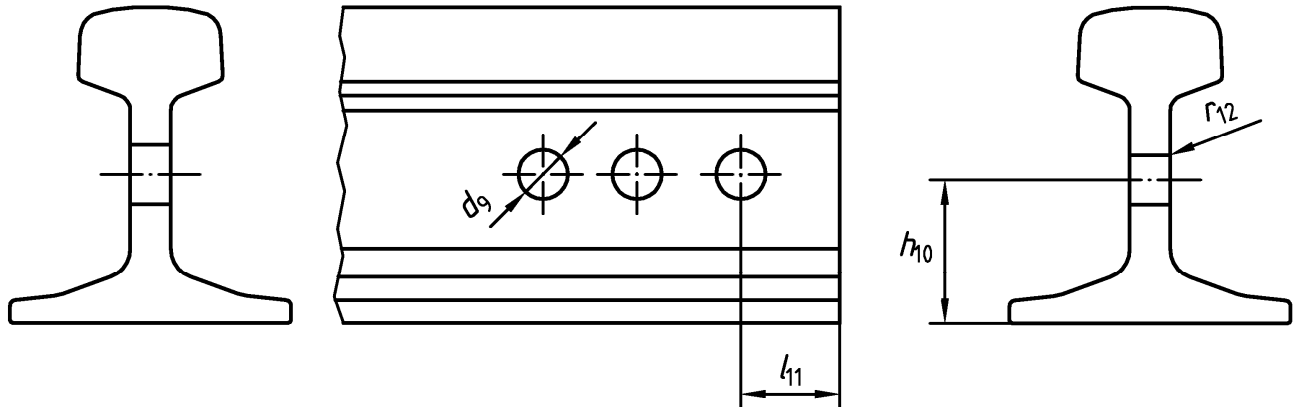
Dimensions in millimetres



Key

1	Reference plane	h_4	Underside flatness
b_{21}	Width at baseplate	b_{22}	Position of running edge relative to foot
d_{17}	Transverse shape of nose		

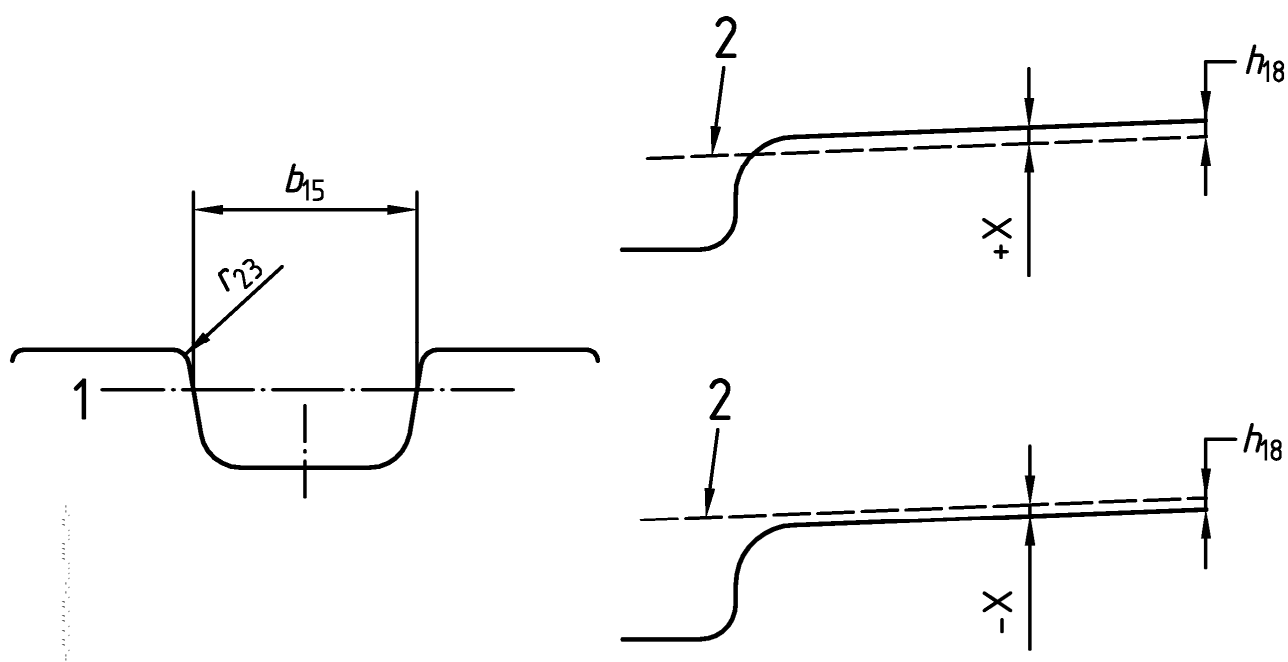
Figure 6 — Critical dimensions for common crossing – cross section



Key

d_9	Diameter of fishbolt holes	l_{11}	Hole position relative to end of crossing
r_{12}	Chamfering of holes	l_{10}	Position of running edge relative to foot

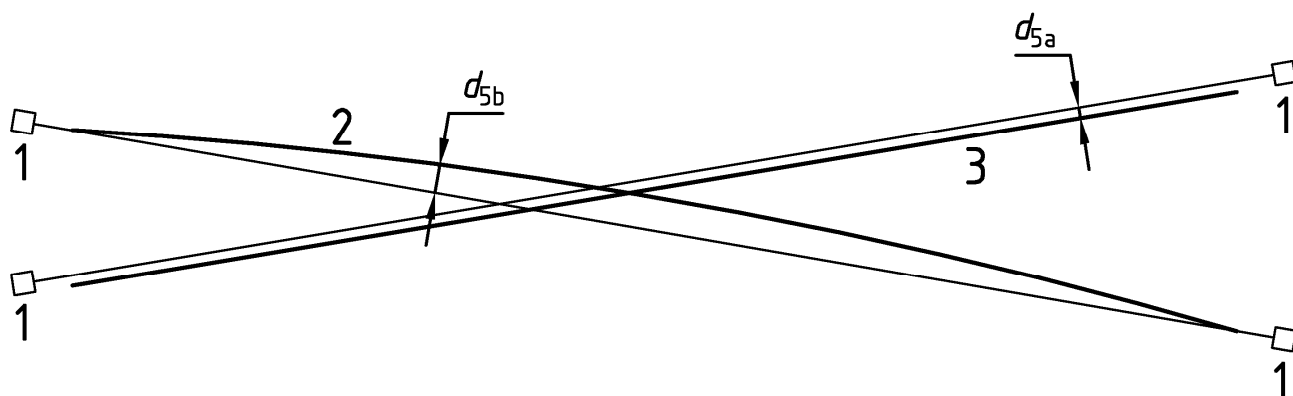
Figure 7 — Critical dimensions for common crossing – hole position



Key

- | | | | |
|----------|--------------------------|----------|---|
| 1 | Gauge line | b_{15} | Throat opening |
| 2 | Theoretical profile | h_{18} | Difference between actual and theoretical topping |
| r_{23} | Radius of wing rail head | | |

Figure 8 — Critical dimensions for common crossing – opening and topping

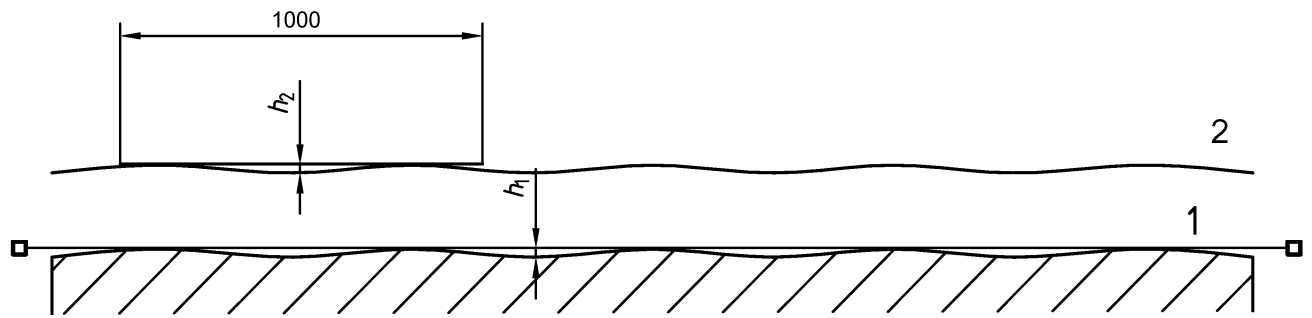


Key

- | | | | |
|---|----------------|----------|-----------------------------------|
| 1 | Reference line | d_{5a} | Deviation along full length |
| 2 | Curve | d_{5b} | Deviation at intermediate offsets |
| 3 | Straight | | |

Figure 9 — Critical dimensions for common crossing – running edge alignment

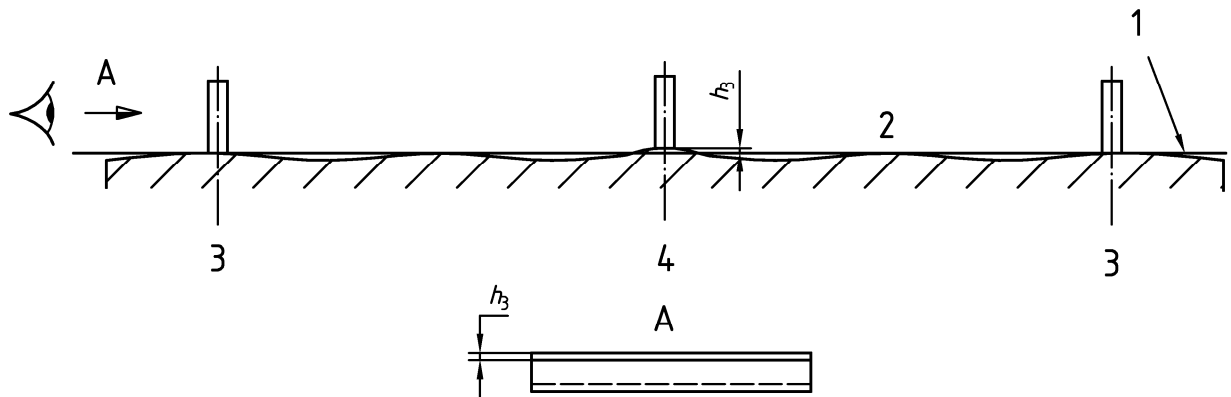
Dimensions in millimetres



Key

- | | | | |
|---|-----------------|-------|---------------------------------------|
| 1 | Reference plane | h_1 | Running table flatness |
| 2 | Top surface | h_2 | Running table flatness (over 1000 mm) |

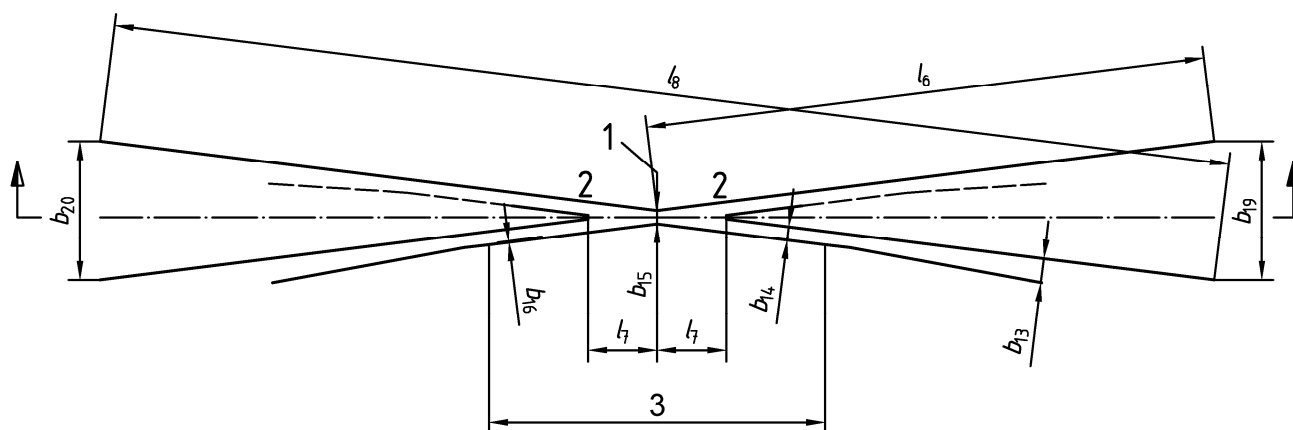
Figure 10 — Critical dimensions for obtuse crossing – top surface



Key

- | | | | |
|---|-----------------|-------|-------------------------------|
| 1 | Reference plane | 3 | End bearer position |
| 2 | Bottom surface | 4 | Intermediate bearer positions |
| | | h_3 | Underside flatness |

Figure 11 — Critical dimensions for obtuse crossing – bottom surface

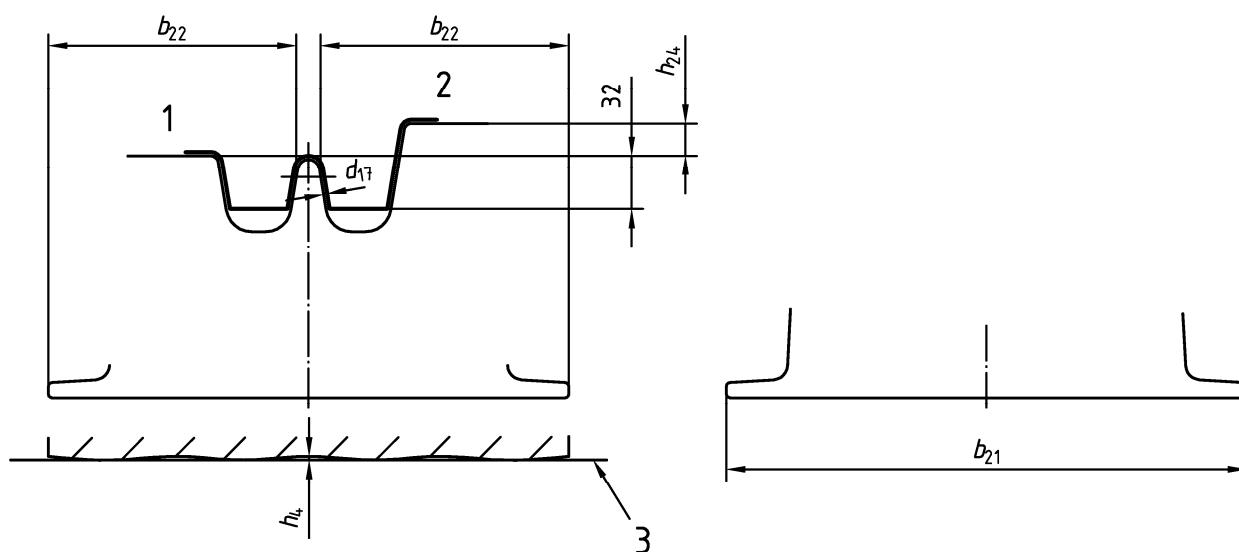


Key

1	Knuckle	b_{15}	Throat opening
2	Nose	b_{19}	Opening
3	Transfer area	b_{20}	Opening
b_{16}	Straightness of wing rails	l_6	Length, nose to wing end opening (wing front)
b_{13}	Flangeway, wing flare	l_7	Length, nose to heel (vee length)
b_{14}	Flangeway, parallel	l_8	Overall crossing length

Figure 12 — Critical dimensions for obtuse crossing – openings and lengths

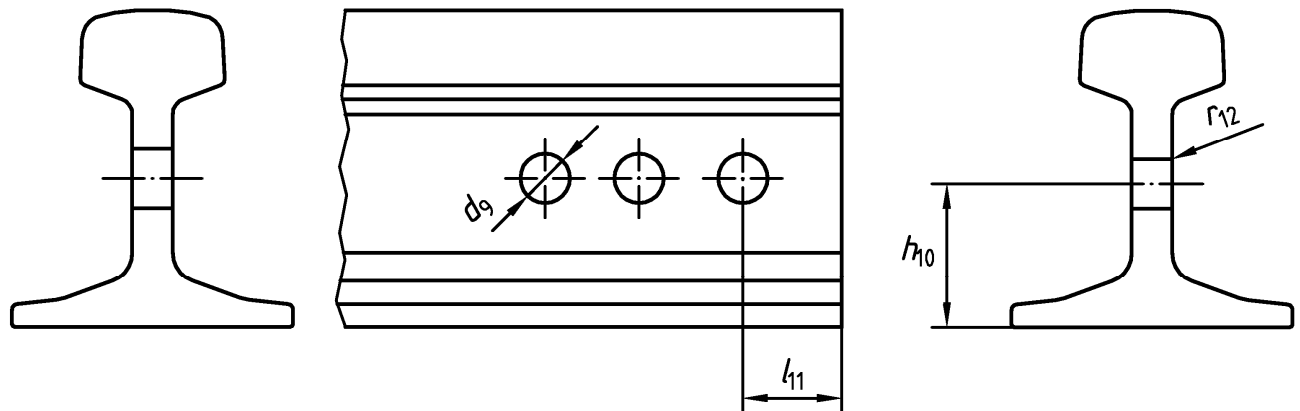
Dimensions in millimetres



Key

1	Wing	d_{17}	Transverse shape of nose
2	Check	b_{21}	Width at baseplate
3	Reference plane	b_{22}	Position of running edge relative to foot
h_4	Underside flatness	h_{24}	Height difference between running surface and check rail

Figure 13 — Critical dimensions for obtuse crossing – cross section

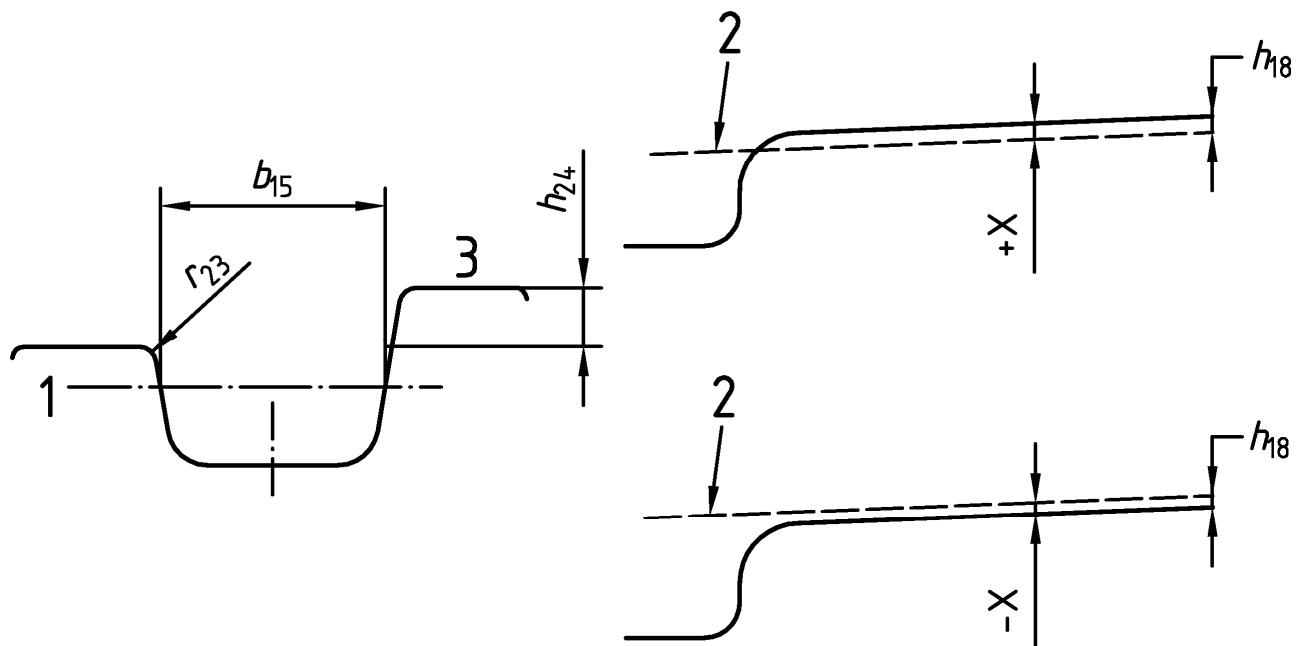


Key

d_9 Diameter of fishbolt holes
 r_{12} Chamfering of holes

l_{11} Hole position relative to end of crossing
 h_{10} Hole position relative fishing surface

Figure 14 — Critical dimensions for obtuse crossing – hole position

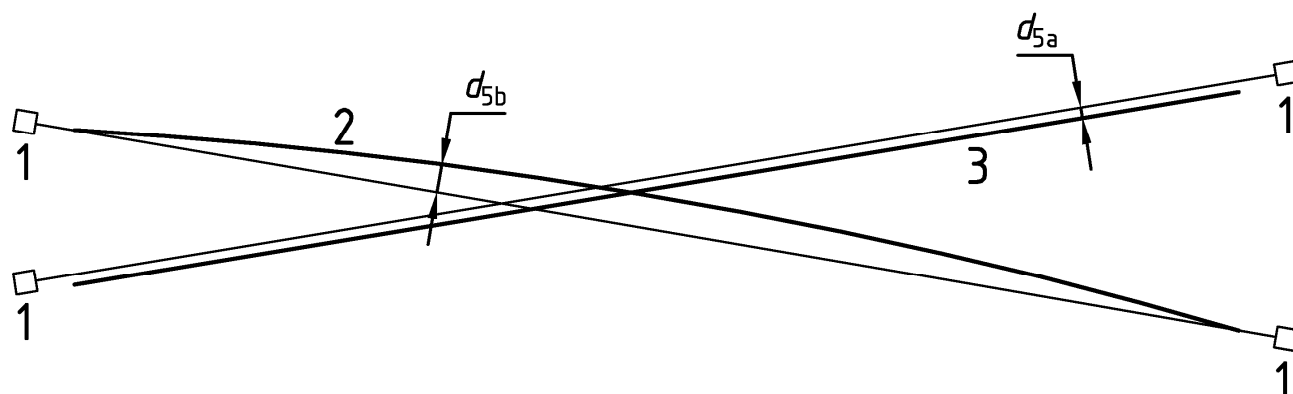


Key

1 Gauge line
2 Theoretical profile
3 Check
 r_{23} Radius of wing rail head

b_{15} Throat opening
 h_{18} Difference between actual and theoretical topping
 h_{24} Height difference between running surface and check rail

Figure 15 — Critical dimensions for obtuse crossing – opening and topping



Key

- | | | | |
|---|----------------|----------|-----------------------------------|
| 1 | Reference line | d_{5a} | Deviation along full length |
| 2 | Curve | d_{5b} | Deviation at intermediate offsets |
| 3 | Straight | | |

Figure 16 — Critical dimensions for obtuse crossing – running edge alignment

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 Performance requirements 4.3 Inclination of the running table 5 Design requirements 5.1 Geometric data 5.2 Rolling stock data 5.2.2 Axle load and spacing 5.2.3 Maximum speed 5.3 Supports and fastenings 6 Tolerances and inspection 6.3 Critical dimensions 6.4 Certification	4. Description of the infrastructure domain 4.2.2 Nominal track gauge 4.2.8 Cant deficiency 4.2.11.b) Rail inclination – Switches and crossings 4.2.12.3 Switches and crossings - Geometrical Characteristics. 4.2.13 Track resistance 5. Interoperability constituents 5.3 Constituents performances and specifications 5.3.1.1.b) Railhead profile – Switches and crossings 5.3.4. c) Switches and crossings – Geometrical characteristics 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	

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
4 Performance requirements 4.3 Inclination of the running table 5 Design requirements 5.1 Geometric data 5.2 Rolling stock data 5.2.2 Axle load and spacing 5.2.3 Maximum speed 5.3 Supports and fastenings 6 Tolerances and inspection 6.3 Critical dimensions 6.4 Certification	4. Description of the infrastructure subsystem 4.2.5.1 Nominal track gauge 4.2.5.4 Cant deficiency 4.2.5.7 2 Rail inclination – Requirements for switches and crossings 4.2.6.2 In-service geometry of switches and crossings 4.2.6.3 Maximum unguided length of fixed obtuse crossings 4.2.7 Track resistance to applied loads 6. Assessment of conformity of interoperability constituents and EC verification of the subsystems 6.2.4.7 Assessment of geometry of switches and crossings 6.2.5.2 Assessment of track resistance for switches and crossings Annex B – Table 21	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	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 to be considered to be interoperability constituents according to § 5.2 (3) of the CR TSI INF

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

Bibliography

- [1] UIC 866-0:1985, *Technical specification for the supply of cast manganese steel crossings for switch and crossing work*

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