# Engineering Standard

## Right of Way

# OTCS 520

# LEVEL CROSSINGS

Version 1.0

Issued August, 2018

Approved by:

# Document control

| Revision | Date of Approval | Summary of change |
|---|---|---|
| 1.0 | August, 2018 | First Issue. Includes content from the following former RIC standards: TS 27 000 1 01, TS 27 000 3 01, TS 27 000 3 02. and CRN CS 520 V1.0 |

# Summary of changes from previous version

| Section | Summary of change |
|---|---|
| | |
| | |
| | |
| | |
| | |

# Contents

# 1 Purpose, scope and application

This Standard establishes design and installation requirements, acceptance standards and damage limits for level crossings, and requirements for passive control treatments at level crossings

It applies to road, pedestrian and service level crossings. Service level crossings include track vehicle access points.

It does not provide requirements for active control treatments at level crossings.

# 2 References

## 2.1 Australian and International Standards

| | |
|---|---|
| AS 1158 - 2005 | Lighting for roads and public spaces |
| AS 1657 -1992 | Fixed platforms, walkways, stairways and ladders – Design, construction and installation |
| AS 1742.7 - 2007 | Manual of uniform traffic control devices Part 7: Railway crossings |
| AS 1743 - 2001 | Road signs - Specifications |
| AS 2150 - 2005 | Hot mix asphalt – A guide to good practice |
| AS 4586 - 2004 | Slip resistance classification of new pedestrian surface materials |
| AS 5100 - 2004 | Bridge design |

## 2.2 CRN documents

| | |
|---|---|
| OTCS 100 | Civil Technical Maintenance Plan |
| OTCS 210 | Track Geometry and Stability |
| OTCS 320 | Overbridges and Footbridges |
| OTCS 410 | Formation & Earthworks |
| OTCS 420 | Track Drainage |

## 2.3 Other references

| | |
|---|---|
| CRN SD 018 | Signal Design Principles – Level Crossings |
| CRN SC 017 | Level Crossing Equipment |
| CRN CM 521 | Level Crossing Manual |
| CRN CP 213 | Trackside Signs |
| AP G17/04 Austroads | Pavement design – A Guide to the Structural Design of Road Pavements |
| NSW Bicycle Guidelines | Roads & Traffic Authority |

## 2.4 Definitions

The following defined terms are used throughout this standard:

| | |
|---|---|
| Level Crossing: | A crossing provided for road motor vehicles, pedestrians and/or livestock traffic to cross rail tracks at grade. May also provide an access point for on and off tracking combination road/rail vehicles. |
| Road Level Crossing: | A level crossing provided for road vehicles to cross the track. |
| Public Level Crossing: | A Level Crossing provided to maintain continuity of a public thoroughfare.<br>Public Level Crossings are available for the use of the general public. |
| Pedestrian Level Crossing: | A level crossing provided for pedestrians to cross the track. |
| Private Level Crossing: | A Level Crossing provided to permit access to private property or to extend access between parts of private property.<br>Private Level Crossings are for the use of property holders and their nominees and are not available for public access. |
| Service Level Crossing: | A level crossing provided for staff and persons authorised by OTHR to cross the track.<br>Service level crossings may be provided at station platforms, in depots and station yards and in field situations for maintenance access.<br>Service level crossings may be permanent or temporary. |
| Level Crossing Structure: | An installation, including the associated support system, providing a continuation of the road/pedestrian pavement to enable road vehicles/pedestrians to cross the railway at grade. |
| Modular Level Crossing: | A level crossing manufactured in concrete or rubber modular sections and assembled on site. |
| Panel: | The individual component in a manufactured level crossing structure. |
| Pedestrian Enclosure: | Fenced area to guide pedestrians on the approach to pedestrian level crossings. Includes a maze arrangement for passive control crossings, and a swing gate for active control crossings. |
| Active Control: | Control of the movement of vehicular or pedestrian traffic across a railway level crossing by devices such as flashing light signals, gates or barriers, or a combination of these, where the device is actuated prior to and during the passage of a train through the crossing. |
| Passive Control: | Control of the movement of vehicular or pedestrian traffic across a railway level crossing by signs and devices, none of which are activated during the approach or passage of a train, and which rely on the road user or pedestrian detecting the approach or presence of a train by direct observation. |
| Authorised Person: | A person authorised by OTHR or its agents to enter onto and cross rail tracks at a Service Level Crossing. |
| Main Road: | A State or Regional Road maintained by the NSW Roads and Traffic Authority. |
| Road Authority: | The entity responsible for the road that the Level Crossing accommodates.<br>For public roads, the Road Authority is usually the NSW Roads and Traffic Authority or the local council.<br>For private roads, the Road Authority is usually the landowner |

See relevant standards for definitions of other terms.

# 3 Engineering authority

Design and selection of infrastructure detailed in this standard may only be undertaken by persons who have been granted appropriate Engineering Authority by the Engineering Manager

# 4 Functional requirements

Level crossings are installed to provide a safe track crossing, at grade, for road, pedestrian and stock traffic. Level crossings also provide access to the track for road/rail vehicles.

A safe crossing equates to the ability to:

- warn users (rail, road and pedestrian users) of the existence of a level crossing
- warn users of the approach of conflicting traffic with sufficient time for protective action to be taken
- allow for the passage of specified (size, weight and speed) road, rail and pedestrian traffic.

# 5 Design requirements

## 5.1 General

The design of new and upgraded level crossings shall be based on the requirements specified in this document.

Designs shall include:

- crossing structure suitable for the traffic loads
- provision of a flangeway for train wheels
- guard rails (where required)
- end restraints for panels
- skid resistant road surface
- slip resistant pedestrian surface
- provision for surface water to flow away from the crossing
- track drainage
- interface with the track structure
- interface with the track geometry
- reliable insulation so as not to interfere with track circuits for signalling, including for typical in-service situations
- traffic control treatments.

The level crossing structure at a location shall be of consistent type and material. There should not be a mix of panels and full depth construction, nor a mix of panel material type.

The design of control treatments at level crossings shall be based on AS 1742.7 “Manual of uniform traffic control devices Part 7: Railway crossings” and the requirements specified in this document.

The design of pedestrian level crossings shall comply with the requirements of AS 1742.7.

The track at the level crossing shall comply with relevant Engineering Standards and Specifications.

## 5.2 Location

Level crossings shall be located clear of:

- the length of track occupied by trains standing at railway signals
- turnouts and insulated joints.

In addition, passive control level crossings shall be located in accordance with the sight distance requirements detailed in this standard and clear of existing installations which restrict sight distance.

## 5.3 Design loads

Level crossing structure designs shall be based on the traffic using the crossing.

Road pavement level crossings shall be designed in accordance with Austroads publication AP G17/04 “Pavement design – A Guide to the Structural Design of Road Pavements”.

Road modular level crossings shall be designed to carry the traffic loads as specified in AS 5100.2 ”Bridge design - Design loads”.

Track vehicle access crossings shall be designed for the range of vehicles using the crossing to access the track. The minimum design load shall be the R20 truck – see Engineering Standard OTCS 320 “Overbridges and Footbridges” for details of R loading configuration. If heavy construction equipment is to use the crossing, the crossing shall be designed as a road level crossing.

Pedestrian level crossings shall be designed to carry pedestrian loads and, where relevant, traffic loads from vehicles travelling along the rail corridor which may drive over the crossing. The minimum load shall be the pedestrian loads in AS 5100.2. The minimum traffic load shall be the R20 truck.

In yards and sidings only, service pedestrian level crossings may be designed for the walkway loads in AS 1657 “Fixed platforms, walkways, stairways and ladders – Design, construction and installation”.

## 5.4 Flangeways

Level crossings shall be designed to provide a clearance to the running rail for train wheel flanges.

Level crossings shall have a minimum flangeway clearance of 60 mm.

Pedestrian level crossings shall have a maximum flangeway clearance of 65 mm as new, maintained to 75 mm..

## 5.5 Guard rails

Guard rails shall be provided on all public and some private level crossings:

The length of the guard rails shall be the design width of the level crossing plus 600 mm for each tapered end (run-in) of the guard rail. The taper shall be 25 mm over the length of the run-in.

The top of the guard rail shall be level with the top of the running rail.

If the flangeway edges of level crossing panels are steel, tapered ends similar to guard rails shall be provided.

## 5.6 Surface material

### 5.6.1 Asphalt level crossings

Asphalt for level crossings shall be designed and installed in accordance with AS 2150 “Hot mix asphalt – A guide to good practice”.

Road level crossings shall use an asphaltic concrete mix for heavy traffic wearing course applications.

Pedestrian level crossings shall use an asphaltic concrete mix for light traffic wearing course applications.

Service level crossings shall use an appropriate asphaltic concrete mix based on the traffic load on the crossing.

### 5.6.2 Modular level crossings

#### 5.6.2.1 General

The level crossing structure shall consist of internal panels to span between the rails of an individual track and external panels for a distance not less than 580 mm outside each rail of that track.

Larger external panels may be designed to span the entire space between adjacent tracks.

The internal panels and the edge of external panels parallel to and adjacent to the rails may be supported either by the track structure or from the rails.

The edge of external panels parallel to and remote from the rails may be supported either by the pavement subgrade or an independent edge beam. Where an edge beam is not used, the road surface abutting the crossing shall be provided with an edge and support independent of the external panels to the level crossing surface system to enable removal of the external panel(s) without damage to the abutting road or footpath surfacing.

Panels shall be properly secured by end restraints.

The panels shall provide a crossing surface which is devoid of any pedestrian tripping hazards.

The panels shall butt up securely in the longitudinal direction so as not to create a hazard for wheelchairs and bicycles.

The level crossing structure shall be designed so that it can be removed, and reinstalled or replaced, either for replacement purposes or to gain access to the track for maintenance or inspection without damage to the component parts of the level crossing structure.

There shall be no appreciable degradation of performance of the level crossing structure under weather conditions to be expected in NSW.

Level crossing panels for use in track circuited locations shall not have steel edges that extend fully around the panel because of the potential for shorting track circuits.

#### 5.6.2.2 Constraints on use of panels for road crossings

The suitability of panels depends on road vehicle speed and other factors such as the presence of impact initiators and the angle of the road crossing the track.

Panels shall not be used on level crossings where curve radius is < 400m.

All panels on road level crossings shall be heavy duty.

Some panels are not suitable for use on road crossings where the road vehicle speed exceeds 80 km/hr. Refer to Appendix 1 for details of approved products.

Panels shall not be used on road crossings where the angle of the road crossing the track is more acute than 30 degrees.

#### 5.6.2.3 Additional constraints on use of steel panels for road crossings

Steel panels may only be installed in low speed, low usage private, public and service road level crossings.

# 6 Configuration requirements

## 6.1 Public road level crossings

### 6.1.1 Crossing configurations

Approved configurations for use in public level crossings are:

- Asphaltic concrete,
- concrete
- concrete panel,
- rubber panel
- steel panel
- compacted road base

Formed gravel and timber road surfaces are only approved for public level crossings where traffic volumes and approach speeds are low.

Ballast road surfaces are not approved for public level crossings but may be used for private and service level crossings.

Where road base containing any material that may contaminate the ballast is used it should be separated from the ballast by a suitable geotextile.

The surface runoff should be directed away from the track structure.

The approach road construction should not interfere with the track and cess drainage.

### 6.1.2 Crossing width

The width of the level crossing shall accommodate the largest vehicle using the crossing.

The width of the crossing and the approaches shall be constant.

Where reasonably practicable, the intersection between road and railway shall be at right angles.

### 6.1.3 Crossing surface

The level crossing surface shall be level with the rail surface and plane between the two rails.

The road surface shall be no higher than the rail level.

The crossing surface shall be stable under acceleration, braking and turning forces without undue vertical displacement or horizontal movement.

The crossing surface shall be designed to prevent the formation of standing water.

Level crossings shall have a skid resistant surface. The skid resistance value for public level crossings shall be similar to the value for the adjacent road surface.

### 6.1.4 Vertical road profile

The vertical road profile of the crossing and its approaches shall be such that:

- there is adequate ground clearance for the types of road vehicles using the crossing
- gradients can be safely ascended or descended by road vehicles using the crossing.

The approach grades to the crossing within the railway reserve should be level, but shall not exceed 1 in 8.

The profile shall have a maximum hump of 75 mm anywhere on the road surface over a length equal to the wheelbase of the road vehicles using the crossing. The profile should exist across the full width of the carriageway and the approaches. The approaches extend for a minimum of 20 metres from the nearest rail.

### 6.1.5 Other requirements

Pavement markings shall be in accordance with AS 1742.7.

For passive control crossings, fences shall be designed to not restrict a road vehicle driver's line of sight to an oncoming train.

The risk of stock entering the rail corridor at the level crossing shall be assessed and cattle stops provided where necessary.

## 6.2 Private road level crossings

### 6.2.1 Crossing configurations

Approved configurations, in addition to the configurations in Section 6.1.1, are:

- unsealed road surface
- Steel panel

- timber

Where road base containing any material that may contaminate the ballast is used it should be separated from the ballast by a suitable geotextile.

The surface runoff should be directed away from the track structure.

The approach road construction should not interfere with the track and cess drainage.

### 6.2.2 Crossing width

The design width of a Private Level Crossing shall suit the reasonable requirements of the user. It should be able to accommodate the largest vehicle using the crossing.

The minimum width of road surface for private level crossings shall be 4.5m.

Where reasonably practicable, the intersection between road and railway shall be at right angles.

### 6.2.3 Crossing surface

The level crossing surface shall be level with the rail surface and plane between the two rails. For multiple tracks, the level crossing surface shall be plane between each adjacent pair of rails.

The road surface shall be no higher than the rail level.

The crossing surface shall be stable under acceleration, braking and turning forces without undue vertical displacement or horizontal movement.

The crossing surface shall be designed to prevent the formation of standing water.

The minimum requirement for road surface adjacent to a private crossing shall be a formed gravel road extending from the track either 7m or to the rail corridor boundary, whichever distance is the shortest.

Where Passive Control with Give Way signs is proposed, the design maximum design speed shall be 60km/h

### 6.2.4 Vertical road profile

The vertical road profile of the crossing and its approaches shall be such that:

- there is adequate ground clearance for the types of road vehicles using the crossing
- gradients can be safely ascended or descended by road vehicles using the crossing.

The approach grades to the crossing within the railway reserve should be level, but shall not exceed 1 in 8.

The profile shall have a maximum hump of 75 mm anywhere on the road surface over a length equal to the wheelbase of the road vehicles using the crossing. The profile should exist across the full width of the carriageway and the approaches. The approaches extend for a minimum of 7m from the nearest rail.

### 6.2.5 Other

At new private level crossings, gates or cattle grids shall be placed in the boundary fence. Gates shall be kept closed except when opened for road vehicle passage.

For existing Private Level Crossings, the provisions of Section 6.1.5 apply.

## 6.3 Pedestrian level crossings (public)

### 6.3.1 General

Pedestrian level crossings shall comply with the requirements of AS 1742.7..

Where reasonably practicable, the intersection between footpath and railway shall be at right angles.

### 6.3.2 Approach footpath

The footpath surface within the pedestrian enclosure or maze should be level. Where it is not practicable to provide a level surface, the footpath shall have a slope of not more than 1 in 40.

### 6.3.3 Walkway across the tracks

The walkway surface across the tracks shall be plane with the rail surface between sleeper ends.

The change in level between the rail and the adjacent footpath shall be not more than 5 mm.

The walkway surface should be level.

On curved track, the walkway shall have a slope of not more than 1 in 20.

The maximum allowable track superelevation is 75 mm.

### 6.3.4 Crossing surface

The crossing surface shall be designed to prevent the formation of standing water and shall have a maximum crossfall of 1 in 40.

The walkway surface material classification according to the wet pendulum test shall be Class V in accordance with AS 4586 “Slip Resistance Classification of New Pedestrian Surface Materials”.

### 6.3.5 Pedestrian crossing structure configurations

Approved pedestrian level crossing structure configurations are:

- asphaltic concrete
- concrete
- concrete panel
- rubber panel.

### 6.3.6 Other

Walkway shoulders on the level crossing structure and access points to the track shall have hazard tactile warning strips in accordance with AS 1742.7.

## 6.4 Facilities for bicycles

Facilities for bicycles shall comply with the requirements of AS 1742.7and the RTA publication “NSW Bicycle Guidelines”.

The design shall include clear path width, hazard tactile warning devices, cycle hazard warning signs and bollards.

## 6.5 Service crossings (road)

The minimum width of road surface for service level crossings shall be 3m.

Approved configurations, in addition to the configurations in Section 6.2.1, are:

- ballast

The minimum requirement is a formed ballast crossing level with the rail surface and plane between the two rails. For multiple tracks, the Level Crossing surface shall be plane between each adjacent pair of rails.

The surface runoff should be directed away from the track structure.

The approach road construction shouldl not interfere with the track and cess drainage.

## 6.6 Service crossings (pedestrian)

The minimum width of crossing surface shall be 1200 mm.

The walkway surface shall be slip resistant.

Hazard tactile warning strips are not required.

Approved configurations, in addition to the configurations in Section 6.3.5, are:

- timber
- fibre reinforced plastic (FRP) grating (in yards and sidings only).

## 6.7 Prohibited configurations

The following configurations are not approved for use in track circuited areas because of the potential for shorting track circuits:

- steel level crossings
- level crossing panels with steel edges that extend fully around the panel.

## 6.8 Track requirements

### 6.8.1 General

The track through the level crossing shall comply with the following requirements:

- formation and capping layer in accordance with Engineering Standard OTCS 410 “Formation & Earthworks”
- concrete sleepers through public road level crossings
- rail ground to the required profile if new rail is used
- new rails if existing running rail is worn, including head width wear and head depth wear
- minimum shoulder ballast width of 75 mm
- ballast to be compacted/stabilised.

### 6.8.2 Track drainage

Level crossing designs shall provide for track drainage through the level crossing structure.

The drainage design shall be in accordance with Engineering Standard OTCS 420 “Track Drainage”.

The minimum requirement is a slotted pipe located on the top of the capping layer near the toe of the ballast.

# 7 Traffic control treatments

## 7.1 General

There are two types of level crossing traffic control: For each type, there are a number of approved configurations

- Passive control
  - Open level crossings with “Give Way” signs
  - Open level crossings with “Stop” signs
- Active control.
  - Level crossings protected by flashing lights
  - Level crossings protected by flashing lights and boom barriers
  - Gated level crossings

These are defined more precisely in AS 1742.7.

Each configuration has an inherent level of safety associated with it. The configuration adopted for any particular site is determined by the level of risk to be managed.

The type of control and control configuration is based on:

- road/rail/pedestrian traffic volumes
- road speed
- train speed
- sight distance to train
- road and rail track alignment
- roadside activity
- accident history
- number of rail tracks.

Passive control configurations are determined in accordance with this Standard.

Active control configurations are determined in accordance with Engineering Standard BSD 018 “Signal Design Principles – Level Crossings”.

Manual gates are a form of active control but the requirements are specified in this Standard.

## 7.2 Sight distance assessment

Passive control for road crossings on main lines shall only be used where sight distances and sight angles as determined in accordance with AS 1742.7 are available.

If sufficient sight distance is not available to meet the sight distance and sighting angle criteria for passive control in AS 1742.7, active control shall be installed at the level crossing.

Sighting distances at all level crossings on operational lines shall be assessed at the frequencies documented in OTCS 100 “Civil Technical Maintenance Plan, using the methodology detailed in Engineering Manual OTCM 521 “Level Crossing Manual”. OTCM 521 contains additional sighting distance tables not included in AS 1742.7.

For existing level crossings, if sufficient sight distance is not available to meet the sight distance and sighting angle criteria for passive control, appropriate risk mitigation actions include:

- undertake any necessary works to improve sight distance (e.g. removal of obstructions)
- relocate the level crossing to improve sight distances
- impose a speed restriction
- install active control
- close and remove the level crossing.

## 7.3 Control devices

### 7.3.1 Passive control signage

Passive control signage at level crossings on the shall comply with the requirements AS 1742.7.

### 7.3.2 Sign details

Sign size shall be in accordance with AS 1742.7.

Sign location, height and orientation shall be in accordance with AS 1742.7.

Signs shall be illuminated or reflectorised in accordance with AS 1742.7.

Signs shall be manufactured in accordance with the requirements of AS 1743.

### 7.3.3 Authorised vehicles only signs

"Authorised Vehicles Only" signs for service level crossings shall be manufactured in accordance with Engineering Specification CRN CP 213 "Trackside Signs".

### 7.3.4 Active control devices

Flashing lights, alarms, boom barriers, red man lights, swing gates and associated signage shall be designed and installed in accordance with AS 1742.7, CRN SD 018 and Engineering Specification CRN SC 017 "Level Crossing Equipment".

### 7.3.5 Pedestrian enclosures

Pedestrian maze size and location requirements shall be in accordance with AS 1742.7, except that the closest point of the maze shall be a minimum 2500 mm from the near rail.

### 7.3.6 Other

Pavement markings, width markers, tactile warning tiles and other devices shall be provided in accordance with AS 1742.7.

# 8 Standard control configurations

## 8.1 General

Level crossing control configurations shall comply with AS 1742.7 and this Standard.

## 8.2 Road crossings (public and private)

### 8.2.1 Passive control

The minimum treatment is the railway crossing give way assembly. This treatment only applies to single tracks and in situations complying with the limits on use in Clause 4.2.2 of AS 1742.7.

The standard treatments are the:

- railway crossing give way assembly and advance warning signs and assemblies.
- railway crossing stop assembly and advance warning signs and assemblies.

Signs and assemblies are detailed in AS 1742.7.

### 8.2.2 Active control

Active control shall be provided in accordance with AS 1742.7 and Signalling Engineering Standards.

## 8.3 Pedestrian crossings

### 8.3.1 Passive control

The minimum treatment at public pedestrian crossings is the railway crossing sign. It shall be used only where pedestrian movement is light

Where pedestrian traffic is heavy a pedestrian enclosure shall also be installed

The controls shall be provided in accordance with AS 1742.7

### 8.3.2 Active control

On main lines a risk assessment shall determine if active control is required.

Active control devices shall be in accordance with Signalling Engineering Standards.

## 8.4 Service crossings

### 8.4.1 Road crossings

#### 8.4.1.1 Passive Control

The minimum treatment at service crossings is the railway crossing stop assembly where it shall be used in conjunction with an “Authorised Vehicles Only” sign

#### 8.4.1.2 Active Control

For service road level crossings on main lines a risk assessment shall determine if active control is required.

### 8.4.2 Pedestrian crossings

In yards and sidings, the minimum treatment for pedestrian crossings is the look for trains sign as detailed in AS 1742.7.

# 9 Installation requirements

The level crossing structure shall be installed in accordance with relevant standards and, where proprietary products are used, manufacturers’ specifications.

Control devices and associated equipment shall be installed in accordance with AS 1742.7 and relevant Engineering standards and specifications.

The track shall comply with relevant Engineering standards and specifications and any specific requirements in this document.

# 10 Documentation requirements

Documentation shall be provided as part of the design and installation process.

Drawings shall include details of:

- design parameters (e.g. road and rail approach speeds, road grades, road vehicle class)
- site survey and plan
- design loads for the level crossing structure
- track and road/footpath alignments and levels
- level crossing track and flangeway configuration
- drainage requirements
- locations of insulated joints (where signalling is affected)
- level crossing structure configuration details
- skid resistance/slip resistance details
- control devices

- signage details and specifications
- actual and design sight distances for passive control crossings
- fencing and cattle stops
- physical barriers (where required) for service level crossings.

# 11 Type approval requirements

The following information shall be submitted when requesting type approval of a level crossing product design:

- Design calculations
- Drawings
- Compatible rail types and sizes
- Test results for skid/slip resistance
- Assembly and installation procedures
- Spares list and availability
- Maintenance plan including details of failure modes, inspections and procedures manual.

# 12 Acceptance standards

## 12.1 Construction

This section specifies the requirements for acceptance of new construction and renewal of level crossings.

### 12.1.1 Track

The track shall comply with the acceptance standards in Engineering Standard OTCS 210 “Track Geometry and Stability”.

### 12.1.2 Level crossing structure

The crossing width shall comply with the approved design.

The level crossing structure shall be installed in accordance with the design and good engineering practice.

The surface shall be in good condition with no potential to cause hazard to users.

Modular crossing installations shall comply with manufacturers’ instructions. Panels shall be fully restrained. There shall be no gaps between adjacent panels.

The footpath grade shall comply with the approved design.

Guard rails, fences, pavement markings, track drainage and signage shall comply with the approved design.

The level crossing structure installation shall comply with the acceptance limits in Table 1:

| Parameter | Standard | Variation from standard |
|---|---|---|
| **Road Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -5 mm |
| Flangeway gap | 60 mm min | -0 mm to +5 mm |
| **Pedestrian Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -5 mm |
| Flangeway gap | 60 mm min | -0 mm to +5 mm |
| Flangeway depth | 50 mm max | +0 mm to -5 mm |
| **Service Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -5 mm |
| Flangeway gap | 60 mm min | -0 mm to +5 mm |

*Table 1 – Construction Acceptance Limits*

## 12.2 Maintenance

This section specifies the requirements for acceptance of level crossings at the completion of track maintenance activities.

### 12.2.1 Track

The track shall comply with the acceptance standards in OTCS 210.

### 12.2.2 Level crossing structure

The level crossing structure shall comply with the acceptance limits in Table 2 on completion of maintenance work:

| Parameter | Standard | Variation from standard |
|---|---|---|
| **Road Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -10 mm |
| Flangeway gap | 60 mm min | -0 mm to +10 mm |
| **Pedestrian Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -5 mm |
| Flangeway gap | 60 mm min | -0 mm to +5 mm |
| Flangeway depth | 50 mm max | +0 mm to -5 mm |
| **Service Crossings** | | |
| Surface level relative to top of rail | Level | +0 mm to -10 mm |
| Flangeway gap | 60 mm min | -0 mm to +10 mm |

*Table 2 – Maintenance Acceptance Limits*

# Appendix 1 Approved level crossing surface products

| Manufacturer | Supplier | Surface Type | Application | | |
|---|---|---|---|---|---|
| | | | Road | Pedestrian | Service |
| Bodan: | KH1 Pty Ltd | Frameless Polymer Concrete Panel (4) | ✓(1), (2) | ✓ | ✓ |
| Holdfast: | Baron Rubber Pty Ltd | Rubber Panel | ✓(1), (2) | ✓ | ✓ |
| STRAIL: | Phoenix AG (Australia) Pty Ltd | Rubber Panel | ✓(1), (2) | ✓ | ✓ |
| Thermit: | Thermit Australia Pty Ltd | Concrete Panel | – | ✓ | ✓ |
| Trelleborg: | Trelleborg Engineered Systems Australia Pty Ltd | Rubber Panel | ✓(1), (2) | ✓ | ✓ |
| Other: | | Asphaltic Concrete | ✓ | ✓ | ✓ |
| | | Concrete | ✓ | ✓ | ✓ |
| | | FRP Grating | – | ✓ | ✓(3) |
| | CRIA approved designs | Steel Panel (4) | ✓(5) | – | – |

NOTE
1. Not where road speed exceeds 80 km/hr
2. Not where angle of road crossing the track is more acute than 30 degrees
3. Pedestrian crossings in yards and sidings only
4. Steel panels or steel framed panels not approved in track circuited areas
5. Low speed low usage road crossings only