

Standard

Rolling Stock - Tram - Access and Egress

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PROUD OPERATOR OF



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1 PURPOSE

The purpose of this Standard is to specify the minimum requirements for access and egress of passengers and workers on trams operating in the Yarra Trams Network.

This Standard outline the requirements to provide safe and efficient access and egress and to minimise risks to passengers and workers associated with access and egress, emergency evacuations and requirements for people with disabilities.

2 SCOPE

The requirements described in this Standard apply to:

- all trams introduced from other networks for operation on the Yarra Trams Network and all trams currently operating on the Yarra Trams Network unless explicitly specified otherwise
- new trams are specifically not covered by this Standard.

3 COMPLIANCE

This Standard shall be fully complied with. Deviation from this Standard is only permitted when a waiver has been sought and approved by Yarra Trams.

‘Shall’ statements are mandatory in the context of compliance with requirements stipulated in this Standard.

‘Should’ statements are considerations in the context of compliance with requirements stipulated in this Standard.

‘Information’ statements provide additional content for clarification purposes only and are not requirements in the context of compliance with this Standard.

‘So far as is reasonably practicable’ statements must at a minimum result in the provision of a technical risk assessment including proposed list of design controls to demonstrate compliance to this Standard.

Any third party or contractor undertaking activities on Yarra Trams assets shall complete and return a compliance schedule for this Standard. Assessment of compliance shall be provided for each requirement, defined by one of three permissible responses:

- a) Compliant;
- b) Partially Compliant;
- c) Non-Compliant.

Absolute requirements in this Standard are defined within square brackets i.e. [AM 4000mm +/-1%]. Absolute values shall not be accepted without prior consultation and acceptance by Yarra Trams. Deviation beyond Absolute values shall not be accepted under any circumstances.



4 REQUIREMENTS

4.1 Design Requirements

Design requirements for the modification or upgrade of access and egress facilities of trams operating on the Yarra Trams Network shall comply, SFAIRP, with:

- DSAPT
- EN 14752:2015, and;
- this Standard.



4.1.1 Passenger Body Side Door

- 4.1.1.1 Where an Allocated Space exists on a tram, the passenger body side entrance doors forming an accessible path to that Allocated Space shall be compliant with Section 2.6 of DSAPT 2002.
- 4.1.1.2 For the redesign of existing fleet door systems, the passenger body side entrance doors should have an unrestricted clearway width of ≥ 850 mm.
- 4.1.1.3 For the redesign of existing fleet door systems, the passenger body side entrance doors should have an unrestricted clearway height of ≥ 1900 mm.
- 4.1.1.4 For the redesign of existing fleet door systems, the new passenger body side entrance door aperture design shall have an unrestricted clearway no smaller than that of the existing design.

4.1.2 Cab Door

- 4.1.2.1 For the redesign of existing fleet door systems, the internal cab doors should have an unrestricted clearway width of ≥ 600 mm.
- 4.1.2.2 For the redesign of existing fleet door systems, the internal Cab Doors should have an unrestricted clearway height of ≥ 1900 mm.
- 4.1.2.3 For the redesign of existing fleet door systems, the internal cab door aperture design shall have an unrestricted clearway no smaller than that of the existing design.
- 4.1.2.4 Where the redesign of an existing cab incorporates an external Cab Door, the external door for the Active Cab shall open to the left side of the tram in the direction of travel.
- 4.1.2.5 Where the redesign of an existing cab incorporates an external Cab Door, the external cab door shall not place the driver entering or exiting the tram via the external Cab Door into the path of an oncoming tram.
- 4.1.2.6 Where the redesign of an existing cab incorporates an external Cab Door, the entry to the cab via the Cab Door shall be possible from track and / or ground level in compliance with EN 14752:2015.
- 4.1.2.7 All doors to the driver cabs, when locked, shall only be opened external to the cab with a secure key.
- 4.1.2.8 The cab doors shall only be capable of being locked externally with a secure key.
- 4.1.2.9 All Cab Doors shall be capable of being locked and unlocked from the cab interior without a key.
- 4.1.2.10 In a tram with no Active Cab, unlocking of any cab body side door shall turn on the cab interior lighting, saloon lighting and lighting in open doorways.
- 4.1.2.11 The Cab Door to the saloon shall be capable of being secured in the open position. This will facilitate safe operation of the Tram during testing, driver training or similar prescribed non-operational activities.



4.1.3 Door Windows

4.1.3.1 Windows compliant to AS/NZS 2080:2006 shall be provided for passenger bodyside doors and the Cab External Door. The size and location of door windows shall be compliant with EN 14752:2015 Clause 4.1.6 *Door windows*.

4.1.4 Door Window Glazing

4.1.4.1 All door windows shall be fitted with safety glass complying with AS/NZS 2080:2006 *Safety Glazing for Land Vehicles*.

4.1.4.2 When determined in accordance with Appendix D to AS/NZS 2080:2006 (test for luminous transmittance) the luminous transmittance shall be not less than 70% for all safety glazing. AS/NZS 2080:2006 Clause 3.3 specifically excepts Rolling Stock from the luminous transmittance requirement, however, in consideration of the interaction with road traffic, the requirements of this Clause shall apply to Yarra Trams rolling stock.

4.1.5 Mechanical Strength

4.1.5.1 All tram external doors shall have mechanical strength compliant with EN 14752:2015.

4.1.5.2 Doors shall comply with the vehicle overturning load case in EN 14752:2015.

4.1.6 Luminance Contrast

4.1.6.1 All external passenger doorways shall comply with the luminance contrast requirements of AS 1428.1:2009 clause 13.1.



4.1.7 Tram Surfing

4.1.7.1 When the doors of the Tram are closed, step edges, ledges or handholds on the outside surface of the tram shall be designed to minimise the risk of 'tram surfing'.

4.1.8 Drainage

4.1.8.1 A drainage system shall be provided for trams in the Yarra Trams Network to divert water from the roof away from any door opening on tram body.

4.1.8.2 The Vehicle shall be designed and constructed such that rainwater or tram wash water from the roof does not flow over the external surfaces of the tram at any time.

4.1.9 Treadplates for Doorways

4.1.9.1 Treadplates must be slip resistant to at least Classification R10 in all horizontal directions when tested using AS 4586.

4.1.9.2 Structural requirements for doorway treadplate shall comply with Yarra Trams Standard, Rolling Stock - Tram - Body (CE-021-ST-0031), having mechanical strength compliant with EN 14752:2015.

4.1.9.3 For trams having an Allocated Space, as per DSAPT limits for independent access and egress the gap between treadplate and platform shall comply with DSAPT:2002 for all tram conditions.

4.1.10 Electrical Protection

4.1.10.1 All door systems shall be designed such that they do not directly or indirectly expose persons to any part of live electrical systems. This applies to doors in the open and closed positions.

4.1.10.2 Entrance system components requiring access during maintenance for door setting/adjustment shall not be positioned in the immediate proximity of any hazardous area, i.e. potential trapping hazard or electrical hazard. Alternatively, an isolation system shall be provided.

4.1.10.3 Electrical protection for the tram electrical system and all sub-systems shall comply with AS 3000 - *Electrical installations "Wiring Rules"* for all protective earthing and cable routing requirements.

4.1.11 Lighting

4.1.11.1 Access doorways shall be fitted with lighting to facilitate access and egress during boarding and alighting.

4.1.11.2 Lighting at tram doors shall be compliant with section 20.2 of DSAPT:2002.

4.1.12 Door Control Buttons / Handles

4.1.12.1 All door control devices for trams operating in the Yarra Trams Network shall be compliant with the requirements specified in Section 12.6 of DSAPT:2002.



4.1.13 Door Labels

4.1.13.1 Door labels for trams operating in the Yarra Trams Network shall be compliant with DSAPT 2002 Section 16 *Symbols* and Section 17 *Signs*.

If a door has been locked out of use, then there shall be a clear indication provided to passengers and intending passengers inside and outside the Tram that the door is out of service.



4.2 Operational Requirements

Operational requirements for doors of trams in the Yarra Trams Network shall be compliant with EN 14752:2015. In addition; the requirements specified in the following Sections 4.2.1 to 4.2.6 shall be complied with.

4.2.1 Closing and Opening Requirements

- 4.2.1.1 The door control system shall prevent doors being opened on both sides of the tram simultaneously during normal operation.
- 4.2.1.2 Doors shall be capable of opening simultaneously on both sides of the tram only for testing purposes whilst not in operation.
- 4.2.1.3 Closing and opening shall initiate an alert compliant with EN 14752:2015 at each door to warn passengers that the door is about to close or open.
- 4.2.1.4 Doors and surrounds shall comply with EN 12650 to avoid trapping and catching hands or limbs by exposed door mechanisms or in the interface between the moving door leaf and the surrounds.

4.2.2 Obstacle Detection

- 4.2.2.1 In case of detection of an obstruction, the dynamic and static closing forces shall be removed in less than 1 second. For the measurement parameters and method of measurement, refer to EN 14752:2015 Annex D. After this period the door shall automatically stop, and the door shall fully re-open.
- 4.2.2.2 Once the doors are fully opened, the door shall not reclose within 0.5.
- 4.2.2.3 Dimensions of the object for testing sensitivity of obstacle detection have been specified in Figure 1; as defined in EN 14752:2015. Test shall be performed in accordance with EN 14752:2015 Clause 5.2.1.4 *Doors obstacle detection*.

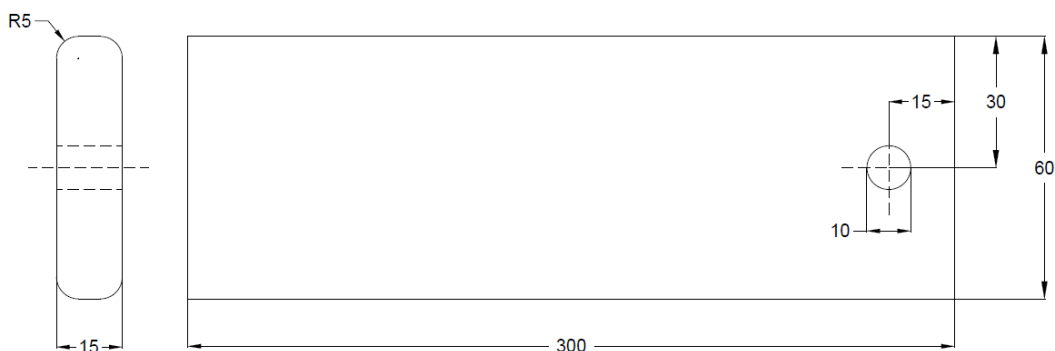


Figure 1 - Test Object Dimensions (All dimensions are in mm)



4.2.2.4 The test shall be conducted during type testing and routine functional testing

4.2.3 Door Control

4.2.3.1 The trams that operate on the Yarra Trams Network shall be equipped with a door controller which provides a means for the driver to control the operation of the doors of the Tram.

4.2.3.2 The means of door control shall enable the driver to initiate commands to open and close the doors via a door control interface within the driver's console.

4.2.3.3 The primary operation of the door controller shall be by the driver. The door controller shall provide the driver with the capability to operate the doors in a Passenger Open Mode or a Driver Open Mode.

4.2.3.4 The door controller shall provide the driver, in each Active Cab, with door opening and door closing controls that are designed to minimise the risk of an incorrect door opening by the driver at the tram stop.

4.2.3.5 In Passenger Open Mode, the door controller shall provide the means so that when the Tram comes to a standstill the passengers may open the saloon doors on the selected side.

4.2.3.6 In Driver Open Mode the door controller shall provide the driver with the means so that when the Tram comes to a standstill all the saloon doors on the selected side shall open.

4.2.3.7 New tram technology may reduce the workload of the driver allowing the opportunity to select and pre-set either Passenger Open Mode or Driver Open Mode with the Tram in motion. Where this



technology is considered for the redesign of a door system, a risk assessed shall be carried out to assess the safety impact of such a change.

- 4.2.3.8 With the Tram at a standstill, the door controller shall provide the driver with the capability to hold all doors open, close all doors or permit doors to close automatically after a time period.
- 4.2.3.9 The door controller shall be capable of retaining the door opening status set by the driver when the Tram is in Park State.
- 4.2.3.10 The settings of the door controller, related to the door opening status, shall only be available from the Active Cab.

4.2.4 Door Status Monitoring

- 4.2.4.1 The trams operating on Yarra Trams Network shall be equipped with a door status monitoring capability to monitor the operation of the doors of the Tram.
- 4.2.4.2 The door status monitoring shall provide the driver with means to monitor the current status of the doors.
- 4.2.4.3 For each door; the door status monitoring shall monitor all door operating parameters.

4.2.5 Door Safety Interlock

- 4.2.5.1 The tram shall be provided with a door safety interlock system. The door safety interlock shall have a “Doors Locked” proving system, interlocked with the traction and braking systems, which shall ensure that all saloon doors of the tram are closed and locked before the tram may move from stand still.
- 4.2.5.2 If the doors are open with the traction/brake controller in a powering position, then tram shall not move. Once all door closed integrity has been proven, the driver shall not be able to move the tram until the traction/brake controller has been moved to the off/coast or braking position and then the powering position is once again selected.
- 4.2.5.3 The tram shall be designed and constructed such that the saloon doors may be unlocked to be opened only when the tram is at a standstill.

4.2.6 Tram Functional Assurance

- 4.2.6.1 Demonstration of Tram functional assurance shall be achieved through compliance with EN 50126, EN 50128 and EN 50129.

4.3 Emergency Requirements

4.3.1 Design

Design of emergency egress devices for trams operating in the Yarra Trams Network shall be compliant with the requirements specified in EN 14752:2015. In addition; the following requirements shall be complied with:

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- 4.3.1.1 An internal and an external emergency door handle compliant with EN 14752:2015 shall be provided at each doorway, which shall unlock the doors, either from the inside of the tram or the outside, respectively.
- 4.3.1.2 Emergency door releases shall be located closest to the door they release.
- 4.3.1.3 External emergency door releases shall be capable of being accessed when Tram is upright or on the upper side when overturned.
- 4.3.1.4 At the exterior of the tram, a means shall be provided at each doorway for emergency services personnel to access tram.
- 4.3.1.5 Emergency warning systems shall comply with DSAPT.

4.3.2 Operation

- 4.3.2.1 Emergency operation requirements for access and egress devices in trams in the Yarra Trams Network shall be compliant with EN 14752:2015. In addition; the following requirements shall be complied with: -
- 4.3.2.2 The operation of the emergency door handle shall not permit the doors to be opened whilst tram is in motion.
- 4.3.2.3 When a tram has come to a standstill the doors shall be capable of being opened internally by the passengers with or without the presence of traction power or other power supplies on tram.
- 4.3.2.4 Internal emergency door releases shall be able to be operated by passengers without the need of keys or specialised tools.
- 4.3.2.5 Internal emergency door releases shall contain features to avoid tamper and inappropriate operation.
- 4.3.2.6 Internal emergency door releases shall provide an indication that the device has been operated.
- 4.3.2.7 External emergency door releases shall be capable of being operated with or without the presence of traction power or other power supplies to the tram.
- 4.3.2.8 External emergency door releases shall contain features to avoid tamper and inappropriate operation.
- 4.3.2.9 External emergency door releases shall provide an indication that the device has been operated.

4.3.3 Door Emergency Requirements

- 4.3.3.1 The tram shall comprise devices and systems which will facilitate safe exit from and entrance to the tram in an emergency in compliance to EN 14752:2015, including communication between the occupants of the tram and people outside of the tram.



5 RELATED LEGISLATION & DOCUMENTS

The following table lists documents that shall be read and applied concurrent with this Standard.

Name	Document number
Design for Access and Mobility – Part 1 – General Requirements for Access – New Building Work	AS 1428.1
Design for Access and Mobility – Part 2 – Enhanced and Additional Requirements – Buildings and Facilities	AS 1428.2
Safety Glazing for Land Vehicles	AS 2080
Electrical installations “Wiring Rules”	AS 3000
Slip resistance classification of new pedestrian surface materials	AS 4586
Rolling Stock - Tram - Body	CE-021-ST-0031
Disability Standard for Accessible Public Transport 2002	DSAPT
Railway applications – Body side entrance systems for rolling stock	EN 14752:2015
Railway Applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)	EN 50126
Railway Applications – Communication, signalling and processing systems	EN 50128
Railway applications - Communication, signalling and processing systems - Safety related electronic systems for signalling	EN 50129
AMS03 Taxonomy	CE-023-IS-0001

6 DOCUMENT VERSION CONTROL

Version History	Date	Detail
1.0	12 Mar 2020	Original approved issue.



7 APPENDIX A – GLOSSARY

The following table lists the specific terms used within this Standard. Further guidance on engineering terms used within Yarra Trams is on the AMS Glossary.

Word	Definition
Allocated Space	DSAPT:2002 defines an Allocated Space in this way: “An allocated space is a three-dimensional space that can accommodate a wheelchair or similar mobility aid.”
AMS	Asset Management System. System of policies, strategies, processes and procedures implemented to manage assets to ISO 55001.
Driver Open Mode	The door control mode set by the driver such that the saloon doors open automatically when the moving Tram comes to a standstill.
DSAPT	Disability Standard for Accessible Public Transport. “The purpose of these Standards is to enable public transport operators and providers to remove discrimination from public transport services.”
FMECA	Failure Modes, Effects and Criticality Analysis. Method to analyse asset failures, their effects on systems and the relevant critical nature of that effect.
Luminance contrast	Difference in luminance or colour that makes an object distinguishable.
Luminous transmittance	The ratio of transmitted light to the incident light. It measures the amount of light that passes through a sample.
Lux (lx)	Unit for illuminance.
MTBF	Mean Time Between Failures. A reliability measure that is used as a guide in the development of maintenance strategies.
Park State	Tram operational condition having power removed.
Passenger Open Mode	The door control mode set by the driver such that passengers may open the saloon doors when the Tram is stationary.
RAMS	Reliability, Availability, Maintainability and Safety. A set of tools and measures to analyse the performance of an asset.
SFAIRP	So Far As Is Reasonably Practicable. This is used to refer to the adherence to a requirement within constraints.
Shall	With reference to the CE-023-IS-0001 - AMS03 Taxonomy, the word “Shall” is taken in this context to mean a non-optional activity or requirement.
Tram Surfing	The act of riding on the outside of a moving tram.