

Specification

DC Traction Isolator Cubicle Specification

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1 PURPOSE

The purpose of this specification is to specify the minimum requirements of DC Traction Isolator cubicle and its associated equipment, which are to be installed within DC traction substations on the Yarra Trams network.

The configuration, ratings and any other project specific equipment details shall be provided by Yarra Trams in the accompanying *Scope of Works* document.

2 SCOPE

The scope of this specification encompasses the design and construction requirements for all new DC Traction external isolators. This specification does not apply retrospectively to existing DC Traction external isolators on the Yarra Trams network. However, this specification is applicable if an existing DC Traction external isolator is being altered, modified or replaced.

This specification applies to any party who is involved in the design or construction of DC Traction external isolators for Yarra Trams.

3 COMPLIANCE

Any party who is involved in the design or construction of DC Traction external isolators for Yarra Trams shall fully comply with this specification. Deviation from this specification is only permitted when a deviation or waiver has been formally requested and approved as the per Yarra Trams Deviation from Standards procedure.

The Yarra Trams Engineering Change Management Procedure [CE-021-PR-0020] shall be followed in all circumstances where change is proposed to this specification.

The following definitions apply throughout the specification:

- 'Shall' statements are mandatory in the context of compliance with requirements stipulated in this specification.
- 'Should' statements are considerations in the context of compliance with requirements stipulated in this specification.
- 'Information' statements provide additional content for clarification purposes only and are not requirements in the context of compliance with this specification.
- '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 specification.



4 REQUIREMENTS

4.1 Service conditions

4.1.1 Operating conditions

- 4.1.1.1 The DC Traction external isolator cubicle shall be designed for outdoor installation with degree of protection IP66.
- 4.1.1.2 The operating conditions are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.1.2 Transport and storage conditions

- 4.1.2.1 The transport and storage conditions are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].
- 4.1.2.2 The *Designer* shall detail the minimum storage requirements. This information shall be contained in the equipment manuals, which are outlined in Table 4.

4.1.3 Noise

- 4.1.3.1 The permissible noise levels inside and outside the substation are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.1.4 Electromagnetic compatibility (EMC)

- 4.1.4.1 The electromagnetic compatibility requirements are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023] and Infrastructure – Network Power – Traction Power – Design and Construction [CE-021-ST-0027].

4.2 General requirements

4.2.1 General

- 4.2.1.1 The DC Traction external isolators shall be outdoor DC disconnectors complying with the following standards:
 - EN 50123-4;

Information: The DC Traction external isolators are used to isolate the DC Traction equipment located within the substation from the remainder of the DC Traction network. The isolators are not intended to be opened or closed under load.



4.2.1.2 The DC Traction external isolators shall meet the following requirements as per EN 50123-4:

Table 1: General requirements

Description	Requirement
Type	Disconnecter and short circuit connector
Operation type	Power-operated unit with dependent manual back-up (In accordance with clause 6.13.1 of EN 50123-4) Short circuit switch to be fault make rated
Location of equipment	Disconnecter installed within a weatherproof cubicle or compartment that is accessible from the outside of the substation.
Number of poles	Single-pole
Class of use: Category	Category V (In accordance with Table 1 of EN 50123-4)
Mechanical endurance	Minimum 1000 operating cycles
Rated auxiliary and control supply voltage	48 V DC
Nominal voltage, U_n	600 V DC with the ability to operate at U_n of 750 V DC in the future
Rated voltage, U_{Ne} (for main circuits)	As defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].
Power frequency withstand voltage level, U_a (for main circuits)	As defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].
Rated impulse voltage, U_{Ni} (for main circuits)	As defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].
Rated service current, I_{Ne} (for main circuits)	To be determined by the <i>Designer</i> . All isolators shall be designed for two cables minimum (typical rated service current is 1000 A per DC Traction cable ¹)
Overload capability	To be determined by the <i>Designer</i> NOTE: Typical rating is 4000 A for 1 s.
Rated short-time withstand current, I_{NCW} (for main and earthing circuits)	The I_{NCW} rating is the same value as the I_{Nss} rating for a time duration of 250 ms. (According to clause 6.18 of EN 50123-6)
Rated short circuit current, I_{Nss} (for main and earthing circuits)	70 kA
Peak of the short circuit current, $\hat{I}_{ss}$ (for main and earthing circuits)	Conventionally assumed to be 1.42 times the prospective sustained short-circuit current for a fault of negligible impedance at the input or output terminals of the switchgear. (According to clause 5.1.1.2 of EN 50123-1)
Rated duration of short circuit (for main and earthing circuits)	250 ms



Description	Requirement
Type of metal-enclosed switchgear	Metal-clad Each outgoing circuit shall be segregated
Separate compartment for auxiliary and control equipment	Yes
Busbar material	Copper
Internal arc classification	AFLR Where: A = Accessibility type A, restricted to authorised personnel only. FLR = Access from the front (F= front), the sides (L= Lateral) and the rear (R= rear). All side protection for users
¹ The continuous current rating of the isolator shall be appropriate for the load passing through it. The rated continuous current of each 400 mm ² copper cable may be assumed to be 1000 A DC. As an example, if a pair of 400 mm ² cables are connected to the isolator, the continuous current rating of the isolator shall be 2000 A DC.	

4.2.1.3 The *Designer* is fully responsible for providing suitable ratings for the DC Traction external isolators and shall therefore verify the values in Table 1.

All electrical apparatus shall accommodate appropriate padlocking system in order to provide safe work environment and to provide safeguards against accidental or unexpected activations of traction power equipment and related circuits. Yarra Trams Isolation and Lockout procedures (IN-022-PR-0010) and Work Instruction (IN-022-WI-0017) shall be followed for lockout and tagout of electrical apparatus work on or near electrical infrastructure.

4.2.2 Insulation coordination

4.2.2.1 The insulation levels are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.2.2.2 All components in the cubicle shall have a minimum clearance distance of 100 mm, and a minimum surface creepage distance of 100 mm.

4.2.3 Earthing and bonding

4.2.3.1 The frame of the DC Traction external isolator cubicle shall be connected to earth through a frame leakage relay in accordance with the Infrastructure - Network Power – Substation -Design and Construction [CE-021-ST-0023]. The insulating material, installed between the



frame of the DC Traction external isolator cubicle and earth, shall provide an isolation resistance of at least 1 MΩ.

- 4.2.3.2 All other requirements are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.2.4 Enclosure

General

- 4.2.4.1 The DC Traction external isolators shall be housed in a weatherproof cubicle or compartment that is accessible from the outside of the substation. The cubicle may be incorporated into the external wall of the substation building or a metal construction suitable for mounting on the wall of the substation. The cubicle shall contain the isolators, mounting brackets and all other fittings required to terminate the power cables on the isolators.
- 4.2.4.2 Any external cubicle metalwork (including fitting) shall be vandal proof and stainless steel or heavy grade aluminum.
- 4.2.4.3 The minimum degree of protection provided by the enclosure (according to AS 60529) shall be IP66.
- 4.2.4.4 Any ingress of water shall be drained away and shall not be detrimental to the operation of the equipment inside the cubicle.
- 4.2.4.5 The operating area around the enclosure must have appropriate lighting levels in accordance with Substation Building Specification [IN-021-ST-0006] and AS/NZS 1680, as well as appropriate internal panel lighting that interconnects with the enclosure doors.

Dimensions

- 4.2.4.6 The DC Traction external isolator enclosure shall be designed to minimise its overall size (and subsequently the physical size of the substation) while meeting the requirements of specifications and standards. The dimensions will vary depending on the number of isolators required to be installed.

Covers and doors

- 4.2.4.7 The covers and doors which are part of the enclosure shall be made from heavy duty aluminum or stainless steel. When they are closed, they shall provide the same degree of protection as specified for the enclosure. Covers and doors shall not be made of woven wire mesh, expanded metal or similar.
- 4.2.4.8 The isolators shall be accessed by full height outward swinging doors (from the outside of the substation building). The doors shall have hand operated door latches with a lockable facility. The shank of the padlock is 10 mm diameter. Door retaining latches shall be provided.



Ventilating openings

4.2.4.9 Ventilating openings and vent outlets shall be arranged or shielded so that they provide the same degree of protection as specified for the enclosure.

Arc fault pressure relief flaps and gas exhaust ducts

4.2.4.10 Internal arcing within an isolator assembly shall be designed in such a way to blow them out safely via exhaust ducting. The pressure relief openings shall be adequate in terms of withstanding the internal pressure caused by an arc fault. Insulation coordination shall be in accordance with the general principles established in AS 2067, AS 1824.1, AS 1824.2 and EN 50124-1.

4.2.4.11 The arc fault pressure relief flaps and gas exhaust ducts shall be designed in such a manner as to prevent injury to the operator should a DC Traction external isolator be inadvertently opened under load or closed onto a short circuit.

Isolator arrangement

4.2.4.12 Each isolator shall be separated by insulation barriers. The minimum spacing between the centres of each isolator shall be 400 mm. The minimum clearance between conducting portions of adjacent isolators shall be no less than 200 mm.

4.2.4.13 Isolators shall be arranged for the blade to be assisted by gravity towards the open position. The moving contact of the isolator shall be connected to the outgoing feeder cable.

Contact position indicators

4.2.4.14 In accordance with clause 6.18 of EN 50123-4, a mechanical indicator coupled to the moving contact or equivalent mean shall be provided. The isolating distance or gap does not need to be visible.

4.2.4.15 Provision shall be made for Auxiliary Contacts for when the isolator is motorised and operating via this method.

4.2.4.16 If the isolator contacts are enclosed in their own compartment (e.g. enclosed switch), then in accordance with EN 50123-4 clause 6.18, they shall have a mechanical indicator coupled to the moving contact or equivalent means to indicate the "CLOSED" and the "OPEN" position of the unit. Symbols "I" and "O" or "ON" and "OFF" should be used to indicate the closed and open positions respectively.



Cable terminations

- 4.2.4.17 Each terminal of the isolator shall be provided with a minimum of two cable flags for the termination of one or two power cables. Each flag shall be suitable for two hole type cable lugs.
- 4.2.4.18 For cable type details, refer to the Cable Specification [IN-021-ST-0003]. Cables shall be terminated with two hole cable lugs.
- 4.2.4.19 Appropriate brackets and clamps shall be provided to adequately support the cables
- 4.2.4.20 Consideration must be given to the space necessary to terminate cables and the minimum 600 mm bending radius for the power cables.
- 4.2.4.21 A separate screen negative bar shall be provided for the termination of cable screens. This terminal bar shall be readily visible but positioned in such a way as to not compromise the safe operation of the isolators. The bar shall be terminated back to the main substation negative bus in the negative cubicle.

Provisions for short-circuiting

- 4.2.4.22 Negative connection points shall be provided at regular intervals for the purpose of attaching short circuit leads between the connection point and the isolator conductors. Connection points shall be constructed of a non corrosive round bar with minimum cross section of 95 mm² and a raised extremity to prevent the short circuit clamp from slipping.

4.2.5 Protection

- 4.2.5.1 The isolator and short circuiting system shall include at least the following protection:
- No-load switching protection;
 - Frame leakage protection;
 - Surge protection;
 - Voltage sensing to prevent equipment closure

No-load switching protection

- 4.2.5.2 A micro switch shall be provided for each external isolator. The micro switch shall trip the relevant DC Traction feeder circuit breaker when the external isolator is being opened. This shall ensure that the external isolators are always opened under no-load conditions
- 4.2.5.3 A minimum of two microswitches shall be provided to identify open or close position



Frame leakage protection

- 4.2.5.4 The frame of the DC Traction external isolator cubicle shall be connected to earth through a frame leakage relay in accordance with the Infrastructure - Network Power – Substation Design and Construction [CE-021-ST-0023].
- 4.2.5.5 In accordance with clause 6.5.7 of EN 50123-7-7, detection of a frame fault shall cause a mass trip of all infeeds to the DC Traction external isolator cubicle to isolate the fault. Therefore, the frame leakage relay shall open a set of contacts and cause the protection to operate, tripping all of the DC Traction switchgear.
- 4.2.5.6 3B segregation shall be required.
- 4.2.5.7 The protection shall not attempt to reclose automatically in the event of frame leakage (an operator must attend on site to restore power).
- 4.2.5.8 An indication of the failure shall be provided to the SCADA system.

Information: The frame leakage protection of the DC Traction external isolator cubicle(s) may be combined with other DC Traction cubicles. It is common practice to combine the frame leakage protection of the DC Traction external isolator cubicle with the DC Traction switchgear cubicles.

Surge protection

- 4.2.5.9 The DC Traction external isolator and associated equipment shall not be damaged by surges due to switching and/or lightning. This may be achieved by selecting appropriate insulation or by using appropriate surge protection devices. Typically, the substation feeder cables should be protected from damage due to surges and/or lightning strikes by a surge diverter installed at the overhead wiring connection point. For general surge protection guidelines, refer to the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.2.6 Interlocking

- 4.2.6.1 The definitions of interlocking are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.2.7 Equipment interfaces

SCADA

- 4.2.7.1 The DC Traction external isolator cubicle shall include at least the SCADA points outlined in Table 2. Each point shall be brought to the SCADA cubicle. The interpretation of Table 2 and additional SCADA requirements shall be in accordance with the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].



Table 2: Summary of SCADA points

Point description - 'Plant'	Point description - 'Designation'	Point description - 'Quantity'	Analogue, Status or Command	Hardwired or Digital	Details	Conditions or Controls
External isolator	X ¹	State	Status	Hardwired	2 Bit	00 = Disconnected 01 = Open 10 = Closed [Normal] 11 = Indeterminate
External isolator cubicle	X ¹	Frame leakage	Status	Hardwired	1 Bit	0 = Fault 1 = Normal [Normal]

¹The designation shall be determined by the *Designer*. Depending on project specific details, this may be “+IP1” or “+IP2” etc.

4.2.7.2 Yarra Trams understands that the SCADA points outlined in Table 2 are only a minimum requirement. The *Designer* shall include additional SCADA points, where required for the effective operation and diagnostics of the equipment.

4.2.7.3 If the *Designer* is planning to include additional SCADA points or deviate from the points outlined in Table 2, this information shall be provided to Yarra Trams in accordance with the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

DC Traction switchgear and control

4.2.7.4 Interfaces with the DC Traction switchgear and control are defined in the DC Traction Switchgear and Controlgear Specification [IN-021-ST-0019].

Negative cubicle

4.2.7.5 Negative short circuiting bus shall be installed in isolator cubicle and connected to the main substation negative bus.

Cables

4.2.7.6 Requirements for the power cables are given in the Cable Specification [IN-021-ST-0003].

4.2.7.7 Control wiring shall meet the electromagnetic compatibility requirements defined in section 4.1.4 and shall be suitably insulated from live parts of the main circuit.



LV distribution

4.2.7.8 Interfaces with the LV distribution are given in the LV Switchboards Specification [IN-021-ST-0009]. Operating area around the enclosure shall have appropriate lighting that is interconnected with the doors. The switching pad shall cover step potential.

4.2.8 Labelling and identification

Warning labels

4.2.8.1 All warning labels shall be in accordance with AS 2067.

Cubicle identification

4.2.8.2 Cubicle identification shall be in accordance with IEC 60445.

4.2.8.3 On the inside of the enclosure, the designation of each isolator (i.e. section number or cable identifier) shall be clearly marked as defined in the *Scope of Works*.

4.2.8.4 The front door of the cubicle shall have a main label saying “POSITIVE 600 V DC ISOLATORS” for U_n of 600 V DC, or “POSITIVE 750 V DC ISOLATORS” for U_n of 750 V DC, depending on U_n , as well as labels identifying the designations of each isolator within the cubicle. The labels shall be traffolyte and fastened to the front of the cubicle with screws and the text shall be at least 50 mm high.

4.2.9 Padlock

4.2.9.1 In accordance with clause 6.13.2 of EN 50123-4, the DC Traction external isolator shall be designed to receive a padlock for locking it in the open position. This provision shall not rely or interact with the conductive parts of the isolator current carrying circuit and shall not put the operator in close proximity to live conductors and/or apparatus.

4.3 Testing

4.3.1.1 The tests defined below shall be compliant with the relevant parts of EN 50123-1 and EN 50123-6.

4.3.1.2 Testing of the external isolator cubicle shall at least comprise the items outlined in Table 3.

Table 3: Summary of tests

Test	Type test ¹	Routine test	Special test	Commissioning test
Verification of conformity to the manufacturing drawings and to characteristics of assembly		M		
Operation		M		
Dielectric withstand: Impulse withstand	M			



Dielectric withstand: Power-frequency withstand	M	M		
Short-time withstand current: Main circuits	M			
Short-time withstand current: Busbars	M			
Short-time withstand current: Earthing circuits	M			
Mechanical operation	M			
Verification of degree of protection	M			
Temperature rise	M			
Electrical operation	M			
Internal arc test	M			
Ductor testing of all DC bus bar electrical connections				M
Insulation testing of frame insulating material				M
M: Mandatory O: Optional. The <i>Scope of Works</i> shall detail if any of these tests are required. ¹ Type tests shall be performed for all rectifier converters not having a type test certificate.				

- 4.3.1.3 In accordance with section 1 of EN 50123-6, individual items of equipment, for example circuit breakers, housed in the assembly shall be designed, manufactured and individually tested (simulating the enclosure when necessary) in accordance with the respective parts of EN 50123 or, when appropriate, with another applicable standard. The housed individual items of equipment include, but is not limited to:
- External isolators (EN 50123-4).

4.4 Reliability, Availability, Maintainability and Safety (RAMS)

- 4.4.1.1 The RAMS requirements are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

4.5 Documentation

- 4.5.1.1 Submitted documentation shall at least comprise the items outlined in Table 4. This documentation shall be provided for the DC Traction external isolator throughout the procedure outlined in EMS Design Acceptance Standard [CE-023-ST-0020].



Table 4: Documentation

Documentation	Step 1: System Design Specifications (SDS)	Step 2: Acceptance Test Criteria	Step 3: Preliminary Design	Step 4: Detailed Design	Step 5: Production	Step 6: Installation/Site Assembly	Project completion
Statement of compliance			✓				
Technical specification			✓				
Single-line diagram of main circuit			✓				
General layout			✓				
Detailed drawings of electrical circuits (main and auxiliary)				✓	✓	✓	✓ ¹
Detailed drawings of mechanisms				✓	✓	✓	✓ ¹
Detailed drawings of mechanical arrangement, including cable boxes				✓	✓	✓	✓ ¹
Connection guide (conductors, earthing, auxiliary circuits, etc)			✓	✓	✓	✓	✓ ¹
Bill of materials				✓	✓	✓	✓ ¹
Detailed drawing of nameplate					✓	✓	✓ ¹
Type test certificates					✓	✓	✓
Test reports					✓	✓	✓
Installation manual(s)			✓ ²		✓	✓	✓
Operation manual(s)			✓ ²		✓	✓	✓
Maintenance manual(s)			✓ ²		✓	✓	✓
List of recommended spare parts and their availabilities			✓ ²		✓	✓	✓
PLC ladder diagrams and software (if applicable)							✓
¹ Drawings shall be submitted into PTV's Drawing Management System Compliant library according to the requirements of clause 4.5.1.2.							
² Only typical non-project specific documentation required.							



4.5.1.2 The documentation shall be compliant with the requirements defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

5 RELATED LEGISLATION & DOCUMENTS

5.1.1.1 The design and construction of DC Traction external isolators shall be consistent with the best engineering practices and shall comply with all of the referenced documents listed in this section. These referenced documents shall be read in conjunction with this specification.

5.1.1.2 All referenced documents shall refer to the most recent published versions of them at the time of invitation to tender.

5.1.1.3 Wherever a conflict exists in the requirements of these documents, the order of precedence shall be observed as defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

Table 5: Referenced documents

Name	Document number
Yarra Trams	
EMS Design Acceptance Standard	CE-023-ST-0020
Infrastructure - Network Power – Substation - Design and Construction	CE-021-ST-0023
Infrastructure – Network Power – Traction Power – Design and Construction	CE-021-ST-0037
DC Traction Switchgear and Controlgear Specification	IN-021-ST-0019
Negative Cubicle Specification	IN-021-ST-0013
Cable Specification	IN-021-ST-0003
LV Switchboards Specification	IN-021-ST-0009
Substation Building	IN-021-ST-0006
Public Transport of Victoria	
PTV Infrastructure Drafting Standards	
Regulations & other legislative documents	
As defined in the Infrastructure – Network Power – Traction Power – Design and Construction [CE-021-ST-0023]	
Industry codes of practice, guidelines, policies, and rules	
As defined in the Infrastructure – Network Power – Traction Power – Design and Construction [CE-021-ST-0023]	
Australian Standards	
Substations and high voltage installations exceeding 1 kV a.c.	AS 2067
Degrees of protection provided by enclosures (IP Code)	AS 60529



International Standards	
Railway applications – Fixed installations – D.C. switchgear – Part 1: General	EN 50123-1
Railway applications – Fixed installations – D.C. switchgear – Part 4: Outdoor d.c. disconnectors, switch-disconnectors, and earthing switches	EN 50123-4
Railway applications – Fixed installations – D.C. switchgear – Part 6: D.C. switchgear assemblies	EN 50123-6
Railway applications – Fixed installations – D.C. switchgear Part 7-1: Measurement, control, and protection devices for specific use in d.c. traction systems – Application guide	EN 50123-7-1
Basic And safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors	IEC 60445

DOCUMENT VERSION CONTROL

Table 6: Document version control

Version History	Date	Detail
1.0	30/07/2021	Original approved issue
1.06	13/05/2025	Periodic Review. No change
1.07	10/03/2026	Periodic review. No change
1.08	30/06/2026	Changed from Standard to Specification. Document number changed from CE-019-ST-0053 to CE-019-SP-0053. Logo changed to YJM.

APPENDIX A – DEFINITIONS & ABBREVIATIONS

Table 7: Glossary - Words

Word	Definition
Scope of Works	The Scope of Works is a key document that defines the specific project-related requirements such as the configuration and rating of equipment to be installed. It prevails over all the specifications.
Designer	The party who is fully responsible for the suitability and compliance of the design of the DC traction substation and all its equipment and subsystems.

Table 8: Glossary - Abbreviations

Abbreviation	Definition
AC	Alternating Current
DC	Direct Current



Abbreviation	Definition
EMC	Electromagnetic Compatibility
EMS	Engineering Management System (internal Yarra Trams abbreviation)
HV	“High Voltage” means a nominal voltage exceeding 1000 V AC or exceeding 1500 V DC
LV	“Low Voltage” means nominal voltage exceeding 50 V AC / 120 V DC but not exceeding 1000 V AC / 1500 V DC
PLC	Programmable Logic Controller
PTV	Public Transport of Victoria
RAMS	Reliability, Availability, Maintainability and Safety
SCADA	Supervisory Control and Data Acquisition



APPENDIX B – TENDER REQUIREMENTS

Table 9 summarises the information which shall be defined by Yarra Trams in the *Scope of Works* at the time of tender.

Table 9: Summary of information to be defined in the *Scope of Works*

Description	Requirement
Equipment designation	
Rated continuous current, I_{NE} [A]	
Designation of each isolator (i.e. section number or cable identifier)	
Number of isolators in the cubicle	
Any special physical or site specific requirements)	

Statement of compliance

The *Designer* shall return a clause by clause statement of compliance to this specification. The Yarra Trams statement of compliance template and deviation procedure for specifications is provided within the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].

Equipment selection principles

The equipment selection principles are defined in the Infrastructure - Network Power – Substation - Design and Construction [CE-021-ST-0023].