PUBLIC TRANSPORT SERVICES

TECHNICAL STANDARD

PART 129017

STATIONS – EQUIPMENT ROOM

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Zero Harm
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1.0 INTRODUCTION

The Department of Planning, Transport and Infrastructure (DPTI) Public Transport Services Division (PTS) owns and operates the Adelaide Metropolitan Passenger Rail Network (AMPRN). There are approximately 85 stations serving the AMPRN. The significant number of stations means that the process of upgrading or renewal is continuous. In order to both economise on design and construction effort and costs and enhance the passengers’ experience a set of common design and construction technical standards for stations has been developed.

Because the set of station standards is primarily used within the contract administration process the technical standards documents must be aligned with both the DPTI wide Master Specification and the PTS engineering management system.

The document attached at Annex A, Technical Standards – Stations – Equipment Room, is one of the set of station standards.

1.1 PURPOSE

The purpose of this Technical Standards is to outline the design requirements for an equipment room at the station precinct.

1.2 SCOPE

This Technical Standards applies to all PTS projects and contractor organisations designing, constructing or maintaining passenger stations on the AMPRN.
2.0 ANNEX A – TECHNICAL STANDARD – STATIONS – EQUIPMENT ROOM

CONTENTS
1. General
2. Standards
3. Design Requirements

1. GENERAL

This Part specifies the requirements for the design of an Equipment Room at railway stations on the Adelaide Metropolitan Passenger Rail Network (AMPRN).

2. STANDARDS

| AS 3084 | Telecommunications Installations |
| AS 3000 | Electrical Installations |
| AS/ACIF S009 | Installation requirements for customer cabling (Wiring Rules) |
| BCA | Building Code of Australia |

3. DESIGN REQUIREMENTS

3.1 Design Life

The structural elements of the Equipment Room shall have a design life of 50 years.

3.2 General

The Station Precinct Equipment room shall provide a suitable climate controlled room to securely house the infrastructure required for the Station Precinct security system, electrical, and passenger information systems. The room shall be sized by co-ordinating the requirements of Parts 129014 “Electrical Infrastructure”, 129015 “Security Systems”, 129016 “Passenger Information Systems”, and future AMPRN Signalling and Communications Upgrades.

The equipment in the room will develop fan noise as a result of the climate control system.

The fan noise will result in an Occupational Health and Safety (OHS) issue if located in normally occupied rooms.

3.3 Dimension

Unless otherwise specified in Project Design Brief the Equipment Room shall be a minimum of 18 m² without partition to allow for electrical equipment and security system equipment.

3.4 Equipment Room Location

The location of the Equipment Room shall be determined by co-ordinating the cabling requirements of the Passenger Information Systems (PIS), Electrical Infrastructure, and Security System Requirements for the particular site, taking into consideration system limitations; or, as indicated in the Project Design Brief.

Where practicable, the Equipment Room shall be in a shaded location to minimise the solar air conditioning load.
3.5 DPTI Security Consultation

If a separate security enclosure is used within the Equipment Room it shall be reviewed and accepted by the Principal before executing final design:

3.6 AS 3084 Compliance

The fit-out of the room shall comply with AS 3084. Note that AS 3084 references the Building Code of Australia (BCA).

For the purposes of interpreting AS 3084, the term “Equipment Room” (ER) shall incorporate the functions of both “Equipment Room” and “Entrance Room” (or “Entrance Facility”).

The ER shall be planned and equipped to comply with all normative requirements of AS 3084 for ERs, notably Clauses 6.4, ZA (including all referenced standards applicable in Australia), ZB2.3, ZB2.4 and ZB6.

In summary, this shall include:

1. Consideration of factors listed in Clause ZC3 in choosing the location;
2. Floor load capacity of 4.8 kPa;
3. Minimum clear height of 2700 mm below any ceiling fittings or suspended items;
4. No suspended ceiling below the true ceiling or slab above;
5. Minimum door size 900 mm × 2 000 mm;
6. Cable tray clearance of 300 mm from any fluorescent light fittings;
7. Connections to site entrance pathways and backbone cable pathways around the site (penetrations as required to connect pit and pipe, wall/ceiling duct or cable tray infrastructure, sized to minimum requirements in Appendix ZB where no further data is provided in this document);
8. Air filtering to provide protection from contaminants. In particular, capability of keeping out pantograph dust which will result from rail electrification;
9. Walls and ceiling painted in a light colour;
10. Electro Static Dissipative (ESD) floor covering;
11. Bunding of any floor entry conduits or penetrations;
12. Protective cages over any sprinkler or fire suppression heads;
13. Climate control via thermostatically activated air conditioning at all times;
14. Positive pressure differential with respect to surrounding areas;
15. Lighting level of average 500 lux at 1 m above finished floor level (AFFL) in front of, and behind, the equipment rack (after equipment installation);
16. Separate supply and power distribution sub-board within the room for the equipment (fed from essential power if available);
17. A minimum of two dedicated 10 A, 240 V AC double electrical outlets, each on separately fused circuits;
(18) All pathways penetrating fire rated barriers shall be properly fire stopped using a re-openable cable feed through;

(19) Powder type fire extinguisher suitable for Class E fires mounted inside the door at the room entry;

(20) Security detection and alarming of access;

(21) Provisions for earth bonding to meet AS/ACIF S009;

(22) Provision of lightning protection and surge filtering on the incoming rack supplies (if not provided already on the main building distribution board); and

(23) Compliance with the standards referenced within AS 3084 (notably Clause ZA2) shall be achieved.

(24) Internal CCTV camera incorporating Infra Red (IR) illumination to monitor equipment racks in case of smoke alarm activation.

3.7 Wall, Floor and Ceiling Finishes

Light colours shall be selected to promote uniformity of lighting levels around the room in support of tasks involving the correct identification of small colour coded components.

Fixed ceilings or suspended slabs above acting as a ceiling shall be painted in ceiling white.

Walls shall be painted in a light colour generally consistent with other finishes at the same site.

The paint seal to ceiling and walls shall be applied before mounting frames, equipment and surface fittings are installed, so that unpainted surfaces will not be exposed if equipment or fixtures are changed or moved in the future.

For temperature control, security and fire rating purposes, the ER shall not have any windows or skylights.

Walls and ceiling on the outside of the buildings shall be fully insulated to minimise the solar heat load during warm weather.

Floors shall be covered in a static dissipative material offering a smooth washable surface.

3.8 Lighting

Lighting shall comprise fluorescent batten fittings with diffusers selected to provide even illumination around equipment racks and walls, and inside racks when the doors are opened.

Ceiling mounted light fittings shall be provided both behind and in front of racks. Light fittings shall not encroach upon the space above racks, which shall be reserved for cable tray, power distribution and smoke detection sensors.

Light fitting colour temperature and spectrum shall be selected to facilitate unambiguous identification of colour coded conductors, fibres and components which will be installed in the ER.

The lights shall be automatically switched on by a movement detector targeted at the door and remain illuminated for a hang time of 15 minutes after last movement was detected. A parallel manual start switch shall be provided inside the door to override the movement detector if necessary.

The lighting level shall meet the requirements of AS 3084 at equipment termination spaces (including on walls) and at the front and rear of cabinets.

The lighting level shall be designed on the basis that the room is unoccupied (and therefore the shadowing effect of occupants is accounted for by virtue of the relatively high lighting level specified).
The lighting level in access and circulation spaces within the room (such as the aisle providing access between the front and rear of the rack) may be lower, but shall exceed 150 lux at the centre of the aisle.

An 80% maintenance factor shall be applied to the manufacturer’s rated light output with new tubes fitted.

The 500 lux requirement shall be achieved on average. The spot illuminance may be up to 30% lower than the average at any point between the rack front or rear and the wall opposite.

3.9 Climate Control

Air conditioning shall be based on cooling of the projected ultimate equipment load which is estimated at 1 300 W. The peak building thermal load (from sun exposure at high outdoor temperatures) based on the AIRAH code for Adelaide shall be taken into account.

The Equipment Room air supply shall be fitted with filters to allow an ingress protection rating of IP 54 (International Protection Rating) to be achieved for the room air supply. At least 2% of the total air moved shall be fresh air. Supply air discharge velocity shall not exceed 6 m/s.

The air conditioning shall be provided to meet the following requirements:

1. The air conditioning shall comprise a single in-wall or split system;
2. The room temperature shall generally be maintained to 22°C and 50% humidity;
3. At peak outdoor ambient conditions and maximum equipment rack load, the supply air to the front of all racks shall not exceed 22°C;
4. The total (maximum) equipment load cooling capacity shall meet or exceed 200 W/m² of Equipment Room floor area;
5. The units selected shall be rated for continuous 24×7 operation with a minimum field service life of 5 years;
6. The indoor unit shall blow cold air into the aisle in front of the equipment rack whilst drawing return air from above and behind the rack;
7. The indoor noise level created by the air conditioning system (as measured with other systems switched off) shall not exceed 60 dBA;
8. Outdoor unit noise levels shall comply with local authority requirements;
9. The outdoor unit shall be fitted with a vandal resistant steel guard fixed to the building or mounting concrete pad using anti-tamper fasteners and shall not be placed in the rail corridor;
10. In the event of power failure, the unit shall automatically restart when power is restored; and
11. Air conditioners shall be fitted with alarms wired via pairs in a Cat 6 cable to a rack EMS or the security alarm panel to report the following conditions:
    a. Air conditioner switched off manually or power fail; and
    b. Air conditioner fault.

3.10 Fire Detection

The ER shall be fitted with a smoke detector wired to the security panel, refer Part 129015 “Security System” for details.
3.11 Power Supply

Power shall be supplied to the ER as required by Part 129014 “Electrical Infrastructure" and Part 129016 “Passenger Information Systems”, additionally, the room will require the following circuits for the operation of the Security System:

(1) 15 A rack pendant outlet #1 (CCTV Rack main – Non-RCD);
(2) 15 A rack pendant outlet #2 (CCTV Rack backup – Non-RCD);
(3) 15 A rack pendant outlet #3 (PA/ICT Rack main – Non-RCD);
(4) 15 A rack pendant outlet #2 (PA/ICT Rack backup – Non-RCD);
(5) Wall convenience general power outlets (RCD protected);
(6) Security alarm panel general power outlet (Non-RCD);
(7) Air conditioner (fixed wiring); and
(8) Lighting.

In accordance with AS 3000 Amendment 1 – 2009, Clause 2.6.3.2.1 Australia item 6(a) “the connected equipment is required by the owner or operator to perform a function that is essential to the performance of the installation and that function would be adversely affected by a loss of supply caused by the RCD operation”. All the equipment in the CER racks has one of the functions of essential system security, patron safety, emergency management or direct operation of the rail signalling and control systems.

The racks shall have their own internal UPS.

The maximum CCTV+ICT/PA equipment demand (under full battery recharge conditions) will be in the range 2.8 kVA to 4 kVA at 0.85 pf.

The average equipment demand under normal steady state power supply conditions is estimated at 1500 VA.

The above estimates exclude lighting and air conditioner load.

A 6 mm² G/Y cable shall be provided from a Communications Earth Terminal at the Main Distribution Board to each of the CCTV rack, PI rack and the MDF.

3.12 Main Distribution Frame

Wall space shall be allocated for the provision of a public carrier network boundary facility (“Main Distribution Frame” (MDF)) comprising at least 1×110 pr frames centred 1 300 AFFL. The selected location shall generally comply with AS/ACIF S009 MDF clearance requirements.

A cable tray support pathway to the ER perimeter wall cable tray, to the public carrier entrance cable penetrations, and to site distribution pathways, shall be provided.

Front wall space centred 1 300 AFFL next to the MDF shall be reserved for a future fibre distribution frame. The frame may optionally be installed in the CCTV rack or in the reserved wall space as the site evolves.

3.13 Telstra Service

A 10 pair Telstra point of entry cable shall be provided from the nearest point of Telstra service connection (coordinate with Telstra).

The following services shall be wired to the MDF and carried on this cable as Public Switched Telephone Network (PSTN) (ordinary exchange line) services:
(1) Emergency Help Phone × n (on platform) – one line per telephone;
(2) Security alarm panel dialler;
(3) Lift car #1 Emergency Help Phone (if applicable);
(4) Lift car #2 Emergency Help Phone (if applicable); and
(5) Police Security Services Branch (PSSB) link Digital Subscriber Line (DSL) service (temporary in lieu of fibre or MIMP network, if applicable).

3.14 Security

3.14.1 Physical Security of Doors and Walls

Any ER walls and doors shall be of construction capable of withstanding malicious vandal attack. Access shall not be readily gained by removing panels or in-wall air conditioners. Walls shall be of masonry or concrete construction.

The door shall be of solid timber construction and steel clad.

The roof shall comprise concrete slab or continuous sheeting of suitable strength. The roof shall not have any access manholes or skylights fitted. By design, the roof shall not be readily reached by climbing a fixed ladder or the surrounding structure.

The roof style shall be consistent with the Roof Style for Railway Lines – refer Part 129005 “Shelters”.

The Security System Enclosure within the Equipment Room entrance door shall be fitted with a lock, Assa Abloy Proteq ' Cliq' - Australian Oval Cylinder 570 - CYL 504 (entry to these rooms shall be logged by an electronic signature held in the cylinder). This requirement will only apply where the CCTV/PI Enclosure is clearly separated by a door from other services.

The ER's external door shall be fitted with weather and dust seals to prevent ingress of water or contaminants into the room. (However, some filtered ventilation near roof level shall be provided if necessary to meet minimum air change requirements of referenced battery accommodation standards and the 2% fresh air criterion of Clause 3.9 “Climate Control”). The external door shall be fitted with a lock keyed to suit a Principal supplied “K11/K12” Security Key. The door shall have a self closing mechanism which shall automatically lock from the outside but can still be opened without the use of a key from the inside.

3.14.2 Alarm

Both the external access and the Security System Enclosure shall be alarmed. A panel inside the external door will allow Operations Personnel to access and deactivate the alarm. The Security System alarm shall only be deactivated by approved personnel entering the Security System Enclosure. The Contractor shall coordinate the alarm system accordingly.

3.15 Fire Rating

The ER shall achieve a one hour minimum fire rating. Refer to the Building Code of Australia (BCA) and Australian Standards.

3.16 Typical Two-Rack Security System Enclosure

Figure 3.10 provides an indicative layout for a two rack enclosure. Entry conduits through the floor for power and communications are not shown, but shall be planned as applicable (including Telstra entry cable and future trackside fibre cables as well as site distribution).

Note: This is a typical layout and not a prescriptive or complete specification. The actual size, orientation and layout of the room and the materials used shall be adjusted to suit the requirements of the site and the
position on the site, whilst maintaining clearances between items, cool air flow to the front of the racks and good illumination at the front and rear of racks. Where possible, it would be advisable to separate the racks entirely (e.g. each rack butted up against opposite walls), allowing enough room between them for unrestricted access to the rear of the racks.

**FIGURE 3.10 – TWO RACK SECURITY SYSTEM ENCLOSURE LAYOUT**

![Diagram of rack security system enclosure layout](image-url)

**NOTES**

1. Layout is typical and showing minimum clearances. The view shows a combination reflected ceiling plan and wall/floor layout.
2. Light fittings are valid for 2400mm AFFL ceiling height, with white or light pastel colour ceiling/wall finishes. Based on Thorn College surface battens.
3. The actual tray routes must be designed to connect to the respective facilities and pathways and wall mounted facilities placed around the tray runs.
4. Lights shall be on a movement detection or time switched control to ensure they are not left on when unattended.
5. Room dimensions are internal clear space.

Date: 2/3/2010