



# Technical Standard - TS108

Technical Standard for Indoor Equipment Room

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# Contents

<b>Figures</b> .....	<b>4</b>
<b>1. Introduction</b> .....	<b>5</b>
<b>2. Definitions and abbreviations</b> .....	<b>5</b>
2.1 Definitions .....	5
2.2 Abbreviations .....	7
2.3 Terminology.....	7
<b>3. Relevant rules, regulations, standards and codes</b> .....	<b>8</b>
3.1 Standards and codes .....	8
3.2 Legislation and regulations .....	9
<b>4. General</b> .....	<b>10</b>
<b>5. Site location</b> .....	<b>10</b>
<b>6. Easement</b> .....	<b>10</b>
<b>7. Room sizes and layouts</b> .....	<b>10</b>
7.1 Main doors .....	11
7.2 Emergency exit door .....	12
7.3 Hatchway type entrance .....	12
<b>8. Building structure</b> .....	<b>12</b>
8.1 Foundation .....	12
8.2 Floor .....	13
8.3 Walls and ceilings .....	13
8.4 Hauling eyes .....	13
<b>9. Fire protection</b> .....	<b>14</b>
9.1 Fire detection and alarm setting .....	14
9.2 Firefighting system .....	14
9.3 Fire ratings.....	14
<b>10. Access requirements</b> .....	<b>14</b>
10.1 Access route doors/gates lock.....	15
10.2 Equipment handling area .....	15
10.3 Equipment carriageway area .....	16
10.4 Stairway and passageway areas.....	16
<b>11. Room requirements</b> .....	<b>16</b>
11.1 Noise .....	16
11.2 Water drainage system .....	16
11.2.1 Site drainage - outside equipment room.....	16
11.2.2 Area drainage - inside equipment room.....	17
11.2.3 Water tightness.....	17
11.3 Lighting and power requirements.....	17
11.3.1 Temporary (during construction stage) .....	17

11.3.2 Permanent ..... 17

**12. Installation works (conduits and cabling system) .....17**

12.1 Conduits system ..... 17

12.1.1 Incoming HV supply route ..... 17

12.1.2 Conduits system (underground) ..... 18

12.1.3 Conduits through building structure ..... 18

12.2 Cables support system ..... 18

12.3 Earthing requirements ..... 19

**13. Who should you talk to?.....20**

**Appendices .....21**

**A. Fire Resistance Level (FRL) .....21**

**B. Equipment room layouts .....22**

B.1 Distribution transformer within building layout ..... 22

B.2 Distribution equipment within building layout..... 23

B.3 Distribution transformer with street frontage layout ..... 24

B.4 Distribution equipment with street frontage layout..... 25

B.5 Distribution equipment under loading docks layout ..... 26

B.6 HV switching cubicle within building layout ..... 27

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## Figures

Figure 1: Example of doorframe and door leaf information .....	11
Figure 2: Example of the hauling eye .....	13
Figure 3: Example of ‘arc length as a turning circle’ .....	15
Figure 4: Warning signage (SA Power Networks’ stock item no. KS 1167).....	18
Figure 5: LV cable signage (SA Power Networks’ stock item no. KS 1020) .....	18
Figure 6: Earth connection in an earth stake pit.....	19
Figure 7: Multiple earth connection .....	19
Figure 8: Earth connection signage (SA Power Networks’ stock item no. KS 1050).....	19
Figure 9: Distribution transformer within building layout .....	22
Figure 10: Distribution equipment within building layout .....	23
Figure 11: Distribution transformer with street frontage layout .....	24
Figure 12: Distribution equipment with street frontage layout .....	25
Figure 13: Distribution equipment under loading docks layout .....	26
Figure 14: HV switching cubicle within building layout .....	27

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## 1. Introduction

This document specifies the minimum requirements for the design and construction of the equipment room, where equipment that is a part of the SA Power Networks distribution network is installed.

The specifications in this document are applicable to all parties, whose activities are associated with the design and construction of the equipment room where SA Power Networks' equipment is located.

The trenching and installation works for underground conduits shall be in accordance with [TS085](#) requirements.

The earthing design shall be in accordance with the SA Power Networks project specification, National and State codes, AS 2067, and [TS109](#) requirements.

## 2. Definitions and abbreviations

### 2.1 Definitions

<b>Contractor</b>	A contractor who is suitably accredited installer (full or provisional) engaged by the customer and has satisfied the SA Power Networks terms and conditions (ie <a href="#">3302</a> ) to undertake the civil and electrical installation works.
<b>Connection point</b>	For this document connection point also has the same meaning as point of supply as defined in AS/NZS 3000.
<b>Customer</b>	The customer as set out in the project specific offer letter.
<b>Customer's agent</b>	A contractor and/or a designer engaged by the customer.
<b>Designer</b>	A person who is suitably accredited designer (full or provisional) engaged by the customer and has satisfied the SA Power Networks terms and conditions (ie <a href="#">3302</a> ) to undertake the design works.
<b>Distribution equipment</b>	Includes padmount distribution transformer, switching cubicle, earth busbars, earth rods, earth pit, associated cables, and accessories.
<b>Distribution network</b>	The assets (eg poles, wires, underground cables, transformers, substations) operated by SA Power Networks, which transports electricity to and from a customer's connection point.
<b>Distribution transformer</b>	A padmount distribution transformer which forms a part of the distribution network, typically with a secondary voltage of less than 1000 Vac.
<b>Indoor equipment room</b>	A room within a building/structure or a free-standing building/structure which has a roof enclosed within a minimum of three (3) walls and houses padmount distribution transformer, associated switchgears including accessories. Note: This type of transformer enclosure does not apply to residential development where domestic style fencing encloses the transformer.
<b>Easement</b>	The right to enter private property, to erect, or lay and maintain the SA Power Networks infrastructure subject to any condition stated in the easement document.
<b>Emergency exit door</b>	An emergency exit door specially designed to help people move out of the building during emergencies, such as fire, earthquake, hazardous material spills and floods.
<b>Fire dampers</b>	Fire dampers are activated either by a thermal element which melts at temperatures indicative of a fire, or by an electric signal from a remote fire alarm system.

**Definitions Continued:**

<b>Fire rating</b>	The fire rating relates to the fire resistance periods for structural adequacy, integrity, and insulation. Also known as 'FRL = Structural adequacy/Integrity/Insulation in that order.
<b>Fire shutters</b>	Fire shutters are metal screens designed to resist heat, flames and stop the spread of smoke.
<b>High voltage (HV)</b>	Voltage exceeding low voltage.
<b>Low voltage (LV)</b>	Voltage exceeding 50 Vac or 120 Vdc ripple free and not exceeding 1000 Vac or 1500 Vdc.
<b>National Construction Code (NCC)</b>	The 'National Construction Code' specifies the technical requirements for the design, construction, and performance of buildings, plumbing and drainage systems. The NCC is made up of the Building Code of Australia (BCA) and the Plumbing Code of Australia (PCA).
<b>Owner/Landowner</b>	The owner/landowner is the person or an entity that is the registered proprietor/owner of the land, as recorded at the Land Titles Office. All easement agreements shall be with the owner/landowner.
<b>Property</b>	<p>Either what is commonly described as a Torrens Title allotment, a Community Title Scheme or Land which is owned by the crown on which the owner/occupier has the right to the installation of the electricity supply.</p> <p>A property may include:</p> <ul style="list-style-type: none"> <li>• a single parcel of freehold, leasehold and/or public land, and/or land held under lease or license on which the customer or controlling body has the right to install their electrical installation;</li> <li>• any combination of contiguous land to which the customer or controlling body has the right to install their electrical installation; and</li> <li>• contiguous land and/or individual titles to which a corporate body, customer and/or controlling body has the right to install their electrical installation.</li> </ul>
<b>Public land</b>	Land owned by the crown or an instrumentality or agent of the crown or by a council or other local government body, including any such land that is subject to native title.
<b>The SA Power Network Project Manager</b>	The SA Power Networks Network Project Manager, Network Project Officer, Network Service Officer, Customer Service Officer, Strategic Project Manager, or any Officer/Supervisor who is responsible for the management of a project.
<b>Works agreement</b>	The agreement as per the SA Power Networks construction terms booklet, ie <a href="#">3302: Construction Terms (Non-Contestable and Contestable)</a> .
<b>Works</b>	As defined in <a href="#">3302</a> , the works described in the offer other than any part of the contestable works described in that offer which the customer elects to undertake.

## 2.2 Abbreviations

<b>CMEN</b>	Common Multiple Earthed Neutral Systems
<b>DIT</b>	The Department of Infrastructure and Transport
<b>HV</b>	High Voltage
<b>LTO or LTRO</b>	Lands Titles Office or Lands Titles Registration Office
<b>LV</b>	Low Voltage
<b>MEN</b>	Multiple Earthed Neutral Systems
<b>NAP</b>	Network Access Permit
<b>NCC</b>	National Construction Code
<b>NICC</b>	The SA Power Networks Network Information for Contractors and Customers
<b>OTR</b>	The Office of Technical Regulator
<b>T/F</b>	Padmount Distribution Transformer
<b>TS</b>	The SA Power Networks Technical Standard

## 2.3 Terminology

<b>Shall</b>	Indicates a mandatory requirement.
<b>May or Should</b>	Indicates a recommendation that will not be mandatory but can be imposed as deemed appropriate by SA Power Networks.



### 3. Relevant rules, regulations, standards and codes

#### 3.1 Standards and codes

The following listed documents are for additional information and other documentation may be required on a project specific basis.

Please Note: It is the responsibility of the customer/customer's agent to ensure you have complied with all applicable, SA Legislative Regulations (under Acts), ESCOSA/ENA/AEMC/IEC documentations, relevant AS/NZS standards, the SA Power Networks publications, and you have ensured their current publications, before implementing them.

##### Australian Standards publications

AS 1319	Safety signs for the occupational environment
AS 1530.7	Methods for fire tests on building materials, components, and structures. Part 7: Smoke control assemblies - Ambient and medium temperature leakage test procedure
AS/NZS 1668 Set	The use of ventilation and air-conditioning in building set
AS 1668.2	The use of ventilation and air conditioning in buildings - Mechanical ventilation in buildings
AS 1670	Automatic fire detection and alarm systems - System design, installation, and commissioning
AS 1905.1	Components for the protection of openings in fire-resistant walls. Part 1: Fire-resistance doorsets
AS 2067	Substations and high voltage installations exceeding 1 kVac
AS/NZS 3000	Electrical installations (known as the wiring rules)
AS/NZS 3100	Approval and test specification - General requirements for electrical equipment
AS 3600	Concrete structures
AS 3700	Masonry structures
AS 3798	Guidelines on earthworks for commercial and residential developments
AS 4100	Steel structures
AS 5577	Electricity network safety management systems
AS 60038	Standard voltages
AS 60068.1	Environmental testing - General and guidance

##### National Construction Code (NCC) publications

Complete Series	National Construction Code (NCC)
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##### Energy Networks Association (ENA) publications

ENA Doc 018	Guideline for the fire protection of electricity substations
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##### CIGRE publications

Doc 537	Guide for transformer fire safety practices
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## The SA Power Networks publications

<b>Manuals</b>	
Manual 14	Safety, reliability, maintenance and technical management plan
<a href="#">Manual 32</a>	Service and Installation Rules
<b>Network Information for Customers and Contractors</b>	
<a href="#">NICC401</a>	Information on network design and installation by an external contractor
<a href="#">NICC404</a>	Working in the vicinity of the SA Power Networks Infrastructure - Network access permit process
<a href="#">NICC802</a>	Padmount transformers - General information
<b>Technical Standards</b>	
<a href="#">TS085</a>	Trenching and installation of underground conduits and cables networks (up to and including 33 kV)
<a href="#">TS099</a>	Distribution and sub-transmission CAD drafting standards
<a href="#">TS100</a>	Electrical design standards for the underground distribution networks (up to and including 33 kV)
<a href="#">TS102</a>	Easement standard for the SA Power Networks infrastructure
<a href="#">TS105</a>	Testing standard for underground and overhead distribution powerlines networks (up to and including 33 kV)
<a href="#">TS105A (Forms)</a>	Standard forms for the SA Power Networks underground and overhead infrastructure
<a href="#">TS109</a>	Earthing of the distribution networks
<b>Relevant E-Drawing Series</b>	

## 3.2 Legislation and regulations

This section provides a list of the relevant legislation and regulations which shall apply to the design, manufacture, installation, testing and commissioning, and operations and maintenance of all plant and equipment for the distribution network.

In an event where there is any inconsistency between legislation and regulations and these technical requirements, the legislation and regulations shall prevail.

- Electricity Act 1996 and Electricity (General) Regulations 2012
- Work Health & Safety Act 2012 and Work Health & Safety Regulations 2012
- Environment Protection Act 1993 and Environment Protection Regulations 2009
- Electricity Corporations (Restructuring and Disposal) Act and Regulations 1999

## 4. General

The indoor equipment room shall be designed and constructed to the industry best practice and shall comply with Electricity (General) Regulations 2012, National Construction Code (NCC), relevant Australian Standards, project specifications, this document, and other statutory authorities' requirements.

On receipt of preliminary drawings of the indoor equipment room, the SA Power Networks Project Manager will provide additional assistance to the associated parties regarding the building details, location, and access requirements.

## 5. Site location

The SA Power Networks preference is for the distribution equipment to be located at street level with 24 hours/7 days per week, unrestricted access from the street. When this is not practicable, the indoor equipment is permitted to be installed in a room of the building.

The location of a suitable site will include numerous considerations, and these will vary for each installation.

The indoor equipment room located within a building shall take into consideration the following requirements:

- ability for SA Power Networks to replace major plant (eg padmount distribution transformer and switching cubicle) under emergency conditions;
- minimising the impact (such as noise levels, load bearings, obstructions) on the areas, adjacent to, above and below the equipment room;
- avoidance of the surrounding hazardous environment and encroachments;
- ventilation and room cooling facilities; and
- the equipment installation methods.

Only with the written approval from the SA Power Networks Project Manager, the indoor equipment room may be located at the building's basement level, provided it adheres to all the requirements of this document.

## 6. Easement

The formal land tenure [by registration with the Lands Titles Office (LTO)] shall be provided by the customer/customer's agent to SA Power Networks for the indoor equipment room, together with rights of access for the SA Power Networks personnel, equipment, related services, and vehicles, where necessary.

The customer/customer's agent shall download form '[Easement - Third Party Letter of Agreement](#)' for easement agreement and submit all documentation to the SA Power Networks Real Estate-REM Branch via email: [RealEstateAdmin@sapowernetworks.com.au](mailto:RealEstateAdmin@sapowernetworks.com.au) together with a written undertaking that they are lodged with the LTO. Refer to [TS102](#) for more details.

## 7. Room sizes and layouts

The indoor equipment room size will be dependent on the type and size of the padmount distribution transformer and/or switching cubicle selected. Confirmation of the distribution equipment selected should be sought from the SA Power Networks Project Manager prior to designing the indoor equipment room.

A minimum separation of 1065 mm is required between the inside room wall and the padmount transformer's HV door side.

For installations requiring multiple units (eg switching cubicle and/or additional padmount distribution transformer), a minimum of 1.0 m clearance shall be maintained between each unit.

The consumer mains switch board (MSB), and metering equipment shall not be installed within the equipment room, whereas the fire damper trip wires (when necessary) are permitted.

The typical separation between the indoor equipment room walls and the distribution equipment are shown in Appendix B.

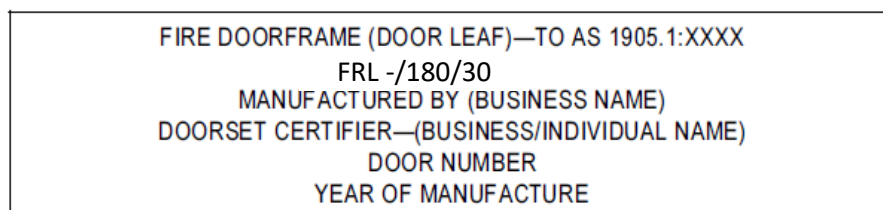
For a padmount distribution transformer's technical data, including size, refer to [NICC802](#) and [TS100](#).

For a switching cubicle's technical data, including size, refer to [TS100](#).

## 7.1 Main doors

The following are the minimum requirements for the equipment room main doors:

- (1) The fire ratings of main doors shall be three (3) hours (ie FRL -/180/30).
- (2) SA Power Networks requires that each of the two main doors measures 2.0 m in width and 4.0 m in height. However, the implementation of "split-style" main doors is permissible, given they meet the following requirements:
  - (a) The main doors shall be interconnected to enable folding, which will result in a combined opening width of 4.0 m. Additionally, these doors shall be fitted with locking mechanisms.
  - (b) When these doors are folded and opened outward, they shall safely extend to 180 degrees. They shall be lockable, and their placement shall not impede pedestrian walkways or vehicular traffic.
  - (c) Furthermore, it is essential to maintain unrestricted and unobstructed access to the main doors at all times. The area in front of these doors shall not be designated for storage, car parking, or as a standing zone, and shall always be kept clear.
- (3) The main doors shall be weatherproof, and in the case of mild steel construction, two (2) coats of exterior gloss paint shall be applied.
- (4) No air space larger than 15 mm is allowed between frame and wall, door and frame, and door to door.
- (5) Any opening adjacent to any door lock shall be fitted with a suitable barrier to prevent unauthorised opening of the door lock.
- (6) It is the responsibility of customer or customer's agent to supply and install danger HV electrical equipment signage (SA Power Networks' stock item no. KS 1167).
- (7) All main doors and frames shall be with approved underwriters label as shown in Figure 1 and in accordance with AS 1905.1.



**Figure 1: Example of doorframe and door leaf information**

The safety signage shall be installed in accordance with AS 1319, the National Construction Codes and the Work Health and Safety regulatory requirements.

There may be additional requirements for safety signage, which will be project specific.

All main doors shall have the following attachments:

- self-latching;
- latching mechanism to be operated at ground level;
- hinges fitted with stainless steel pins; and
- handles are to be installed on both the interior and exterior sides of the main doors:
  - The exterior handles shall be securely fixed, while the interior handles shall permit free movement to facilitate emergency exit access for the personnel.
  - A security plate, latch, or a similar mechanism shall be installed to safeguard the interior door handles from unauthorised access.

## 7.2 Emergency exit door

Each equipment room shall be provided with a minimum of one (1) emergency exit door, which can provide an escape in the event of an emergency.

The emergency exit door size shall be a minimum of 820 mm wide x 2040 mm high x 40 mm thick. The standard door width may vary (ie 820 mm, 870 mm, 920 mm and 1020 mm).

The emergency exit door shall be opened outwards and indicated on the design drawings.

A visible Exit signage and Emergency Lighting shall be installed.

To allow safe egress the emergency exit door shall remain clear 24 hours/7 days per week.

Danger HV electrical equipment signage (SA Power Networks' stock item no. KS 1167) is to be fitted.

## 7.3 Hatchway type entrance

The design of hatchway type entrances for equipment access used with basement equipment room is acceptable, only if two (2) separate emergency exit doors, via stairs, external to the equipment room are provided.

The emergency exit doors including the necessary hatch cover and frame assembly shall be designed and installed to the best industry standards.

The area above the equipment hatchway shall not be less than 4.0 m in height to allow for the use of a crane, to install and remove the equipment.

Personnel hatchways and vertical ladders as an access or escape means are not acceptable.

## 8. Building structure

The structural strength of the building and all materials used for construction of the indoor equipment room, shall be in accordance with current National Construction Code (NCC), relevant Australian Standards, and specification stated on the structural design drawings.

At the preliminary stage, the design of the conduits and cable system (including conduit numbers, sizes, types, location, pits, cable trays, etc) shall be specified on the building construction drawing, which shall be approved by the SA Power Networks Project Manager, before construction commences.

The equipment room shall be free from steps or irregular surfaces, thereby ensuring a safe environment for the installation, removal and operation of the equipment.

The hauling eyes on the wall/floor shall be designed and installed in accordance with Section 8.4.

The building structure shall maintain fire ratings as stated in Section 9.3.

The equipment room shall be watertight construction and be suitably proofed against vandals and unauthorised access.

Where the indoor room has openings, roof ceiling space/cavities, install galvanized steel mesh (with openings less than 130 mm<sup>2</sup>) to prevent vermin (eg rats, mice, etc) and birds from entering the room.

### 8.1 Foundation

The equipment room foundation constructed on the natural or filled ground shall withstands all the anticipated load combinations (ie static and dynamic).

Where the foundation is placed on soil, the soil shall be clear of any obstruction or rubble that could interfere with the installation of the earthing electrode system through the equipment room floor.

## 8.2 Floor

The equipment room floor shall be constructed in accordance with the specifications stated on the structural design drawings.

The floor shall be designed to withstand the anticipated load combinations (ie static and dynamic) of the distribution equipment, its associated accessories, including additional weight of cranes/skating system that are required to install and removal of the distribution equipment.

The floor shall have the same load bearing characteristics as the equipment handling and carriageway areas and will have a non-slip finish.

In instances where the equipment is installed on a suspended slab, it is mandatory to display appropriate signage indicating the designed load capacity. This measure is crucial to prevent potential overloading issues in the future.

The equipment room floor shall consider the need for access to the earthing cables/electrodes.

## 8.3 Walls and ceilings

The equipment room walls shall have sufficient structural strength to support the weight of any equipment mounted on it without collapsing.

The ceiling shall be constructed of a suitable material that provides sufficient structural strength for the mounting of the hauling eyes. Refer to Section 8.4 for more details.

## 8.4 Hauling eyes

The following are the minimum requirements for the hauling eye (Refer to Figure 2 as an example):

- (1) At the preliminary stage, the location and number of hauling eyes shall be confirmed by the SA Power Networks Project Manager prior to designing of the indoor equipment room.
- (2) Where approved, the anchors and/or hauling eyes (provided by the owner/associated parties) shall be installed to achieve the overall equipment load.
- (3) The hauling eyes should also be specified for intermediate cable pits outside the equipment room.
- (4) All anchors and hauling eyes shall be permanently stamped to indicate its safe working load.
- (5) The hauling eyes located in floors shall be removable and, upon removal, the floor surface shall be level to avoid a tripping hazard.
- (6) Threaded recesses shall be provided with reusable removable plugs to stop ingress of foreign matter.



Figure 2: Example of the hauling eye

## 9. Fire protection

The SA Power Networks equipment room shall be designed to contain any products of a fire within the room, to ensure that there is no fire to other parts of the building.

The fumes and other gases shall be eliminated from entering the indoor equipment room.

### 9.1 Fire detection and alarm setting

The fire detection and alarm system shall be installed in accordance with AS/NZS 1668 and AS 1670.

The compliant fire detection system and alarm setting shall be installed, maintained, and tested prior to the building being habitable.

The testing and maintenance of the fire detection system will require a '[Request for Network Access \(ie RNA\)](#)' permit.

### 9.2 Firefighting system

The firefighting equipment, fire-hydrant system and other water sources shall be installed outside the equipment room.

### 9.3 Fire ratings

It is essential that three (3) hours fire ratings (ie FRL 180/180/180) ratings be maintained for any penetration of the walls, floors, ceilings, and doors (ie building structure) or other services.

The use of a spray on material to achieve fire ratings is not permitted.

The sealing of the penetration shall be done strictly in accordance with the manufacturer instructions.

## 10. Access requirements

The following are the minimum requirements for the SA Power Networks personnel safety and access:

- (1) Unrestricted Personnel Access for 24 hours/7 days per week, including without notice Emergency Access to the equipment room and associated mains from the date of handover, shall be provided to the SA Power Networks personnel. This requirement shall be included in any immediate or future building security arrangements.
- (2) Provide access details such as Keys, Key codes etc, prior to connection of supply and keep SA Power Networks informed, should access alter.
- (3) Imposing any restrictions on the SA Power Networks personnel and/or vehicle access, is not acceptable.

The examples of restrictions are:

- building security protocols changed;
  - PIN numbers/swipe cards expired;
  - requesting prior notifications to enter premises; and/or
  - the need to get special keys.
- (4) Unhindered Vehicle Access may be required for emergency situations and maintenance purposes. Access points shall be located where they will no obstructions by vehicles, equipment, site usage or any other impediments.
  - (5) Entering the equipment room without being accompanied by the accredited SA Power Networks representative, is prohibited.

## 10.1 Access route doors/gates lock

Where access to the equipment room is not direct from the street, any locked doors/gates on the route to the equipment room shall be fitted with either:

- lock with a cylinder keyed to the SA Power Networks master key system; or
- pad bolt or similar fixing capable of accepting Lockwood series padlocks and keyed to the SA Power Networks master key system; or
- Australian Locksmiths P1 dead latch, incorporating a heavy-duty key-n-knob lock with rigid outside knob, key retracting bolt and inside lever be always free.

Refer to the section title Locking facilities of the [Manual 32](#) for more details.

Refer to the drawing title Security equipment - Locks and keys of E-Dwgs E 2774 sheets 1.1 and 1.2 for more details.

The building owner/landowner shall bear the cost for the installation and maintenance of all doors/gates locks.

## 10.2 Equipment handling area

The following are the minimum requirements for the equipment handling area (ie the area in front of the equipment main doors), which shall be available for the SA Power Networks personnel, for the safe handling, installation and removal of the equipment:

- (1) This area shall be a minimum of 4.0 m wide x 4.0 m deep and with an available turning circle of 6.2 m (Refer to Figure 3) to accommodate a mobile crane operation to install and remove the equipment.
- (2) The ground slope of this area should not exceed 1:20.
- (3) This area shall be designed to withstand the combined (ie static and working) loads of the distribution equipment, its associated accessories, including additional weight of mobile cranes and skating system.
- (4) This area shall have the same load bearing characteristics as the equipment room floor and carriageway areas.
- (5) For the effective operation of a skating system, this designated area shall be kept flat and free from any potential obstructions, thus guaranteeing safe and unimpeded manoeuvrability.

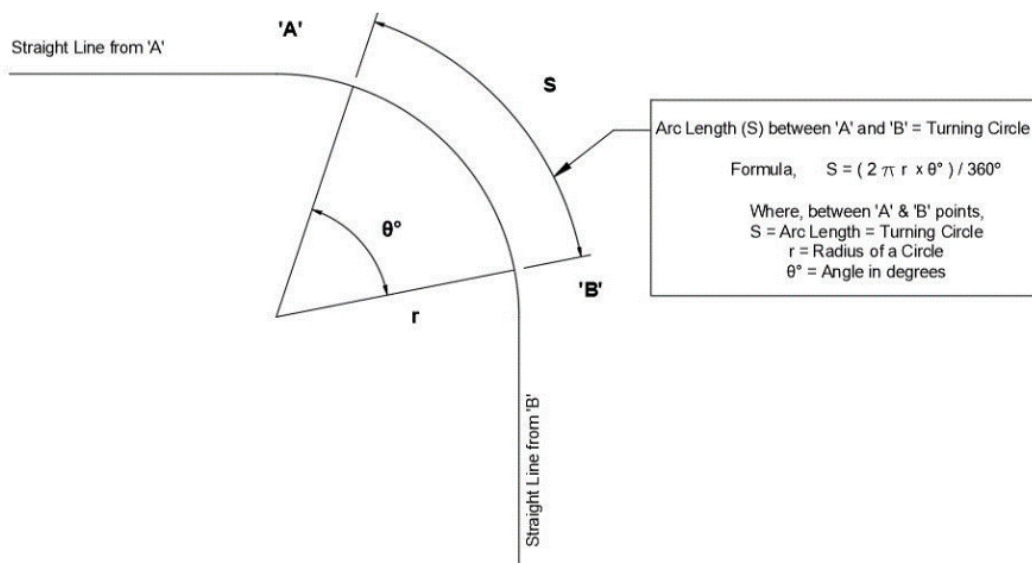


Figure 3: Example of 'arc length as a turning circle'



### 10.3 Equipment carriageway area

The following are the minimum requirements for the equipment carriageway area which shall be available for the SA Power Networks personnel, for the safe handling and removal of the equipment:

- (1) This area shall be a minimum of 4.5 m wide x 4.5 m high with an available turning circle of 6.2 m to accommodate a mobile crane operation to install and remove the equipment.
- (2) The ground slope of this area should not exceed 1:12.
- (3) This area shall be designed to withstand the combined (ie static and working) loads of the distribution equipment, its associated accessories, including additional weight of mobile cranes and skating system.
- (4) In instances where equipment is installed in a basement, a headroom of 6.5 m is required to facilitate crane access for the loading and unloading of the equipment.
- (5) Where the equipment is installed beneath loading docks via a gatic or a hatchway system, a headroom of 3.5 m is mandated to allow vehicular test van access through the basement up to the equipment room.

### 10.4 Stairway and passageway areas

The following are the minimum requirements for the stairway and passageway areas:

- (1) These areas shall be a minimum of 1.2 m wide x 2.2 m high (ie for headroom)
- (2) The access doors should be fitted with micro-switches to automatically activate the stairway and/or passageway lighting.
- (3) The installation of stairways, handrails, and/or guardrails within the equipment room is strictly prohibited.
- (4) The use of a stairway as an emergency exit route is not permissible under any circumstances.
- (5) The customer or their agent is responsible for supplying and installing appropriate handrails and guardrails outside the equipment room, but only when specified in the layout drawing. All installations shall comply with the relevant AS/NZS standards and the National Construction Code (NCC) requirements.
- (6) These areas shall be always kept clear.
- (7) It is not acceptable for passageway routes to be through hazardous areas.

## 11. Room requirements

### 11.1 Noise

The overall noise levels generated from the equipment room shall not exceed the db(A) requirements specified in the Environmental Protection (Noise) Policy, and shall comply with local councils, and other authorities' requirements.

The ventilation fans are a major source of noise and need to be silenced by the attenuator attachments and baffles.

The attenuator attachment can protrude substantially within the equipment room; therefore, the equipment room size may be increased.

The size and position of fans within the equipment room shall be acceptable to the SA Power Networks Project Manager.

### 11.2 Water drainage system

#### 11.2.1 Site drainage - outside equipment room

The site shall be effectively drained to keep the area outside the equipment room completely drained and dry.

**11.2.2 Area drainage - inside equipment room**

The area inside the equipment room shall be free of the risk of flooding and storm water damage, and any drains provided shall be kept in working condition.

The equipment room is to be equipped with a level actuated sump pump/s installed at the lowest point, which can be utilised to achieve suitable drainage and separation of oil, according to EPA standards.

**11.2.3 Water tightness**

The equipment room shall be watertight to the best industry standards, to safeguard all equipment, which are subject to risk of damage from exposure to water or dampness.

**11.3 Lighting and power requirements****11.3.1 Temporary (during construction stage)**

Prior to handing over of the equipment room, the equipment room shall contain suitable temporary lights and power supplied from the customer's installation to allow for the safe installation of equipment in a room.

**11.3.2 Permanent**

Within the equipment room, the customer/customer's agent will provide and install the necessary permanent light fittings, power outlets, and all wiring shall be in accordance with the National Construction Code (NCC) and the relevant Australian Standards.

Where required, the customer/customer's agent shall provide and install exhaust fans, pumps, and controls in accordance with the manufacturer's specifications.

**12. Installation works (conduits and cabling system)****12.1 Conduits system**

All electrical conduits and cable enclosures, between the equipment room and the property boundary shall be specified on the design drawings to enable SA Power Networks to install HV and LV cables in the equipment room. Any subsequent alteration to the design during construction shall be approved by the SA Power Networks Project Manager.

The location of the equipment room should be such that the length of conduits or other cable enclosures is as short as possible. The conduits and other cable enclosures should run in a horizontal straight line from the property boundary to the equipment room.

Where the equipment room cannot be located at street level or there are obstructions on the property which necessitate bends in the cable run, install conduit bends with a minimum bending arc length of 1.8 m.

All conduits are to be installed free of obstructions or any material that should hinder or damage the cable during the cable pull.

Where the SA Power Networks cables/conduits reticulate through the building and are accessible to the public, customer or their agent is responsible to supply and install warning signage (SA Power Networks' stock item no. KS 1167) for HV cables as shown in Figure 3 at 4.0 m intervals along their entire length, and similarly install signage (SA Power Networks' stock item no. KS 1020) for LV cables as shown in Figure 4.

When installation of the conduits is completed, the associated parties shall arrange inspection for the SA Power Networks representative.

**12.1.1 Incoming HV supply route**

The incoming high voltage supply route between the SA Power Networks HV distribution system and the equipment room shall be via underground conduits/cables system.

The customer/customer's agent to install conduits/cables between the property boundary and the equipment room.

The easement width required for the cables is normally 4.0 m.

No structures should be erected, or levels altered within the easement without written permission from the SA Power Networks Project Manager.

**12.1.2 Conduits system (underground)**

The conduits, conduit bends sizes, installation arrangements, minimum cover and separations to other services shall be in accordance with [TS085](#). The HV and/or LV cables shall be in accordance with [TS100](#).

When entering the equipment room, all conduits shall be installed with bell mouths to protect the cables from damage during installation and setting of cables.

**12.1.3 Conduits through building structure**

There are various acceptable methods for installing conduits through building on a route to the equipment room from the property boundary. Consult with the SA Power Networks Project Manager for the agreed methodology.

Conduits shall be securely fixed to prevent movement when cable hauling forces are applied, and to support the weight of the cables. Furthermore, the installation shall comply with the relevant fire protection regulations.

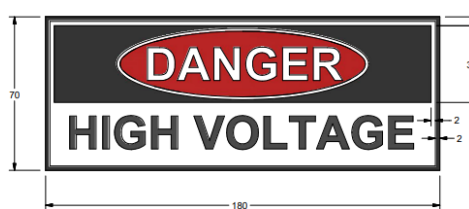
**12.2 Cables support system**

The cables support system (includes cable ladders, cable trays and their supports) shall be designed to meet the load requirements of the cable management system (ie for HV, LV, earth cables’ loads).

The overall loading of cables support system on the building structure is assumed to be 50 kg/m, unless specified otherwise. The cables support system loads shall be considered as permanent live loads. Retrofitting of existing cables support system shall consider loading requirements on a case-by-case basis.

The cables support system shall be installed in accordance with the manufacturer’s instructions and ensure that:

- it can safely support the loads being imposed upon it;
- the proposed fixings to adjacent components are also sufficient for the intended load;
- any declared deflection limits are not exceeded;
- signage on cables support system should state the load for which the cables support system has been designed for to avoid any future overloading issues; and
- install appropriate signages for HV, LV and/or earthing cables displayed on the cable tray at 4.0 m intervals along their entire length.
  - For HV cables, use signage (SA Power Networks’ stock item no. KS 1167), refer to Figure 4.
  - For LV cables, use signage (SA Power Networks’ stock item no. KS 1020), refer to Figure 5.
  - For earthing cables, use signage (SA Power Networks’ stock item no. KS 1050), refer to Figure 8.



**Figure 4: Warning signage (SA Power Networks’ stock item no. KS 1167)**



**Figure 5: LV cable signage (SA Power Networks’ stock item no. KS 1020)**

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### 12.3 Earthing requirements

The customer or their agent(s) bear the responsibility for designing an earthing system that complies with [TS109](#), AS 2067, and the SA Power Networks site project specifications. The design will be subject to review and approval by the relevant SA Power Networks Project Manager.

SA Power Networks will nominate the appropriate earthing scheme to be employed at the site-specific location (ie CMEN or MEN).

The position of the earth stake is not critical, if it makes a good contact with the soil, however, preferred location is close to the source transformer to reduce the length of the connection for convenience.

The equipment's CMEN earthing system shall not to be connected to the building's MEN earthing system to prevent the induction of fault current into the building or vice versa.

The main doors of the equipment room, building reinforcement, and auxiliary systems (such as forced ventilation, lighting, fire detection, alarms) shall be connected to the building's MEN earthing system.

The floor containing structural steel beams that support the distribution equipment, checker plates, gatic lids shall be connected to the SA Power Networks equipment CMEN earthing system.

When there are multiple pieces of the SA Power Networks equipment to be installed, a sufficient number of earth bars are to be provided to accommodate earthing cables. This is to ensure that if any plant or equipment is removed, the earthing of the other equipment is not compromised or disconnected from at least one of the earth stakes in the basement as shown in Figure 7.

A minimum size of 120 mm<sup>2</sup> Cu earth cable is recommended; however, the earthing design drawing will determine the number and sizes of earth cables required on a site-specific basis.

At the earth stake pit and at the earth bar, install the SA Power Networks identification tags (SA Power Networks' stock item no. KS 1050) as shown in Figures 6, 7 and 8.

The customer/customer's agent shall conduct a regular earthing test program for the ongoing compliance of the earthing system as per the relevant Australian Standards.



Figure 6: Earth connection in an earth stake pit



Figure 7: Multiple earth connection



Figure 8: Earth connection signage (SA Power Networks' stock item no. KS 1050)

## 13. Who should you talk to?

**(1) The SA Power Networks Customer Solutions Managers:**

- Website: <https://www.sapowernetworks.com.au/public/download.jsp?id=315697>

**(2) General enquiries:**

Contact the SA Power Networks customer service team:

- Website: <https://www.sapowernetworks.com.au/contact-us>, or
- Email: [customerservice@sapowernetworks.com.au](mailto:customerservice@sapowernetworks.com.au), or
- Call: 13 12 61

**(3) Faults and emergencies:**

Contact SA Power Networks 24/7 phone line:

- Call: 13 13 66

**(4) Network access permit enquiries:**

Contact the SA Power Network customer solutions-connection central team during business hours 8:00 am to 3:00 pm, Monday to Friday:

- Email: [connectioncentral@sapowernetworks.com.au](mailto:connectioncentral@sapowernetworks.com.au), or
- Call: (08) 8404 5409

**(5) Before You Dig Australia (BYDA) enquiries:**

- Website: <https://www.byda.com.au/>

**(6) Material sales group**

Contact Material sales group for assistance with any materials purchase:

- Email: [materialsales@enerven.com.au](mailto:materialsales@enerven.com.au)

## Appendices

### A. Fire Resistance Level (FRL)

The meaning of Fire Resistance Level (FRL) is the grading periods in minutes as specified in National Construction Code (NCC) for determining the following criteria:

- structural adequacy; and
- integrity; and
- insulation, and
- expressed in that order (eg Structural adequacy/Integrity/Insulation).

For an example, a building load bearing element (eg Walls) with FRL of three (3) hours (ie 180/180/180) will maintain, when tested as per AS 1503.7:

- structural adequacy for a period of 180 min; and
- integrity for a period of 180 min; and
- insulation for a period of 180 min.

A non-load bearing element (eg Fire Doors), with FRL of -/180/30, meaning that in a standard fire test, the element is not required to retain any structural adequacy criterion. However, the element shall maintain its:

- structural adequacy -/
- integrity for at least 180 min; and
- insulation properties for at least 30 min.

The fire resistance test applies a fourth criterion, radiation to fire-resistant doorsets, dampers and glazing, but the radiation grading is not included in the statement of FRL given on the door-tag.

For details on the use of the radiation criterion, refer to the National Construction Code (NCC).

## B. Equipment room layouts

### B.1 Distribution transformer within building layout

Where a distribution transformer to be installed within a building where 3.0 m operating area is provided inside building, the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 9, for the room layout.

The main fire doors' fire ratings shall be three

(3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

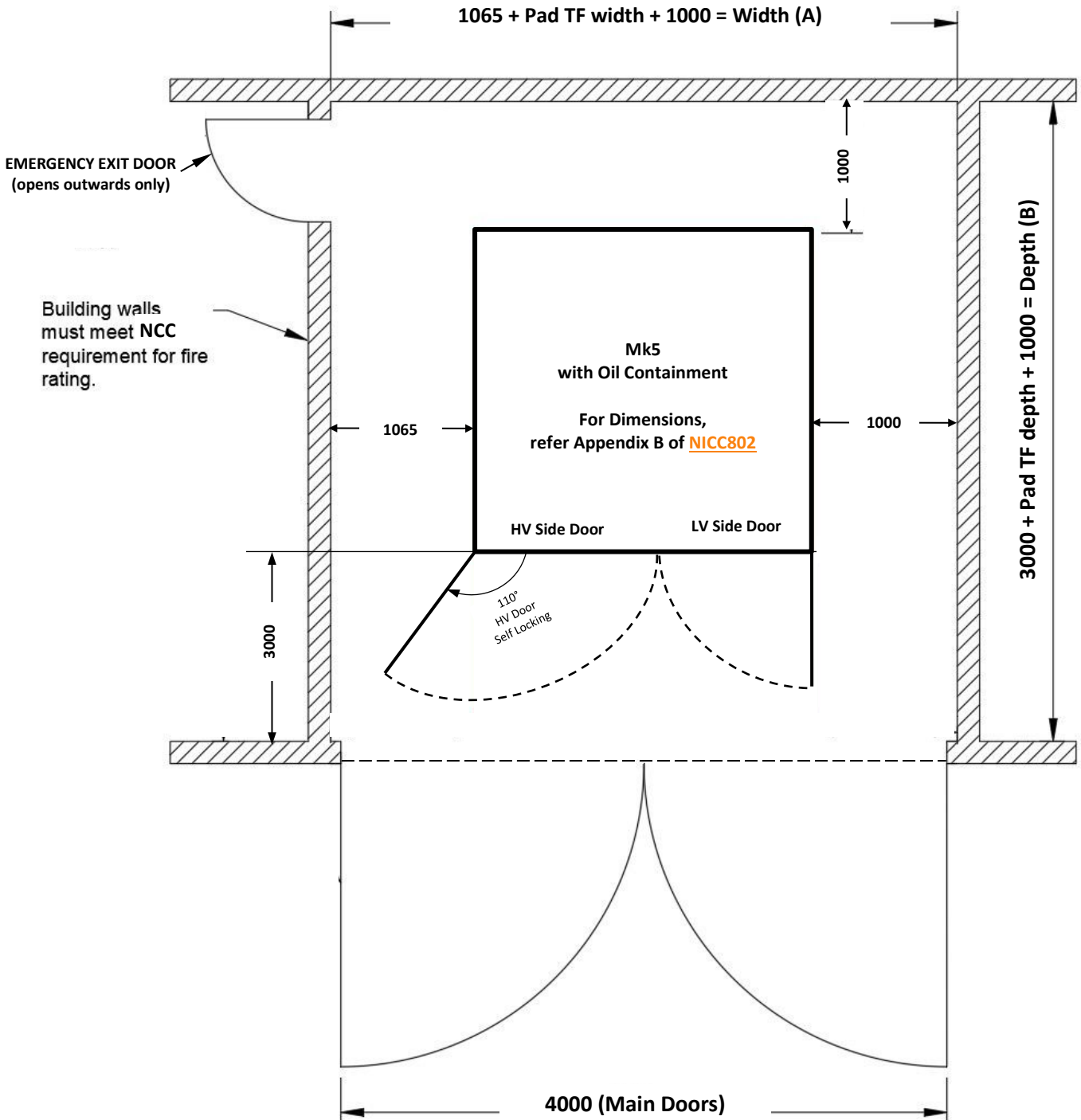


Figure 9: Distribution transformer within building layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.

## B.2 Distribution equipment within building layout

Where the distribution equipment is to be installed within a building where 3.0 m operating area is provided inside building, the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 10, for the room layout.

The main fire doors' fire ratings shall be three (3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

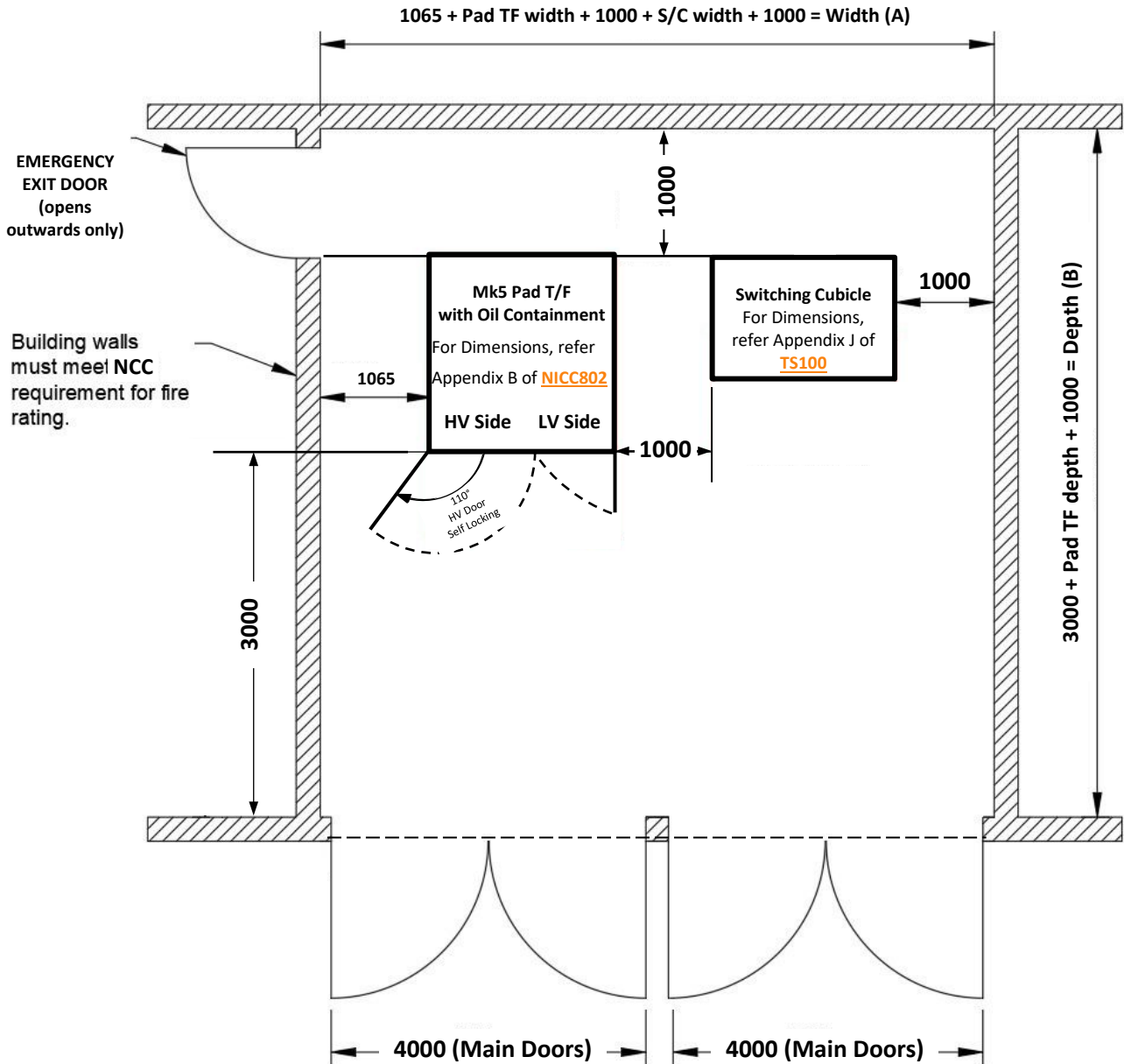


Figure 10: Distribution equipment within building layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.



### B.3 Distribution transformer with street frontage layout

Where a distribution transformer sits 1.5 m (min) back within the equipment room and 1.5 m (min) unrestricted access is available from footpath (ie to achieve a minimum 3.0 m overall operating area), the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 11, for the room layout.

The main fire doors' fire ratings shall be three (3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

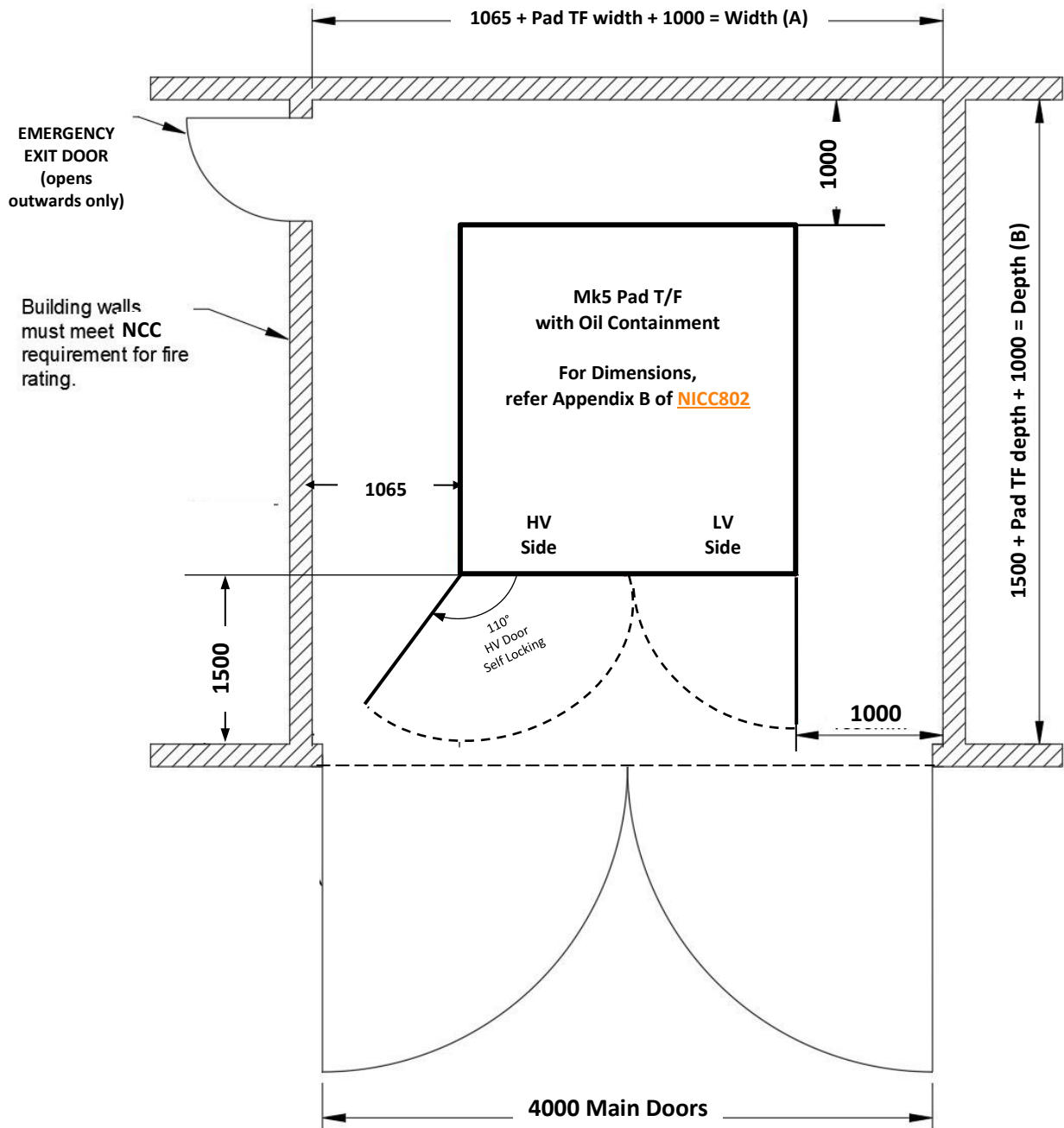


Figure 11: Distribution transformer with street frontage layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.

### B.4 Distribution equipment with street frontage layout

Where the distribution equipment sits 1.5 m (min) back within the equipment room and 1.5 m (min) unrestricted access is available from footpath (ie to achieve a minimum 3.0 m overall operating area), the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 12, for the room layout.

The main fire doors' fire ratings shall be three (3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

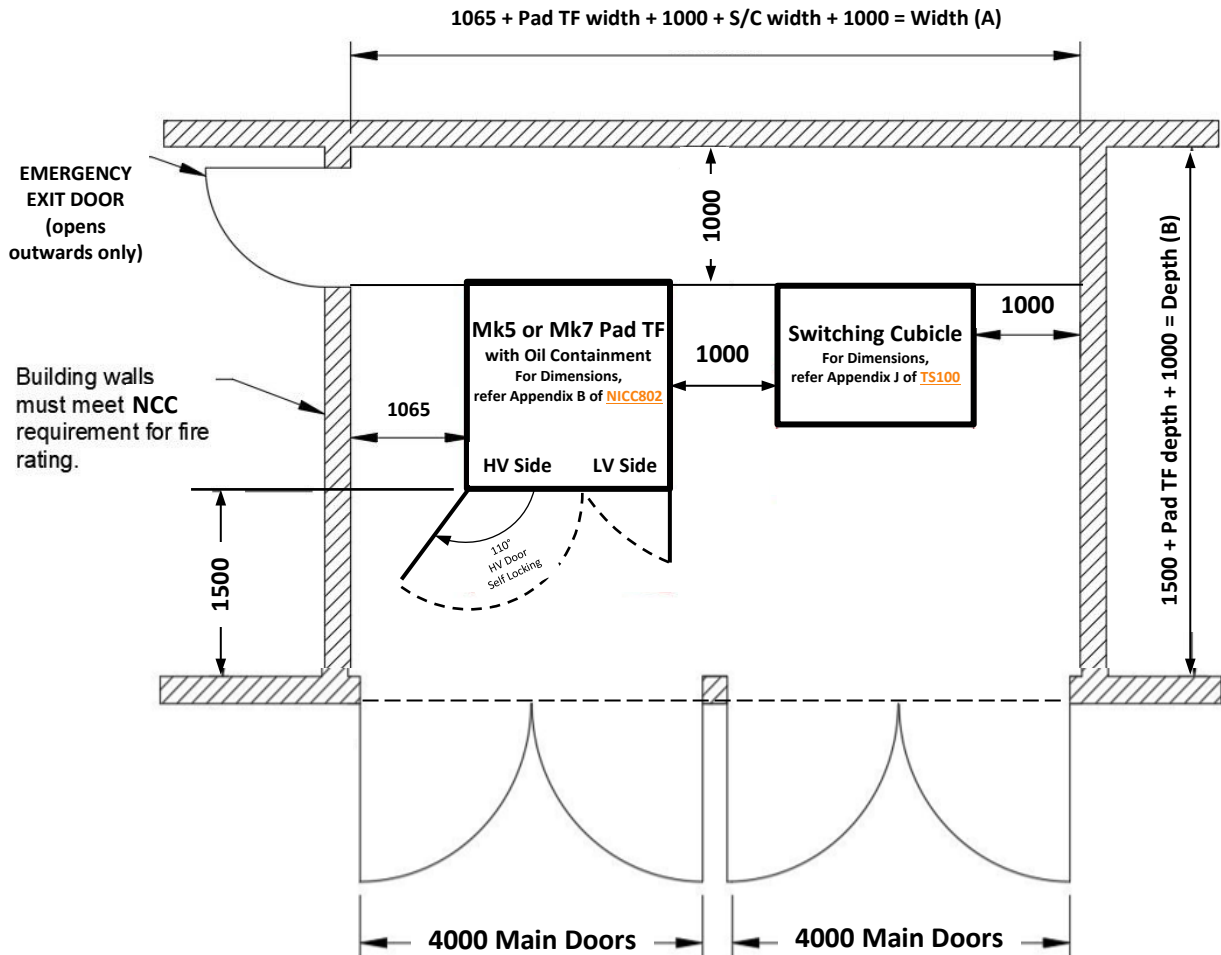


Figure 12: Distribution equipment with street frontage layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.

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### B.5 Distribution equipment under loading docks layout

Where the distribution equipment is required to be installed under loading docks, and 3.0 m operating area is provided inside room, then the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 13, for the room layout.

The main fire doors' fire ratings shall be three (3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

Note that two (2) emergency exit doors (opens outwards only), including the access space above ground level a minimum height 4.0 m is required, for installing distribution equipment.

Where the equipment is installed beneath loading docks via a gatic or a hatchway system, a headroom of 3.5 m is mandated to allow vehicular test van access through the basement up to the equipment room.

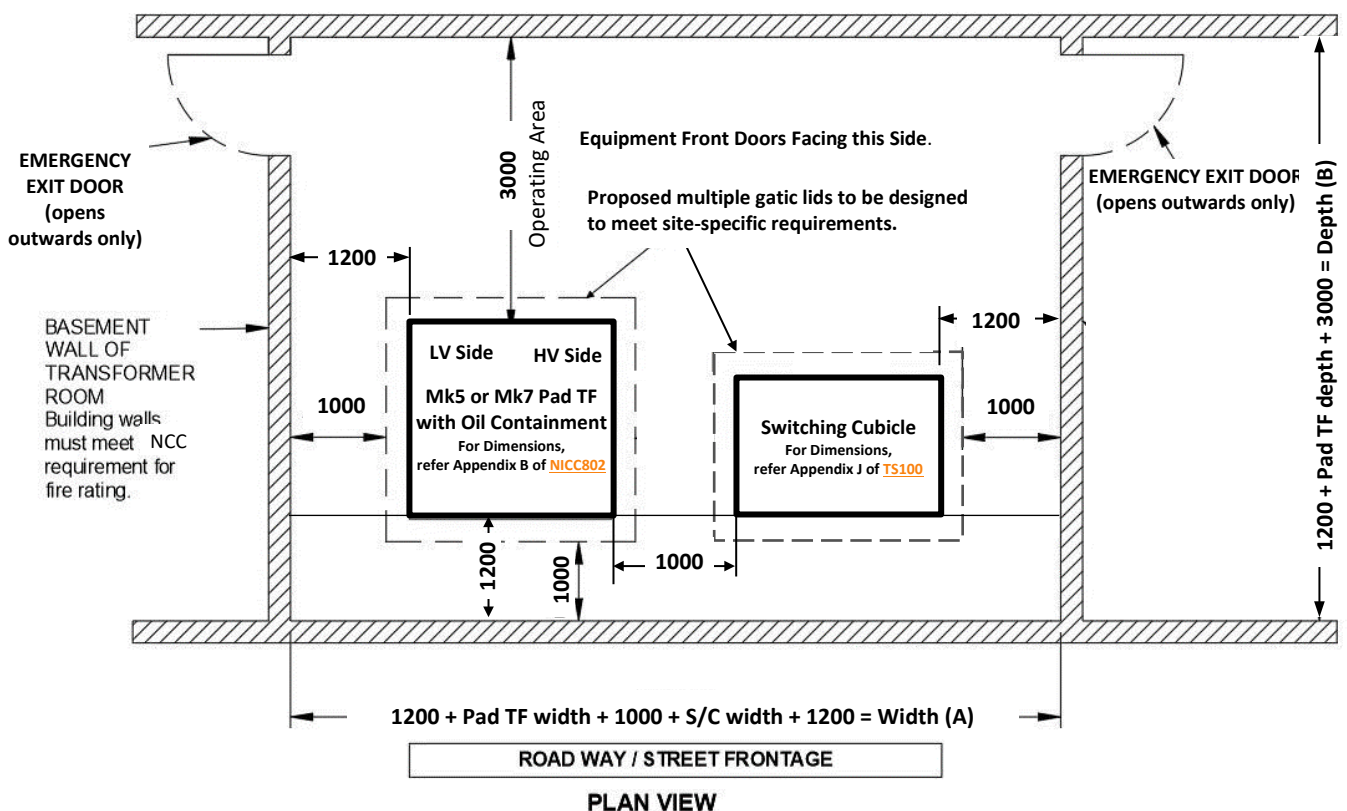


Figure 13: Distribution equipment under loading docks layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.
- (3) Any wall and/or structure to be a minimum of 1.0 m to gatic cover opening.

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### B.6 HV switching cubicle within building layout

Where a HV switching cubicle is to be installed within building where 3.0 m operating area is provided inside building, the equipment room size shall be width (A) x depth (B) x 4.0 m height (H). Refer to Figure 14, for the room layout.

The main fire doors' fire ratings shall be three (3) hours (ie FRL -/180/30). Refer to Section 7.1 and Appendix A, for more details.

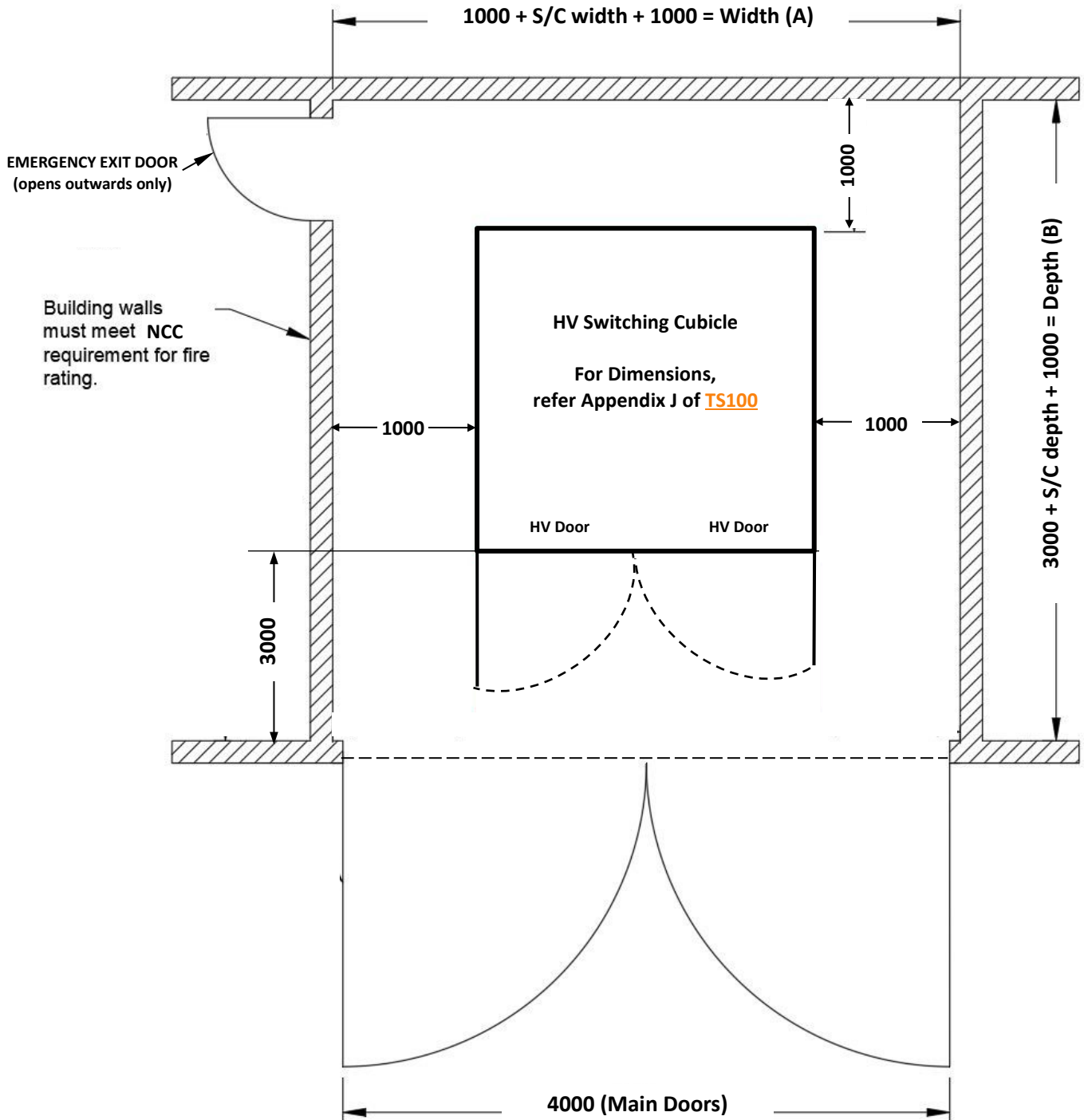


Figure 14: HV switching cubicle within building layout

Notes:

- (1) All dimensions are in 'mm' and are minimum requirements.
- (2) Drawing is 'Not to Scale'.