

Technical Specification - HV Switchrooms

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Revision details

Version No.	Clause	Description of revision
1.0		General revision
2.0		General revision
2.1	All	Format update, changing 'shall', 'should' and 'may' to must where relevant to Sydney Water, 'approved' replaced with 'accepted', minor editorial changes elsewhere.

Introduction

This Specification is for the design, supply and installation of HV Switchrooms for Sydney Water assets.

Sydney Water makes no warranties, express or implied, that compliance with the contents of this Specification shall be sufficient to ensure safe systems or work or operation.

It is the user's sole responsibility to ensure that the copy of the Specification is the current version as in use by Sydney Water.

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For the purpose of this Specification "Sydney Water" is the nominated person or organisation that has written authority to act on Sydney Water's behalf.

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Copyright

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Acronyms

Term	Definition
AC (ac)	Alternating current
ANSI	American National Standards Institute
AS	Australian Standard
ASD	Aspirated smoke detector
AUD	Australian Dollars
c/w	complete with
DB	Distribution board
GA	General Arrangement (drawing)
GPO	General Purpose Outlet

Term	Definition
H ₂ S	Hydrogen Sulphide
HMI	Human Machine Interface
HV	High Voltage (i.e. > 1000 V AC or > 1500 V DC)
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical & Electronic Engineers
ISO	International Standards Organisation
ITP	Inspection and Test Plan
LV	Low Voltage (i.e. greater than ELV but ≤ 1000 V AC or ≤ 1500 V DC)
MAO	Manual-Off-Auto
MSDS	Material Safety Data Sheet
MV	Medium Voltage (note this term is not used in this specification)
NCC	National Construction Code
PE	Photoelectric
PLC	Programmable Logic Controller
PPE	Personal Protection Equipment
pu	per unit
PVC	Poly-Vinyl Chloride
RCD	Residual Current Device
SAA	Standards Association of Australia
SCADA	Supervisory control and Data Acquisition
Sec.	second
SLD	Single Line Diagram
TBA	To Be Advised
TBC	To Be Confirmed
TCS	Trip Circuit Supervision

1. General

1.1 Introduction

The Equipment Specification defines the minimum technical requirements for the design and Construction of High Voltage (HV) Switchrooms. This Specification does not apply to the installation/erection, commissioning or performance testing of the equipment.

This Equipment Specification includes (but is not limited to) details regarding the following:

- a) Switchroom construction
- b) Switchroom access doors
- c) Switchroom earthing
- d) Switchroom cable trenching
- e) Switchroom distribution board
- f) Switchroom lightning and power
- g) Switchroom signage.

1.2 Scope

This specification ensures the High Voltage switchroom will be built to the minimum acceptable requirements

The key stakeholders for this specification include the Sydney Water Operations team, maintenance providers and project delivery parties.

1.3 Proprietary items

Nomination of a proprietary item by Sydney Water does not imply preference or exclusivity for the item identified.

Alternatives that are equivalent to the nominated items can be submitted to Sydney Water for acceptance. The submission must include appropriate technical information, samples, calculations and the reasons for the proposed substitution, as appropriate.

2. Technical requirements - general

2.1 Environmental requirements

The HV Switchroom and associated equipment must be constructed, manufactured for operation in the following environmental conditions.

Environmental conditions		
Maximum ambient temperature		+ 45 °C
Maximum 24 hr average temperature		+ 35 °C
Minimum ambient temperature (corresponds to “minus 5°C indoor class”)		-5 °C
Maximum relative humidity	For one month	90%
	For 24 hours	95%
Maximum elevation above sea level		1000 m

2.2 Standardisation

Equipment must be designed with standard parts and components readily available within Australia. Parts and components must be standardised as much as possible. All replaceable and consumable equipment must be standard supply equipment. The use of “one off” special designs is not permitted.



3. Technical requirements - construction

3.1 General

The switchroom must be of durable, solid and low maintenance construction. The switchroom must be constructed from new materials and meet the appropriate Australian standards and building codes as a minimum.

The switchroom must be constructed so that it is free from moisture, ground water and flooding at all times during its service life.

Switchroom must be constructed at ground level with paved vehicular access (roadway) up to the equipment access door and paved pedestrian access up to all person access doors. Provision for parking of four vehicles must be provided outside the switchroom, preferably at the equipment access end of the switchroom.

Switchroom must be considered Class 8 as per National Construction Code (NCC) and comply with the fire rating requirements detailed in the NCC and AS/NZS2067.

The designer must consider potential internal and external fire scenarios and ensure that the switchroom is able to withstand the scenarios and allow for the safety of personnel inside and in the vicinity of the switchroom.

It is essential that the minimum fire rating be maintained for any full or partial penetration of the floor, wall, roof, or door.

Where it is required that the HV switchgear must be vented external to the switchroom, the exhaust vent must be positioned away from any access walk way and at a height no less than 2300 mm above ground level. The area outside the switchroom where the exhaust vent is located must be fenced off to prevent personnel access. The exhaust vent must be sealed to prevent the ingress of dust and moisture into the switchroom or switchgear exhaust tunnel. The fire rating of the switchroom must not be compromised with the installation of the exhaust vent.

3.2 Design life

The switchroom and associated equipment must have a minimum design life under normal operating and maintenance regimes of 50 years.

3.3 Dimensional requirements

The inside dimensions of the switchroom building must be appropriate to the nature, size and arrangement of the equipment and also the operating condition of the equipment. Minimum gangway widths and safety distances as specified in relevant Australian Standards and Building Code of Australia must be adhered to.

Switchroom buildings as a minimum must be divided into two separate rooms:

- a) A HV switchgear room
- b) A control/maintenance/communications room.

The Contractor must be considerate to the following before final switchroom sizing is determined:

Common:

- a) Compliance with statutory access and egress requirements contained within the Australian Standards
- b) Minimum 4000 mm internal ceiling height
- c) Layout of equipment in switchroom must be such that any cubicle or equipment can be removed and re-installed without having to remove or disturb any other equipment or wiring in the switchroom

- d) There must be no need to remove the roof or wall of the switchroom to remove any equipment.

For HV switchgear room:

- a) Actual HV switchgear being accommodated within the room
- b) Spare floor area allowing for future expansion of the HV switchgear. As a minimum allow two panels either side of the switchboard.
- c) Minimum 1000 mm clear access past fully racked out HV switchgear
- d) Minimum 1000 mm clear access behind HV switchgear requiring rear access
- e) Adequate clearance for safe installation/removal of the largest single switchgear module
- f) Adequate room for the storing of minimum two circuit breaker trolleys (for withdrawable switchgear only).

For Control/maintenance/communications room:

- a) Actual equipment being accommodated within the room
- b) Minimum 600 mm clear access past all equipment doors full opening swing range
- c) Minimum 600 mm clear access behind equipment requiring rear access
- d) Adequate clearance for safe installation/removal of the largest single equipment module
- e) Adequate room for maintenance area for the maintenance of the withdrawable switchgear trucks.

Where the Contractor is not responsible for the supply of the HV switchgear and control/auxiliary equipment, initial sizing will be provided by Sydney Water, based on recommendations of the switchgear/equipment supplier.

3.4 Maintainability

The design, selection and arrangement of the equipment must always maximise both operator and maintenance safety and ensure the ease of maintenance and cleaning in accordance with the relevant standards and occupational health and safety (OH&S) requirements.

The design must allow suitable access to all points requiring inspection, maintenance and repairs.

3.5 Foundations

The switchroom must be constructed on a stable foundation that bears on the soil.

The foundations must be designed to carry the full weight of the switchroom with all switchgear and equipment installation in the switchroom.

3.6 Floors

The switchroom floors must be of steel reinforced concrete slab construction designed to carry the full weight of the switchroom with all switchgear and equipment installed. The switchroom floor level must be 150 mm above the surrounding ground level.

The switchroom floor must be level, sealed, easy to clean, pressure-resistance, non-slip and wear resistant. The switchroom floors must comply with the non-slip requirement outlined in WSA 201 Section 5.12 (note 2).

Self-levelling concrete must be used in the switchroom floor to provide a level surface required for the equipment installation.

The HV switchgear room floor must have a minimum tolerance of ± 1 mm per meter in all directions with maximum tolerance of ± 3 mm over the entire HV switchgear room floor.

The Switchroom floor must have a cable trench forming part of the building that runs the entire length of the room under the HV switchgear to allow for bottom entry of the HV cables. The cable trench must have a minimum depth of 1000 mm and width of 1000 mm. Cable ladder/rack must be installed in the trench to support the HV cables of the bottom of the trench. The contractor must take in consideration the minimum bending radius and number of HV cables required when determining the cable trench dimensions.

Cable trenches must be fitted with Aluminium or galvanised steel load rated grates. The grates must be sectioned into manageable sizes to allow for easy manual removal by two persons using an appropriate lifting device. The top of the grates must be flush with the floor level with a maximum gap of 2 mm between the edge of the grate and concrete floor.

3.7 Walls

All walls must be of double brick construction. Vermin proofed air bricks must be provided in brick walls. The walls must have sufficient structural strength to support the switchroom ceiling/roof and any equipment mounted on the walls.

The walls must be sealed and watertight to protect the equipment within the switchroom from dust and moisture.

The mounting of any equipment on the walls must not compromise the minimum two hour fire rating of the switchroom due to mounting bolts penetrating walls. It is the responsibility of the Contractor to provide evidence that the fire rating of the walls is not compromised.

3.8 Roof

The switchroom roof must be of reinforced steel slab construction. The roof must be sealed and watertight to protect the equipment within the switchroom from the ingress of dust and moisture.

The roof must be sloped for self-cleaning and must have a pitch that allows minimal dust and debris accumulation. The roof must be sloped away from personnel access doors or where this is not feasible, have a barrier to prevent rainwater falling over the entrance.

Guttering and down pipe must be fitted to carry water run off to ground level and storm drain.

The roof must have a minimum fire rating of two hours.

No penetration through the roof must be permitted.

3.9 Doors

Doors must be heavy-duty two hour fire rated external grade solid timber, ledged and braced with galvanised metal covering the exterior face. Heavy duty hinges, minimum three off for personnel access doors and four off for equipment access doors must be fitted on doors. Door frames must be heavy duty pressed steel.

Doors must open to the outside and lockable from the outside only. For access doors between the HV switchgear room and control room they must open into the control room only.

Doors must be openable from the inside independently of whether the door has been locked from the outside by the pushing of the panic bar exit mechanism. Additional door handle on the inside of the doors is not required. Doors must be fitted with seals and weather strips all around the frame, top and bottom to fully exclude water and dust entry.

Doors must be fitted with special high voltage double barrel locks and keys available from Sydney Water approved supplier.

Doors must be fitted with automatic self-closing mechanisms. Facilities must also be provided to hold doors in the open position.

Each room of a switchroom must have at least two exits to the outside; one exit must be an equipment access door with full length double doors to allow transport of HV switchgear and equipment through and the other must be a personnel access door. The two exit doors must be spaced at either end of each room of the switchroom.

An access door between the HV switchgear room and control/maintenance/communications room must be provided.

Typical minimum clear opening dimensions for doors:

Door Type	Height (mm)	Width (mm)
Personnel and adjoining room access	2200	900
Equipment access (double doors)	2500	2000

3.10 Surface preparation and painting

All external and internal brick surfaces must be of natural brick finish.

All preparation, pre-treatment of surfaces and painting must be carried out strictly in accordance with Sydney Water Standard specification PCS100 “Protective coating standard” and WSA 201 “Manual for Selection and application of protective coatings” and its Supplement.

Preferred paint colours	
Doors and Door frames	To match colour if building for external surfaces X61 (Wombat) for internal surfaces

3.11 Drainage

The switchroom site must be effectively drained to keep the area outside the switchroom freely drained and dry. Stormwater drainage systems must be designed and provided to industry best-practice standards.

The surrounding ground area on which the switchroom is constructed must be minimum 500 mm above the 1 in 100 year flood level. Any drains provide must divert water away from the switchroom.

3.12 External landings

A concrete slab must be constructed in front of the switchroom equipment access doors of suitable size (minimum 3000 mm wide and 2500 mm long) to allow the switchgear and equipment to be moved in and out of the switchroom without the need for lifting facilities. The slab must be design and slightly sloped away from the switchroom equipment access doors to ensure no water enters the switchroom.

3.13 Cable and services entry

All HV cables must enter the switchroom directly into the switchroom cable trench via underground heavy duty UPVC conduits. All conduits entering the cable trench must be fitted with bell mouths flush with inside wall of cable trench. The conduits must be angled so that any water in conduits runs away from the switchroom

All other services entering the switchroom must be via heavy duty UPVC underground conduits that penetrate directly up through the floor of the switchroom. The conduits ends must have no sharp edges and protrude minimum 50 mm above floor level.

All conduits entering the switchroom or between adjoining rooms must be sealed to prevent the ingress of water and vermin. The conduits must be fire stopped to ensure the switchrooms fire rating is maintained.

No HV cables or services must enter through walls or roof of the switchroom.

3.14 Earthing

The switchroom building earthing system must be designed in accordance with Australian Standards and Sydney Water specification DOC0016 Earthing and Lightning Protection.

3.15 Lightning protection

The requirements for lightning protection must be assessed in accordance with AS/NZS 1768. The switchrooms lightning protection system must be designed in accordance with Australian Standards and Sydney Water specification DOC0016 - Earthing and Lightning.

4. Technical requirements - electrical, control and instrumentation

4.1 Fire and smoke detection

Switchroom building must have as a smoke and thermal fire detection system in accordance with NCC requirements. Provision must be made to allow for future detection, suppression and protection systems.

The fire detection system panel must be installed in the control/maintenance/communications room. The fire detection system must be microprocessor based with a wall mounted metal Fire Indication Panel complete with battery backup and LED indicators and controls. As a minimum the indicators must include Power On, Charger High/Low and Battery Fail. Manual controls must be provided for battery test, reset and lamp test.

The HV switchgear room must be fitted with minimum two smoke detectors and one smoke detector in the control/maintenance/communications room.

On fire detection the system must:

- a) Shutdown air conditioning units and ventilation fan(s)
- b) Seal of all ventilation dampers
- c) Activate a local audible alarm mounted above the switchroom door
- d) Manual call points.

Two portable wall mounted fire extinguishers must be provided, one at each end of the HV switchgear room. One portable wall mounted fire extinguisher must be provided in the control/maintenance/communications room adjacent to the personnel access entrance. Each fire extinguisher must be a 4.5 kg type suitable for electric fires complete with operating instructions on the cylinder. A fire blanket must be mounted on the wall adjacent each fire extinguisher.

4.2 Distribution board (DB)

The switchroom must have a 415 / 240 V AC Light and Small Power distribution board mounted on an internal wall for supply of all switchroom lights (external, internal and emergency fittings), air conditioning and General Purpose Outlets (GPOs). The switchroom DB must have a typed up circuit identification schedule (legend) fixed inside the panel door and an equipment number and description label on the front door. The switchroom DB must be installed with at least one spare circuit breaker of each size used and must have spare space and capacity for at least 25% future growth.

All circuit breakers and switching devices in the switchroom DB must be able to be pad-locked in the open position.

The Contractor must supply a single line diagram (SLD) and Layout diagram of the switchroom building DB for approval by Sydney Water's representative prior to manufacture.

4.3 Lighting

All luminaries must be industrial type IP55 rated LED type.

The Contractor must complete a full lighting design in accordance with the requirements of the Australian Standard for the switchroom under normal and safety/emergency lighting situations verifying their lighting design. The lighting design report must be submitted to Sydney Water for approval.

Interior switchroom lighting must consist of suitable light fittings with 2-way (multiple-way) switching located inside the switchroom at each exit. The minimum required lux level inside the switchroom at the front of the switchboard panels and all other operational surfaces (i.e. 500 mm above floor level) must be in accordance with NCC requirements, with due care taken in the layouts to avoid glare at these levels.

The minimum required lux level inside the switchroom for safety/emergency lighting situation must be in accordance with AS Standard and NCC requirements.

As a minimum, every alternate light fitting must be a maintained emergency fitting, with additional maintained emergency light fittings located at the exits, the switchroom distribution board, battery charger and HV switchgear incomer circuit breakers, as is applicable for the final design. The emergency lights must operate for a minimum of two hours after a power failure. The distribution board must contain a two hour test timer circuit, with manual over-ride, to facilitate the regular testing of the batteries of the emergency light fittings. All lights must extinguish when switched off under regular conditions.

Illuminated emergency exit lights with 100 mm high lettering must be fitted at each exit and at all other points in the switchroom such that there is no location within the switchroom where a person cannot visually see a sign. These lights must remain illuminated at all times, switching to batteries if power is lost. The exit light fittings must incorporate a test circuit.

The external lighting must consist of weatherproof IP65, maintained emergency light fittings, and automatically controlled by a light sensitive switch or photo electric cell (PE Cell). The PE Cell must be mounted on the exterior wall of the switchroom facing a Southerly direction. A "Manual-Off-Auto" (MOA) selector switch must be supplied and installed at switchroom exits. The MOA switch must be located such that it is accessible after the building is locked up. When selected "Auto" the lights must operate by the switching of the PE Cell. When selected in "Manual" the PE Cell must be overridden and the security lights must be switch on. When selected "Off" no operation of the external security lights must be possible.

External lighting must be provided at each entrance to the switchroom above the doorways.

Light fittings near the sea or in corrosive atmosphere must be of marine grade aluminium.

The internal and external lighting circuits must be separated and protected by an RCD. Minimum size of the circuit breaker feeding lights must be 20 A. No more than 20 lighting points must be fed from a circuit breaker.

All luminaries must be installed in locations, which are accessible and maintainable with portable platform ladders. It must be possible to replace the fittings without the use of scaffoldings and /or machineries like cranes, cherry pickers etc. Lights must not be installed over any switchgear of equipment.

Light switches must be industrial type with minimum 10 A rating, complying with AS 3133. Light switches must be supplied and installed adjacent door openings and must be installed on the lock side of the door at each entry to each room. Switches must not be installed across the junction of different wall finishes.

Mounting height for switches must be approximately 1200 mm to the centre of plate above floor level, unless otherwise indicated.

4.4 General power

General power socket-outlets (GPOs) must be provided for building and general maintenance. All outlets and switches must be industrial type.

As a minimum, switchrooms must have the following:

- Four, double 10 A, 240 V AC general power outlets inside the Control/maintenance/communications room on a separate RCD protected circuit
- Four, double 10 A, 240 V AC general power outlets inside the HV switchgear room on a separate RCD protected circuit. Outlets to be installed on wall facing HV switchgear at either end of the room.
- One, 32 A three phase welding outlet mounted on wall facing HV switchgear at equipment door end of room. Each 3phase outlet to be protected by an individual RCD circuit breaker.
- Minimum size of the circuit breakers feeding GPOs must be 20 A. Final sub-circuit in a distribution board must be of single purpose only.

- GPOs must be of the combination switch socket type, fitted with safety shutters, and must be selected to meet the requirements of the location and function. Socket outlets must have the earth pin located at 6 o'clock position and must be polarised as recommended in the Wiring Rules.
- Unless otherwise indicated, flush plates for outlets other than ironclad, must be impact resistance plastic mouldings, suitably reinforced, of selected colour and finish.
- Generally, power outlets must be located at a height of 460 mm above floor finished level and 250 mm above bench tops. The position of the GPOs must allow unrestricted access for use. Equipment must not be installed in front of GPOs.

4.5 Air-conditioning and ventilation

Each room of the switchroom must be fully air conditioned and ventilated in accordance with AS 1668.

The switchroom must have a minimum of five air changes per hour.

Air conditioning must be provided for each room independently by split cooling systems. The system must consist of indoor fan evaporator units connected to air-cooled condensing and compressor units suitable for external mounting. Heat exchangers must be highly corrosion resistant. A fully redundant split cooling system may be required when specified by Sydney Water.

The system must be capable of maintaining the switchroom temperature at 25 °C, under all environmental conditions and maximum calculated equipment heat load. The heat load must include an allowance for the installation of future equipment. The system must continue to operate at this performance level with any one air conditioner component faulted or out of service.

Air conditioners must have an industrial type IP65 rated lockable on-load isolator fitted within arm's reach of the externally mounted compressor unit. The compressor units must be mounted on concrete plinths outside the switchroom. The internally mounted air outlets must be mounted at a height greater than the top level of the installed switchgear. Air returns must incorporate disposable filters suitable for the removal of dust. The indoor units must not be mounted directly above any electrical equipment. Internal units must be drip-free. A voltage free contact must be provided on each MCB supplying an air-conditioner unit for monitoring purposes.

Power to the air conditioners and ventilation fan(s) must be supplied from the local Switchroom distribution board. Their power control circuit must accept an external trip signal to stop them in the event of a fire (refer Section 4.1 Fire and Smoke Detection). After a power supply interruption of any kind, the air conditioners must automatically revert to the last operating state once power is restored.

The air conditioners and ventilation fan(s) must be set up to maintain an even run time of each unit and prevent unnecessary cycling.

Air conditioning and ventilation systems must be fitted with H₂S (Hydrogen Sulphide) scrubbers when installed at Wastewater pumping station or treatment plant.

Air conditioners are to be mounted on the south facing side of the switchroom to avoid direct sunlight exposure.

Any ducting or penetrations in the switchrooms walls or floor required for the air-conditioning and venting system must not compromise the switchrooms fire rating.

The air conditioner and ventilation units must not ventilate directly onto the HV switchgear or equipment.

Sensors must be installed in the switchroom to monitor the room temperature. The sensor must have a local temperature display and also provide a signal back to the SCADA system.

4.6 Wiring

All work must be in accordance with AS 3000, AS 3007 and AS 3008.

Switchroom wiring for light and power must be installed in surface mounted PVC conduits. Surface conduits must be run in vertical and horizontal directions. Conduits bends must be fitted with inspection covers.

Jointing of conduits and fittings must be carried out strictly in accordance with the manufacturer's recommendations. Saddles supporting conduits must be effectively secured to the surface on which they are run. Saddles must be proprietary brand and sized for the conduit being supported.

Conduits must terminate in luminaries, equipment and accessories or in wall boxes and junction boxes of a type compatible with the installation. Plain to screwed adaptors must be used to terminate conduits into fittings.

All circuits, originating from any distribution board, must be run in a separate conduit.

4.7 Signage

Switchroom danger signs must be in accordance with AS 3000, AS 1319 and Sydney Water specification SDIMS0026 "Service Delivery Safety Signage Specification". The required signs must be fitted to each door providing access into the HV switchroom including internal doors.

All switchroom doors must have labels fitted to indicate that the building is a restricted area.

All switchroom doors must have a switchroom identification number and emergency contact details in 20 mm lettering.

In addition to operating instructions on portable fire extinguisher cylinders (refer section 4.1) labels providing appropriate operation instructions must also be fixed to the wall adjacent to these units.

A laminated single line diagram of the electrical reticulation system must be mounted on a switchroom wall.

4.8 Switchroom equipment and fixtures

Typically, HV switchrooms must have the following equipment installed:

HV Switchgear Room:

- HV switchgear
- Two circuit breaker trolleys (when withdrawable switchgear is installed)
- HV switchgear operating tool peg or shadow board. Typically mounted on the wall facing the front of the switchgear.
- Fire extinguishers. One on each end of the room adjacent to access doors
- Fire blankets. One adjacent each fire extinguisher.
- Resuscitation Chart. Typically mounted on the wall facing the front of the switchgear.
- Single Line diagram of the electrical reticulation system. Typically mounted on the wall facing the front of the switchgear.
- Temperature monitoring device.

Control/Maintenance/Communications Room:

- DC system
- Switchroom DB (typically wall mounted).
- UPS system
- communications panel
- HMI Panel
- IEC61850 automation / remote switching panel
- Dedicated maintenance for the HV switchgear trucks etc
- A steel cupboard / cabinet for the storage of equipment and switchgear consumable items

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- A steel cupboard / locker for the storage of PPE, special tools and test equipment
- Fire extinguishers. One on each end of the room adjacent to access doors
- Fire blankets. One adjacent each fire extinguisher
- LV Rescue kit
- Resuscitation Chart
- Single Line diagram of the electrical reticulation system
- Temperature monitoring device.

5. Inspection & certification

5.1 General

Sydney Water will require inspections to be carried out by its nominated representative during the construction stages of all equipment provided by the Contractor. A Contractor's representative must be present during all inspections required by Sydney Water.

Sydney Water may randomly inspect any stage of construction upon written notification to the Contractor and reserves the right to engage a specialist consultant to assist with the inspection and of the switchroom. The specialist consultant may carry out non-destructive examinations to check compliance with any specification requirements.

5.2 Notification

Prior to nominated hold-points, including commencement of construction, inspection dates and final completion of construction, the Contractor must provide sufficient notice to allow for the witness of inspections by Sydney Water. Notification must be provided in writing and must not be less than 14 days prior to the event.

6. Quality assurance and inspection and test plans

The Contractor must implement a quality system that complies with the requirements of ISO 9001 for all construction work of the switchroom.

The Contractor must submit for approval two project-specific Inspection and Test Plans (ITPs) for the Switchroom covering all activities i.e. engineering, design, construction, wiring, site testing, resolution of site defects/punchlists, handover, etc.

The ITPs must identify the standards and/or procedures as well as the acceptance criteria that must apply for each stage in the ITPs.

Unless approved otherwise, all standards, procedures and acceptance criteria included in the ITPs must comply with the requirements defined in this specification.

Perform all design and construction work for the switchroom in accordance with the approved ITPs.

Sydney Water may apply witness points and/or hold points on various stages of the ITPs.

Sydney Water must be given the option of witnessing all inspections. Sufficient notice of seven calendar days must be given to Sydney Water to attend witness point/hold point inspections.

Sydney Water may elect to appoint third party inspector(s) to witness inspections and tests.

All costs associated with attendance by representatives of Sydney Water at inspections and tests must be borne by Sydney Water.

7. Reference documents

The HV Switchroom and all associated equipment and materials must be designed, constructed, manufactured, installed and tested in accordance with the latest revisions of the Federal and State statutory requirements, applicable Australian and IEC Standards, as well as the Sydney Water standard specifications:

Document type	Title
Legislation	<ul style="list-style-type: none"> - Latest edition of the Work Health and Safety Act - Latest edition of the Service and Installation Rules of New South Wales
Policies and procedures	<ul style="list-style-type: none"> - WSA201 - Manual for Selection and application of protective coatings. - Supplement to WSA201 - Manual for Selection and application of protective coatings. - PCS100 - Protective Coatings - SDIMS0026 - Service Delivery Safety Signage Specification
Other documents	<ul style="list-style-type: none"> - DOC0016: Specification Earthing and Lightning - CPDMS0022 - Technical Specification Electrical
Standards	<ul style="list-style-type: none"> - AS ISO 1000: The International System of Units (SI) and its application (ISO 1000) - AS 1319: Safety signs for Occupational environment - AS 1428: Design for access and mobility - AS 1670: Fire detection, warning, control and intercom systems (Parts 1,3, 4, 6) - AS 1680: Interior lighting (Parts 0, 1, 2) - AS 1841: Portable Fire Extinguishers, (Parts 1-7) - AS 2067: Switchgear assemblies and ancillary equipment for alternating voltages above 1 kV - AS 2700: Colour standards for general purposes - AS/NZS 3000: Electrical installations (known as the Australian/New Zealand Wiring Rules) - AS/NZS 3008.1.1: Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions - AS 3600: Concrete Structures - BCA: Building Code Australia

7.1 Conflicts between Specification, Standards and/or Codes

Review the above standards and make use of them where they are applicable. Identify any conflicts between the above standards and recommend which criteria to use. The Contractor must refer any conflicts in the information to Sydney Water for clarification.

Ownership

Ownership

Role	Title
Group	Integrated Systems Planning - Liveable City Solutions
Owner	Manager of Urban Design and Engineering
Author	Lead Engineer Electrical

Change history

Version No.	Prepared by	Date	Approved by	Issue date
1	Robert Lau / Andrew Manganas / Paul Zhou	05/12/2014	Norbert Schaeper	05/12/2014
2	Robert Lau / Paul Zhou	31/08/2018	Ken Wiggins	31/08/2018
3	Paul Zhou	20/02/2020	Steve-Keevil Jones	20/02/2020

