NSW GOVERNMENT | Telco Authority

# Guidelines for Equipment Huts and Outdoor Units

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**Related Policies and Documents**

| Report Reference Number | Issuer | Reference | Document Name |
|---|---|---|---|
| [1] | SAI Global | AS 1170.4 | Structural Design Actions, Part 4, Earthquake |
| [2] | SAI Global | AS 1657 | Fixed platforms, walkways, stairways and ladders – design, construction and installation |
| [3] | SAI Global | AS/ACIF | Installation Requirements for Customer Cabling |
| [4] | SAI Global | AS/NZS | Structural Design Actions, Part 0, General |
| [5] | SAI Global | AS/NZS 1170.1 | Structural Design Actions, Part 1, Permanent, Imposed and Other Actions |
| [6] | SAI Global | AS/NZS 1170.2 | Structural Design Actions, Part 2, Wind Actions |
| [7] | SAI Global | AS/NZS 1170.3 | Structural Design Actions, Part 3, Snow and Ice Actions |
| [8] | SAI Global | AS/NZS 1841 | Portable fire extinguishers |
| [9] | SAI Global | AS/NZS 3000 | Electrical Wiring Rules |
| [10] | SAI Global | AS/NZS | Electrical Installations- selection of cables |
| [11] | SAI Global | AS1530.3 | Methods for fire tests on building materials, components and structures - Simultaneous determination of ignitability, flame propagation, heat release and smoke release |
| [12] | SAI Global | AS2444 | Portable fire extinguishers and fire blankets - Selection and location |
| [13] | SAI Global | AS4428.0 | Fire detection, warning, control and intercom systems - Control and indicating equipment - General requirements and test methods |
| [14] | NSW Rural Fire Service | NSW Rural Fire Service | Guidelines for Asset Protection Zones |
| [15] | NSW Rural Fire Service | NSW Rural Fire Service | Practice Note 1/11 - Telecommunications Towers in Bushfire Prone Areas |
| [16] | NSW Telco Authority | NSW TA Guideline 5 | Structural Assessment Guideline for Towers, Masts and Antenna Mounts |
| [17] | NSW Telco Authority | NSW TA Guideline 6 | Radio Site Electricals |

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# 1 Executive summary

This document is intended to provide a performance specification for the selection of appropriate equipment huts and outdoor units (ODUs) for NSW Government radio sites. This document allows the NSW Government to ensure that the design and supply of equipment huts and outdoor units will be of a standard that will ensure compliance with all relevant Australian Standards and meet service levels for NSW Government communications facilities.

This performance standard seeks to encompass a large cross-section of huts and outdoor units utilised at NSW Government operational radio communications sites. These include prefabricated equipment huts, outdoor units, and in situ equipment buildings. For each of these cases, specifications will be provided for electrical, structural, security (including fire resistance and weather proofing), and layout components.

Application of these specifications will be site-specific depending on the nature of equipment hut required and the designated site importance.

# 2 Introduction

## 2.1 Purpose

The purpose of this specification is to provide the planner, designer, and the constructor with detailed technical requirements which must be complied with in performing works for the NSW Government.

This specification is applicable for new equipment huts, in-situ equipment rooms, and outdoor units. It defines the requirements throughout the asset lifecycle phases including planning, design, construction, operations, maintenance, and disposal.

Variance from this standard is considered acceptable where the alternative solution meets the objectives of the supported services and facilities in a more cost effective manner, taking total cost of ownership in to account.

## 2.2 Scope

The requirements specified in this document apply to all new equipment huts, which include huts, in-situ equipment rooms, and outdoor units designed and constructed for the NSW Government. This document shall be considered to detail the minimum standards for all new infrastructure and the benchmark for upgrade or augmentation of existing huts.

This document must be used in conjunction with normal practice in the telecommunications industry.

In the event that a conflict arises between the requirements of this document and relevant Australian Standard, the mandatory obligations of the Australian Standards shall prevail as follows:

1. Commonwealth and State Acts
2. Australian Standards, Codes and Regulations and BCA
3. NSW Government standards
4. Industry standards

It shall be the hut supplier's responsibility to use appropriate standards and codes and to follow normally accepted practice in the industry where any areas are not covered by this document or other NSW Government standards.

## 2.3 Safety in design

The design process represents the conceptualisation of ideas and implementation of strategies, by a professional design team that enable minimising hazards at source.

Safety in design is the recognition that a design decision can lead to hazards being built into a product, building, or structure that may manifest itself during construction, operation, maintenance, disposal or demolition.

The design team and Supplier are bound by WHS legislation to record and demonstrate that hazards are eliminated or risk-mitigated for all designs. It should be noted that the Commonwealth WHS Regulations 2011, Chapter 6, Regulation 291 identifies construction work in this field is a high risk activity.

Safety in design endeavors to identify, replace, substitute, or mitigate future WHS risks and hence provide a safer workplace environment for those personnel who will construct, manage, operate, work in, maintain, and ultimately demolish the product, structure, or building.

# 3 General Requirements for Huts and ODUs

## 3.1 General description

Provision of a weather tight, weather resistant housing is essential for the successful operation of the facility. The hut and ODU shall be robust, transportable, fit for the intended purpose, and suited to the site location.

The design shall incorporate all components preassembled and installed prior to delivery on site. The design shall be Australian and industry code compliant, permitting ease of personnel circulation to install and access equipment both in the construction, operational and maintenance phases.

## 3.2 Classification of services

The NSW government operates services with varying levels of importance. For the purpose of this specification, the following service classifications shall be considered.

| Service classification | Description |
|---|---|
| Mission critical | Application is critical to emergency response and management. Unavailability of this application may impact on management of a life and death situation. |
| Operational | Application is critical to performing daily operational tasks, however unavailability will not impact on the ability to manage a life and death situation. |
| Business | Application is related to business or administrative activities |
| Information | Application provides information that might be useful to a mobile unit, but is not critical to performing their daily tasks. |

Table 1: Classification of service

## 3.3 Importance level

The importance level of a shelter (hut and ODU) shall be determined in accordance with AS/NZS 1170.0 table F1. Unless advised otherwise by the Customer, the Service Provider should adopt importance levels based on classification of services as follows:

| Service classification | Importance Level in accordance with AS/NZS 1170.0 |
|---|---|
| Mission Critical | 4 |
| Operational | 2 |
| Business | 2 |
| Information | 2 |

Table 2: Shelter importance level per service classification

## 3.4 Annual probability of exceedance

For shelter structures, the design events shall be determined in accordance with AS/NZS1170.0 considering service importance and event type. The annual probability of exceedance of the design events for ultimate limit state design shall be in accordance with AS/NZS 1170.0 Table F2.

Unless advised otherwise by the Customer, the following probabilities shall be adopted:

| Service Classification | Importance Level in accordance with AS/NZS 1170.0 | Annual probability of exceedance | | |
|---|---|---|---|---|
| | | Wind | Snow | Earthquake |
| Mission Critical | 4 | 1/1000 | 1/250 | 1/1000 |
| Operational | 2 | 1/250 | 1/50 | 1/250 |
| Business | 2 | 1/250 | 1/50 | 1/250 |
| Information | 2 | 1/250 | 1/50 | 1/250 |

Table 3: Event probability of exceedance per service classification

## 3.5 Design working life

The design working life of a hut or ODU shall meet or exceed 20 years.

Four hut and four ODU types are proposed which correspond to the four Importance levels defined in AS/NZS1170.0. Each hut or ODU supports differing levels of fire protection and can support a range of different form factors.

## 3.6 Layouts

### 3.6.1. Huts and ODUs

The designer shall ensure that the overall dimensions provide a safe work environment and that the dimensional tolerances consider the modular nature of the equipment to be installed and maintained. Further detail on each hut and ODU type including the preferred external dimensions are provided in the classification on the table in Appendix A.

## 3.7 Structural design requirements

### 3.7.1. General

The hut or ODU shall be designed and manufactured with sufficient structural integrity, strength, and stability to support its self-weight and all equipment loads during fabrication, transportation, lifting, and installation on site. Note if battery packs are installed after delivery to site then their effect in transport and lifting loads need not be considered.

The hut frame may be flat-packed to site, however if loaded, transported and delivered preassembled to site, then the hut shall have lifting points with adequate capacity for dynamic lifting actions and placement with equipment racks, if pre-installed, and shall have provisions for anchoring down into foundations. The safe working load (SWL) for the lifting lugs will be clearly marked by each lifting lug.

The supplier shall provide the design documentation including structural certification, current for the delivery and installation date, to the Customer on delivery.

Hut and ODU design shall comply with the relevant Australian Standards and the National Construction Codes of Practice.

In bushfire-prone areas the construction methods for the building and components will comply with the recommendations in AS3959- 2009 and NSW Rural Fire Service recommendations.

### 3.7.2. Permanent and imposed actions

#### 3.7.2.1. Hut Floor

The hut floor shall be designed to withstand the most adverse combinations of permanent and imposed loads to which it will be subjected during its design life.

The floor shall be designed for support and fixing of equipment and DC power system racks located in the most adverse position on the floor structure to resist vertical, horizontal and overturning actions.

In addition to the areas loaded with equipment loads, the floor structure shall be designed for the following live actions as nominated in AS 1170:

| Type | Service classification | Uniformly Distributed Action(kPa) | Concentrated Action (kN) |
|---|---|---|---|
| 1 | Mission critical | 3.0 | 2.0 |
| 2 | Operational | 3.0 | 2.0 |
| 3 | Business | 2.0 | 1.5 |
| 4 | Information | 2.0 | 1.5 |

Table 4: Floor load allowances - huts

### 3.7.2.2. Hut Roof

The hut roof shall be non-trafficable and be designed for the following minimum actions:

| Type | Service classification | Uniformly Distributed Action(kPa) | Concentrated Action (kN) |
|---|---|---|---|
| 1 | Mission critical | 0.5 | 1.0 |
| 2 | Operational | 0.5 | 1.0 |
| 3 | Business | 0.4 | 0.8 |
| 4 | Information | 0.4 | 0.8 |

Table 5: Roof load allowances

The roof soffit shall be capable of supporting all fittings and fixtures as well as a loading of 100kg per linear metre of cable ladder for future additions and alterations.

Nominally the roof design shall allow for a minimum 2° pitch. In alpine, sub-alpine and regions where the weather bureau records show snowfalls, a minimum 30° roof pitch is recommended. The high side of the roof shall be located over the door wall. The hut design will minimise the potential for the build-up of fuel, and a solution with no roof gutters is preferred in bushfire-prone areas.

### 3.7.2.3. Hut Walls

The hut wall shall have sufficient capacity to support all nominated equipment, distribution board, meter panel, cable supports, etc. The minimum design load 100kg per linear metre of cable ladder (includes both permanent and imposed actions) shall be considered and applied to the wall or integrated support rack. The walls will have clearly defined areas for the attachment of cantilever brackets and racks with maximum SWL load ratings of “pull out,

vertical and horizontal shear" for the substrate. The wall directly below the gland plate shall be designed to support a 200kg minimum vertical load.

These equipment loads shall be considered in the earthquake analysis and design.

#### 3.7.2.4. Hut door

The hut door shall be a minimum of 900mm clear opening and no less than 2050mm in clear height. The door should be metal clad and rigid. For Type 1 and Type 2 huts the door shall be able to withstand 40kWm2 of radiant heat. Thermal insulation shall be equal to or greater than the wall insulation.

### 3.7.3. Wind actions

The hut and ODU shall be designed to resist wind actions in accordance with AS/NZS 1170.2 for an annual probability of exceedance specified in Clause 3.5.

The manufacturer shall provide to the Customer the details of design clearly stating the design criteria and any assumptions.

### 3.7.4. Snow and ice actions

In sub-alpine and alpine regions, the hut and ODU shall be designed to resist snow and ice actions in accordance with AS/NZS 1170.3 for an annual probability of exceedance of the design event specified in Clause 3.5. Reference shall also be made to weather bureau records for any areas outside sub-alpine regions that have received snowfalls in the past.

The manufacturer shall provide to the Customer the details of design clearly stating the design criteria and any design assumptions.

#### 3.7.4.1. Falling ice – protection measures

Hut and ODUs deployed in sub-alpine and alpine regions shall be manufactured to suit the conditions.

They shall be adequately protected from falling ice and snow using horizontal protective shields and protective guards for all exposed horizontal runs of feeder cables.

Alternatively mechanical protection may be provided by standalone structure or facility built over the hut or ODU.

### 3.7.5. Earthquake loads

#### 3.7.5.1. General

Earthquake loads shall be determined in accordance with AS 1170.0 and AS 1170.4.

#### 3.7.5.2. Probability factor

The probability factor (kp) shall be taken from table 3.1 of AS 1170.4 for annual probability of exceedance corresponding with the relevant structure importance level.

#### 3.7.5.3. Hazard factor

The hazard factor (Z) shall be taken from Table 3.2 of AS 1170.4. Where the location is not listed, be determined from figures 3.2(A) to 3.2(F).

#### 3.7.5.4. Site sub-soil class

The site shall be assessed and assigned to the sub-soil class it most likely resembles in accordance with section 4 of AS1170.4 and the geotechnical investigation.

#### 3.7.5.5. Earthquake design category

The earthquake design category (EDC) shall be determined in accordance with table 2.1 of AS 1170.4 for the corresponding importance level, sub-soil class and structure height.

#### 3.7.5.6. Analysis and design

Earthquake loads for EDC I and II structures shall be determined by static analysis in accordance with section 6 of AS 1170.4.

Earthquake loads for EDC III structures shall be determined by dynamic analysis in accordance with section 7 of AS 1170.4.

Design of structural components for earthquake loads shall be in accordance with AS 3600 and, AS 4100 for concrete and steel structures respectively.

### 3.7.6. Footing design

Hut, ODU footings and tie downs shall be designed to resist the most adverse combination of permanent, imposed, wind, snow, earthquake and other actions to which they will be subjected for annual probability of exceedance as specified in clause 3.5.

The footing shall be designed to suit the site geotechnical conditions. An interpretive geotechnical report shall be provided to the foundation designer by the Customer.

When mounted on a roof slab, adequate ventilation shall be provided to the subfloor area to prevent moisture build up.

The footing designer shall provide to the Customer engineering certification and the details of design clearly stating the foundation design criteria and any assumptions.

## 3.8 Disposal

All demolition work shall comply with the AS 2601-2001 The demolition of structures and the Demolition work code of practice dated 2014 as issued by Safe Work Australia.

### 3.8.1. Engineering considerations

The demolisher shall carry out or arrange the carrying out of any calculations, analysis, testing or examination necessary, prior to the demolition, to minimise the health and safety risks to the demolisher and the public.

### 3.8.2. Risk management

The demolisher shall manage risks in accordance with the WHS Act and Regulations 2011.

### 3.8.3. Demolition works plan

Demolition work shall be carefully planned before the work commencement. Planning involves identifying hazards, assessing risks and determining appropriate control measures in consultation with all relevant persons involved in the work.

### 3.8.4. Waste recycling and disposal

Materials and finishes specified for the original structure may require special attention at the time of demolition and any special requirements for the disposal and/or recycling of those materials or finishes should be advised to the demolisher through the risk assessment documentation provided by the tower supplier.

### 3.8.5. Hazardous materials

All hazardous materials and waste that has the potential to exert a detrimental effect on people or the environment shall be correctly identified on site and safely disposed of in an environmentally and socially acceptable manner.

# 4 Hut Performance Requirements

## 4.1 Materials

### 4.1.1. General

The hut shall be designed and manufactured using lightweight modular construction with integral lifting frame that provides robust members and connections throughout. If so, provide sufficient redundancy and robustness within the frame and lifting lug design to accommodate the failure of one lifting point during the lifting operation without member or connection failure elsewhere in the system.

The floors may be reinforced concrete or light weight construction such as galvanised steel base frame with infill floor. The floor shall be constructed using treated timber floor joists and plywood sufficient to resist termite attack.

Alternatively the walls, roof and floor may be precast reinforced concrete or tilt up reinforced concrete or reinforced concrete block work walls with in-situ concrete or lightweight floor construction.

### 4.1.2. External finish

The hut external finish shall be specified by the Customer for each site.

The general requirement is for low maintenance materials with a minimum 20 years design life and fit for the intended purpose. Acceptable finishes include:

- Painted
- Rendered faux brick
- Powder coated
- Other finishes may be considered with Customer endorsement

Internal finishes:

- Flooring: anti-static vinyl
- Walls: painted or powder coated
- Other finishes may be considered with Customer endorsement

### 4.1.3. Weatherproofing

The hut shall be designed in a way to prevent ingress of water and moisture into the hut. Any leakage and seepage of water into the hut is unacceptable.

All doors and wall penetrations shall be provided with a water deflector draining to each side of the opening.

All penetrations, connections, fixings installed by the hut manufacturer shall be made waterproof.

Elevated huts (i.e. other than slab on ground) should be sufficiently elevated to allow for underfloor ventilation and clearing of debris (by wind or manual intervention).

### 4.1.4. Dust sealing

Hut types 1 and 2 shall be designed for a maximum ingress of:

| Type | Density |
|---|---|
| Sand | 30mg/m3 |
| Dust | 0.4mg/m3 |
| Sedimentation | 350mg/m3 |

Table 6: Dust ingress sealing requirements

All doors and windows shall be provided with compressible type or mechanical seals to all sides.

### 4.1.5. Thermal performance

The hut design team and supplier shall take into consideration thermal effects in the design of the structure resulting from the weather extremes particular to the region. Also refer Clause 4.2.4, AS/NZ1170 Pt0: general principles.

The hut shall be insulated to limit heat transfer. For all sites outside Alpine areas the thermal insulation shall be provided to roof and walls to achieve thermal coefficient of R=2.0 to the roof and R=1.5 to the walls.

For Alpine areas the roof and wall materials shall achieve a thermal coefficient of at least 3.8.

### 4.1.6. Security

The hut door shall be in a vandal proof frame with concealed three pin type, anti-lift off button tipped security stainless steel hinges with a locking arrangement and protected by an integral anti-gemmy plate.

In cases where the Customer has no standard keying system, a default locking system (e.g. Lockwood series 3572) shall be supplied.

### 4.1.7. Vermin proofing

The hut shall be sealed and to prevent the entry of mammalian, reptilian, amphibious and insect vermin.

## 4.2 Electrical requirements

The AC electrical supply to the equipment hut shall be derived from an unmetered source as close as practicable to the equipment hut location. This point of supply shall be determined in consultation with the regional electricity distributor. If an unmetered point of supply cannot be attained the design consultant must inform the Customer as soon as it is known.

The design and installation shall conform fully to the requirements of AS/NZS 3000 (the wiring rules) and the NSW Service and Installation Rules (NSWSIR).

### 4.2.1. AC Supply characteristics

The AC electrical supply to the equipment shall be at the following nominal configurations:

- Single phase, 230V
- Three phase, 230/400V

The frequency shall be 50Hz.

The choice of voltage shall be determined by the availability of electricity distributers existing network infrastructure. Three phase supply will be preferred on the basis of equipment and cabling choice.

The requirements of AS/NZS 3000 shall be applied in regards to volt drop (i.e. a maximum of 5% at the extremity of the electrical installation in the equipment hut).

### 4.2.2. Maximum demand

The design consultant shall perform after diversity maximum demand (ADMD) calculations based on appendix C, section C2 of AS/NZS 3000 for the fully fitted out equipment hut. This shall include all lighting, power circuits, air conditioning, rectification equipment and miscellaneous circuits.

The ADMD calculations shall be used to determine the maximum load when making an application for electrical supply from the electricity distributer.

### 4.2.3. AC supply to the equipment hut

AC supply to the equipment hut shall comply with:

- AS/NZS 3000 (the wiring rules)
- NSW Service and Installation Rules (NSWSIR)
- NSW TA Guideline 6

### 4.2.4. Equipment hut distribution and cabling

The hut shall have an AC power system designed and installed in accordance with the below:

- The AC power system within the hut should be designed and installed as a three phase system. This shall be suitable for single phase operation by the means of strapping across the phases at an easily accessible location, typically the main switch or circuit breaker within the main switchboard.

- An enclosure suitable for mains cable termination and revenue meter housing shall be provided on the exterior of the shelter.
- All AC power system distribution is to be installed using dedicated distribution boards and protective devices.
- All AC power system cabling is to be installed using methods such as cable ducting/ trunking, conduits and trays; the method chosen shall not impede positioning of euqipment.
- The AC power system shall have a suitably specified surge protection device (SPD)to be mounted in a location that can be serviced. Provided with visual indicators as to the status of sacrificial elements. Optional: alarm contacts noting failure/expiry of SPD

Cable selection shall be determined in accordance with the calculated maximum demand of each individual circuit. The maximum demand shall take into account all likely factors affecting the circuit.

The following provide guidance on cable selection:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |
| AS/NZS 3008:1.1 | Electrical Installations- selection of cables |

In addition the cable selection process shall consider low fire and smoke hazard insulation properties.

Separation of AC power cabling shall be maintained as required by:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |
| AS/NZS 3015 | Electrical installations-Extra Low Voltage (DC) Power Supplies within Public Telecommunications Networks |
| AS/ACIF S009 | Installation Requirements for Customer Cabling |

### 4.2.5. Alternative supply source

The equipment hut shall be fitted with a means of alternative AC supply such as an inlet socket for a portable generator. A Customer-nominated changeover switch shall be specified and installed as part of the equipment hut AC power system. This shall comply with the requirements of AS/NZS 3000. The generator inlet and generator changeover switch shall be sized to the installed or future electrical maximum demands.

### 4.2.6. Lighting

Adequate internal lighting shall be provided to achieve 320 Lux in accordance with AS/NZS 1680.2.2 interior and workplace lighting. The luminaires shall be located so as provide the illumination levels to all areas with minimal shading/ shadows.

An external light (vandal proof maintained fitting) shall be provided above the door. Located to completely illuminate of egress/ front steps and minimise shadow.

### 4.2.7. Power sockets

Review with the Customer the number of power sockets that shall be provided in accordance with the design brief. These shall be RCD protected as required by AS/NZS 3000. All critical equipment as nominated by the Customer shall be supplied via dedicated captive sockets rated for the critical equipment.

Power sockets supporting critical equipment, including standby power systems, shall incorporate a captive mechanism for retaining the power plug.

### 4.2.8. Air conditioning

Where air conditioning is to be fitted, each unit shall be supplied by a dedicated circuit.

### 4.2.9. Emergency lighting and fire/smoke alarms

Emergency lighting and fire/ smoke alarms shall be provided in all cases. Where required the alarms shall be tied in to any existing base building/ site alarm systems. These alarms shall be wired to a dedicated breakout unit.

### 4.2.10. Earthing

An earthing system is an essential element in all electrical systems. Within a telecommunications hut an earth system may be required to perform different functions such as a protective earth, lightning protection and a service or telecommunications earth.

All AC power system equipment shall be earthed in accordance with the following:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |

## 4.3 Heating, ventilation and air conditioning (HVAC)

### 4.3.1. General requirements

The equipment hut shall be provided with an air conditioning or passive ventilation system to provide the conditioned environment nominated by the Customer for the specified region(s).

The design consultant shall prepare air conditioning heat load calculations in order to design an adequate air conditioning system for both Customer heating and cooling requirements.

### 4.3.2. Design criteria

Ambient design conditions used for calculation of cooling loads and selection of air conditioning equipment shall be 44°C DB, 24°C WB.

The air conditioning system shall maintain internal conditions not greater than 25°C, 50% relative humidity with ambient conditions as nominated above and a cooling load comprising:

- External solar load
- Internal equipment load

### 4.3.3. Air conditioning unit(s)

The unit(s) shall produce not less than the required capacity at the nominated internal and external conditions and produce low noise levels.

Any external components shall be weatherproof. The casing shall be mounted rigidly in location with adequate support, and shall be secured from inside the hut to prevent unauthorized removal. Ensure weatherproof sealing of all refrigerant pipe penetrations.

The unit fans and compressor shall be isolated from the casing by resilient mounts, and sound absorbing material shall be used to minimise internal and external noise in noise sensitive areas. Acoustic measures such as compressor shrouding and additional sound absorbing materials shall be available as an option for use in noise sensitive areas.

The unit's air filter panel (internal) shall be easily removable without the need for special tools. Filters should be disposable media type and efficiency of 80% with Test Dust No.2 and 70% with Test Dust No.4 when tested in accordance with AS 1132.

The air conditioner shall be provided with a five (5) year labour and parts warranty on all components.

#### 4.3.3.1. Air-conditioning controls

A programmable logic controller (PLC) or similar shall be provided to control the operation of the hut air conditioning. Outputs from the PLC shall turn power to the air-conditioner circuits on and off as required to maintain conditions in the hut based on the remote temperature sensor. The remote temperature sensor shall monitor for presence of bush fire/ smoke and shut down air conditioning when detected.

The air conditioners shall be set to operate with fan speed on 'high' and for maximum cooling.

Where multiple air-conditioner units are provided, the leading air conditioner will start and operate as necessary to maintain room temperature. If the temperature in the hut nominally rises above Customer supplied set point the second (lag) air conditioner will operate to supply additional cooling to maintain conditions. The air conditioners shall cycle using lead/ lag changeover as controlled by the PLC, with a 60/ 40 split between the units to prevent simultaneous failure.

If the temperature rises to the Customer specified maximum set point, the PLC shall give an indication of a high temperature status.

Fire dampers shall be supplied for 'through wall air conditioners' where risk of bushfire is present (Bushfire Attack Level (BAL) greater than 12.5). Fire dampers are to be easily replaceable. Split-system air conditioners should be considered where BAL is greater than 29.

The PLC board shall contain at least two sets of high current contactors for air conditioners and one low-current contactor fresh air fan. Individual circuits shall be provided for each air conditioner and fresh air fan. Each circuit shall be hard-wired to dedicated socket outlets for 'through-wall' units and fresh air fans. Circuits shall be direct wired to split-system units.

The PLC panel shall contain:

- Visual status displays
- Push buttons for 'staff comfort' and for air conditioner resetting and testing; this feature is to be fully labeled with operating instructions at the push button(s)

The PLC shall include the following air conditioning control features:

- Automatic lead/ tag changeover of the two air conditioners
- Timed changeover of the leading air-conditioner to ensure distributed running time of both air- conditioners and to prevent freezing in cold ambient temperatures
- Three-minute delay start timers to reduce or prevent short cycling of the air conditioners
- Inhibitor to prevent both air conditioners starting at the same time

- Air-conditioner fault reset; the Customer shall specify local/remote and manual/automatic operation
- 'Staff comfort' mode allowing for manual override/starting of the air-conditioning

#### 4.3.3.2. Status indicators

The PLC panel shall contain visual display of the status of the following items:

- Ambient room temperature
- Air conditioner on/off/fail
- High temperature alarm
- Temperature sensor fail

### 4.3.4. Fresh fan ventilation

Where requested by the Customer, a ventilation fan and relief air vent shall be installed to provide cooling/ fresh air ducting. The capacity of the fan will be not less than a single air conditioner unit fan operating on high speed.

The fan shall be fitted with a filter that will be fit for the intended purpose.

The fan and relief air-vent shall be fitted with suitably rated fire dampers.

## 4.4 Fire protection and security

### 4.4.1. General

When the hut is proposed to be located in a bushfire-prone area refer to the NSW Rural Fire Service Community Resilience Practice Note 1/11 and any applicable bushfire hazard reports prepared by accredited bushfire consultants. In these cases hut materials should be designed to withstand 40kWm² of radiant heat and shall withstand ember penetration into the structure. This recommendation should be adopted for all types 1 and 2 huts and at the Customers discretion for type 3 and 4 huts.

Products that penetrate the hut envelope and are not designed to withstand 40kWm² of radiant heat or withstand ember penetration shall require a fire damper incorporated into their design.

### 4.4.2. Access

Where practical, the hut shall be situated in a location that will allow unrestricted 24 hour access.

Access door shall be provided where shown on the site drawings. It will be nominally 900mm wide x 2040mm high and fitted into a fully sealing steel door frame. The door and frame shall be vandal proof and be fire rated to achieve the same fire resistance level (FRL) as the hut walls.

### 4.4.3. Security

The access door shall be fitted with a stainless steel door lock with a key and a hold open door latch hook. Deadlocking is not required. The access door shall be provided with alarm switch to detect 'door open' and 'door closed' situations. Door alarm shall be wired to alarm breakout unit.

### 4.4.4. Fire security

Fire protection shall be provided to the hut in accordance with AS/NZS 1841, AS2444, AS3786, AS4428.0 and the National Construction Code (NCC).

A smoke detector shall be provided in a location nominated by the Customer. Where required, the smoke detector shall be hard wired to the alarm breakout unit.

Where required by the building regulations, or Customer specific requirements, provide and fit a 2kg carbon dioxide fire extinguisher in location shown on the site drawings. Fire extinguisher shall be provided complete with a mounting bracket and identification sign.

### 4.4.5. Fire hazard properties

All hut materials shall have a spread of flame index of not greater than nine and smoke development index of not greater than eight in accordance with AS1530.3.

### 4.4.6. Maintenance of FRL integrity

The hut shall be constructed with a fire resistance level (FRL), to suit potential site conditions, as nominated in the classification table (Appendix A).

### 4.4.7. Entry points

The design of all external entries must ensure there is no water ingress to the hut. All wall, floor and roof transits are to be made water and vermin proof using approved proprietary fittings and conduits. Entries through fire rated walls must be fireproofed in accordance with the NCC and any local requirements.

## 4.5 Cable supports and gland plates

### 4.5.1. Cable ladder and supports

The hut manufacturer shall supply and install all cable ladder and supports as directed by the Customer. The manufacturer shall submit hut drawings to the Customer for approval prior to fabrication.

### 4.5.2. Gland plates

In bushfire-prone regions where BAL is less than 29, or other than ‘mission critical’ shelters, the hut manufacturer shall provide a cable entry plate, minimum 600mm wide x 400mm high on both end walls. The gland plate shall be a minimum 3mm thick clear anodised aluminum or a non-ferrous material to the approval of the Customer. The gland plate shall be supplied undrilled.

For type 1 or 2 shelters In bushfire-prone regions where BAL greater than 29 the hut manufacturer shall provide a fire rated gland plate / cable transition, e.g. Roxtec EziEntry™ system to suit the Customer cable requirements specification.

# 5 Outdoor units (ODU) Performance Requirements

## 5.1 Space requirements

Unless specified otherwise by the Customer, a space of at least 1500mm shall be provided in front of the ODU to prevent obstructing the outdoor unit (ODU) door from opening and to provide adequate working space in front of the unit.

Side and rear clearances shall be provided as per manufacturer’s recommendations to ensure that the doors can be opened at least 90° and to provide sufficient air flow and access.

## 5.2 Access

The ODU shall be situated in a location that will allow unrestricted 24 hour access.

## 5.3 Security

Access doors shall be fitted with a stainless steel door lock with a key and a hold open door restraint. Deadlocking is not required.

Access doors shall be provided with alarm switch to detect ‘door open’ and ‘door closed’ situations.

## 5.4 Fire security

Fire protection shall be provided to the ODU as shown on the site drawings in accordance with AS/NZS 1841, AS2444, AS3786, AS4428.0 and the NCC.

## 5.5 Fire hazard properties

When located in bushfire prone areas all ODU materials shall be designed to withstand 40kWm² of radiant heat and shall withstand ember penetration into the structure. All ODU materials shall have a spread of flame index of not greater than nine and smoke development index of not greater than eight in accordance with AS1530.3.

The ODU may require fire resistant screen walls to achieve the FRL requirements in a bushfire-prone zone.

## 5.6 Maintenance of FRL integrity

The ODU shall be constructed with a Fire Resistance Level (FRL) of -/120/120 (two hours).

## 5.7 Entry points

The design of all external entries must ensure there is no water ingress to ODU. All transits are to be made water and vermin proof using approved proprietary fittings and conduits.

## 5.8 Electrical requirements

### 5.8.1. General requirements

The AC electrical supply to the ODU shall be derived from an unmetered source as close as practicable to the ODU location. This point of supply shall be determined in consultation with the regional electricity distributor. If an unmetered point of supply cannot be attained the design consultant shall inform the Customer as soon as it is known.

The design and installation shall conform fully to the requirements of AS/NZS 3000 (the wiring rules) and the NSW Service and Installation Rules (NSWSIR).

### 5.8.2. AC Supply characteristics

The AC electrical supply to the ODU should be at the following nominal voltages,

- 230V Single phase

The frequency shall be 50Hz.

The requirements of AS/NZS 3000 shall be applied in regards to volt drop, i.e., a maximum of 5% at the extremity of the electrical installation in the ODU.

## 5.9 Maximum demand

The design consultant shall perform after diversity maximum demand (ADMD) calculations based on Appendix C, Section C2 of AS/NZS 3000 for the fully fitted out ODU. This shall include all lighting, power circuits, air conditioning, rectification equipment and miscellaneous circuits.

The ADMD calculations shall be used to determine the maximum load when making an application for electrical supply from the electricity distributer.

### 5.9.1. AC supply to the ODU

The requirements for the AC supply to the ODU are covered in the NSW Government site design guidelines and shall comply with:

- AS/NZS 3000 (the wiring rules)

- NSW Service and Installation Rules (NSWSIR)

### 5.9.2. Air conditioning

Air conditioning where specified by the Customer shall be supplied by dedicated circuits.

### 5.9.3. Earthing

An earthing system is an essential element in all electrical systems. Within a telecommunications installation an earth system may be required to perform different functions such as a protective earth, lightning protection and a service or telecommunications earth.

All AC power system equipment shall be earthed in accordance with the following:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |

## 5.10 Heating, ventilation and air conditioning (HVAC)

### 5.10.1. General requirements

Where specified by the Customer, the ODU shall be provided with an air conditioning system or fresh-air fan. The design consultant shall prepare air conditioning heat load calculations in order to design an adequate air conditioning system.

### 5.10.2. Design criteria

#### *5.10.2.1. Ambient Design Conditions*

Ambient design conditions used for calculation of cooling loads and selection of air conditioning equipment shall be 44°C DB, 24°C WB.

The air conditioning system shall maintain internal conditions not greater than 25°C, 50% relative humidity with ambient conditions as nominated above and a cooling load comprising:

- External solar load
- Internal equipment load

### 5.10.3. Air-conditioning unit(s)

The unit(s) shall produce not less than the required capacity at the nominated internal and external conditions and produce low noise levels. The air conditioner unit shall incorporate the following:

- Any external components shall be weatherproof. The casing shall be mounted rigidly in location with adequate support, and shall be secured from inside the ODU to prevent unauthorized removal. Ensure weatherproof sealing of all refrigerant pipe penetrations.

- The unit fans and compressor shall be isolated from the casing by resilient mounts, and sound absorbing material shall be used to minimise internal and external noise. Acoustic measures such as compressor shrouding and additional sound absorbing materials shall be available as an option for use in noise sensitive areas.
- The unit's air filter panel (internal) shall be easily removable without the need for special tools. Filters should be disposable media type and efficiency of 80% with Test Dust No.2 and 70% with Test Dust No.4 when tested in accordance with AS 1132.
- The air-conditioner shall be provided with a five (5) year labour and parts warranty on all components.

### 5.10.4. Air-conditioning controls

A programmable logic controller (PLC) or integral controller shall be provided to operate and monitor the ODU air- conditioning.

The controller should:

- provide a three-minute delay start timers to reduce or prevent short cycling of the air conditioners
- provide air conditioner fault alarm
- ODU high temp alarm

# 6 In-situ equipment rooms

## 6.1 General

This section provides the designer and contractor with requirements for construction of an in-situ equipment room located within an existing building. All materials and workmanship shall be in accordance with the NCC and the relevant Australian Standards.

In-situ equipment rooms shall be fully sealed to provide weatherproof and dustproof enclosure, all openings and penetrations shall be finished to maintain the waterproof integrity and durability of the construction.

## 6.2 Layout

Equipment room layout and dimensions shall suit the site requirements and be detailed on site drawings prepared by the designer. The final layout shall be approved by the Customer prior to construction.

Any modifications to the host building structure and any of its services for the equipment room fit-out shall comply with the NCC and the relevant Australian Standards.

## 6.3 Structural actions

### 6.3.1. Floor

A structural assessment shall be conducted for the floor of the host building considering all equipment and DC power systems for their proposed installation locations. In addition to the areas loaded with equipment loads, the floor structure shall be assessed for the following imposed actions:

| Type | Service classification | Uniformly Distributed Action(kPa) | Concentrated Action (kN) |
|---|---|---|---|
| 1 | Mission critical | 3.0 | 2.0 |
| 2 | Operational | 3.0 | 2.0 |
| 3 | Business | 2.0 | 1.5 |
| 4 | Information | 2.0 | 1.5 |

Table 7: Floor load allowances – equipment rooms

The designer shall provide structural certification confirming adequacy of the existing floor structure to support equipment room actions.

## 6.4 Materials

### 6.4.1. Roof

New in-situ equipment room shall have a roof or a ceiling of fire rated construction.

It shall have a fire resistance level (FRL) of -/120/120 (2 hours) and be constructed using lightweight timber or metal framed construction with multiple layers of fire rated gypsum plasterboard, or as a fire rated suspended ceiling fixed to the soffit of the slab or structure above.

All timber framing shall be in accordance with AS1684 and AS1720.

All metal framing shall be in accordance with AS/NZS 4600.

### 6.4.2. Wall

New in-situ equipment room walls shall be constructed using fire rated construction.

The walls shall have a fire resistance level (FRL) of -/120/120 (2 hours) and be constructed using either lightweight or masonry construction.

### 6.4.3. Lightweight construction

Lightweight construction shall comprise of timber or metal stud frame lined on both sides with multiple layers of fire rated gypsum plasterboard.

All timber framing shall be in accordance with AS1684 and AS1720.

All metal framing shall be in accordance with AS/NZS 4600.

Proprietary fire rated partition wall systems shall be constructed in accordance with the manufacturer's specifications.

### 6.4.4. Masonry construction

Masonry walls shall be constructed using brick, hollow block or core-filled block systems.

All masonry shall be constructed in accordance with AS 3700.

Where in-situ equipment room walls are constructed between two concrete slabs, a deflection head shall be provided at the top of the walls to allow for existing slab deflection.

## 6.5 Penetrations

Penetrations in the host building shall be carried in consultation with the property owner. Due care shall be taken to protect other services, structures and finishes.

Penetrations through fire rated slabs and walls shall be sealed with approved material to maintain the integrity of the fire rating.

All penetrations to be sealed to maintain insulation rating of room, prevent dust/ dirt/ moisture ingress, and prevent vermin.

## 6.6 Access

The in-situ equipment room shall be situated in a location that will allow unrestricted 24 hour access to authorised personnel and emergency services.

Preference shall be given to an external access door. Where the equipment room is located internally, consideration shall be given to both construction and maintenance constraints as well as future installation and removal of equipment racks.

Access door shall be provided where shown on the site drawings. It will be nominally 900mm wide x 2040mm high and fitted into a fully sealing steel door frame. The door and frame shall be vandal proof and be fire rated to achieve the same FRL as the equipment room walls.

## 6.7 Security

The access door shall be fitted with a stainless steel door lock with a key and a hold open door latch hook. Deadlocking is not required.

The access door shall be provided with alarm switch to detect ‘door open’ and ‘door closed’ situations.

## 6.8 Fire security

Fire protection shall be provided to the equipment room as shown on the site drawings in accordance with AS/NZS 1841, AS2444, AS3786, AS4428.0 and the NCC.

A smoke detector shall be provided in location shown on the site drawings. Where required by the site owner, the smoke detector shall be hard wired back to the host building fire information panel.

Where required by the building regulations, or Customers requirements specification, provide and fit a 2kg carbon dioxide fire extinguisher in location shown on the site drawings. A fire extinguisher shall be provided complete with a mounting bracket and identification sign.

## 6.9 Fire hazard properties

All equipment room materials shall have a spread of flame index of not greater than nine and smoke development index of not greater than eight in accordance with AS1530.3.

## 6.10 Maintenance of FRL integrity

The in-situ equipment room shall be constructed with consideration to the host building fire rating requirements. The fire rating level integrity of the host building must not be compromised by the construction of the in-situ equipment room.

## 6.11 Entry points

The design of all external entries must ensure there is no water ingress to the equipment room or surrounding building. All wall, floor and roof transits are to be made water and vermin proof using approved proprietary fittings and conduits.

Entries through fire-rated walls must be fireproofed in accordance with the NCC and any local requirements.

## 6.12 Electrical requirements

### 6.12.1. General requirements

The AC electrical supply to the in-situ equipment room shall be derived from an unmetered source as close as practicable to the in situ equipment room location. This point of supply shall be determined in consultation with the regional electricity distributor. If an unmetered point of supply cannot be attained the design consultant shall inform the Customer as soon as it is known.

The design and installation shall conform fully to the requirements of AS/NZS 3000 (the wiring rules) and the NSW Service and Installation Rules (NSWSIR).

### 6.12.2. AC Supply characteristics

The AC electrical supply to the in situ equipment room shall be at the following nominal voltages:

- Single phase, 230V
- Three phase, 230/400v

The frequency shall be 50Hz.

The choice of Voltage shall be determined by the availability of electricity distributers existing network infrastructure. Three phase supply will be preferred on the basis of equipment and cabling choice.

The requirements of AS/NZS 3000 shall be applied in regards to volt drop (i.e., a maximum of 5% at the extremity of the electrical installation in the equipment hut).

### 6.12.3. Maximum demand

The design consultant shall perform after diversity maximum demand (ADMD) calculations based on appendix C, Section C2 of AS/NZS 3000 for the fully fitted out in situ equipment room. This shall include all lighting, power circuits, air conditioning, rectification equipment and miscellaneous circuits.

The ADMD calculations shall be used to determine the maximum load when making an application for electrical supply from the electricity distributer.

### 6.12.4. AC supply to the in-situ equipment room

The requirements for the AC supply to the in situ equipment room are covered in the NSW Government site design guidelines and shall comply with:

- AS/NZS 3000 (the wiring rules)
- NSW Service and Installation Rules (NSWSIR)

### 6.12.5. In-situ equipment room distribution and cabling

The in situ equipment room shall have an AC power system designed and installed in accordance with the following:

- The AC power system shall be designed and installed as a three phase system; this shall be suitable for single phase operation by the means of strapping out the phases at an easily accessible location

- All AC power system distribution is to be installed using dedicated distribution boards and protective devices
- All AC power system cabling is to be installed using methods such as cable ducting/ trunking, conduits and trays; the method chosen shall not impeded equipment positioning
- The AC power system shall have a suitably specified surge protection device installed

Cable selection shall be determined in accordance with the calculated maximum demand of each individual circuit. The maximum demand shall take into account all likely factors affecting the circuit.

The following provide guidance on cable selection:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |
| AS/NZS 3008:1.1 | Electrical Installations- selection of cables |

In addition the cable selection process shall consider low fire and smoke hazard insulation properties.

Separation of AC power cabling shall be maintained as required by:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |
| AS/NZS 3015 | Electrical installations-Extra Low Voltage (DC) Power Supplies within Public Telecommunications Networks |
| AS/CIF S009 | Installation Requirements for Customer Cabling |

### 6.12.6. Alternative supply source

Where Type 1 services are supported and essential power is unavailable, the in-situ equipment room should be fitted with a means of alternative AC supply such as an inlet socket for a portable generator. A changeover switch shall be specified and installed as part of the in situ equipment room AC power system. This shall comply with the requirements of AS/NZS 3000. The generator inlet and generator changeover switch shall be sized to the installed or future electrical maximum demands.

The generator inlet socket shall be located to allow easy access for the generator, preferably at ground level, with 24 hour access for the Customer.

### 6.12.7. Lighting

Adequate internal lighting shall be provided to achieve 320 Lux in accordance with AS/NZS 1680.2.2 interior and workplace lighting. The luminaires shall be located so as provide the illumination levels to all areas with minimal shading/shadows.

### 6.12.8. Power sockets

Adequate power sockets shall be provided in accordance with the design brief.

These shall be RCD protected as required by AS/NZS 3000.

### 6.12.9. Air conditioning

Air conditioning shall be supplied by dedicated circuits.

### 6.12.10. Emergency lighting and fire/ smoke alarms

Emergency lighting and fire/ smoke alarms shall be provided in all cases. Where required the alarms shall be tied in to any existing base building/ site alarm systems.

### 6.12.11. Earthing

An earthing system is an essential element in all electrical systems. Within an in-situ equipment room an earth system may be required to perform different functions such as a protective earth, lightning protection, and a service or telecommunications earth.

All AC power system equipment shall be earthed in accordance with the following:

| | |
|---|---|
| AS/NZS 3000 | Electrical Wiring Rules |

## 6.13 Heating, ventilation and air conditioning (HVAC)

Refer to sections 7 above.

# 7 Operation and Maintenance Requirements

## 7.1 General

The following documentation shall be provided in a form acceptable to the Customer:

- operating handbook including all design drawings and member schedules
- key client contacts in an emergency
- maintenance manual
- trouble shooting manual
- detailed list of recommended spares holdings

- as-built Installation drawings prepared in accordance with Customer's drawing and CAD specifications
- certificate of Compliance Electrical Work
- test certificates
- commissioning sheets
- recommended maintenance schedule
- guidance on safe and sustainable disposal

# 8 Terms and definitions

| Term | Definition |
|---|---|
| ADMD | After diversity maximum demand |
| BCA | Building Code of Australia, Volumes 1 & 2 of the NCC |
| BTS | Base transceiver station |
| Customer | NSW Telco Authority or other NSW government agency |
| DB | Dry bulb |
| EDC | Earthquake design category |
| EME | Electromagnetic energy |
| EWP | Elevated work platform |
| FRL | Fire resistance level |
| Hut | An equipment shelter installed on site for the specific purpose of |
| Insitu room | A room in existing building that has been utilised to house |
| NCC | National Construction Code |
| NSW TA | New South Wales Telecommunications Authority |
| ODU | Outdoor unit. A small sheet metal enclosure for the protection of |
| RF | Radio frequency |
| SPD | Surge protection device |
| SWL | Safe working load |
| WB | Wet bulb |
| WHS | Work health and safety |

Table 8: Terms and definitions

# Appendix A Classification Table

| Cabinets and Huts - BCA Class 10b | | | BCA Fire Resistance Level ** | | | |
|---|---|---|---|---|---|---|
| Structure | Shelter Type | Importance level to AS 1170.0 | BAL Flame Zone | BAL 29-40 | BAL 12.5-19 | BAL - LOW |
| ODU* | 1 | 4 | 120/120/120 | 90/90/90 | 60/60/60 | 60/60/60 |
| | 2 | 3 | 90/90/90 | 60/60/60 | 60/60/60 | |
| | 3 | 2 | | | | |
| | 4 | 2 | | | | |
| Hut | 1 | 4 | 120/120/120 | 90/90/90 | 60/60/60 | 60/60/60 |
| | 2 | 3 | 90/90/90 | 60/60/60 | 60/60/60 | |
| | 3 | 2 | 60/60/60 | 60/60/60 | 60/60/60 | |
| | 4 | 2 | 60/60/60 | 60/60/60 | 60/60/60 | |

| Cabinet type | Length (m) | Width (m) | Height (m) |
|---|---|---|---|
| CA | TBD | TBD | TBD |
| CB | TBD | TBD | TBD |

| Hut Type | Length (m) | Width (m) | Height (m) |
|---|---|---|---|
| HA | 3.5 | 2.4 | 2.4 |
| HB | 4 | 3 | 2.8 |
| HC | 6 | 3 | 2.8 |
| HD | 6 | 6 | 2.8 |
| HE | 15 | 6 | 2.8 |

| Service classification for bush fire operational capability | | |
|---|---|---|
| 1 | Mission critical | Service must remain operational |
| 2 | Operational | Prefer service to remain operational |
| 3 | Business | System not expected to remain operational |
| 4 | Information | System not expected to remain operational |

**Callout** O-1-4-OA = ODU/ Service classification / Importance level / Cabinet size
H-1-4-HA = Hut / Service classification / Importance level / Hut type
* ODU may require screen walls to achieve FRL
** FRL - Fire Resistance Level - from the BCA = Structural Adequacy/Integrity/Insulatio
BAL - Bushfire Attack Level

**Note**

**For insitu equipment rooms the BCA FRL will prevail if more severe**

**For guidance on construction requirements in bushfire prone areas refer AS 3959 -2009**

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