Technical Requirement Specification:

Containers and Co-locating containers





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Containers and Co-locating containers

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1 SCOPE

The scope of this specification is limited to the supply, delivery and installation of containers for Broadband Infraco:

- as telecommunication equipment shelters for Broadband Infraco equipment; and
- as telecommunication equipment shelters for its clients' equipment,

when establishing new sites or expanding existing sites on its network, shall suitable permanent infrastructure not be available,

2 OBJECTIVES

This specification details the technical requirements of Broadband Infraco for the manufacture, supply, delivery and installation of standard containers to be deployed as telecommunication equipment shelters on its network. It comprises of the following main areas.

- Container shell
- Co-locating containers partitioning
- Alternating Current (AC) distribution Board
- Canopy
- Lights and AC socket outlets
- Security
- Cabling

- Direct Current (DC) distribution Board
- Generator connection Box
- Earthing
- Ducting
- Alarm and air conditioner control unit
- Air conditioners
- General items
- Options
- Delivery and Installation
- Interconnections

3 REFERENCE DOCUMENTATION

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the edition indicated was valid. All controlled documents are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent edition of the documents listed below:

Doc No	Description
SANS 10142-1	Wiring of premises
SANS 164-2	Plug and socket-outlet systems for household and similar purposes for use in South Africa – Part 2: IEC system, 16 A 250 V A.C.
SANS 61643-1/IEC 61643-1	Surge protective devices connected to low voltage power distribution systems
SANS 1973-3	Low-voltage switchgear and controlgear ASSEMBLIES Part 3: Safety of ASSEMBLIES with rated prospective short-circuit currents of up to and including 10 kA
SANS 1973-8	Low-voltage switchgear and controlgear ASSEMBLIES Part 8: Safety of Minimum Tested ASSEMBLIES (MTA) with rated short-circuit currents above 10 kA and rated busbar current up to and including 1 600 A
SANS 1619	Small power distribution boards
SANS 10108	The classification of hazardous location and the selection of apparatus for such use in such locations
SANS 1274	Coatings applied by the powder-coating process
SABS IEC 60947 part 2	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

SANS 60309	Plugs, Socket-outlets And Couplers For Industrial Purposes
SANS 62053-21/IEC 62053-21	Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)
NE-NT-SP0098	Specification for Air conditioners
NE-NT-SP0049	Specification for switch disconnector and circuit breakers
NE-NT-SP0001	Telecommunication Equipment Cabinets

Table 1: List of Applicable Standards

4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

4.1 DEFINITIONS

- "Lockable " means when refer to a door or cover must be lockable it shall mean that the cover or door shall be lockable by a suitable padlock.

4.2 ACRONYMS AND ABBREVIATIONS

Acronym	Description
AC	Alternating Current
ACS	Air conditioner switch unit
AUX	Auxiliary
BTU	British thermal unit
COC	Certificate of Compliance as per SANS 10142-1
DC	Direct Current
DIN	A DIN rail or top-hat rail is a standardized 35 mm wide metal rail with hat-shaped cross section widely used for mounting circuit breakers and industrial control equipment inside equipment racks
EAS	Environmental Alarms Systems (Building Management System)
EER	Energy Efficiency ratio

Acronym	Description
e.g.	exempli gratiā, meaning “for example”
Etc.	Et cetera
ETS	European Telecommunication Standard
IEC	International Electro-technical Commission
ISO	International Organisation of Standards
kA	kilo-ampere
kW	kilowatt
LED	Light emitted Diode
ODF	Optical Distribution Frame
mm	millimetre
MTA	Minimum Tested assembly
PDF	Portable Document Format
PDU	Power Distribution Unit
QA	Quality Assurance
SABS	South African Bureau for Standardisation
SANS	South African National Standards
SPD	Surge protection device
TT	An earthing type of configuration as per SANS 10142-1
PSCC	Prospective short circuit current

Table 2: List of Acronyms and Abbreviations

5 GENERAL INFORMATION

5.1 CONTAINER SIZES

Broadband Infraco requires different container sizes as detailed in Table 5.1 and Table 5.2.

Name	Width [m]	Length [m]	Height [m]

3m x 3m Broadband Infraco network	3	3	>3.15
3m x 6m Broadband Infraco network	3	6	>3.15

Table 0-3: Broadband Infraco network container Sizes

Name	Width [m]	Length [m]		Height [m]
		Co-locating area	Broadband Infraco area	
3m x 6m co-locating container	3	3.6	2.4	>3.15
3m x 6m shared co-locating container	3	2.6	3.4	>3.15
3m x 6m high heat load shared co-locating container	3	2.6	3.4	>3.15

Table 0-4: Co-locating container sizes

Note: *All dimensions listed in Table 5.1and Table 5.2 are external measurements. (Refer to attached addendums and drawings for more information).*

Throughout this specification, containers are referred to by “Name” to distinguish between different sizes.

5.2 CONTAINER DESIGNS

Designs of the various containers are depicted in the drawings of Addendums A,B, C, D and E respectively. These designs illustrate Broadband Infraco’s requirements, and provide context to the detailed technical requirements specified in subsequent sections.

5.3 MAXIMUM CONFIGURATIONS

The maximum configuration for each container plan is detailed in Table 5.3 and Table 5.4.

	Broadband Infraco container

Item	Number of Item	
	3m x 3m	3m x 6m
ETSI Rack (600 x 300 x 2200 mm)	4	16
AUX Rack (600 x 600 x 2200 mm)	1	1
Battery cabinet	2*	4*
Batteries	16	32
Rectifier	1	2
ODF Rack (600 x 600 x 2200 mm)	1	1
AC Distribution board	1	1
DC Distribution board	2	4

Table 0-5: Maximum Configurations of Broadband Infraco network containers

	Co-locating container		
	Number of Item		
Item	3m x 6m co-locating container	3m x 6m shared co-locating container	3m x 6m high heat load shared co-locating container
ETSI Racks (800 x1200 x 2200 mm)	0	0	0 or 2**
ETSI Racks (600 x 600 x 2200 mm)	9	6	6
ETSI Racks (600 x 300 x 2200 mm)	3	5	3 or 6**
ODF/Meet Me Rack (600 x 600 x 2200 mm)	2	2	2
Battery Stand	2* or 3*	2* or 3*	0
Batteries	32	32	0
Rectifier	2	2	0
AC Distribution board	1	1	1
DC Distribution board	2	4	4

Table 0-6: Maximum Configurations of co-locating containers

*Cabinets' footprint is 600mm x 600mm. (Depending on the rectifier and battery configuration may be 1 or 2 rectifier systems and thus the option of 2 or 3 cabinets)

**The cabinet layout may be either 2 x high heat load cabinets (1200mmx800mm) or 3 x 600mmx 300mm cabinet and design should cater for both.

5.4 GENERAL DESCRIPTION

The Broadband Infraco network container will owned by Broadband Infraco, including all power systems, equipment racks, miscellaneous racks, optical distribution frame (ODF) and other equipment are positioned. See layout drawing in Addendum A, B.
The co-locating containers will be divided in two main areas. The first area is allocated to the equipment racks where customers' equipment will be located and the second area is reserved for Broadband Infraco, where, the power systems and the optical distribution frame (ODF) and other miscellaneous equipment is positioned. The two areas are respectively referred to as: Co-locating area and Broadband Infraco area. See layout drawing in Addendum C ,D and E.

6 TECHNICAL REQUIREMENTS

The technical requirements of the containers are described in the following sections.

6.1 CONTAINER SHELL

1. All container shells shall be constructed from at least 2 x 40mm Chromadek-silicone type material back to back.
2. All chromadeck, as well as all openings including the DC fans and louvres, as specified in paragraph 6.14, and the exhaust for the high health loads as specified in paragraph 6.15, shall be reinforced with strong steel meshed of minimum 4mm in the centre of the container walls and doors to strengthening of the walls against possible vandalism and crime. The "shortway of mesh" shall be of such a small grading that any potential intruder won't be able the cut the mesh with hacksaw or bolt cutter.
3. All container shells shall be white, unless otherwise specified.
4. All container shells shall have angled roofs to ensure that no water stagnates on top.
5. The roof of the container shall cover the whole container area including an extension on the back of the container of at least 1.25 m to be able to cover the outdoor units of the air conditioners from direct sunlight. (This is to keep the temperature on the outdoor units to

the lowest possible temperature as air conditioners may not able to work properly in high temperatures or can even shut down at high temperatures). The roof shall be manufactured from the same material as the rest of the container i.e. 80mm cromodeck. The extension areas over the air conditioners may instead of cromodeck be made of stainless steel as well. In both cases, the extension over the air conditioners shall be supported with 3 bars with each bar have a minimum 1.6mm rectangular stainless steel bars extended from the container wall to the edge of the canopy.

6. All the indoor trays and wireways are to be supported by the roof integrity and thus it shall ensure that the roof shall be supported all the trays and wireways fully installed including the weight of all cabling. It shall be assume for weight determination/calculation that DC Power cabling from all equipment racks and positioning shall be made of 25mm² cables.

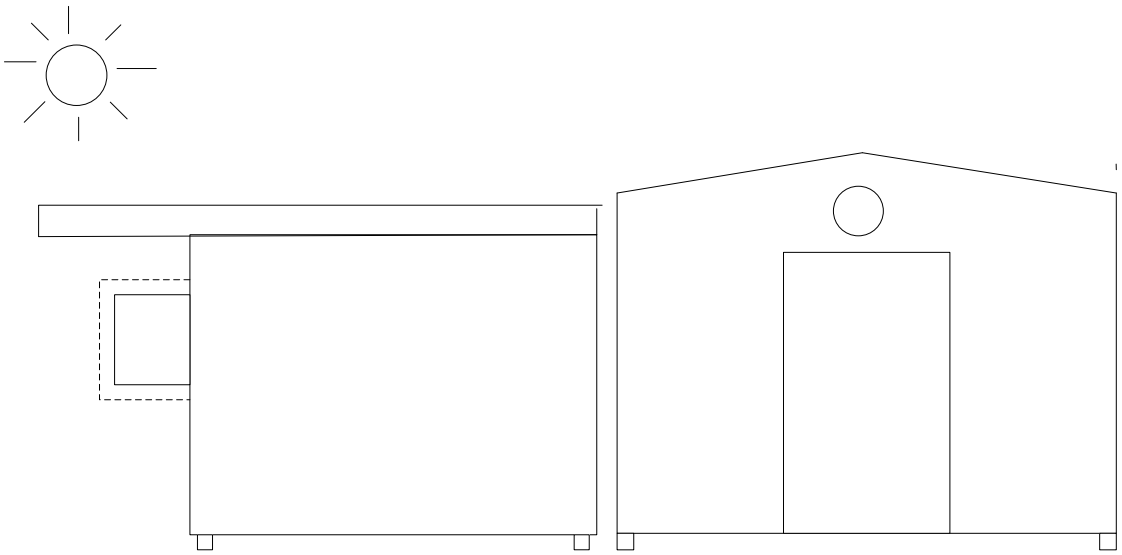


Figure 0-1: Side view and front view of container indicating the roof requirements

7. All container shell and roof joints shall be waterproofed for a minimum period of 10 years.
8. All door lock and hinges mechanisms shall be made from stainless steel.
9. All door locks shall be equipped with mechanism to limit possible hindering and damaging of locks as far as possible. The lock method shall be of a 90 degrees opening countersink lock type:
10. All doors shall be equipped with proper durable and elastic sealers around the edges of the door to prevent water and dust entering the container. It shall however still be possible to open and close doors without force i.e. be possible for any single person to open the door

with one hand.

11. All door frames shall be made of aluminium.
12. The Broadband Infraco network containers shall have one door while the co-locating container shall have two access doors as per drawings in addendum. All door opening shall have the following minimum dimensions: H ≥ 2300mm, Width ≥ 900mm. All door locks and hinges mechanisms shall be made from stainless steel.
13. All Broadband Infraco network container and shells shall allow for the air conditioners as applicable, in the position as in the proposed layout in the addendums but still able to accommodates all the identified equipment and racks as in the specification.
14. The vandal-proof cages of all air conditioner outdoor units and generator connection boxes shall be lockable and coated with anti- corrosive powder and applied according to SANS 1274 to the same colour as the container (i.e. white).
15. The water drain pipes/services pipes of the air conditioners must go through a hole made through the cages mentioned above.
16. All metal-based material used on the outside of container shells, except for the base frame, shall be either stainless steel or aluminium.
17. All container floors shall be completely covered with anti-static floor tiling, which shall also be properly earthed to the central earth bar.
18. All container shells shall have a base frame from thick grade steel, and shall be strengthened to handle a load of 1500 kg/m² without deformation of the container shell itself. The container base frame shall be further strengthened to carry a load of 3500 kg/m^2 around the rectifier and batteries floor positions. . The container base frame shall be hot dip galvanised after manufacturing thereof.
19. All containers shall be capable of being equipped with adjustable legs (refer to 6.1.9 as well). Leg base plate to be installed in such a way that it could be secured onto the plinth with raw bolts.
20. All containers shall have cable (fibre and AC connections) entries as per attached drawings and addendums. The option of having diversity entries for the various cables is preferred and the various options available shall be submitted by the bidder.

6.2 CO-LOCATING CONTAINERS PARTITIONING

1. The co-locating containers shall be partitioned in two separate internal compartments separated by a strong durable meshed-wire fence installed inside the co-locating container

as illustrated in the drawings of Addendum C, D and E.

2. The meshed-wire fence mentioned above shall run across the whole width and up to a height of minimum 2.2m inside of the co-locating containers.
3. The wire fencing shall be of such grading that no part of a human body (with the exception of fingers) can protrude through the fencing for protection and security of the equipment but shall still allow the cooling to flow unrestricted through the wire.

6.3 AC DISTRIBUTION BOARD

1. All containers shall be fitted with 1 (one) AC distribution board, securely mounted against the wall of the container as indicated on the design drawings of Addendums A, B,C and D.
2. All containers shall be fitted with 1 (one) AC junction board, securely mounted below the AC distribution board against the wall of the container as indicated on the design drawings of Addendums A, B,C and D, as well as Figure 6.2, to provide a structured interface between the external armoured AC supply cable and the internal AC distribution board.
3. The AC distribution board and AC junction board shall be preferably light grey colour.
4. The following minimum labels and signs shall be visible at all times on the AC distribution and - junction board.(The colours of all labels shall be red on white unless specified in SANS 10142-1):
    a. A sign stating “380V 3 phase 50 Hz” AC Power as per AC board configuration;
    b. A label indicating the current rating and certified fault current rating of the distribution board; and
    c. All appropriate electrical and safety danger signs as per SANS 10142-1 shall be displayed.
5. All distribution boards shall be labelled on the inside of the distribution board on the faceplate with the following signs.
    a. All main switch disconnector/on-load isolator shall be labelled as “Single point of disconnection” and “This Single point of disconnect shall be switched off in the event of inadvertent contact or leakage; and
    b. The earth connection on the cabinet shall be labelled with the appropriate earth sign and shall be applied to on the back plate of the distribution board and shall be green in colour.
6. A suitable power metering (kWh units) device to measure the actual power usage from the mains supply shall be installed. This meter shall be DIN rail mountable and the reading of the

meter shall be possible without opening of the AC distribution board. The power meter shall be compliant with SANS 62053-21 class 1 or better.

7. Proper lightning / surge protection shall be installed for all AC distribution boards (as per par 6.7 and shall be provided on each phase and neutral for protection. The supplied lightning protection shall be a combination of class 1 and class 2 configured as a TT (or "3" +1") earthing system.
8. A visual indication (preferably an LED light) shall be visible on the AC board indicating when the Eskom/municipality AC power are available on site (NOT generator power) to give an indication when one can switch back to mains power in the scenario of running a generator on site



Figure 0-2: AC Junction Board for 3-Phase Power Supply

6.3.1 TYPE A: AC DISTRIBUTION BOARD – 3-PHASE POWER

1. All circuit breakers of the AC distribution board shall have protection ratings dimensioned as specified in Table 6.1 and labelled accordingly.
2. The AC distribution board shall have an automatic 4-pole 3-position 100 A change-over switch built into it to select between Normal Mains supply (preferred supply) and Standby Plant (generator) supply with a manual override switch. The switch shall automatically detect which supply is available and switch over where required. In the case of both feeds are available the switch shall switch back to the mains supply.
3. The AC distribution board shall be earthed to the central earth bar.

Breaker Function	Rating	Label
Mains Input	40 A – 3-phase (4P)*** (3m x 3m container) 50 A – 3-phase (4P)*** (3m x 6m container) 63A – 3-phase (4P)*** (High Heat load share co-locating container)	Mains
Rectifier 1	25 A – 3-phase (4P)	RECTIFIER A
Rectifier 2	25 A – 3-phase (4P)	RECTIFIER B
AC Light Inside 1	6 A – 1-phase	CEILING LIGHT 1
AC Light Inside 2	6 A – 1-phase	CEILING LIGHT 2
AC Lights Outside*	6 A – 1-phase	EXTERNAL LIGHT
AC Plugs*	16 A – 1-phase	PLUGS
Air Conditioner 1**	20 A – 1-phase***	AIRCON 1
Air Conditioner 2**	20 A – 1-phase***	AIRCON 2
Air Conditioner 3**	20 A – 1-phase***	AIRCON 3
Air Conditioner – High heat load 1**	20 A – 1-phase***	AIRCON 4
Air Conditioner – High heat load 2**	20 A – 1-phase***	AIRCON 5
Earth Leakage	40 A – 1-phase	EARTH LEAKAGE

Table 0-1: Protection Ratings: AC Distribution Board – TYPE A (3 phase)

Note:

Air conditioner 4 and 5 are only applicable to the High Heat load share co-locating container

** Shall be protected by the Earth Leakage.*

*** In the case of using plugs for the air conditioners these units shall also be fed via an earth leakage.*

In all cases shall the load be spread equally over the 3 phases. Typical power reticulation to be as follows:

1. *All air conditioners to be powered from different phases; and*
2. *Light circuits and plug circuits shall be spread over the phases.*

6.4 DC DISTRIBUTION BOARD

1. All DC distribution board(s) shall be lockable with a key (same key for all boards) and shall be securely mounted against the wall of the container as indicated in the design drawings of Addendums A,B,C and D.
2. The DC distribution board(s) shall be preferably a light grey colour.
3. The DC distribution board configurations shall be equipped with single feed DB Boards as per Table 6.3.

	DB Board Type	Amount of Single feed boards
3m x 3m Broadband Infraco network containers	1	2
3m x 6m Broadband Infraco network containers	2	4
3 m x 6 m co-locating container	3	2
3 m x 6 m shared co-locating container	1 (Infraco network area) and 3 (col-locating area)	2 – Type 1 and 2 - Type 3
3 m x 6 m high heat load shared co-locating container	1 (Infraco network area) and 3 (col-locating area)	2 – Type 1 and 2 - Type 3

Table 0-2: DC DB boards

4. Earthing

One earth stud shall be provided on the backplane for connection of an earth cable. The earth stud shall make provision of connecting of at least a 50mm² cable.

5. Protective Coatings

Protective coatings shall be as per SANS 1619.

6. Labelling

1 All distribution boards shall be labelled on the outside with the following signs:

a. A sign stating "- 48V DC Power – Positive earth";

b. Shall be labelled according to the current and rating and certified fault current of the distribution board;

c. All appropriate electrical and safety danger signs as per SANS 10142-1 shall be displayed;

d. Labelling of the distribution board to indicate it is a single feed board, inclusive of indication where the boards are fed from, and label to indicate FEED A and/or FEED B; and

All distribution boards shall be labelled on the inside of the distribution board on the faceplate with the following signs;

i. All circuit breaker positions shall be labelled with the following number scheme:

1. A 1, A 2…….A15 for the A feed

2. B1, B2……..B15 for the B feed

ii. All Single point of disconnects shall be labelled be either "Single point of disconnect A" (for the A-feed) or "Single point of disconnect B" (for the B-feed). And with "This Single point of disconnect shall be switched off in the event of inadvertent contact or leakage".

2 All DC labels shall be black on yellow unless specified in SANS 10142-1.

3 An earth connection shall be applied to on the back plate of the distribution board and shall be green in colour.

7. Single Feed board

1 Each DC DB shall have the following minimum dimensions to be able to allow sufficient space for cabling entering and existing DC DB board:

- Width – 400mm;
- Height – 400mm; and
- Depth - 200mm.

2 Each DC distribution board shall be dimensioned for single feeds to the racks, i.e. it shall contain 1 (one) set for single feed and the 2nd single feed DC board for the 2 sets of circuit breakers and positive common bars installed next to the 1st Single feed board

Each feed shall have the following minimum components:

a) One incoming Single point of disconnect capable of accepting 35 mm² cable
b) Adaptor to be available in cases where cable from rectifier is 50mm² (refer to paragraph 6.9)
c) Face plate (flush) covering all the internal wiring and exposed busbars
d) Positive bars (all positive bars to be commoned to one another) with the required take-off points, Minimum 13 for Type 1, and -3 and a minimum 22 for Type 2 pre-punched holes,

capable of terminating 25mm² cable with a ring lug and two incoming cables i.e up to 50mm² with ring lug for each power feed. Tin coated copper busbar rated at 2A/mm² minimum is to be provided

e) DIN rails for mounting of the required circuit breakers

f) Tin coated copper busbar which common the output of the switch disconnector/on-load isolator with all the incoming circuit breakers. Earth busbar to be rated at 2A/mm² minimum

3 Each DB board shall be rated to be to be at least the same current rating as the incoming switch disconnector/on-load isolator/circuit breaker.

4 It shall be possible to install and de-install DIN rail circuit breakers with no complex manoeuvring of movements and resulting no impeding on the operations of adjacent circuit breaker's during maintenance and or expanding of circuits.

5 The spacing in all DB board components shall be such to allow that there is sufficient space inside all DC boards for terminating the incoming cablings (50mm²) and all load cabling for all the provided circuit breakers. It shall be assume that all load cabling shall be 25mm².

6 All DC DBs shall be design to ensure that the load on the DC DBs can be extended and or reduce at any point of time while the board is already in service.

8. TYPE 1: DC Distribution Board

The Type 1 DC distribution boards (for 3 x 3m Broadband Infraco network containers) shall be equipped with the circuit breakers as listed in Table 6.4.

DB 1 - Feed A	DB – 2 Feed B
Switch disconnector/on-load isolator/Circuit breaker ≥150A	Switch disconnector/on-load isolator/Circuit breaker ≥150A
3 x 63 A	3 x 63 A
3 x 40 A	3 x 40 A
1 x 32 A	1x 32 A
1 x 16 A	1x 16 A
2 x 6 A (DC light and DC extractor fans)	2 x 6 A (DC light and DC extractor fans)
Minimum 2 additional spare positions	Minimum 2 additional spare positions

Table 0-3: Protection Ratings: DC Distribution Board – TYPE 1

9. TYPE 2: DC Distribution Board

1 The Type 2 DC distribution boards (for 3 x 6m Broadband Infraco network containers) shall be equipped with the circuit breakers as listed in Table 6.5.

2 It will also be acceptable instead of using the proposed Type 2 DB Board, but use multiply Type 1 and 3 DB Boards covering the total requirements as per Table 6.5

DB 1 - Feed A	DB 2 - Feed B
Switch disconnector/on-load isolator/Circuit breaker ≥150A	Switch disconnector/on-load isolator/Circuit breaker ≥150A
4 x 63 A	4 x 63 A
8 x 40 A	8 x 40 A
1 x 32 A	1x 32 A
2 x 16 A	2 x 16 A
1 x 10 A	1 x 10 A
2 x 6 A (DC light and DC extractor fans)	2 x 6 A (DC light and DC extractor fans)
2 spare position	2 spare position

Table 0-4 Protection Ratings: DC Distribution Board – TYPE 2

10. TYPE 3: DC Distribution Board

1 The Type 3 DC distribution boards (for co-locating areas in the 3 x 6m shared co-locating containers) shall be equipped with the circuit breakers as listed in Table 6.6.

DB 1 - Feed A	DB – 2 Feed B
Switch disconnector/on-load isolator/Circuit breaker ≥150A	Switch disconnector/on-load isolator/Circuit breaker ≥150A
4 x 32 A (for co-locating cabinets)	4 x 32 A (for co-locating cabinets)
2 x 16 A (for co-locating)	2 x 16 A (for co-locating cabinets)
2 x 6 A (DC light and DC extractor fans)	2 x 6 A (DC light and DC extractor fans)
Minimum 2 x Additional spare positions	Minimum 2 x Additional spare positions

Table 0-5: Protection Ratings: DC Distribution Board – TYPE 3

6.5 MATERIALS AND COMPONENTS OF DISTRIBUTION BOARDS

1. All face plates shall have handles for easy removal during operations.
2. All components, assemblies and layout shall be according to the following documents as applicable:

a) SANS 1473-1 - Low voltage switchgear and assemblies and SANS 1973-1.

b) SANS 1765 - Safety of distribution boards and SANS 1973-3.

c) SANS 1619 - Small power distribution boards.

6.6 ACCREDITATION OF ASSEMBLIES

1. All distribution boards (AC and DC) shall be compliant in all aspects with the requirements of SANS 1973-3 or SANS 1973-8 as per the mentioned PSSC as per Table 6.7.

DB Board type	PSCC value
AC boards	10kA
DC DB Board Type 1 (3mx 3m container)	10kA
DC DB Board Type 2 (3mx 6m container)	10kA

Table 0-6: PSCC values for DB boards

6.7 SURGE PROTECTION DEVICE (SPD)

1. All AC boards shall be fitted with SPDs.
2. SPDs shall comply with the requirements of SABS IEC 61643-1.
3. SPD shall comply with the following levels installed between the phases and Neutral.

Table 0-7: SPD specification

SPD's (L-N)		
NOMINAL DISCHARGE CURRENT (8/20) (MINIMUM)	In	≥ 25kA/50kA
Lightning Impulse current (L-N) (10/350)	Iimp	≥ 25kA
Voltage protection level	Up	≤ 1.5 kV (maximum)

4. In conjunction with the above SPD the following surge protection device (gap type arrestor) installed between the Neutral and earth.

Table 0-8: Spark Gap

SPD's (N-PE)		
LIGHTNING IMPULSE CURRENT (10/350) (N-PE)		50kA (min)

5. The Maximum operating voltage (Uc) of the SPD unit shall be between 255V and 300V.
6. The SPD shall be equipped with a mechanical disconnection mechanism and shall have a visual indicator showing the end of life of the unit.
    a. Indication: Indication shall be of the mechanical type (flagging).
7. The SPD units shall be equipped with remote signalling via a potential free relay contact to indicate that the disconnection mechanism has been activated.
8. The SPD units shall be modular and shall be possible to replace faulty surge modules by pulling out faulty modules out of service instead of using tools.
9. The SPD shall be DIN Rail mountable.
10. The lightning / surge protection devices shall have a fuse/circuit breaker in series to protect the cabling and installation of the container in case it goes faulty in short circuit mode

6.8 CIRCUIT BREAKERS

1. Offered AC and DC circuit breakers and switch disconnector/on-load isolators shall be compliant to specification NE-NT-SP0049 in all cases.

6.9 SWITCH DISCONNECTOR/ON-LOAD ISOLATORS

1. Offered AC and DC circuit breakers and switch disconnector/on-load isolators shall be compliant to specification NE-NT-SP0049 in all cases.
2. Switch-disconnectors shall be supplied with an additional accessory/terminal for terminating 50 mm² cable in the case of DC cable length from rectifier to DB board in excess of 10m.

6.10 GENERATOR CONNECTION BOX

1. A lockable generator connection box shall be provided on the outside of all containers as indicated on the design drawings of Addendums A,B, Cand D.
2. The generator connection box shall house the connection socket to the Standby Plant.
3. The generator connection box shall be sealed properly to prevent insects from entering it.
4. The generator box shall open from the bottom upwards to ensure that no water can enter the box when opening the box as can see in the below drawing.

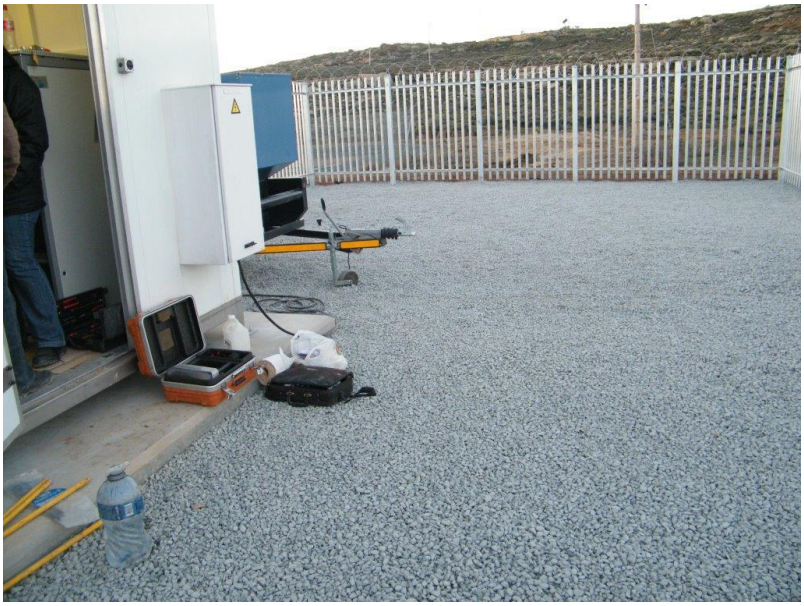


Figure 0-3: Generator box

5. The cable connection to the inside of the container shall be sealed properly to prevent water from entering the container.
6. The connection socket shall be a 5-pin SANS 60309 compliant male socket rated at 125 A.
7. The generator connection box shall be lockable with BBI standard lock and water proof when the external generator cable is plugged into the connection socket.
8. The generator connection box shall be rust resistant

6.11 EARTHING

1. All containers shall have an internal tin- coated copper central earth bar of minimum size of

40mm x 5mm.

2. The internal central earth bar shall be extended to the overhead equipment earth busbar via an earth cable of the same area as the equipment earth busbar. Equipment earth bar shall be tin- coated copper and positioned as indicated in the Addendums and shall be minimum size of 25mm x 3mm.
3. The tin- coated copper central internal earth bar shall be installed such that it is extended to an earth point on the outside of the container.



Figure 0-4: Central earth bar extended to the outside (please note earth bar shall tin-coated)

4. The antenna feeder gland plate (if option selected) shall also be earthed to the same earth point.
5. The central earth bar shall have 9 (nine) holes as follows:
    a. Outside 2 (two) holes – 12 mm in diameter, used to fasten the earth bar to the container; and
    b. Inside 7 (seven) holes – 8 mm in diameter, open for general use.
6. Where a meshed wire cable trunking is installed, the shall be earth to the internal central earth bar

6.12 DUCTING

1. All cabling between equipment located on the walls and roof of the container (excluding equipment racks), shall be installed inside suitable trunking with protective covers.
2. A cable grid shall be provided next to the position of the Optical Distribution Frame (ODF) rack to route incoming optical fibres to the ODF.
3. Signalling, optical fibre and DC power trunking shall be labelled as follows:
    a. Signalling (mesh wire grid): “Data”;

b. Optical fibre (yellow fibre tray): “Optical Fibre”;
c. DC power (heavy duty mesh wire grid): “-48V DC A feed” for A feed and “-48V DC B feed” for B feed (Note: White PVC trunking to be used for DC lights and door sensors only as per paragraph 6.12.1); and
d. All labelling shall be done with a strong metal plate fixed to the trays with cable-tie as can be seen in the below picture.



Figure 0-5: Labelling of trays and duct

4. The cabling to and between equipment racks shall be overhead as follows:
    a. AC, DC power, signalling and optical fibre shall be installed separate from each other (Figure 6.5).
    b. The racking for the DC power and signalling shall be installed for all possible future rack positions.
    c. The optical trunking shall be installed as per Addendums A, B,C and D.
    d. Optical trunking shall be of the Telect Wavetrax® or ADC Krone FibreGuide® fibre cable management system type, or any other similar fibre cable management product. (To be approved by Broadband Infraco



Figure 0-6: Separate DC Power, Signalling and Optical Fibre Trunking (please note that unlike the above picture, DC power shall be installed in mesh wired grid as well)

6.13 AIR CONDITIONERS

1. All air conditioners shall be compliant to specification NE-NT-SP0096.
2. All air conditioner power cables shall be connected to the Air conditioner circuit breakers in the AC board or via an ACS (when required, shall be issued to the container builder depending on EAS system to be used.)
3. In the scenario of using more than 2 air conditioners the weight of the various air conditioners may compromise the walls strength and in these cases the air conditioners shall be support with extra support structures as can see in the below picture 6.8.
4. All support structure shall be made to the plinth and be made of galvanised steel. In the scenario of the installation to take place at coastal area (less than 35km from coast) material is to be made from 3CR12 stainless steel.
5. The support structures (square tubes) shall have a square base plates fixed to the plinth with bolts
6. All air conditioners shall be installed with a suitable vandal-proof cages catering for up to 36000BTU air conditioners in all cases. The installed air conditioner cages shall allow for free air flow, honey comb ventilation (see Fig. 6-7) or expanded metal –mild steel.
7. Only two air conditioners outdoor units/cages shall be installed maximum on any side (including the back). The extra outdoor unit/s shall be installed (site dependant) so that it is installed on another side but still not facing north. The outdoor unit positioning must have the

flexibility to installed it on either side of the container.

8. The metal sheet shall be installed inside the container to support the installation of the cage



Figure 0-7: Vandal-proof covers for Air Conditioner Outdoor Units



Figure 0-8: Air Conditioner Outdoor Units support structures

Name	Quantities	Type	Capacity
3m x 3m Broadband Infraco network – three phase	2 or 3*	Split Unit	24 000 BTU
3m x 6m Broadband Infraco network – three phase	3	Split Unit	24 000 BTU
3m x 6m co-locating container	3	Split Unit	24 000 BTU*
3m x 6m shared co-locating container	3	Split Unit	24 000 BTU*
3m x 6m high heat shared co-locating container	3 plus 1 or 2 for high heat load cabinets	Split Unit	24 000 BTU*

*Default option is for 2 air conditioners but in some cases a 3rd air conditioner may be required

Table 0-9: Capacity Sizes – Air Conditioners

Different configuration and or air cons ratings may be required at times where the proposed air conditioner poses physical constrains inside the container and or when the new installation require a different configuration and or installation.

6.14 DC EXTRACTOR FANS AND INLET LOUVERS

1. Supply an adequate exhaust variable speed fan/s and inlet louvers in container to ensure the excessive heat can escape from the container under emergency conditions.
2. The inlet louver and exhaust fans shall be rated to ensure that with the following heat load from the telecommunication equipment can keep the internal temperature not to be more than 15 degrees Celsius than the outside ambient temperature with both air conditioners not operational.

a. All 3-phase 3m x 3m container: Maximum equipment heat load = 2.7kW;

b. 3m x 6m Broadband Infraco network container: Maximum equipment heat load = 4.6kW; and

c. Both 3m x 6m co-locating containers: Maximum equipment heat load = 5.3kW.

Note in all case an additional 1kW heat load due to lights and inefficiency of rectifiers shall be added.

- The typical fan speed shall have an estimated minimum airflow capability of 900m³/h per DC fan with typical two fans per 3m x 3m container; and
- The typical fan speed shall have an estimated minimum airflow capability of 1200m³/h per DC fan with typical two fans per 3m x 6m container.

3. The exhaust fan/s shall be DC powered and controlled via the EAS on site and shall only be activated when the AC Power (or air conditioner) failure has occurred on site and the heat inside the container has increased and reached to a level 27 degrees Celsius.
4. Sufficient filters shall be installed in the inlet louver to ensure that no dust and or dirt can enter the container. Maintenance required on these filters shall not be more than once in 4 months. The inlet louvers shall be installed in the access door/s.
5. No water and or dirt must enter the container via the DC extractor fan and or the inlet louver (either during normal site operational or during emergency operation (with extractor fan operational)).
6. The DC fan louvers must close if the fan is not running and open if the fan is running
7. The inlet louvre shall be installed with a thick expanded metal at the mid-point of the louvre assembly.

6.15 HIGH HEAT LOAD SHARED CONTAINER

1. Two cabinet positions in the 3m x 6m High heat co- location container have been reserved for possible high heat loads
2. These cabinets will be supported with in-cabinet cooling which will be supplied with the cabinet as per NE-NT-SP0001 paragraph 6.12
3. A dedicated and direct exhaust (for the fan solution as well as the active cooling) to the outside of the container is required for these cabinets. The perforated cut out exhaust holes should be positioned at the top of the cabinet positions which will be cut out as and when required.
4. In the scenario of using active cooling (air conditioners) the outdoor unit shall be install at the appropriate position against the container wall. The outdoor cage/s shall be compliant to outdoor paragraph 6.13 and be provisioned accordingly.

6.16 LIGHTS AND SOCKET OUTLETS

6.16.1 AC LIGHTS

1. The internal AC lights inside the container shall be standard 1200mm fluorescent lights which can take 2 (two) fluorescent tubes each of an LED type.
2. The AC lights shall be installed on the roof of the container with the light switch located inside the container next to the access door/s.
3. The number of AC lights per container size is as listed in Table 6.11.
4. The container shall also have an appropriate waterproof low power (power saving globe) AC lights on the outside, above the door/s.
5. The switch for the outside AC light shall be waterproof, and shall be located next to the door/s on the outside of the container.

Name	Number	
3m x 3m Broadband Infraco network	2	
3m x 6m Broadband Infraco network	4	
	co-locating area	Broadband Infraco area
3m x 6m co-locating container	2	2
3m x 6m shared co-locating container	2	2
3m x 6m high heat load shared co-locating container	2	2

Table 0-10: Number of AC Lights per Container

6.16.2 DC LIGHTS

1. The container shall be provided with -48V DC light(s) for emergency periods. The DC lights shall switch on automatically when the door of the container opens, and switch off again when the door of the container closes.
2. The DC lights shall be of LED type to ensure power usage is kept to a minimum.
3. The container shall be fitted with a door limit switch just above the door/s on the inside of the container to enable the automatic switching on and off of the DC light(s).
4. The DC light(s) shall be powered from the A-Feed DC distribution board while in the case of

the 3x6m the two DC lights will be fed from one of each feed.

5. The number of DC lights per container size is as listed in Table 6.12.

Name	Number	
3m x 3m Broadband Infraco network	1	
3m x 6m Broadband Infraco network	2	
	Co-locating area	Broadband Infraco area
3m x 6m co-locating container	2	2
3m x 6m shared co-locating container	2	2
3m x 6m high heat load shared co-locating container	2	2

Table 0-7: Number of DC Lights per Container

6.16.3 AC SOCKET OUTLETS

1. All AC socket outlets shall be of the double 3-pin type compliant to SABS 164-1 and be fed via earth leakages.
2. The number of AC socket outlets per container size is as listed in Table 6.13.
3. The AC socket outlets shall be positioned on the container walls as illustrated in the design drawings of Addendums A,B and C.

Name	Number	
3m x 3m Broadband Infraco network	2	
3m x 6m Broadband Infraco network	3	
	Co-locating area	Broadband Infraco area
3m x 6m co-locating container	2	2
3m x 6m shared co-locating container	2	2
3m x 6m high heat load	2	2

shared co-locating container		

Table 0-8: Number of AC Socket Outlets per Container

6.17 ADDITIONAL SECURITY ITEMS – OPTIONAL ITEMS

1. All containers shall be equipped with appropriate movement sensors to activate suitable placed flood lights to be mounted on top part of each wall of the container.
2. Four floodlights shall be provided with each light position in different wind direction to ensure that the whole area around the container is covered by the floodlight luminaries.
3. Each flood light shall be controlled by a separate sensor and shall be able to pick up movement of at least 5metres (sensitivity shall be adjustable).
4. All sensors shall be supplied with potential free contacts so that the supplied EAS can be relayed these alarms to the BBI NOC.
5. Flood lights shall be of LED type to ensure power usage is kept to a minimum and be fed from the already supplied DC DB boards. The flood lights shall be able to be powered from a 48V DC supply, Although not recommended but In the scenario of a 48V DC interface not available for the DC lights a DC/DC converter may be used to step the supplied voltage down from 48V to 12V which shall be more freely available.
6. In addition to the above movement sensors, on each corner of the plinth on which the container will be placed, a suitable posts which are chemical anchor to the plinth shall be installed. These posts will be supplied and be equipped with infrared beam detection system (part of the EAS specification) and be able to relayed these alarms to the BBI NOC.

6.18 CABLING

1. All cabling, installations and workmanship shall be compliant to SANS 10142-1 and a certificate of compliance (CoC) and test report including all wiring (AC and DC) shall be issued for each container. If any contradictory requirements exists between the specification, the drawings referenced and other specifications or legal documents that have been quoted, the order of precedence, from highest to lowest is:
    a. SANS 10142-1 and any other statutory requirements; and
    b. Specification and drawings.

    In all instances if any contradictions are noted, this shall be communicated to Broadband Infraco immediately.
2. All AC, DC and earth cabling shall be performed as detailed in the interconnection specifications of Addendum F. Please refer to paragraph 7 as well.

6.19 GENERAL ITEMS

1. All containers shall be provided with a wall-mounted, foldable table/s, positioned as illustrated in the design drawings of Addendums A, B, C and D.
2. All containers shall be provided with a document storage box inside the container, next to the Broadband Infraco network door.
3. All containers shall be provided with bracket for installing indoor- and outdoor cameras which will be supplied as part of the EAS. The location of the cameras will be as per addendums A,B C and D.
4. All containers shall be provided with bracket for installing smoke detectors which will be supplied as part of the EAS. The location of the smoke detectors will be as per addendums A, B, C and D.
5. All containers shall be provided with bracket for installing indoor movement sensor/detector which will be supplied as part of the EAS. The location of the smoke detectors will be as per addendums A,B C and D.
6. All containers shall be fitted with a 5 kg, CO2 fire extinguisher/s on the inside of the containers mounted adjacent to the document box. Typical example of a fire extinguisher is indicated in figure 6.9.
    a. Safety signs, indicating the presence and positioning of the fire extinguisher shall be brought on as per figure 6.10. The safety sign shall comply with the following minimum requirements;
    b. Indicating the position of the fire extinguisher;
    c. Indicating that the fire extinguisher container CO2 and It is safe to be used for live equipment; and
    d. Shall have luminance property to make it visible in dark and or poor visible environments.



Figure 0-9: Fire Extinguisher



Figure 0-10: Fire Extinguisher safety sign

7. Be equipped with a suitable sturdy bracket to hold the fire extinguisher in place shall be installed to ensure that the fire extinguisher shall not came loose under any force of opening and or closing the various doors. However, the fire extinguisher shall be design such to easily clip loose in the case of emergency.
8. A small portable table which can accommodate a laptop and test equipment unit (shall be supplied with each container which have the following minimum standards
    a. Must be manufactured from lightweight steel or aluminium and shall be covered with a rubber mat for each shelf;
    b. Shall have at least 3 shelves/tiers;
    c. Shall be equipped with 4 wheels to make it moveable around the container;
    d. The table shall be supplied with a brake mechanism ;
    e. Shall be able to handled weight of at least 20kg per shelf; and
    f. Shall have dimensions of the following:
        - Height: 800mm-1m;
        - Width: 800-1m; and
        - Depth: 450mm-600mm.
    g. Refer to figure 6.11 for a typical picture of the movable workstation



Figure 0-11: Three tier movable workstation

9. A small portable 3 step ladder shall be supplied and be stored against the wall with each container with the following minimum standards:
    a. Must be manufactured from aluminium and shall be covered with a rubber mat for each step;
    b. Shall have 3 steps minimum;
    c. Shall be able to handle a weight at up to 150kg; and
    d. Height to top step shall be minimum 500mm.



Figure 0-12: Three step ladder

10. The container shall support a weight load of 1500kg/m². However, the area for the rectifier and batteries and shall be able to support a weight of up to 3500kg/m².
11. All containers to be fitted with Tip-n-Tell and Drop-n-Tell indicators on the outside.

6.20 ADDITIONAL ITEMS

The following options shall be provided for:

1. Inclusion of an antenna feeder gland plate on the front of the container to be provided on request, with an allowance for:
    a. 4 x flexible waveguide entries, and
    b. 4 x $1\frac{3}{8}$ inch feeder entries.
2. Construction of containers in white, another specific colour, or in the “stone look”

7 EAS, RECTIFIERS AND BATTERIES

1. The supply and install of the EAS and the rectifiers and batteries falls outside of the scope of this specification.
2. However the EAS, rectifiers and batteries and applicable cabling, depending on the project, may be installed in the container at the factory. In these cases it will be expected of the container supplier to deliver the fully equipped container to site.
3. The supplier of the container shall ensure to receive all the relevant certificates of compliance and test reports for the equipment and installation of the EAS, rectifier and batteries and all required cabling and shall hand it over to Broadband Infraco during inspection and type-approval.
4. All instructions from the relevant equipment supplier shall be adhered at all times which may include transport, storage and other related aspects to ensure that all supplied warrantees- , test reports and certificates of compliances are still valid after the container has been given over to Broadband Infraco at site.

8 DELIVERY AND INSTALLATION

1. Broadband Infraco shall test, inspect and approve all containers, fully reticulated (may be fitted and equipped with the required rectifiers, batteries, EAS system as per paragraph 7) before delivery may take place.
2. All containers shall be delivered to Broadband Infraco site after it has been inspected and approved by Broadband Infraco.
3. Proper transport (vehicles with air suspensions) shall be used in all cases to ensure that the container with all its content (all content must be properly secured with special care taken for the batteries due to its weight) will be transported safely to site, as certain sites are in remote areas with access to site via dirt roads only.
4. All containers which are delivered to site shall be properly positioned on the supplied plinths and shall be connected to the supplied Eskom/AC supply on site which is accessible via a manhole/draw-box.
5. The connections and installations practises shall be done according to SANS 10142-1 and an

applicable certificate of compliance and test report shall be issued accordingly.

9 WARRENTY

1. Provide a two (2) year warranty on the complete product delivered including but not limited to, all finishes, structure, equipment and interior- and or exterior components.
2. A further 3 years (3) year warranty to be supplied for the building structure (including anti-corrosive and powder coating of the vandal-proof cages and generator box), roof material and all roofing accessories

END

ADDENDUM A: LAYOUT DRAWINGS – 3M X 3M CONTAINER

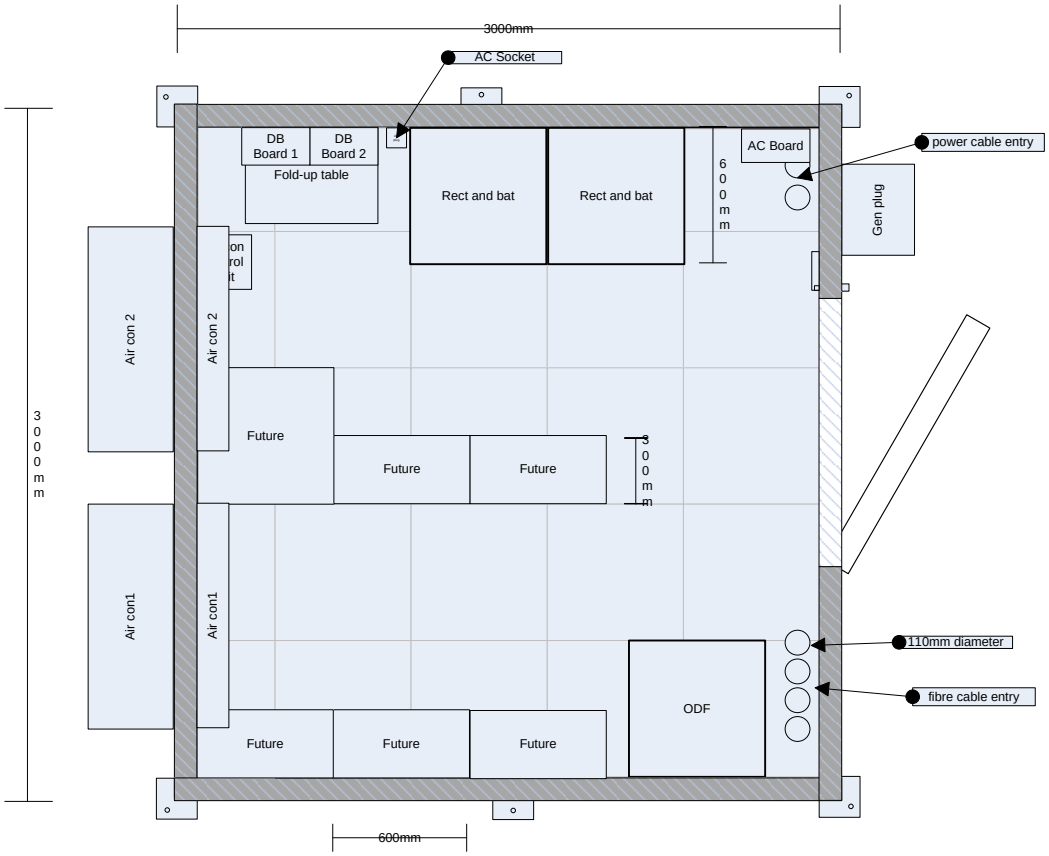


Figure A- 1: 3x3 Container – Equipment Layout

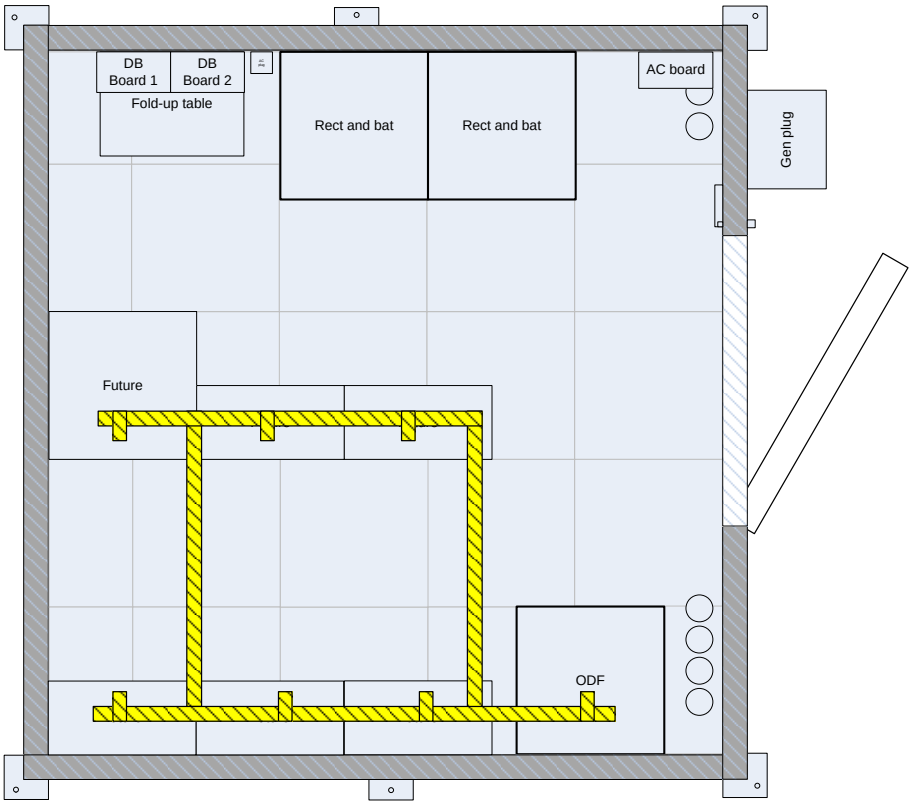


Figure A- 2: 3x3 Container – Fibre trunking Layout

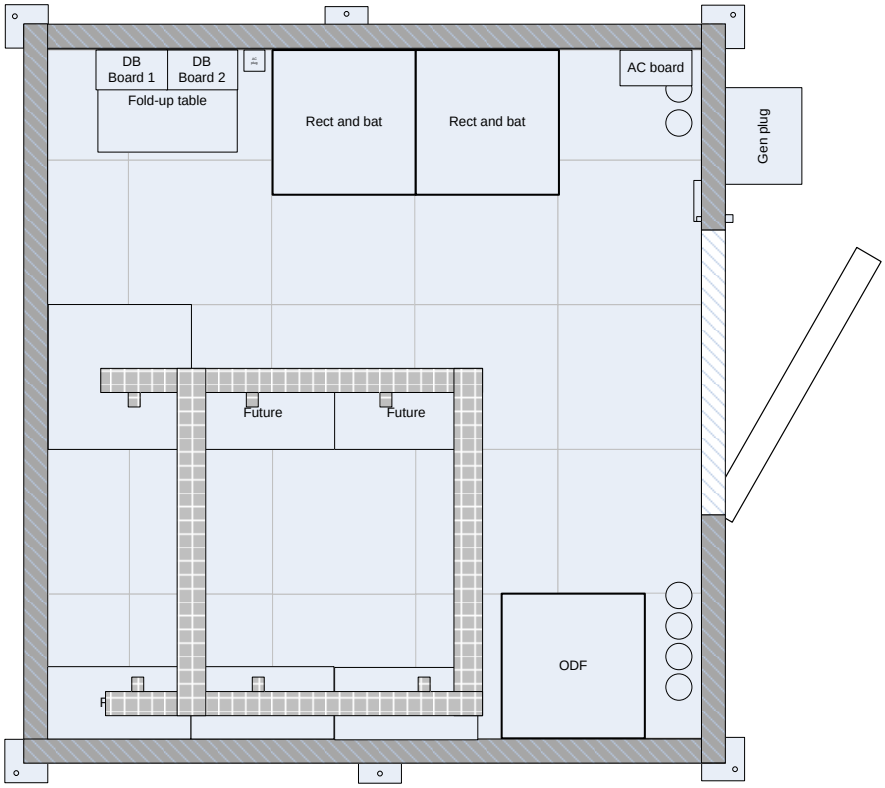


Figure A- 3: 3x3 Container – Wire trunking Layout

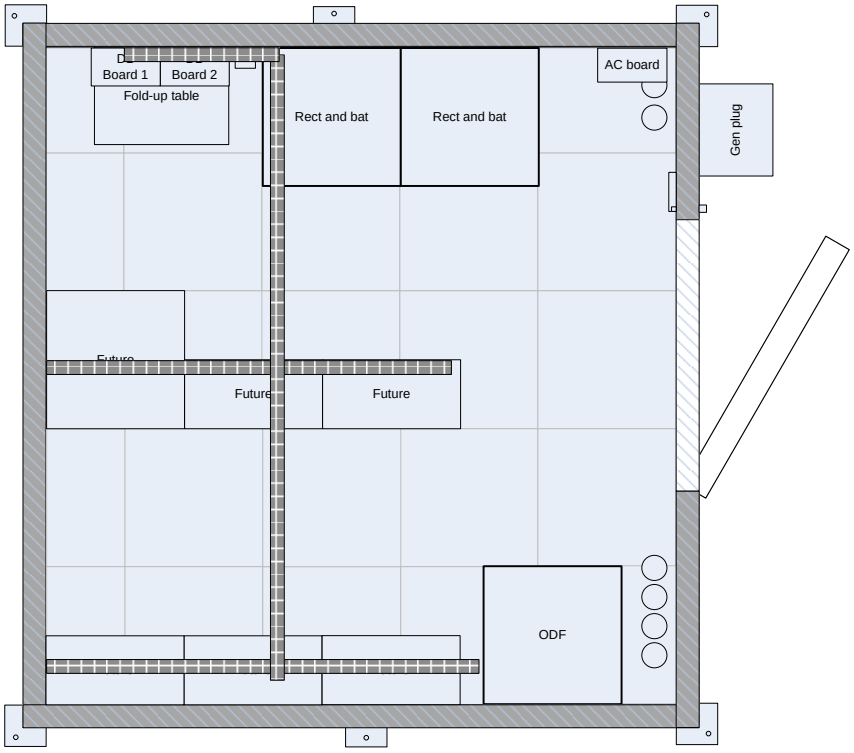


Figure A- 4: 3x3 Container – Power Layout –DC A feed

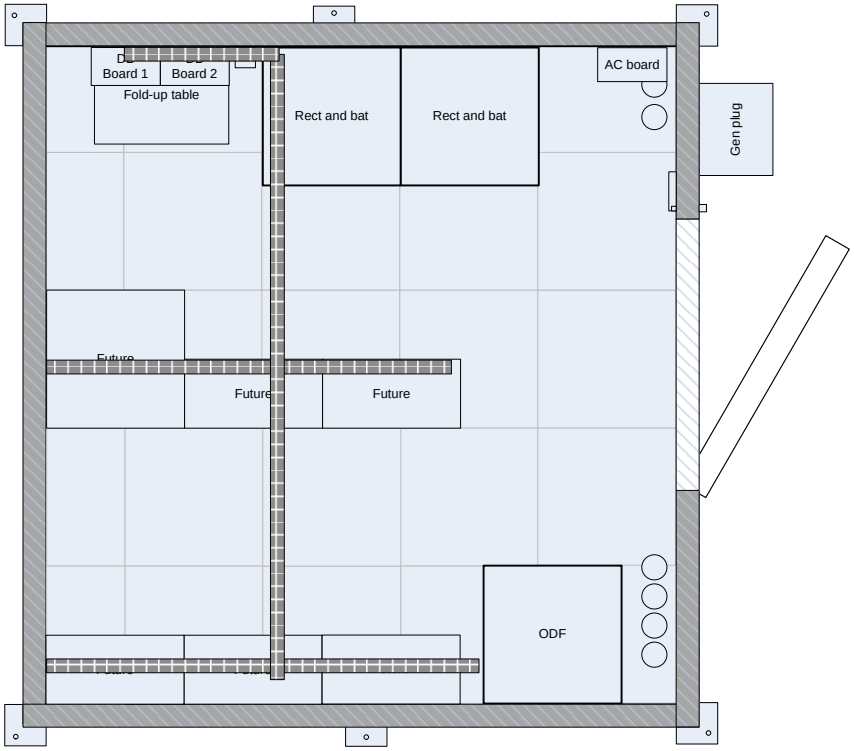


Figure A- 5: 3x3 Container – Power Layout –DC feed B

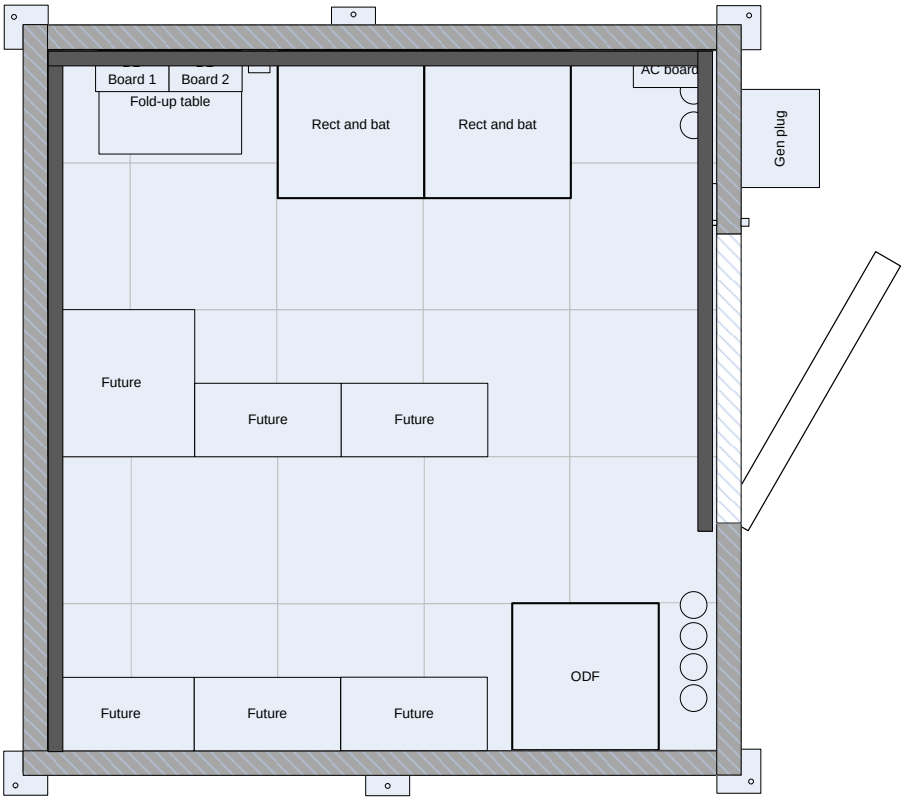


Figure A- 6: 3x3 Container – AC PVC trunking Layout

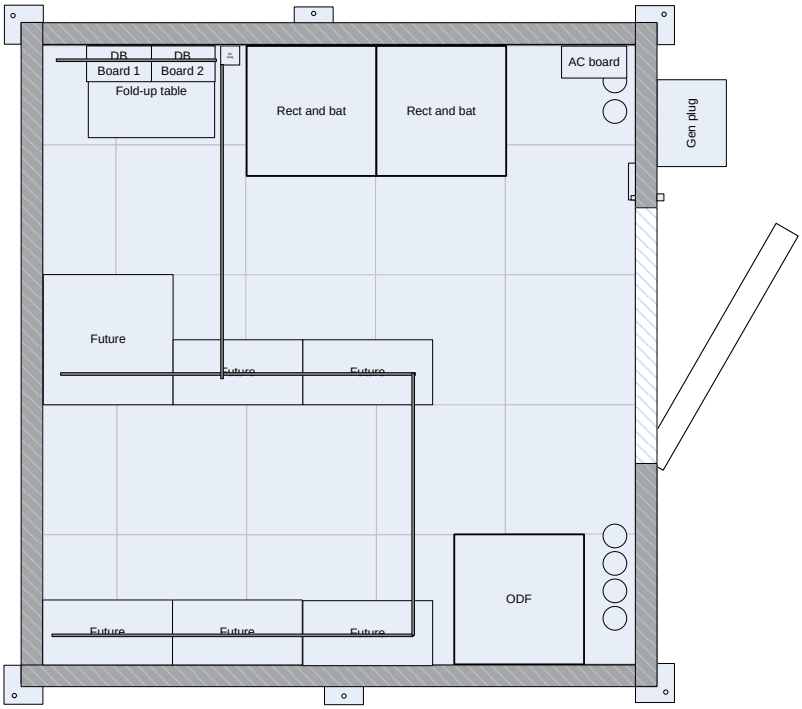


Figure A- 7: 3x3 Container – Earth bar Layout

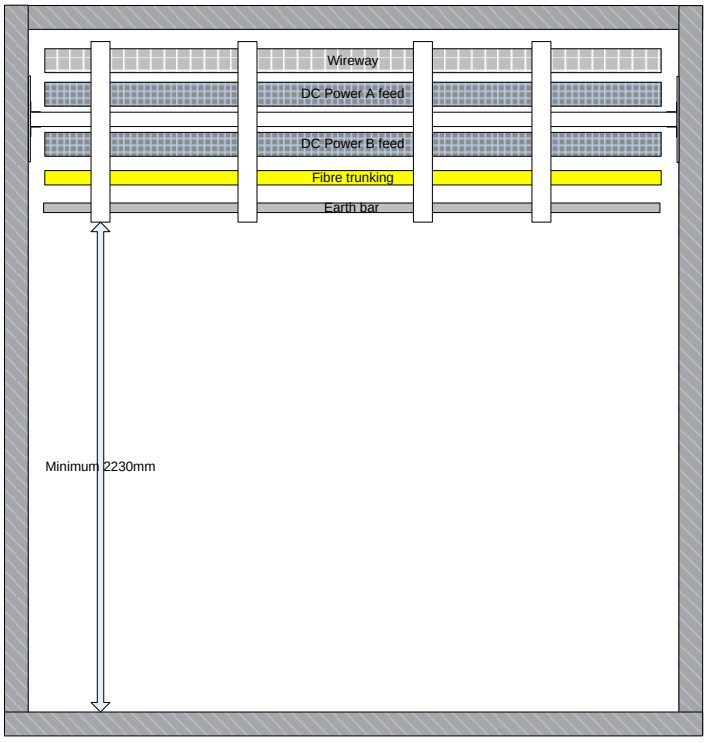


Figure A- 8: 3x3 Container – Generic side view

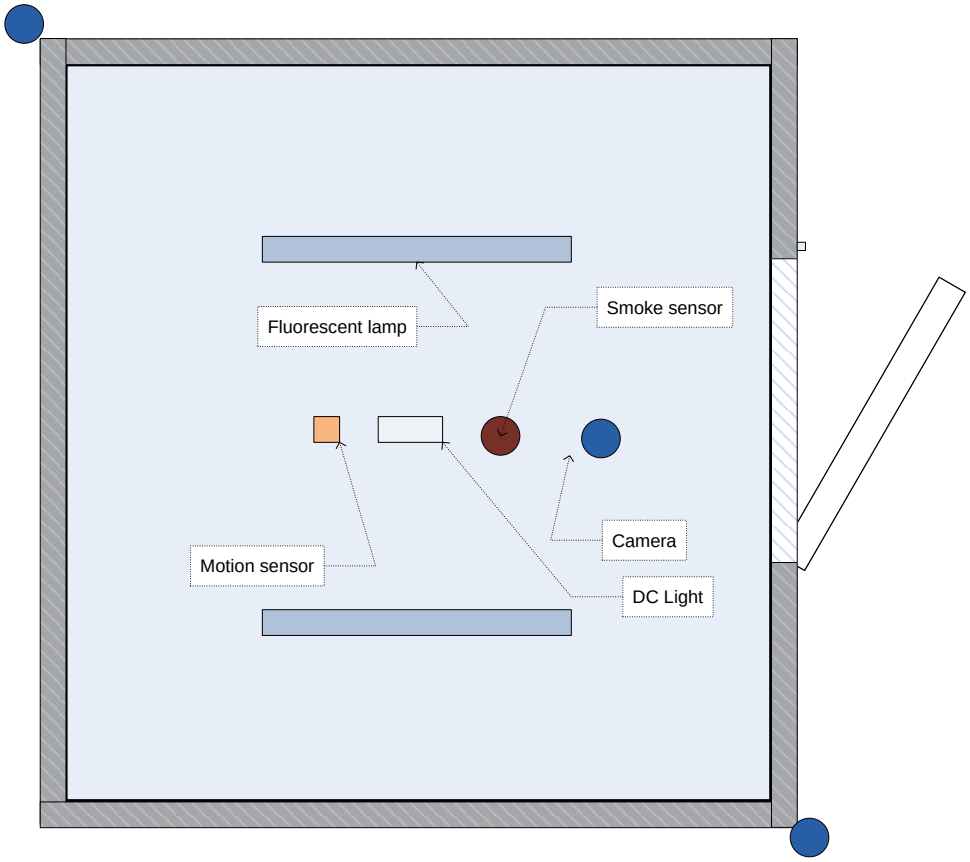


Figure A- 9: 3x3 Container – Rooftop view

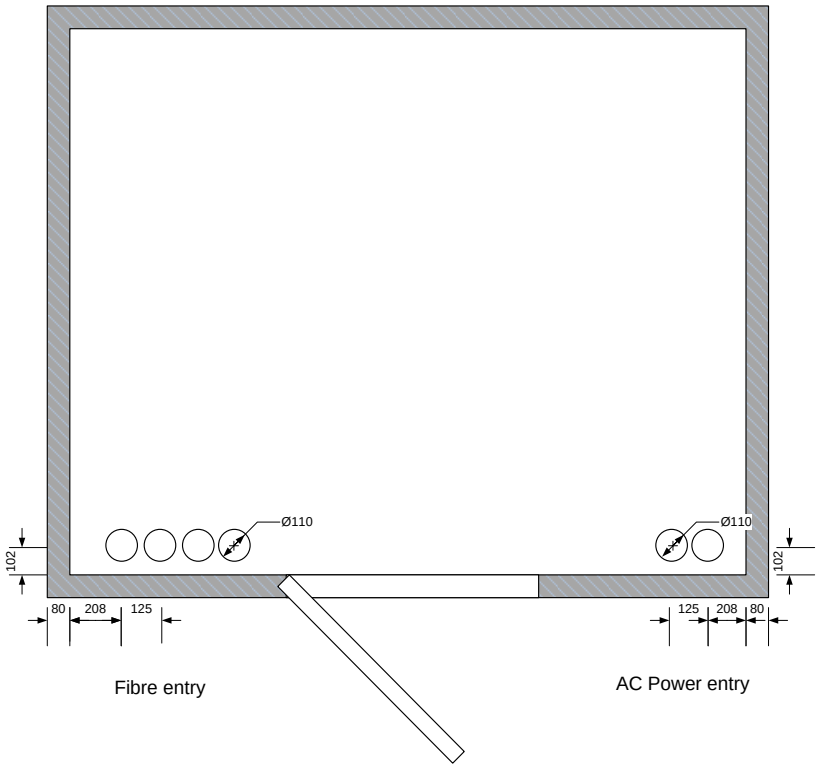


Figure A- 10: 3x3 Container –Fibre and power entry

Note in the scenario of an existing site, the existing plinth the power and fibre entry may be slightly different and these positioning will be confirmed before manufacturing shall take place

ADDENDUM B: LAYOUT DRAWINGS – 3M X 6M CONTAINER

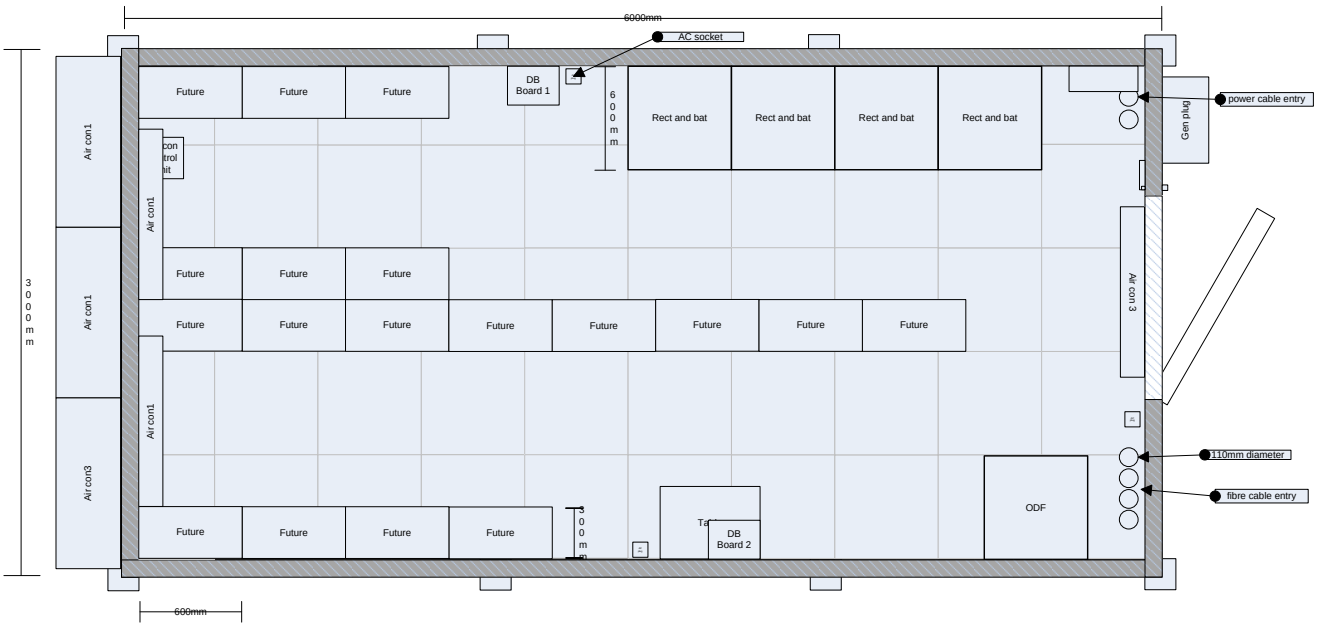


Figure B- 1: 3x6 Container – Equipment Layout

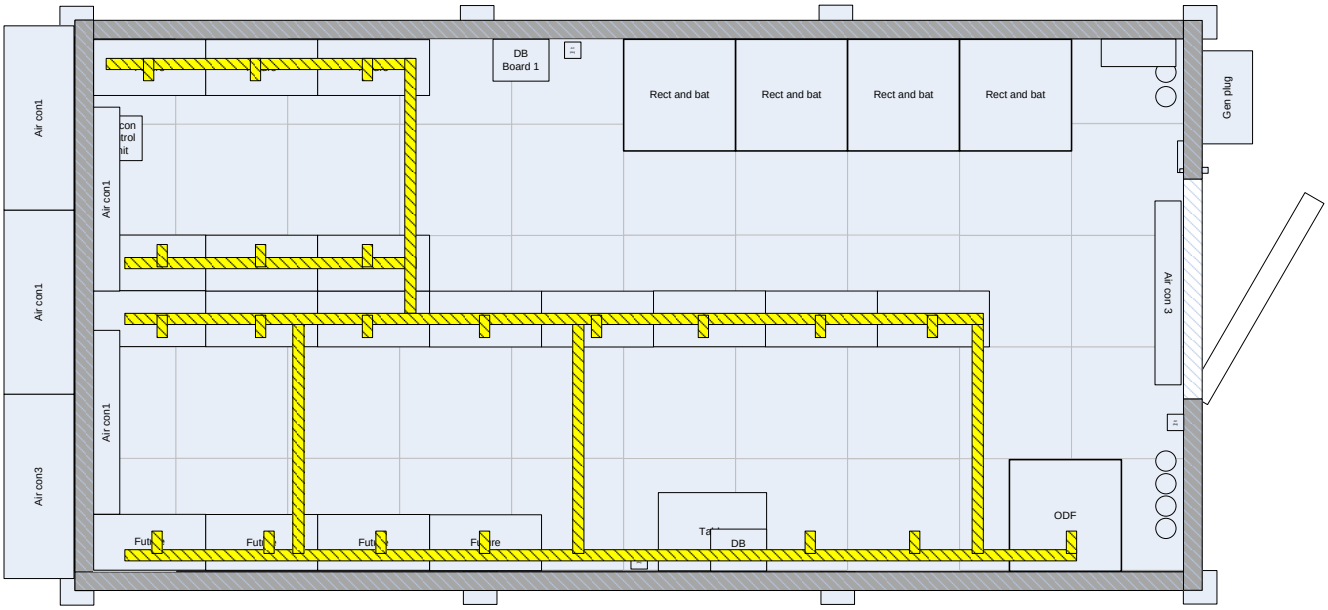


Figure B- 2: 3x6 Container – Optical fibre Layout

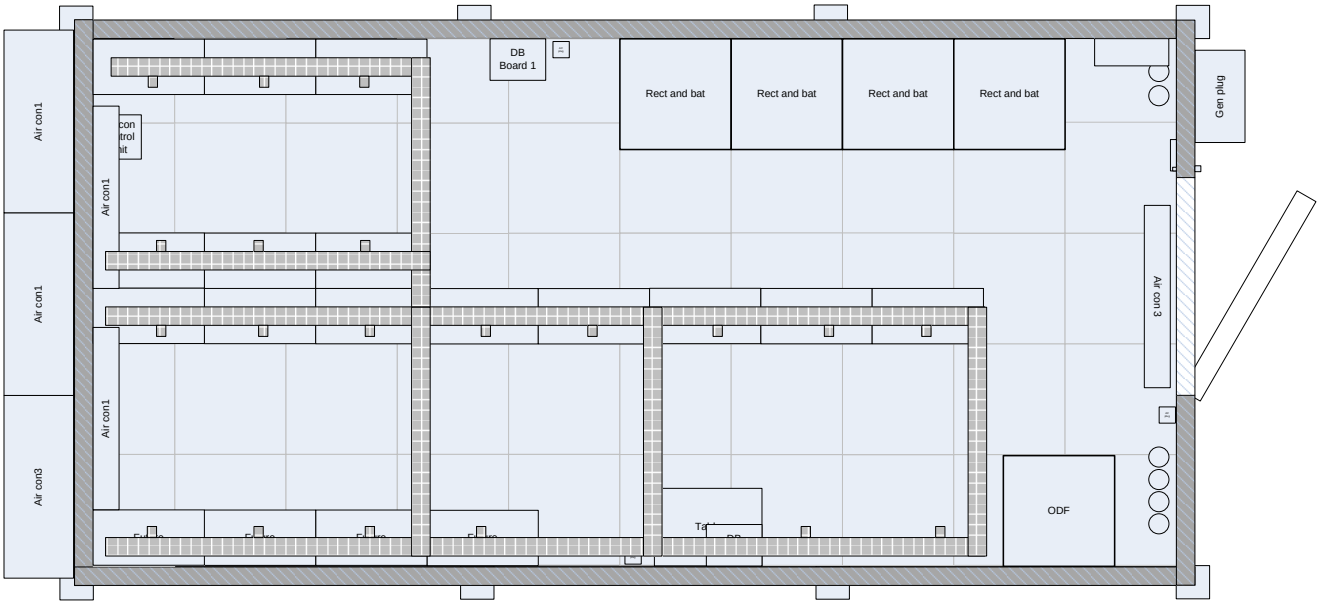


Figure B- 3: 3x6 Container – Wire trunking Layout

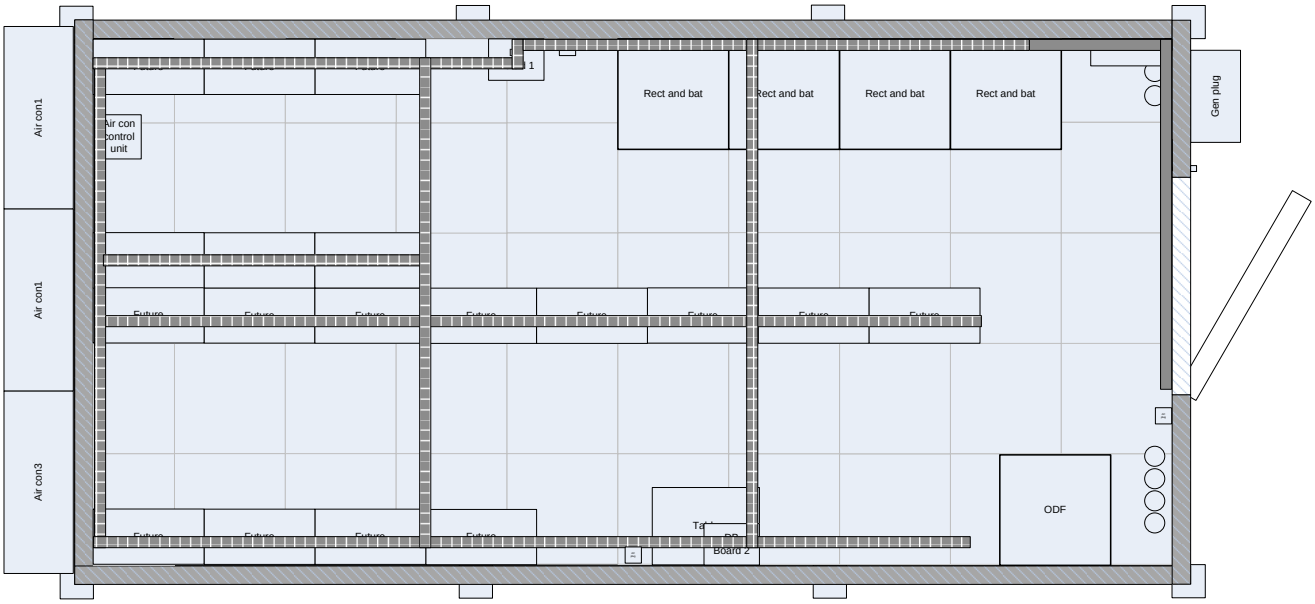


Figure B- 4: 3x6 Container – DC Power Layout – A feed

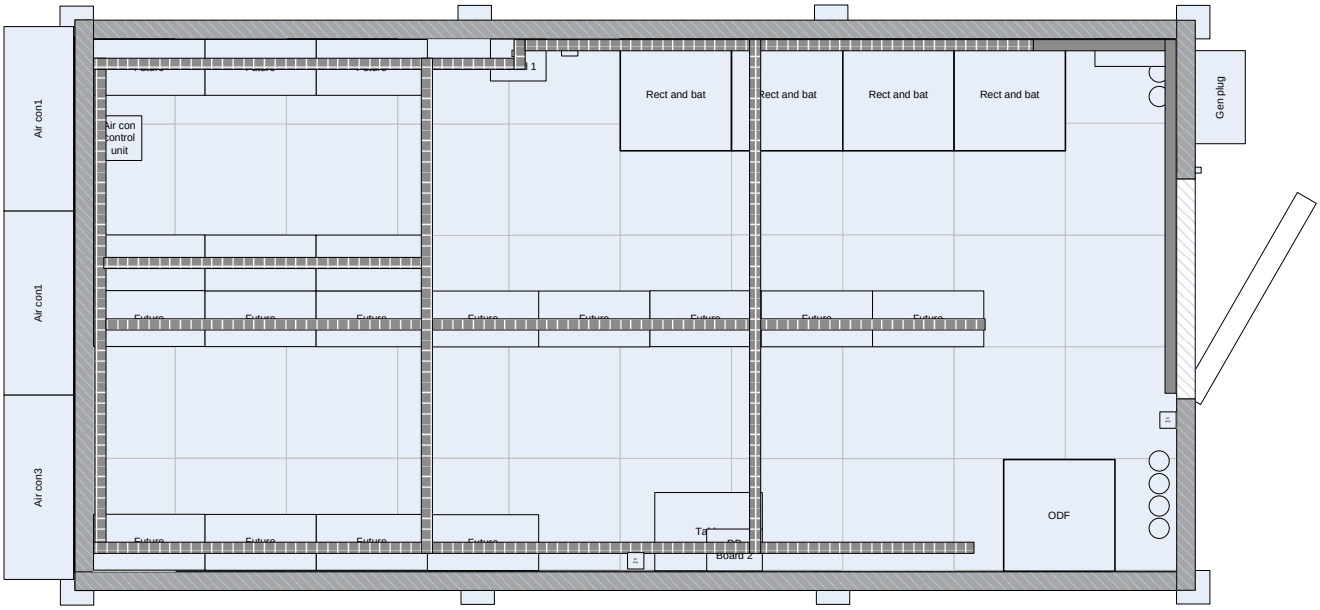


Figure B- 5: 3x6 Container – DC Power Layout – B feed

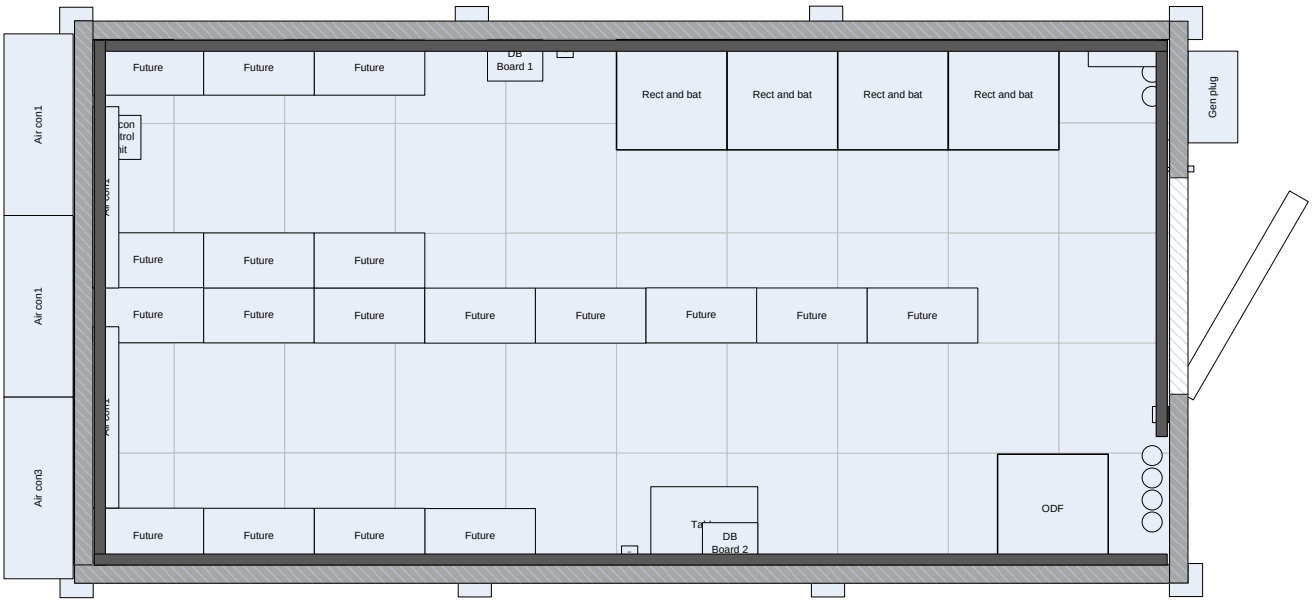


Figure B- 6: 3x6 Container – AC PVC trunking Layout

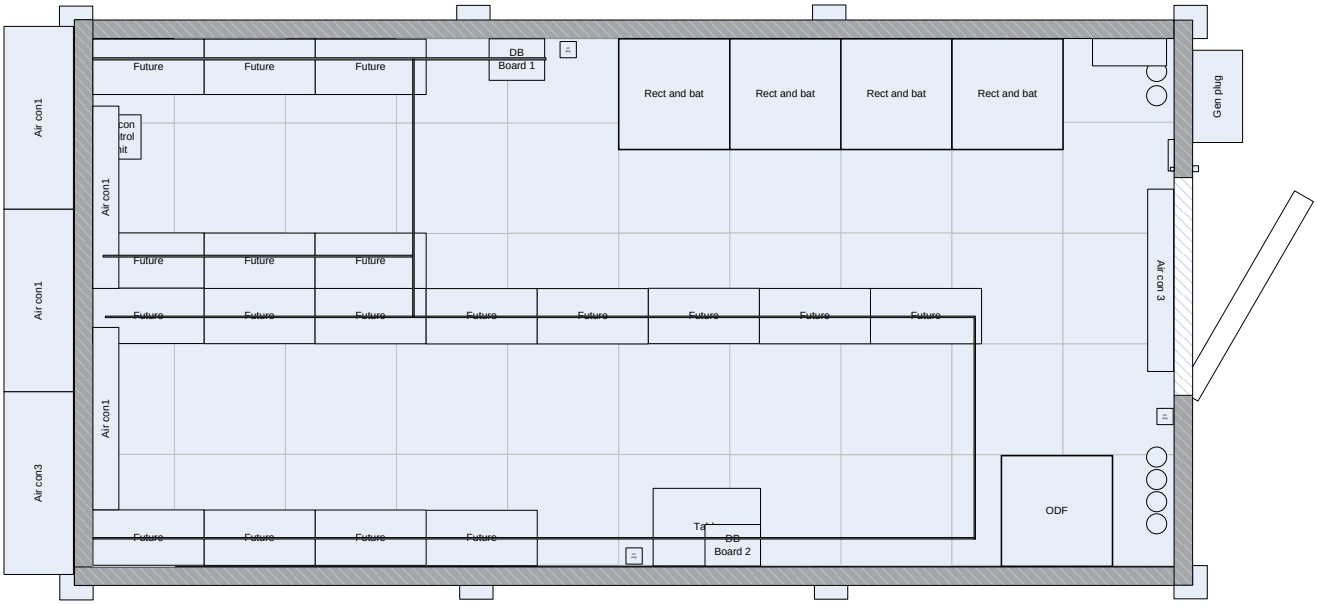


Figure B- 7: 3x6 Container – Earth bar Layout

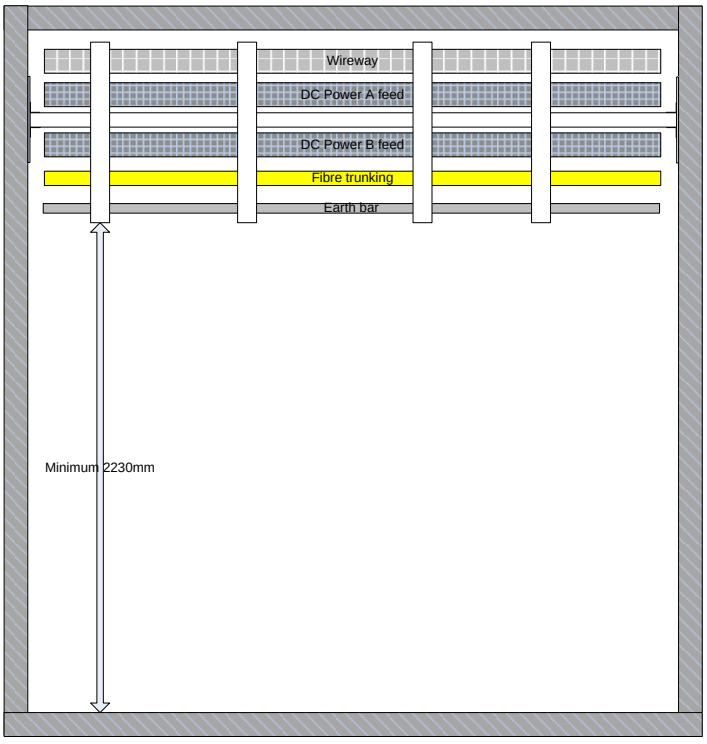


Figure B- 8: 3x6 Container – Generic side view

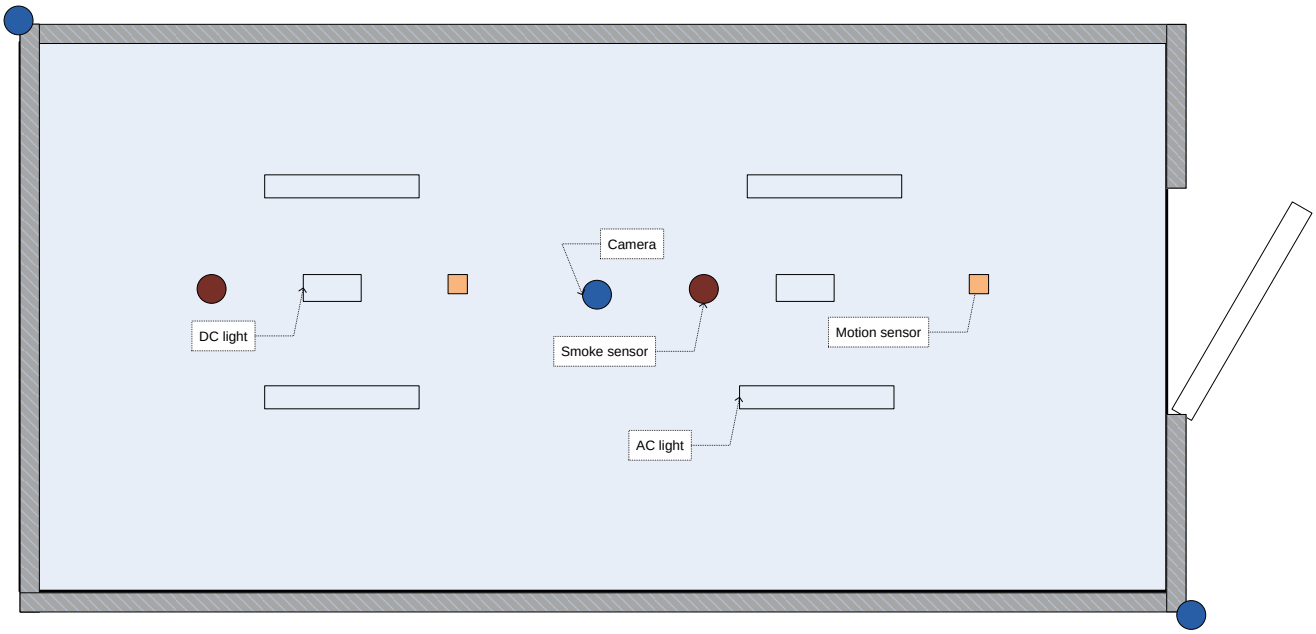


Figure B- 9: 3x6 Container – Rooftop view

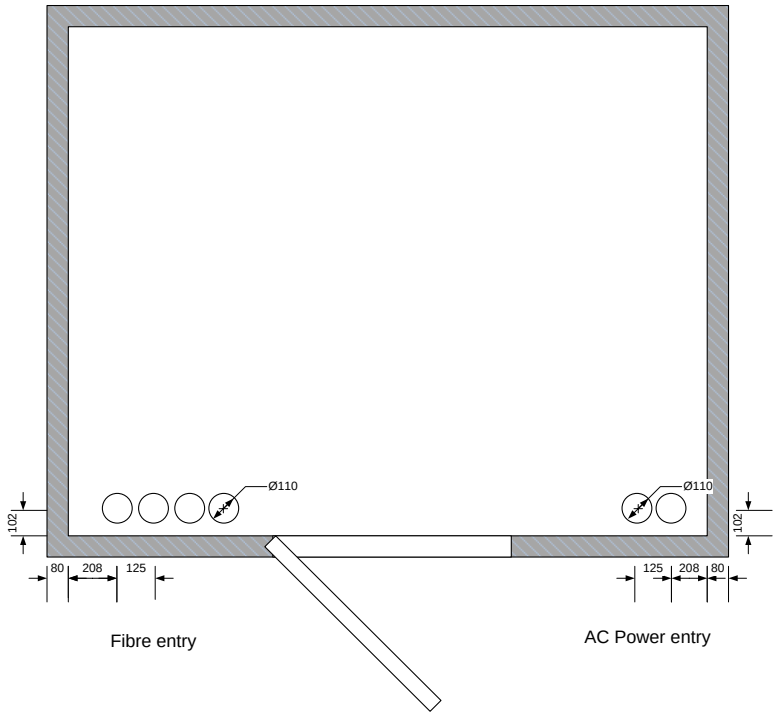


Figure B- 10: 3x6 Container –Fibre and power entry

Note in the scenario of an existing site, the existing plinth the power and fibre entry may be slightly different and these positioning will be confirmed before manufacturing shall take place

ADDENDUM C LAYOUT DRAWINGS – 3M X 6M CO-LOCATING CONTAINER

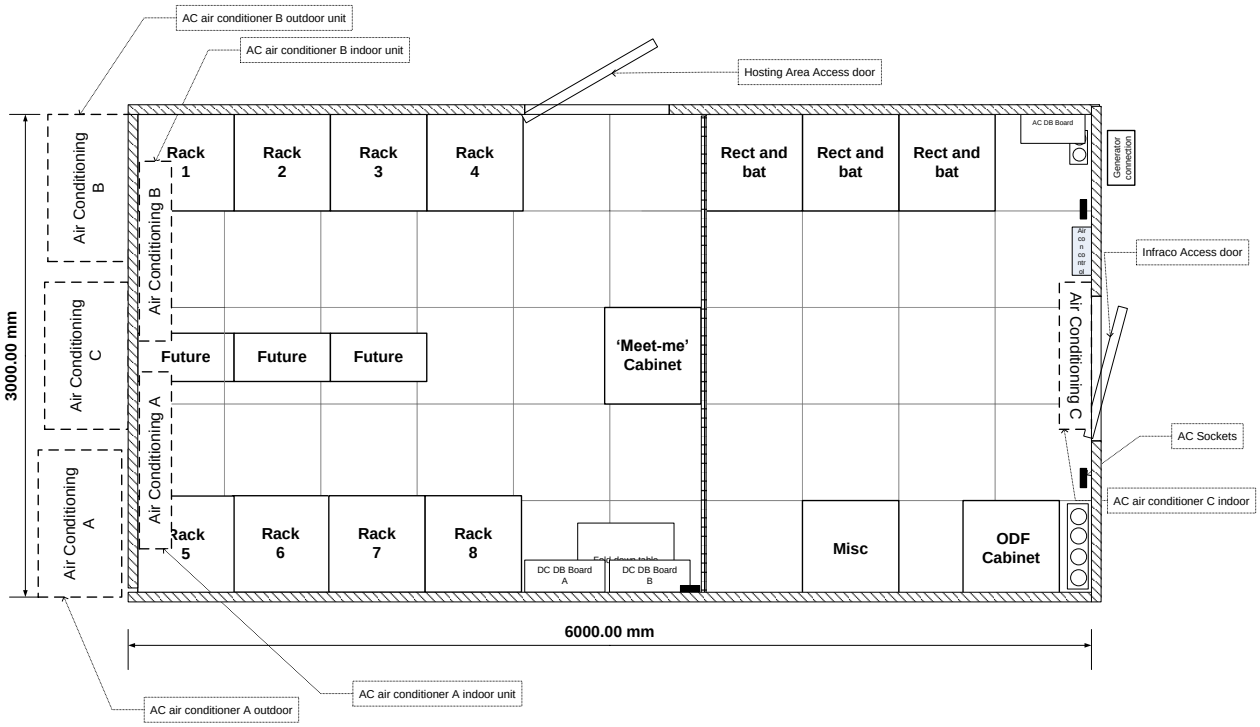


Figure C- 1: 3mx6m Co-locating Container – Equipment Layout

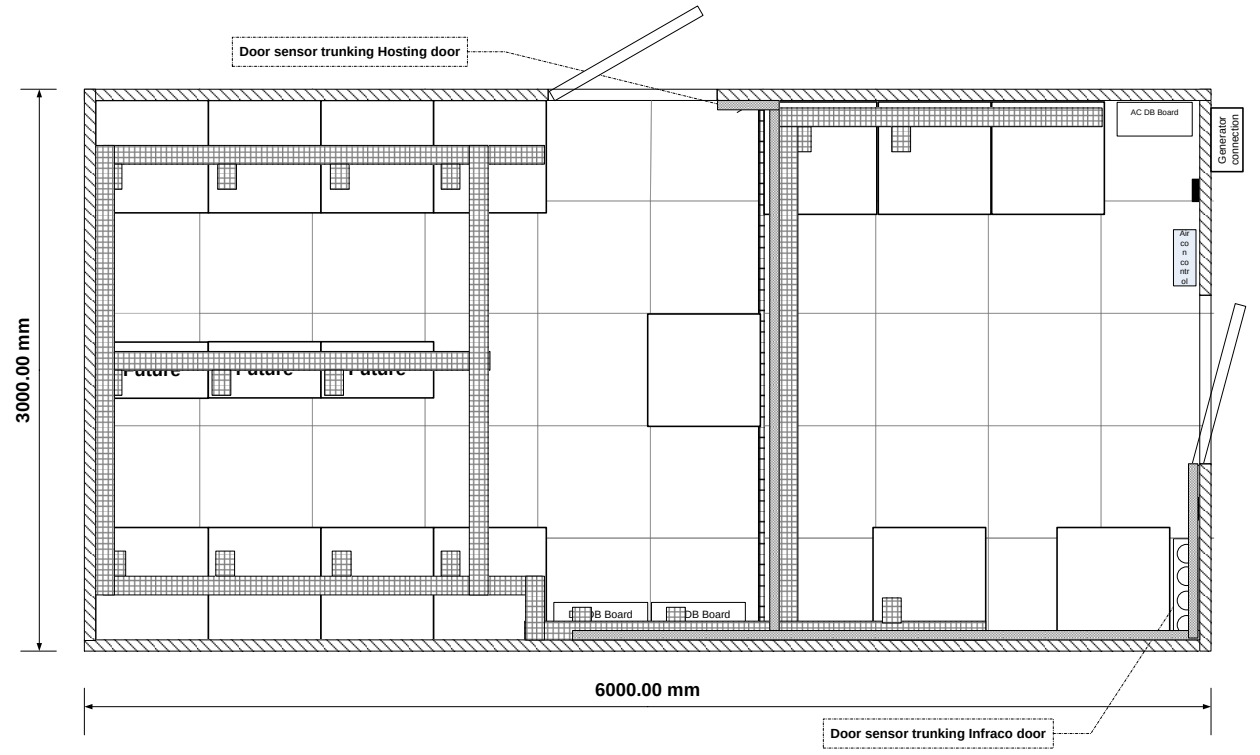


Figure C- 2: 3mx6m Co-locating Container – DC Power Layout A feed

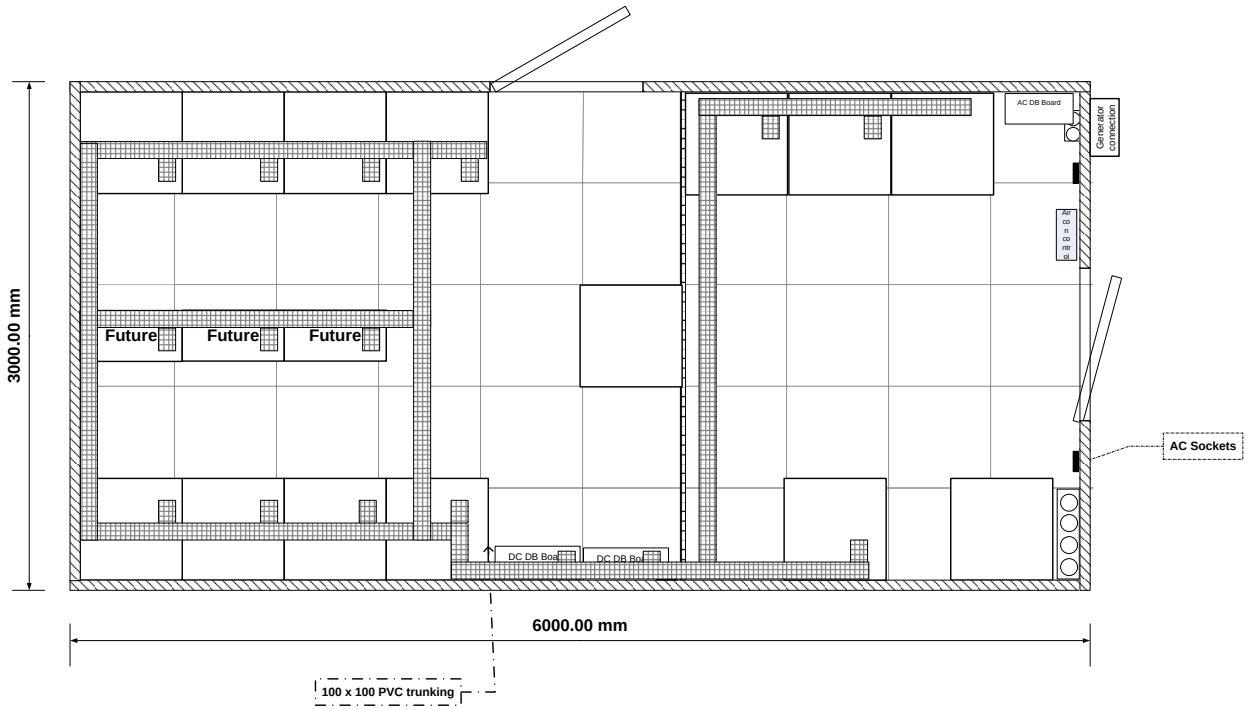


Figure C- 3: 3mx6m Co-locating Container – DC Power Layout B feed

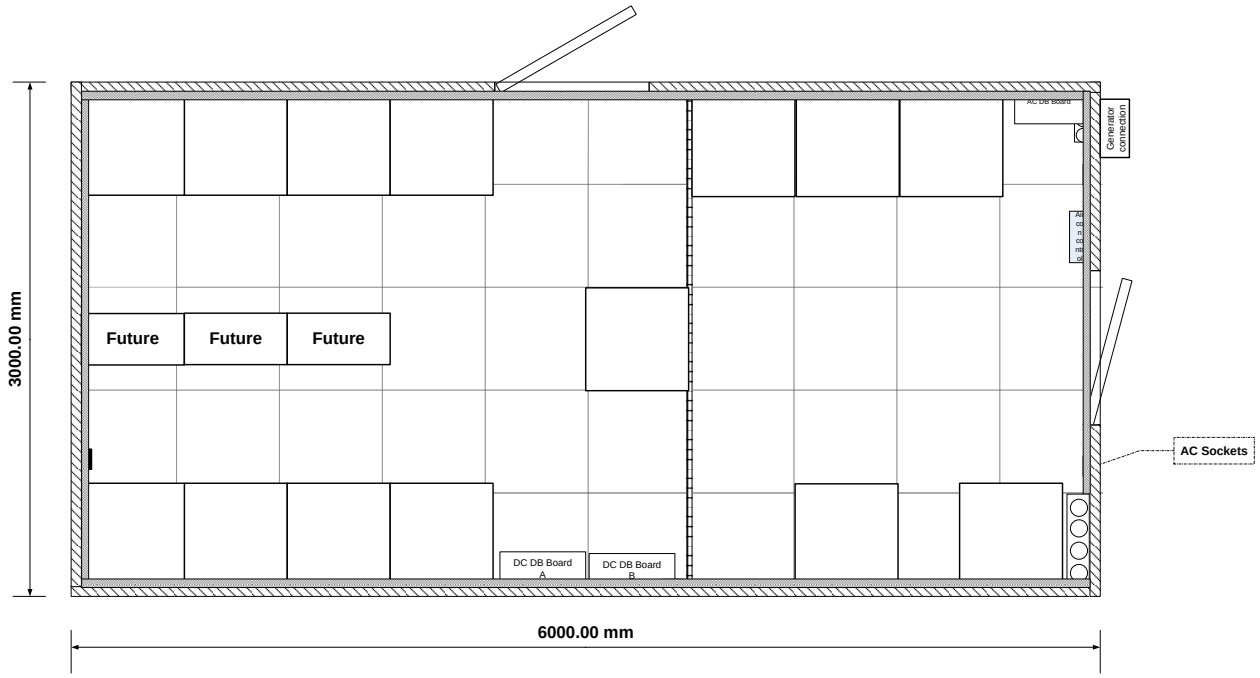


Figure C- 4: 3mx6m Co-locating Container – AC PVC trunking Layout

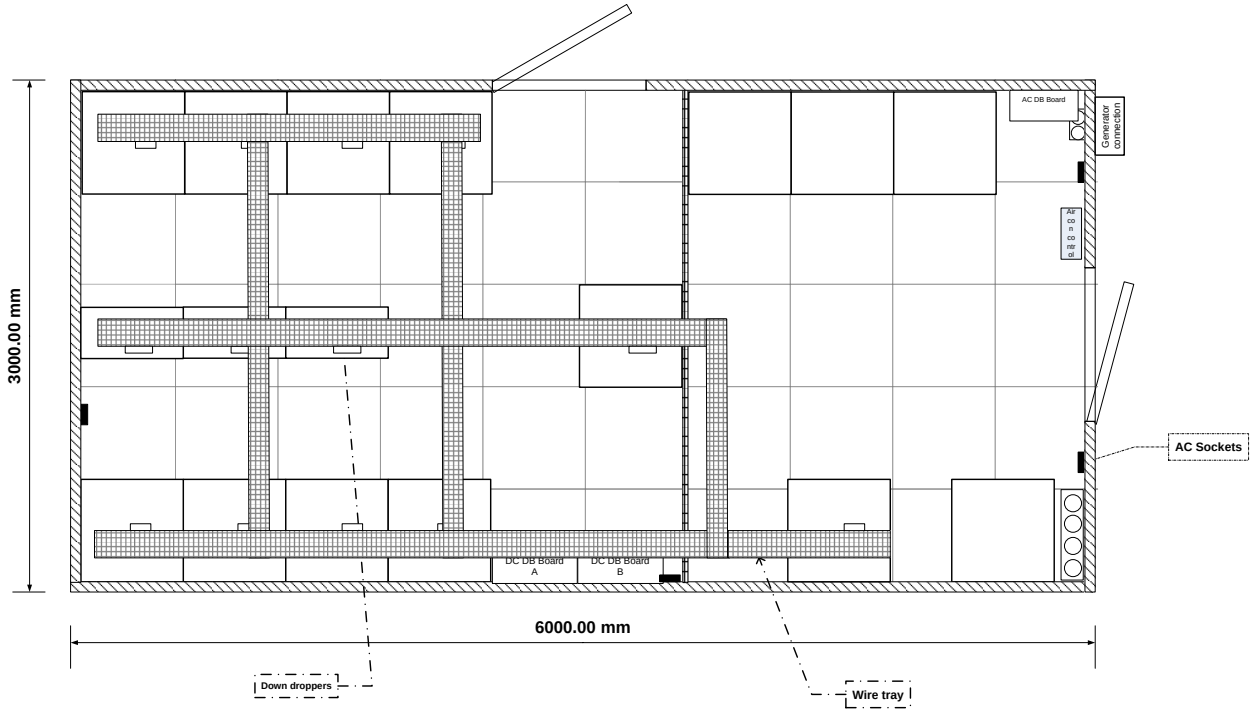


Figure C- 5: 3mx6m Co-locating Container – Wire trunking Layout

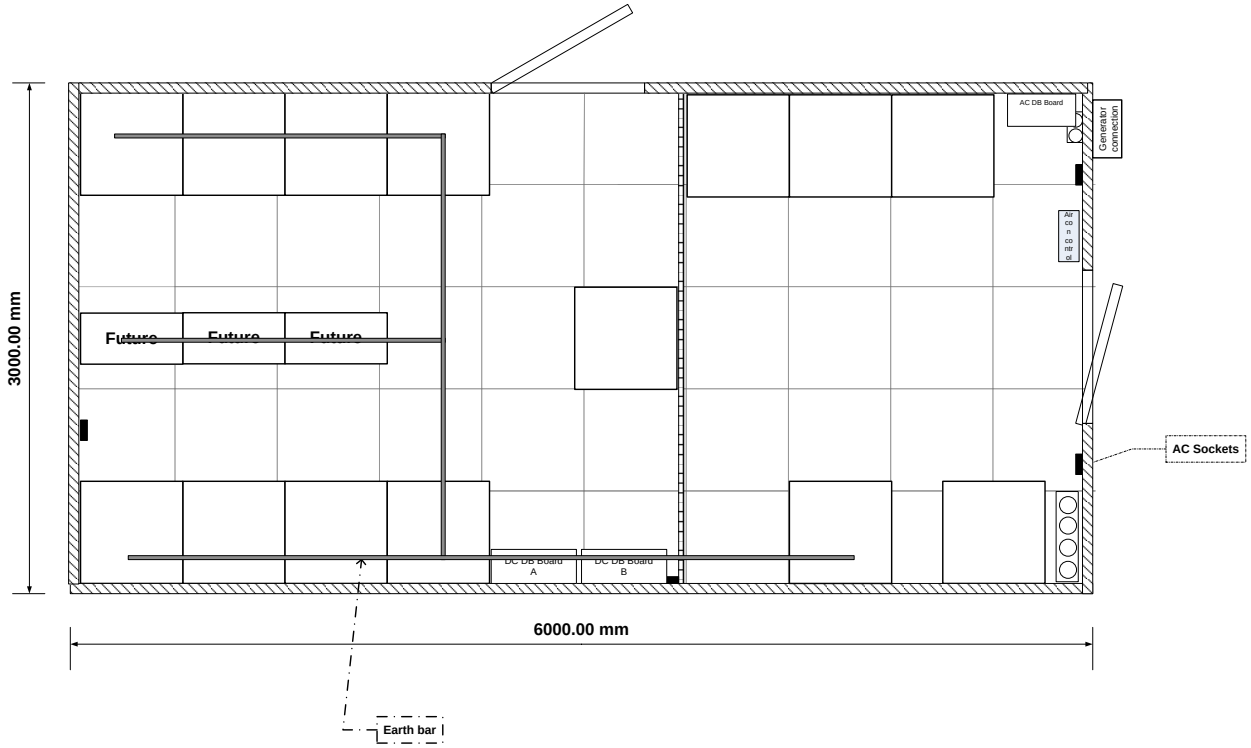


Figure C- 6: 3mx6m Co-locating Container – Earth bar Layout

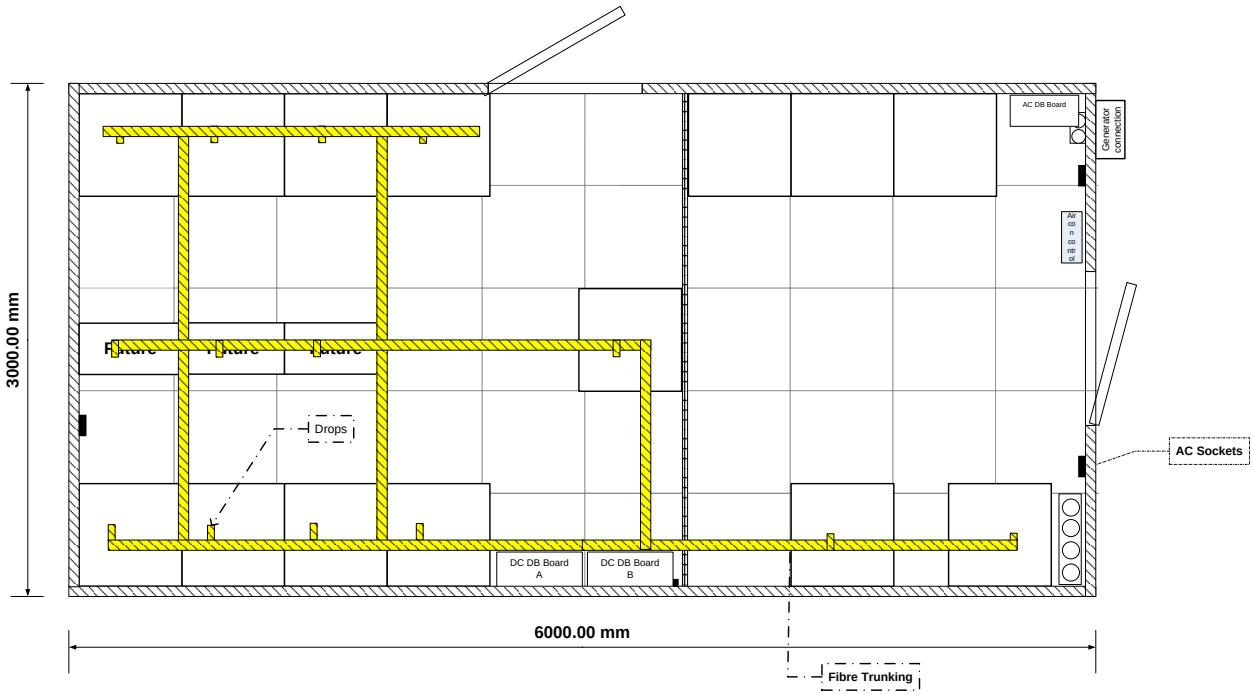


Figure C- 7: 3mx6m Co-locating Container – Optical fibre Layout

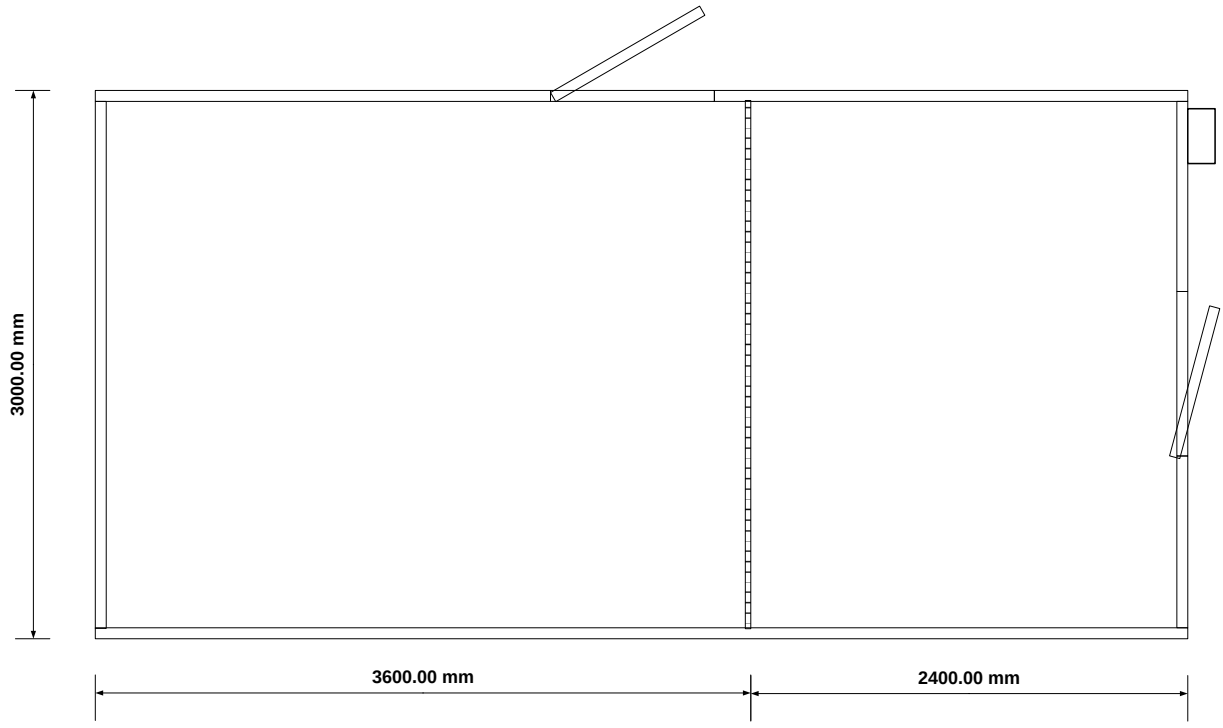


Figure C- 8: 3mx6m Co-locating Container – Panel Layout

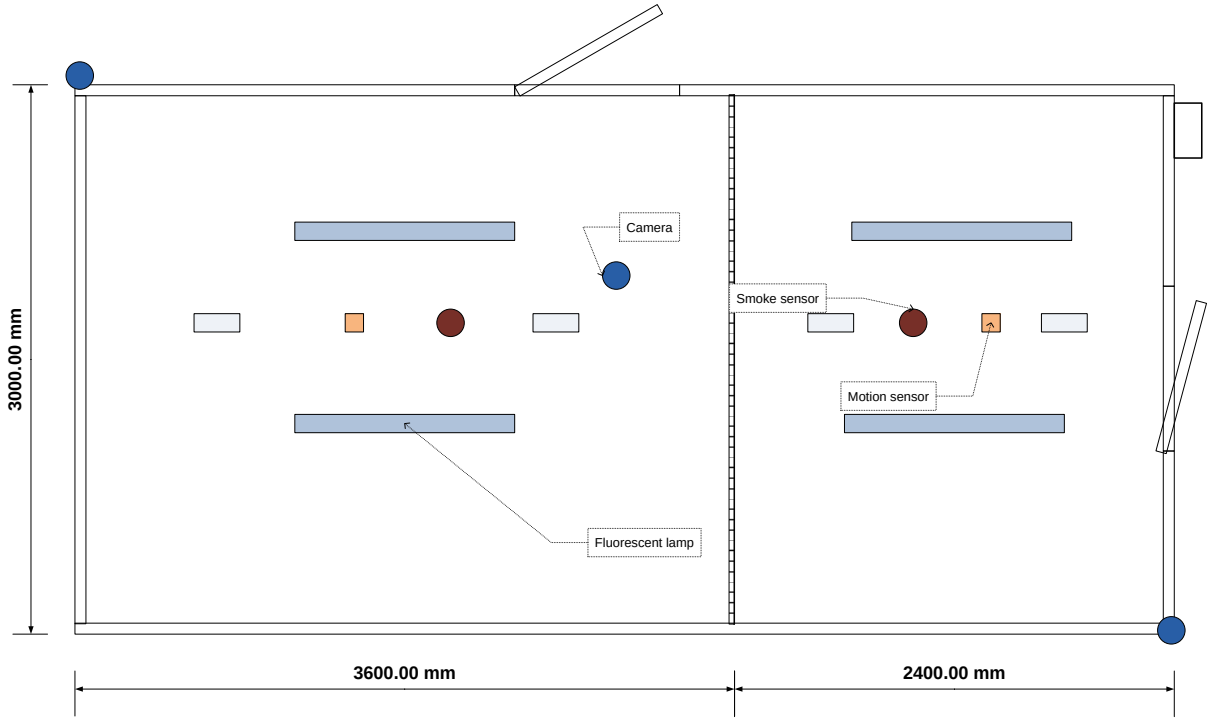


Figure C- 9: 3mx6m Co-locating Container – Roof Layout

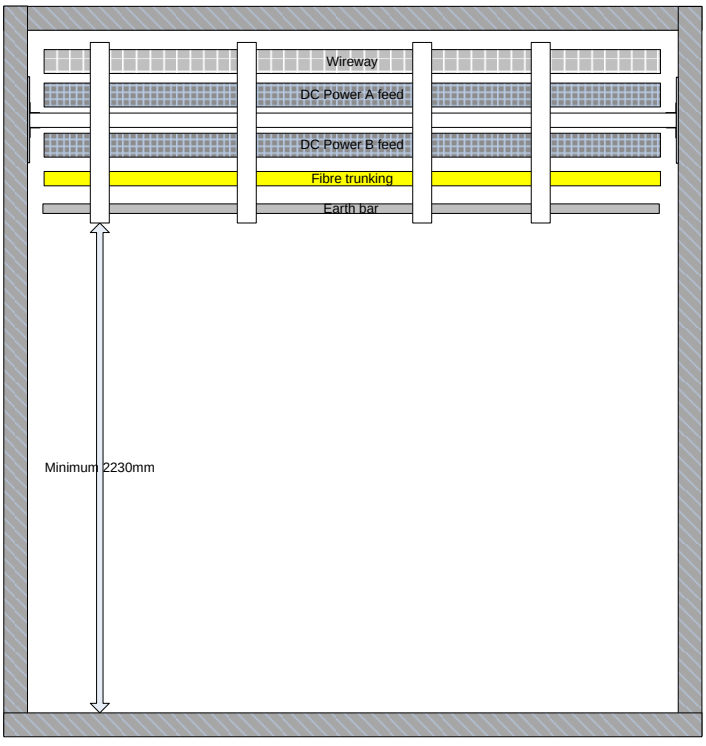


Figure C- 10: 3mx6m Co-locating Container– Generic side view

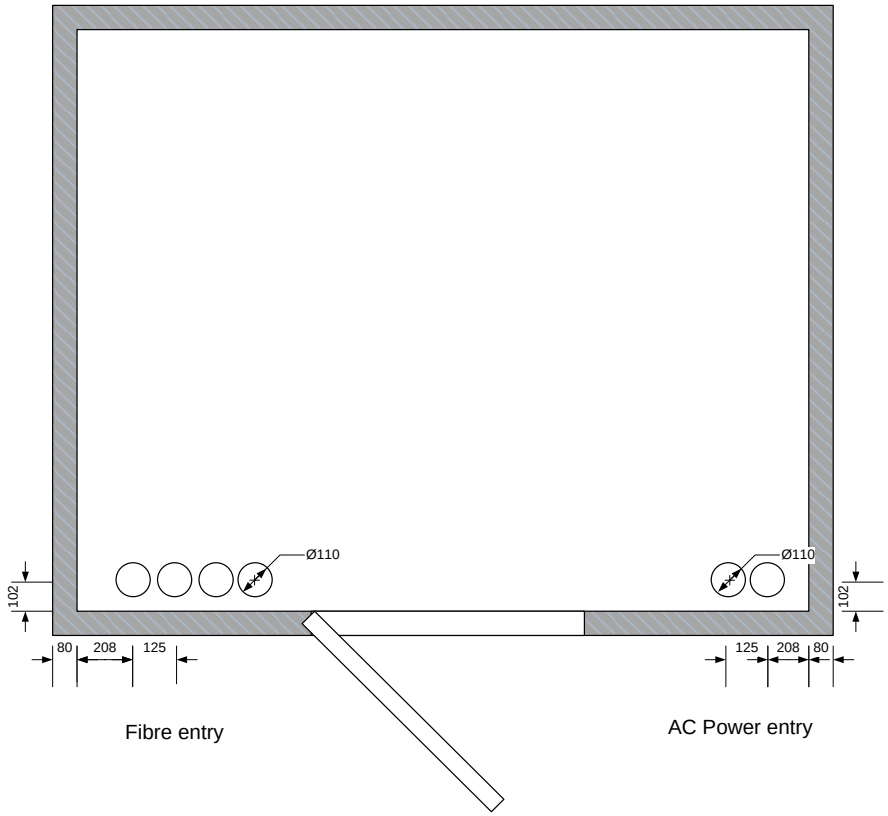


Figure C- 11: 3x6 Co-locating Container– Generic fibre and power entry

Note in the scenario of an existing site, the existing plinth the power and fibre entry may be slightly different and these positioning will be confirmed before manufacturing shall take place

ADDENDUM D LAYOUT DRAWINGS – 3M X 6M SHARED CO-LOCATING CONTAINER

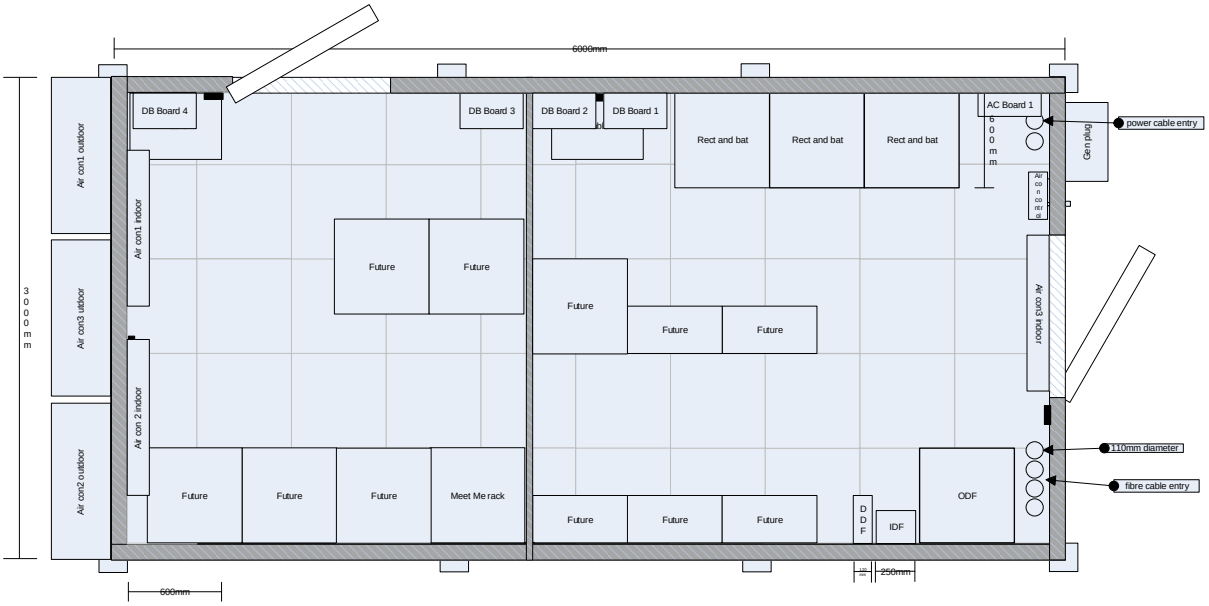


Figure D- 1: 3mx6m Shared Co-locating Container – Equipment Layout

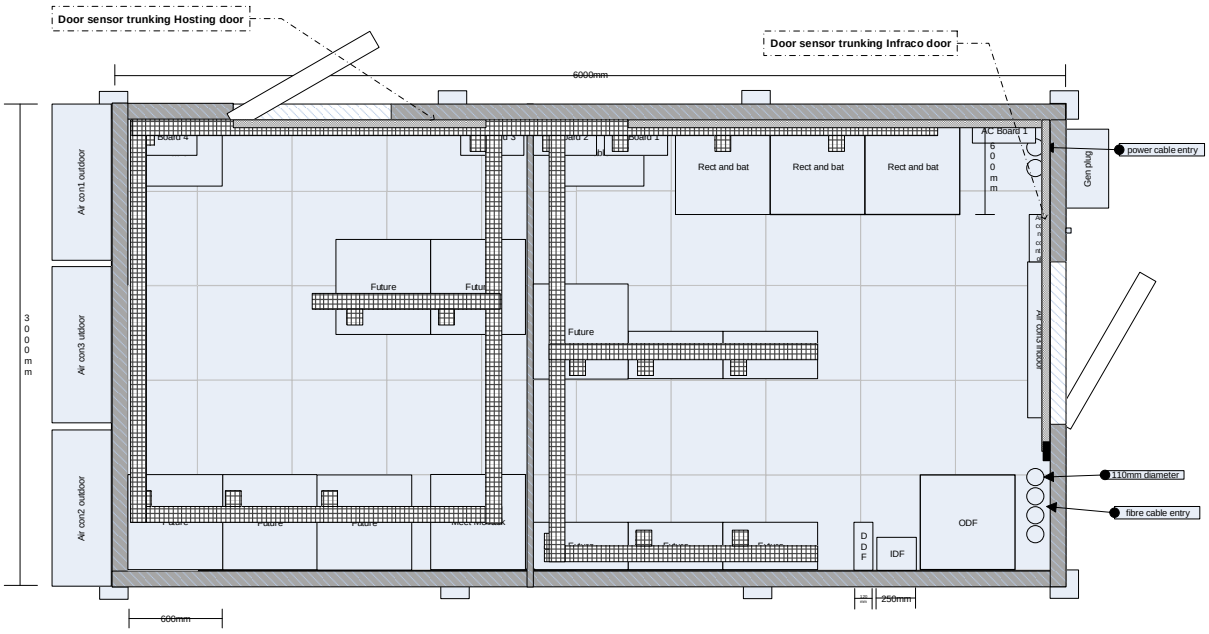


Figure D- 2: 3mx6m Shared Co-locating Container – DC Power Layout – A feed

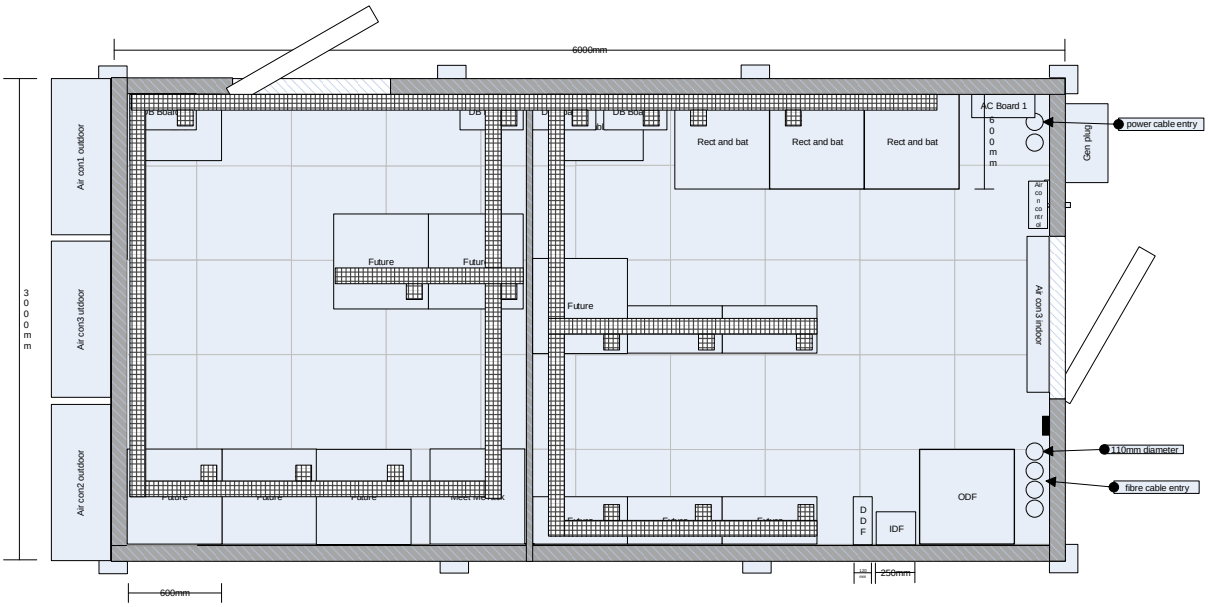


Figure D- 3: 3mx6m Shared Co-locating Container – DC Power Layout – B feed

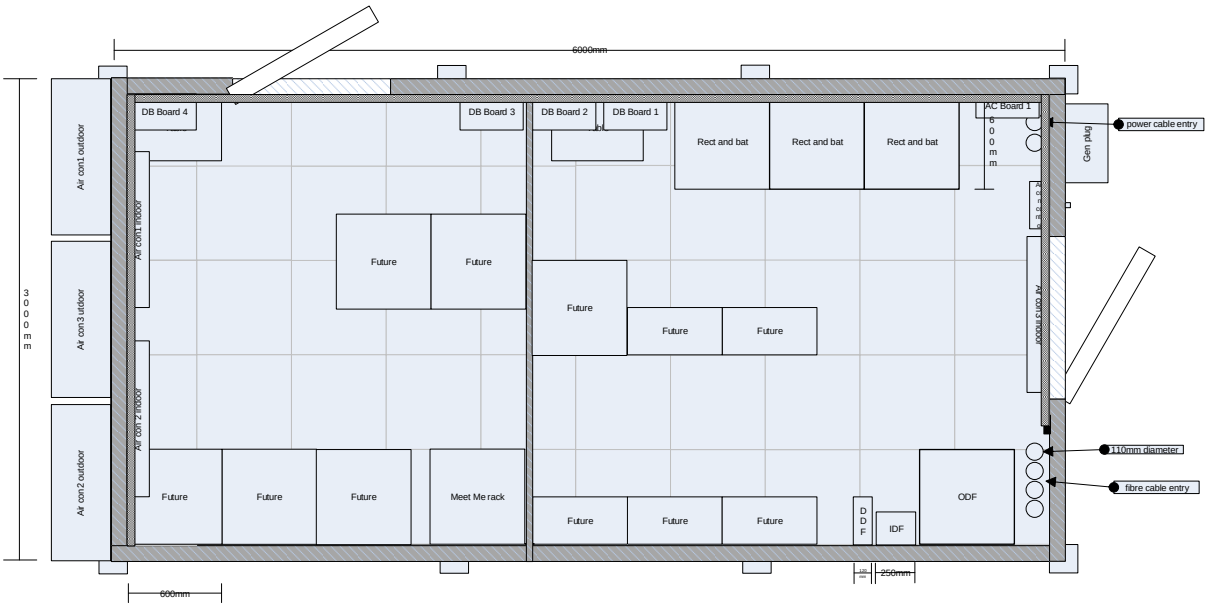


Figure D- 4: 3mx6m Shared Co-locating Container – AC PVC trunking Layout

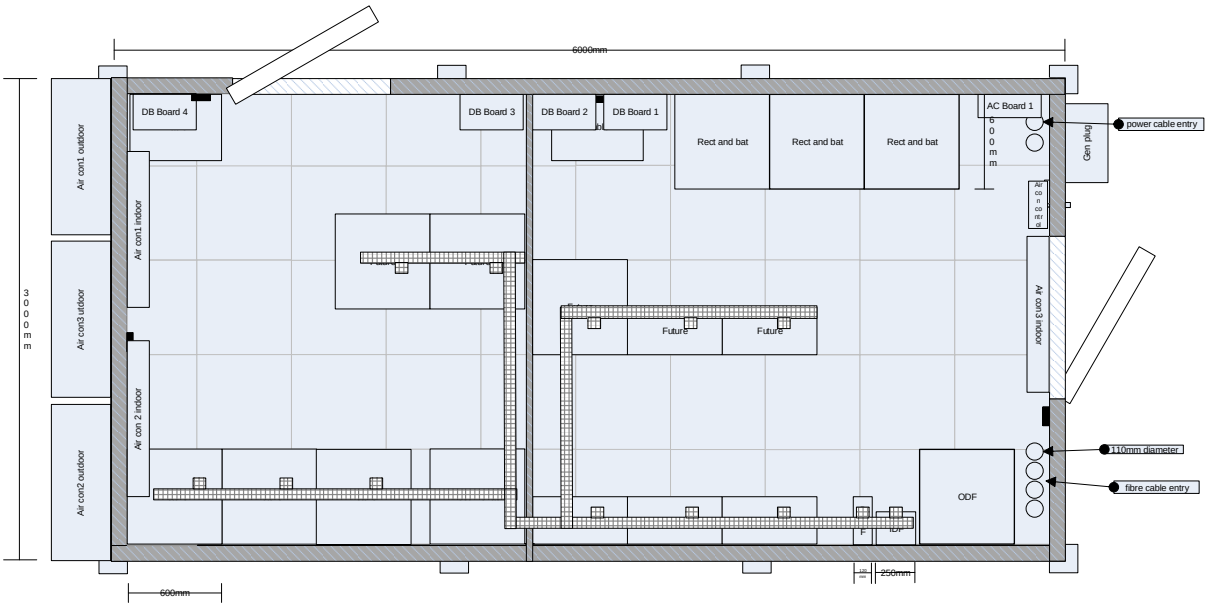


Figure D- 5: 3mx6m Shared Co-locating Container – Wire trunking Layout

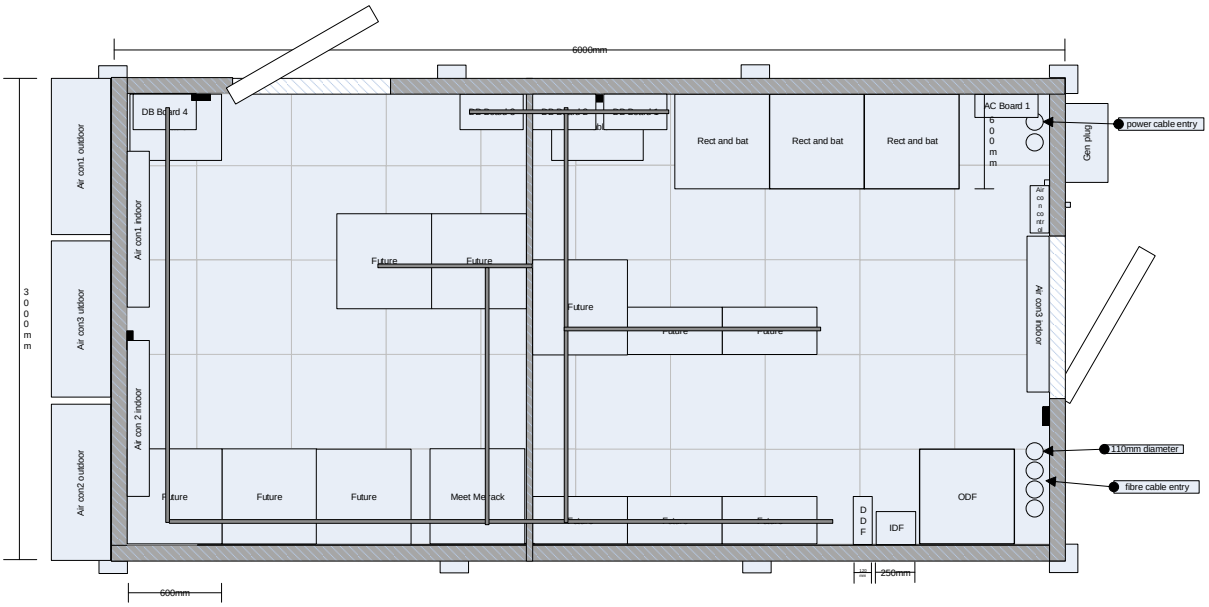


Figure D- 6: 3mx6m Shared Co-locating Container – Earth bar Layout

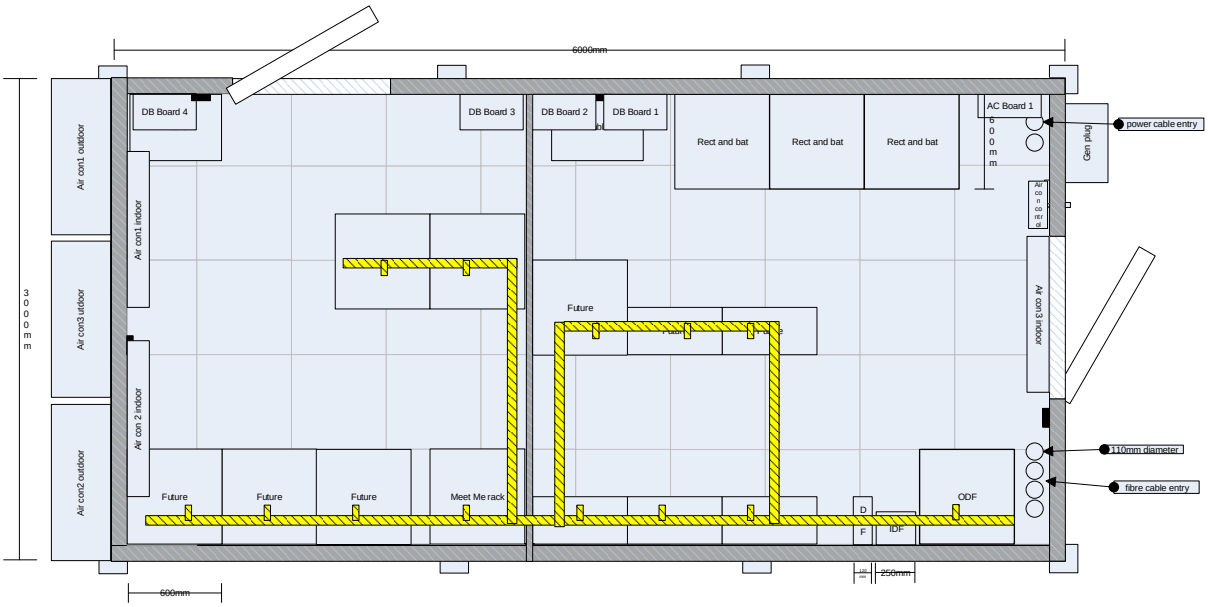


Figure D- 7: 3mx6m Shared Co-locating Container – Optical fibre Layout

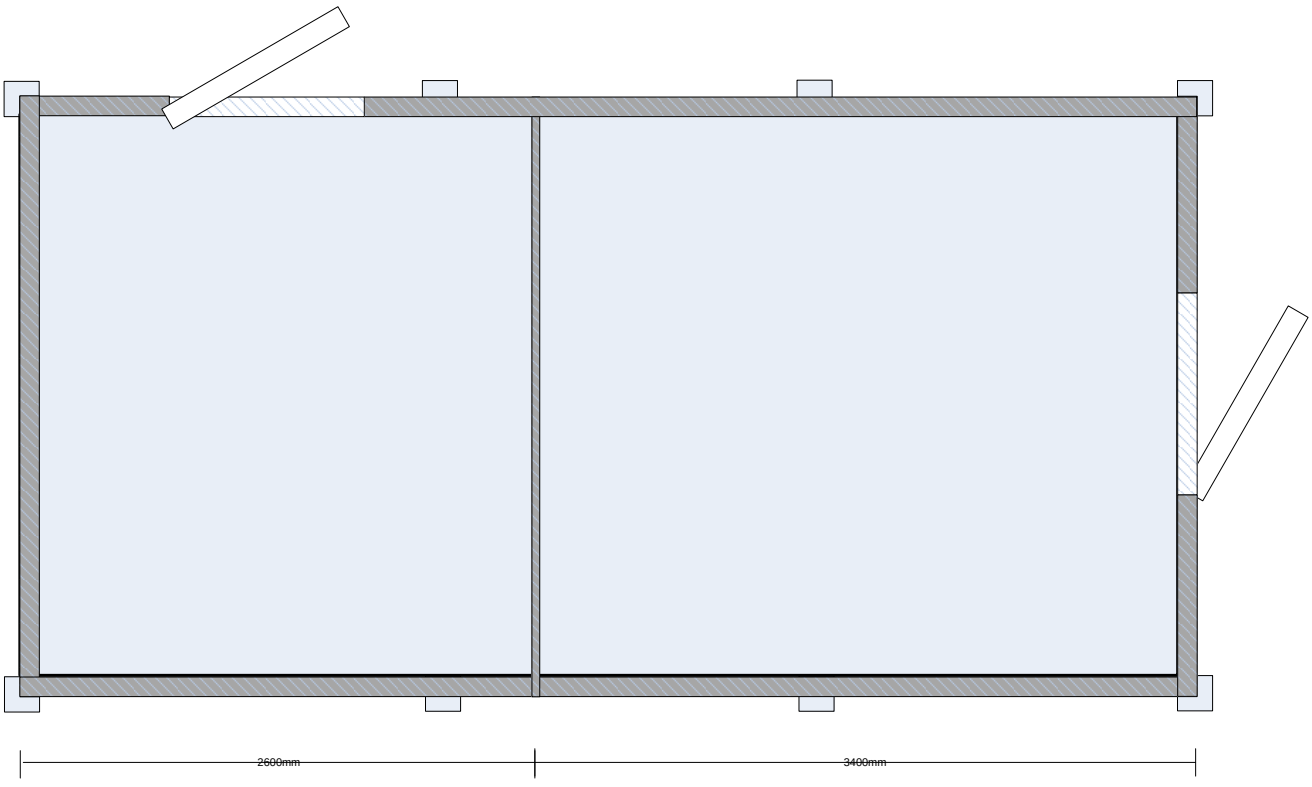


Figure D- 8: 3mx6m Shared Co-locating Container – Panel Layout

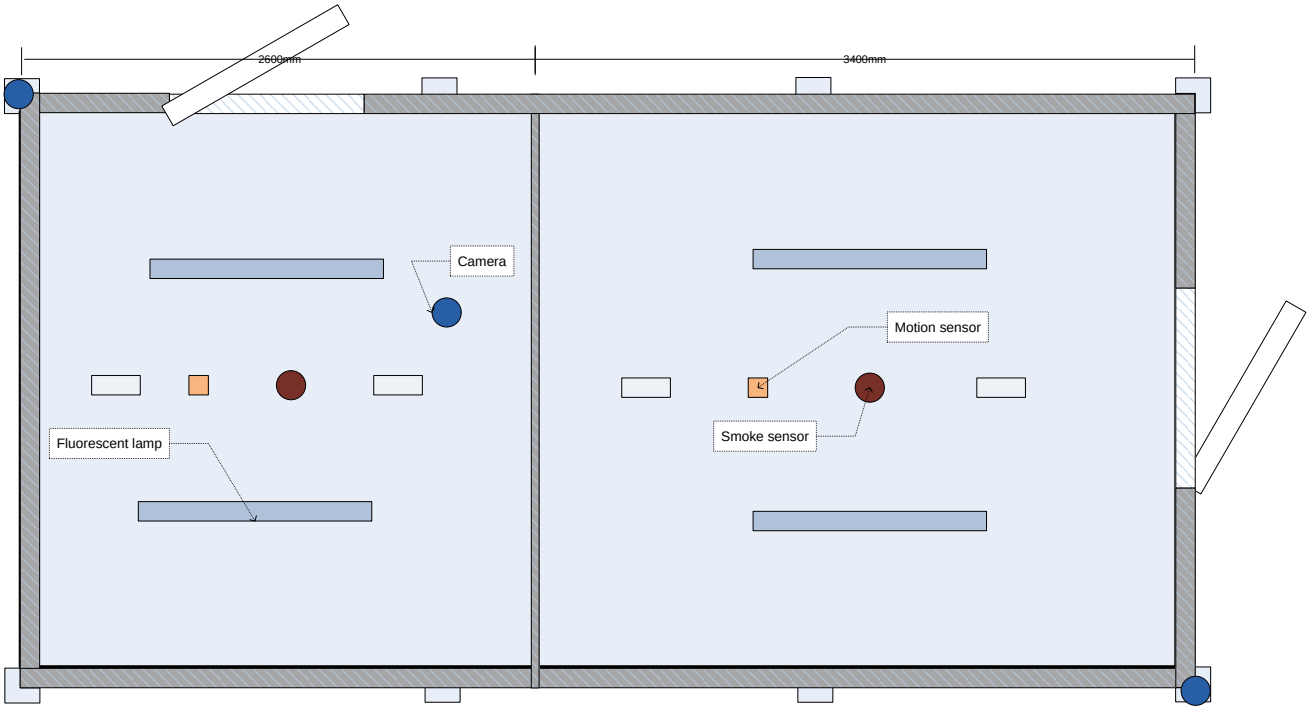


Figure D- 9: 3mx6m Shared Co-locating Container – Roof Layout

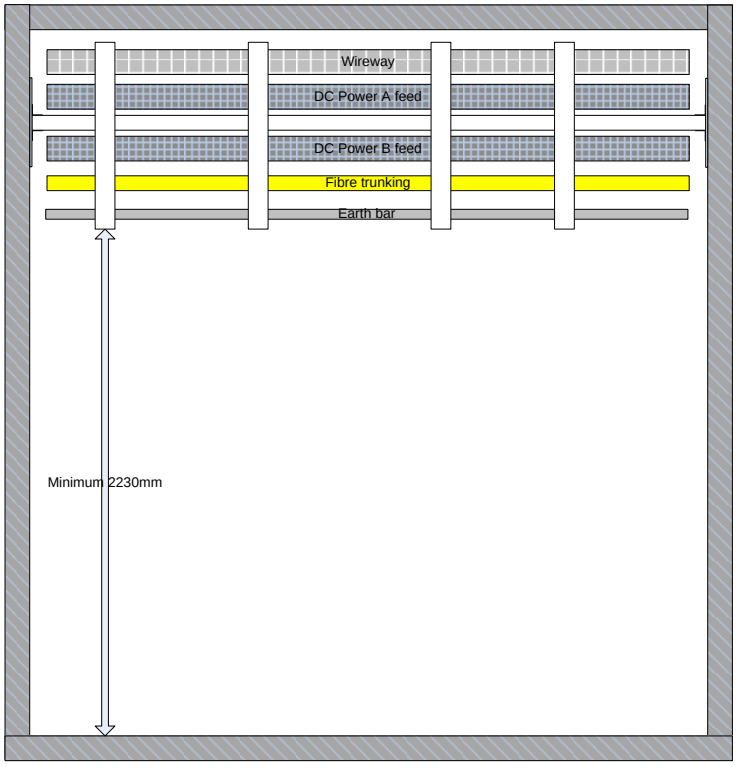


Figure D- 10: 3mx6m Shared Co-locating Container – Generic side view

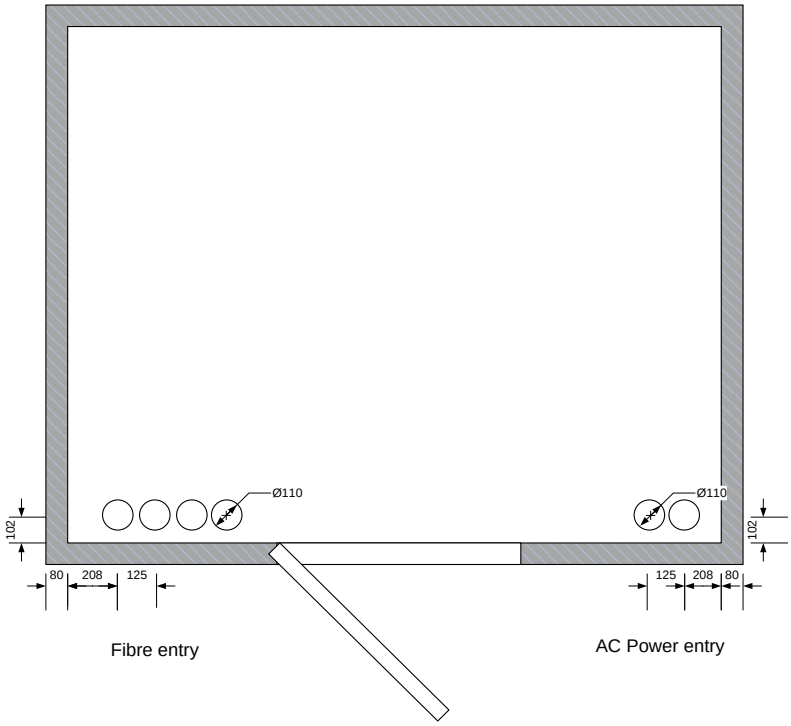
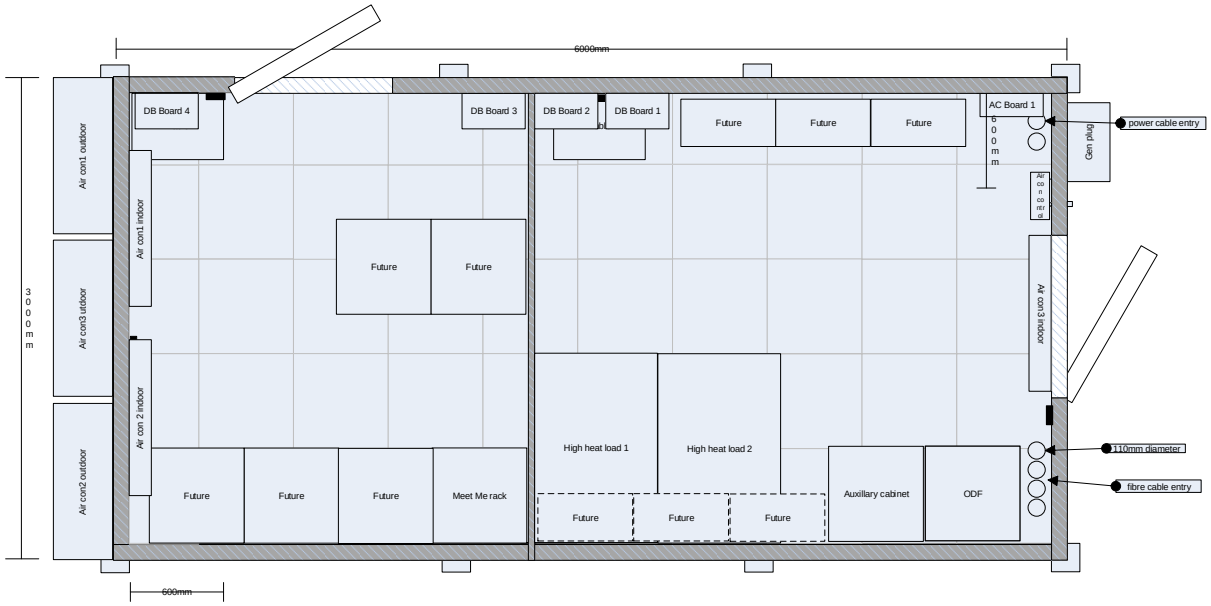


Figure D- 11: 3mx6m Shared Co-locating Container – Generic fibre and power entry

Note in the scenario of an existing site, the existing plinth the power and fibre entry may be slightly different and these positioning will be confirmed before manufacturing shall take place

ADDENDUM E LAYOUT DRAWINGS – 3M X 6M HIGH HEAT LOAD SHARED CO-LOCATING CONTAINER


6000mm
3000mm
600mm
DB Board 4
DB Board 3
DB Board 2
DB Board 1
AC Board 1
Future
Future
Future

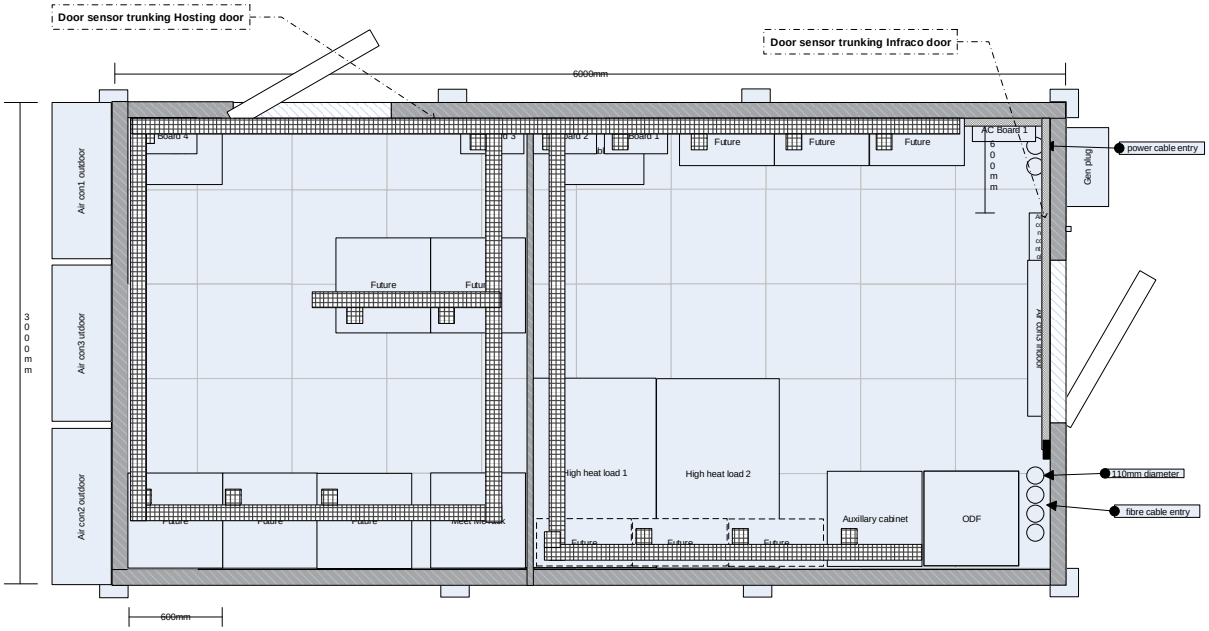


Figure E- 13: 3mx6m High Heat Load Shared Co-locating Container – DC Power Layout – A feed

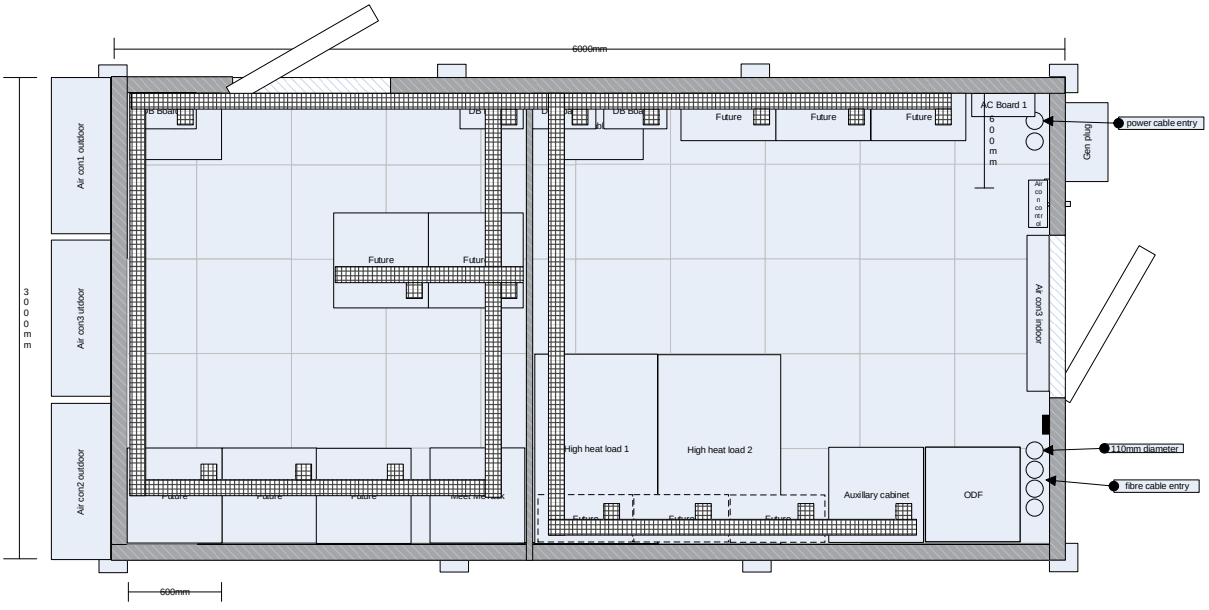


Figure E- 14: 3mx6m High Heat Load Shared Co-locating Container – DC Power Layout – B feed

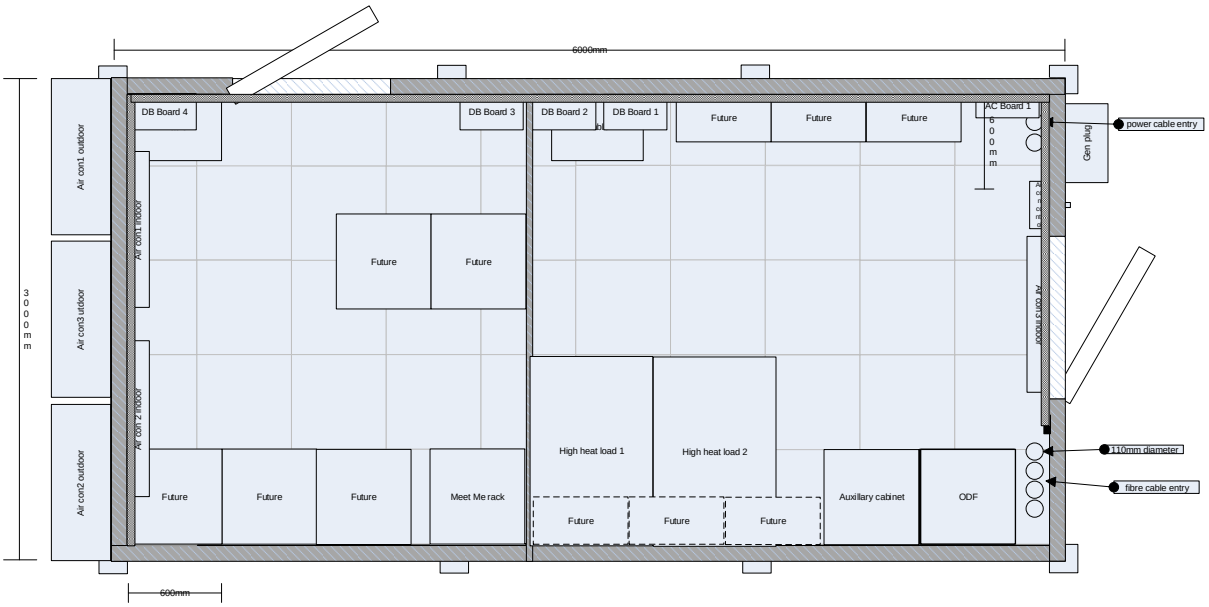


Figure E- 15: 3mx6m High Heat Load Shared Co-locating Container – AC PVC trunking Layout

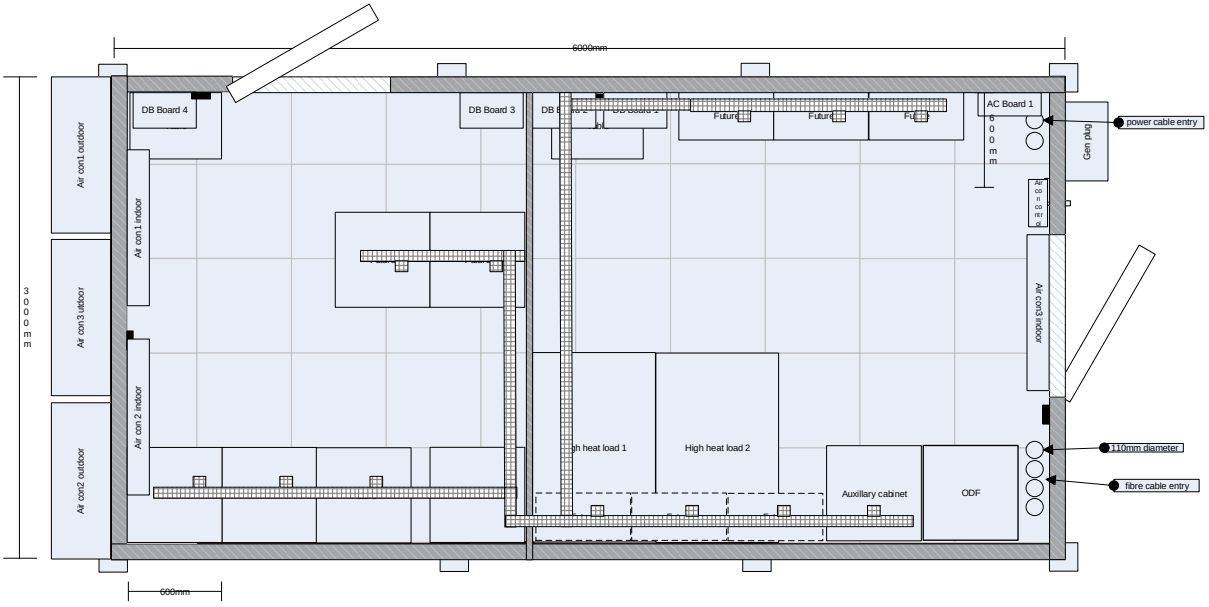


Figure E- 16: 3mx6m High Heat Load Shared Co-locating Container – Wire trunking Layout

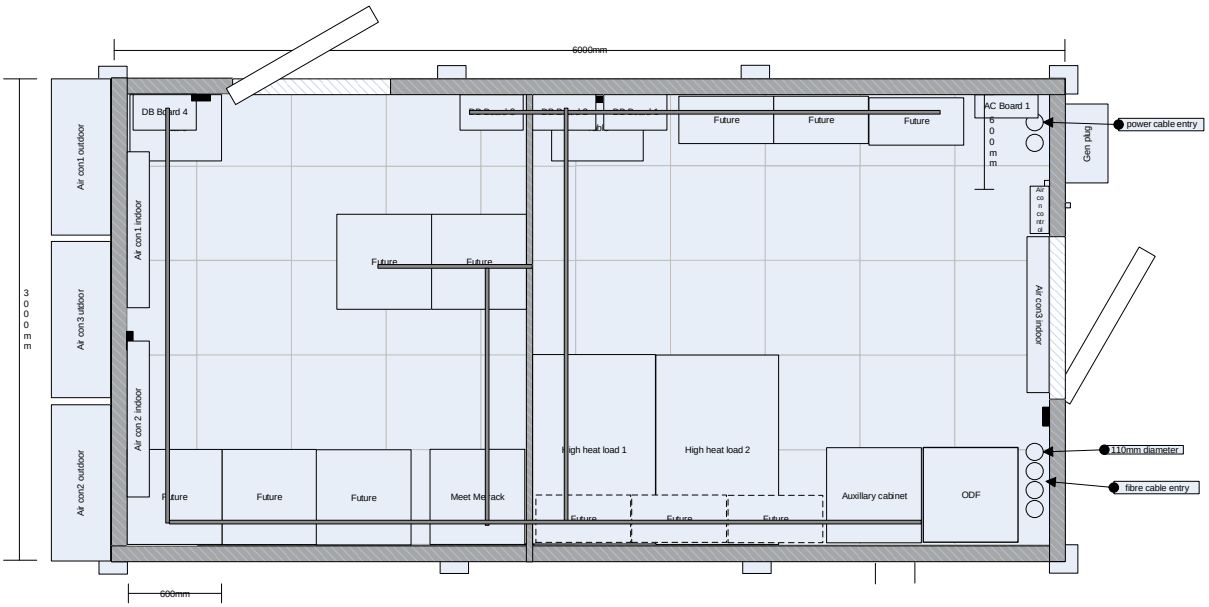


Figure E- 17: 3mx6m High Heat Load Shared Co-locating Container – Earth bar Layout

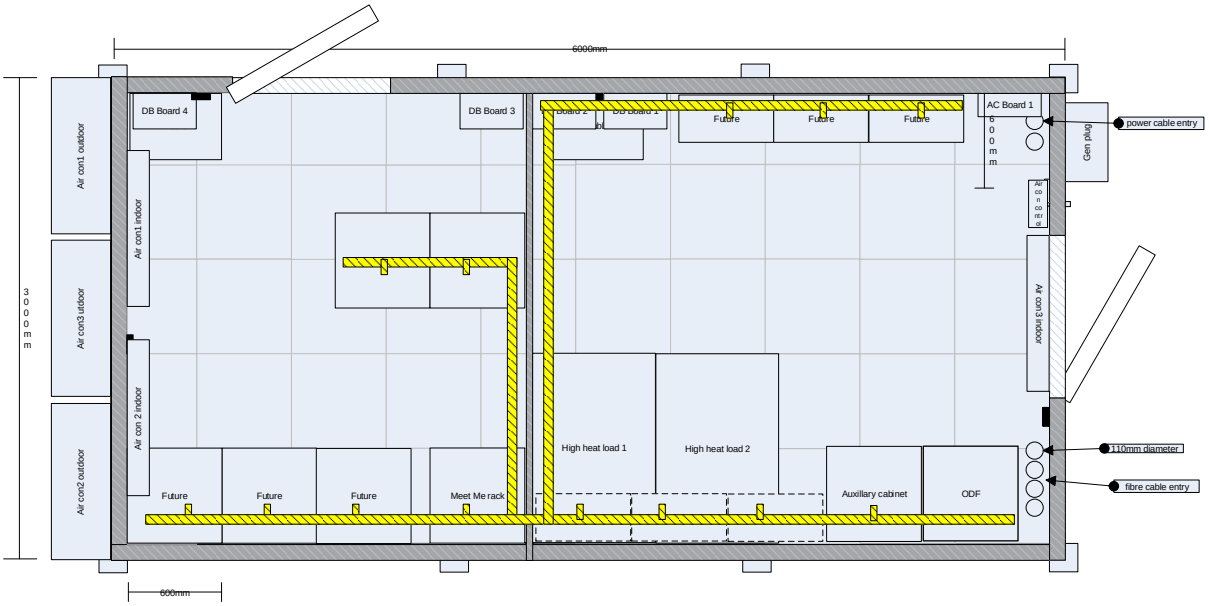


Figure E- 18: 3mx6m High Heat Load Shared Co-locating Container – Optical fibre Layout

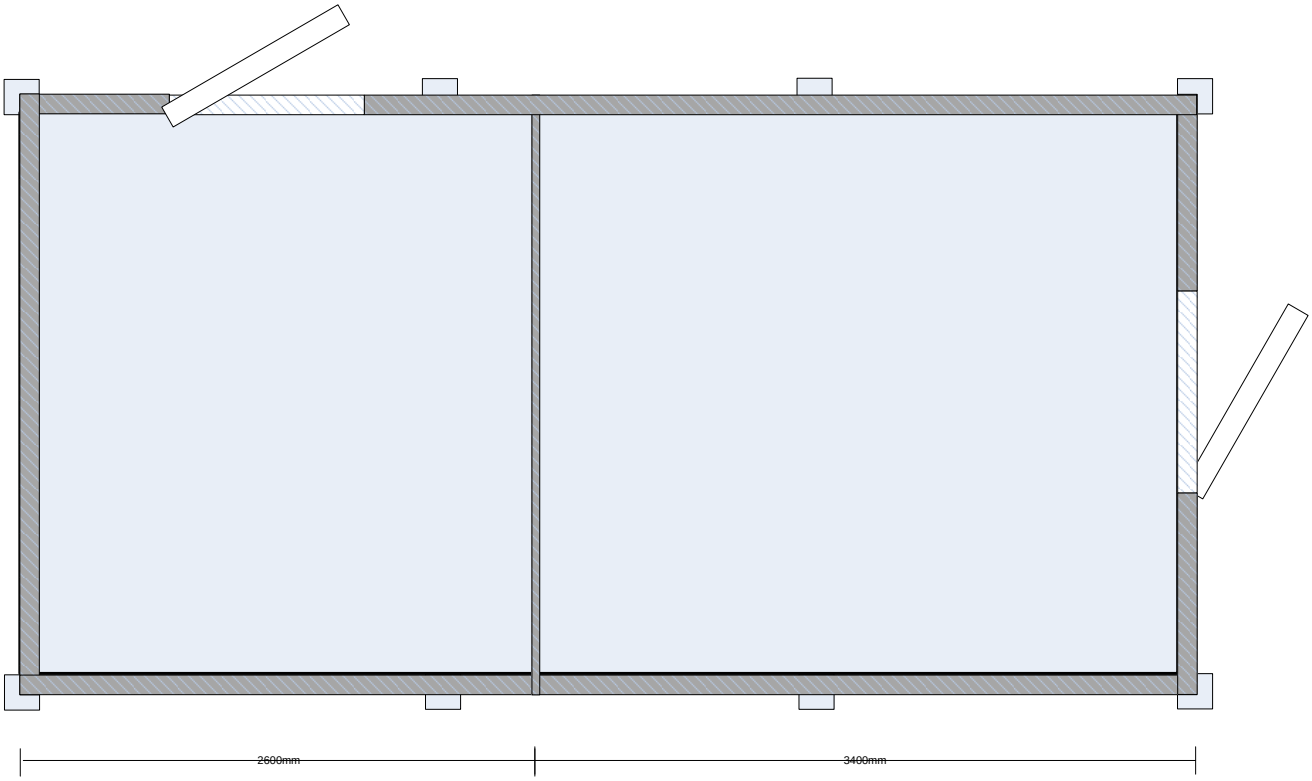


Figure E- 19: 3mx6m High Heat Load Shared Co-locating Container – Panel Layout

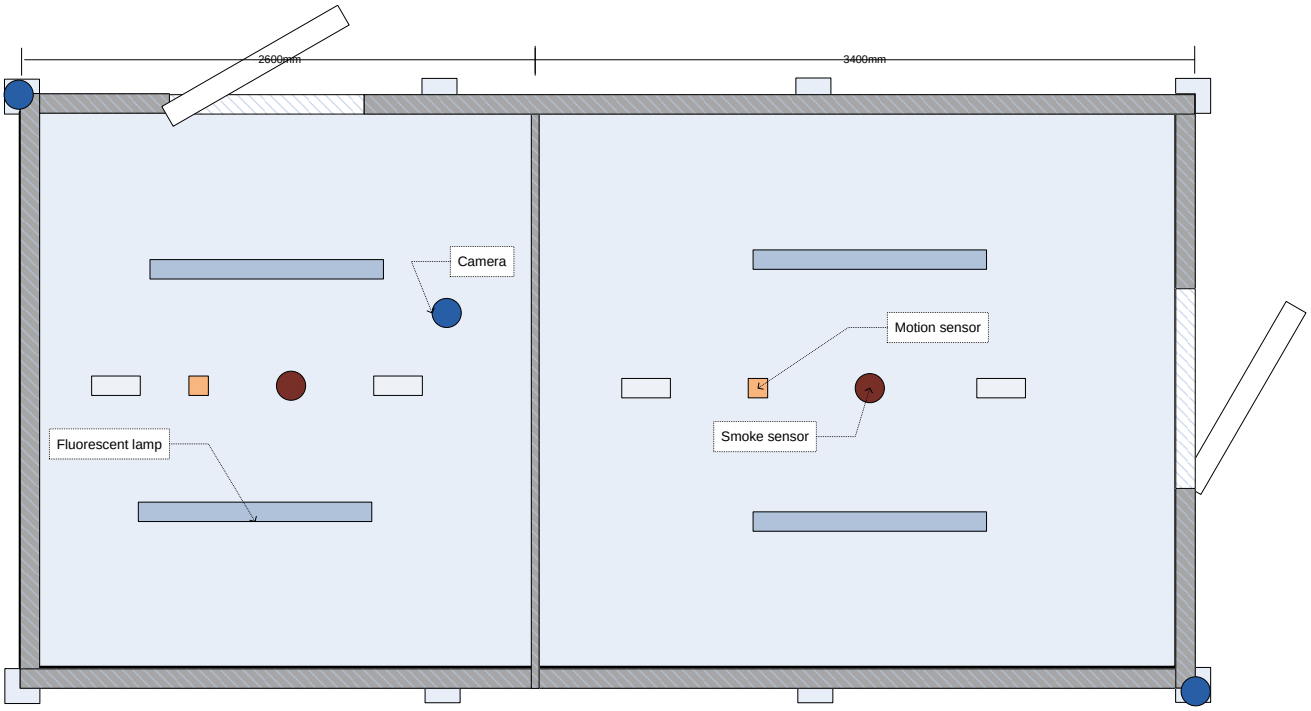


Figure E- 20: 3mx6m High Heat Load Shared Co-locating Container – Roof Layout

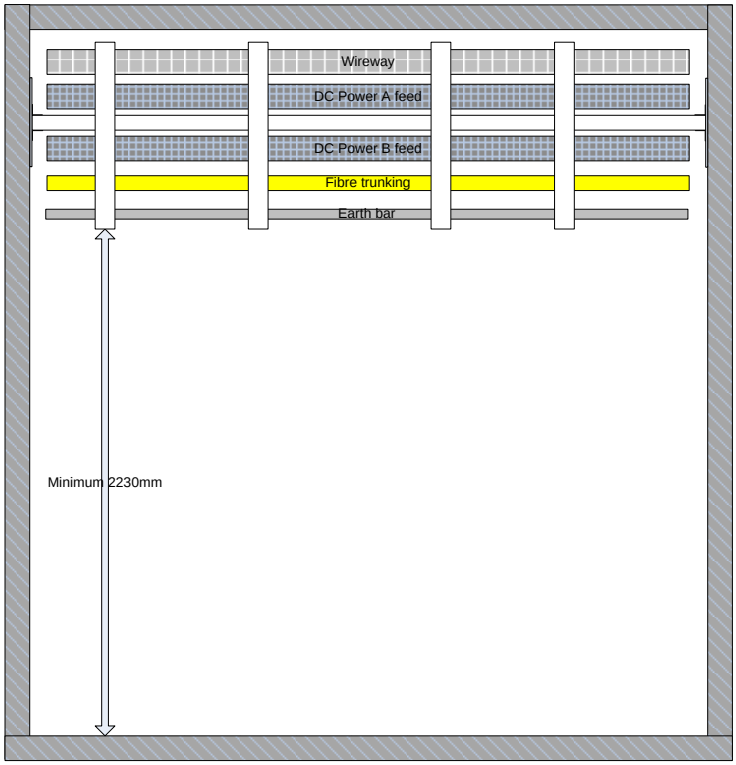


Figure E- 21: 3mx6m High Heat Load Shared Co-locating Container – Generic side view

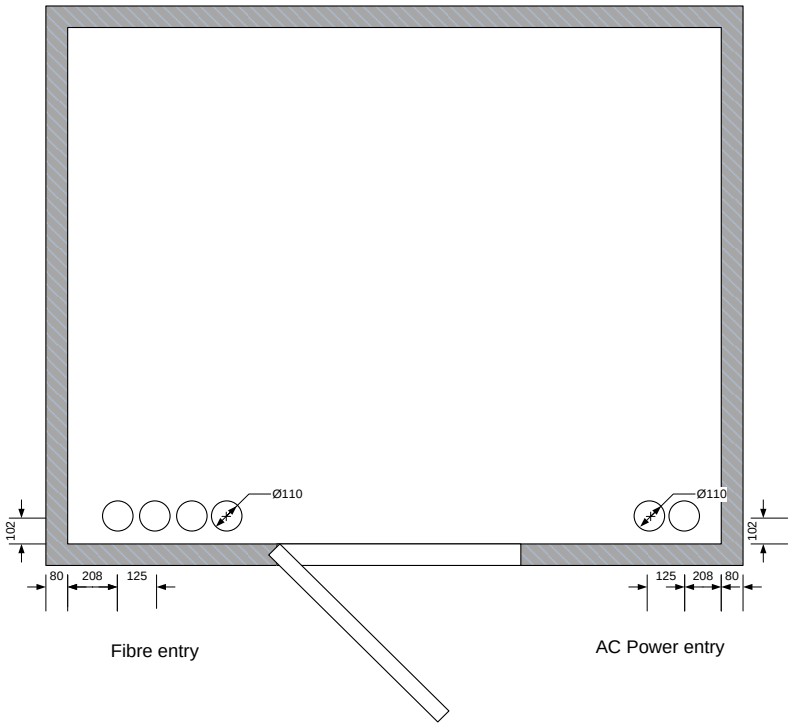


Figure E- 22: 3mx6m High Heat Load Shared Co-locating Container – Generic fibre and power entry

Note in the scenario of an existing site, the existing plinth the power and fibre entry may be slightly different and these positioning will be confirmed before manufacturing shall take place

ADDENDUM F: HIGH-LEVEL WIRING OF CONTAINERS

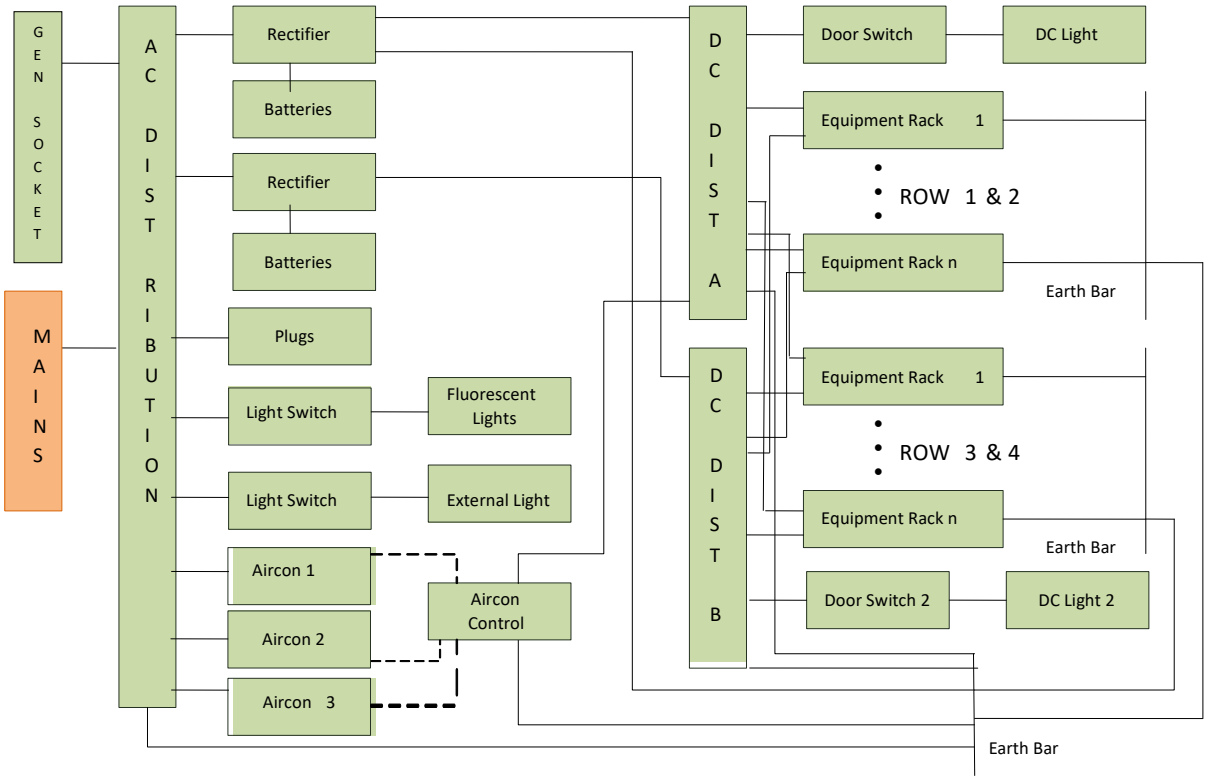


Figure F- 1: High-Level AC Interconnection Diagram for the various containers

Table E.1: AC Cabling Specification for 1-Phase Power Supply

Equipment A	Connector	Cable	Connector	Equipment B
Generator Connection Board		**35 mm² cable**		**AC Distribution Board**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**16 mm² cable**		**Rectifier**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	

Equipment A	Connector	Cable	Connector	Equipment B
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**2.5 mm² cable**		**AC Sockets**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Fluorescent Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch (Inside)**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
Light Switch (Inside)		**1.5 mm² cable**		**Fluorescent Light**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch (Outside)**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
Light Switch (Outside)		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**4 mm² cable**		**Aircon Control**
	Suitable connector required	Red	Suitable connector required	(repeat for each air conditioner)

Equipment A	Connector	Cable	Connector	Equipment B
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	

Table F.2: AC Cabling Specification for 3-Phase Power Supply (excluding 3mx 6m co-locating container and 3m x 6m shared co-locating container

Equipment A	Connector	Cable	Connector	Equipment B
Generator Connection Board		**35 mm^2 cable**		**AC Distribution Board**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**16 mm^2 cable**		**Rectifier**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	(per each rectifier)
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**2.5 mm^2 cable**		**AC Sockets**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector	

Equipment A	Connector	Cable	Connector	Equipment B
			required	
AC Distribution Board		**1.5 mm² cable**		**Fluorescent Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch (Inside)**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
Light Switch (Inside)		**1.5 mm² cable**		**Fluorescent Light**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch (Outside)**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
Light Switch (Outside)		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
AC Distribution Board		**4 mm² cable**		**Aircon Control**
	Suitable connector required	White	Suitable connector required	(One Air conditioner to be powered from white phase and one air conditioner o be powered from blue phase)
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Black (per each air conditioner)	Suitable connector required	
	Suitable connector required	Green / Yellow (per each air conditioner)	Suitable connector required	

Table F- 3: AC Cabling Specification for 3 x 6m co-locating-, 3m x 6m shared co-locating and 3m x 6m high heat load shared container

Equipment A	Connector	Cable	Connector	Equipment B
Generator Connection Board		**35 mm² cable**		**AC Distribution Board**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**16 mm² cable**		**Rectifier**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	(per each rectifier)
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**2.5 mm² cable**		**AC Sockets**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Black	Suitable connector required	
	Suitable connector required	Green / Yellow	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Fluorescent Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch 1 (Inside)**
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector	

Equipment A	Connector	Cable	Connector	Equipment B
			required	
Light Switch (Inside)		**1.5 mm² cable**		**Fluorescent Light 1**
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch 2 (Inside)**
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
Light Switch (Inside)		**1.5 mm² cable**		**Fluorescent Light 2**
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Black	Suitable connector required	
AC Distribution Board		**1.5 mm² cable**		**Light Switch (Outside)**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
Light Switch (Outside)		**1.5 mm² cable**		**Outside Light**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Yellow / Green	Suitable connector required	
AC Distribution Board		**4 mm² cable**		**Aircon Control**
	Suitable connector required	Red	Suitable connector required	(Each air conditioner to be powered from a different phase)
	Suitable connector required	White	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	
	Suitable connector required	Black (per each air conditioner)	Suitable connector required	

Equipment A	Connector	Cable	Connector	Equipment B
	Suitable connector required	Green / Yellow (per each air conditioner)	Suitable connector required	

(a) DC Power Interconnection Specification

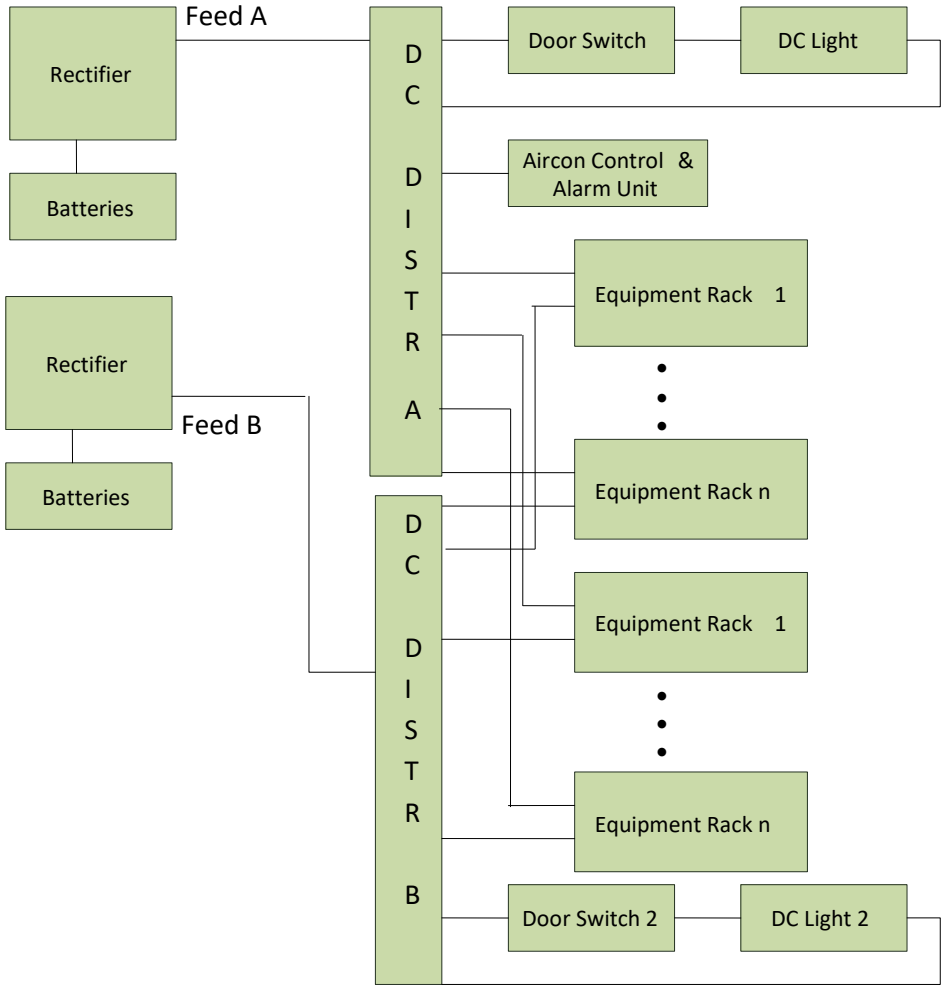


Figure F- 2: DC Interconnection Diagram for the various containers

Table E- 4: DC Cabling Specification for all containers

Equipment A	Connector	Cable	Connector	Equipment B

Equipment A	Connector	Cable	Connector	Equipment B
Rectifier 1		**35 mm² /50 mm² cable**		**DC Distribution Board A**
	Suitable connector required	Blue (for -)	Suitable connector required	Per each feed
		35 mm² 50 mm² cable		
	Suitable connector required	Red (for +)	Suitable connector required	
Rectifier 2		**35 mm² /50mm² cable**		**DC Distribution Board B**
	Suitable connector required	Blue (for -)	Suitable connector required	Per each feed
	Suitable connector required	Blue (for -)	Suitable connector required	
DC Distribution Board		**1.5 mm² cable**		**DC Light**
	Suitable connector required	Red	Suitable connector required	
DC Distribution Board		**1.5 mm² cable**		**Door Switch**
	Suitable connector required	Blue	Suitable connector required	
Door Switch		**1.5 mm² cable**		**DC Light**
	Suitable connector required	Blue	Suitable connector required	
DC Distribution Board		**1.5 mm² cable**		**Alarm System**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	
DC Distribution Board		**25 mm² cable**		**Equipment Rack**
	Suitable connector required	Red	Suitable connector required	
	Suitable connector required	Blue	Suitable connector required	

(b) Earthing Interconnection Specification

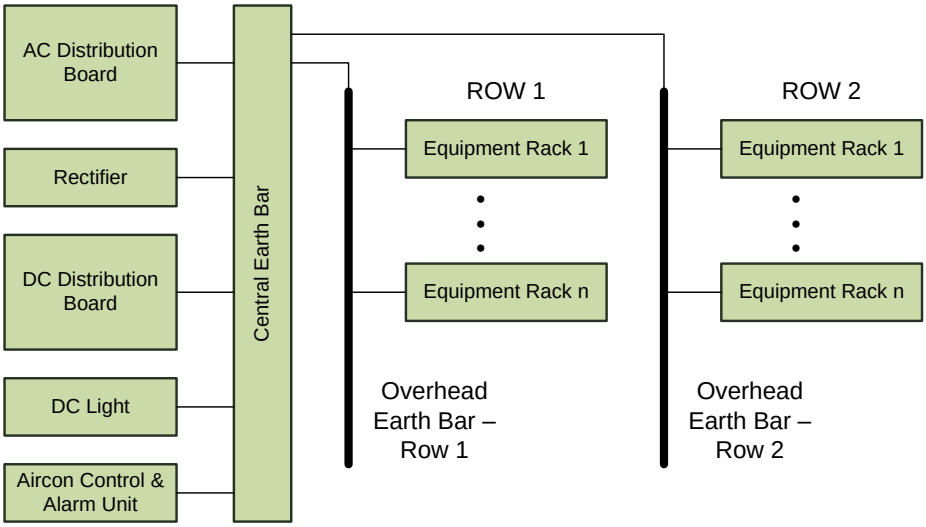


Figure F- 3: Earthing Interconnection Diagram for the various containers

Table E 5: Earthing Cabling Specification for the containers

Equipment A	Connector	Cable	Connector	Equipment B
Central Earth Bar		**25 mm2 cable**		**AC Distribution Board**
	Suitable connector required	Green / Yellow	Suitable connector required	
Central Earth Bar		**16 mm² cable**		**Rectifier**
	Suitable connector required	Green / Yellow	Suitable connector required	
Central Earth Bar		**16 mm² cable**		**DC Distribution Board**
	Suitable connector required	Green / Yellow	Suitable connector required	
Central Earth Bar		**4 mm² cable**		**DC Light**
	Suitable connector required	Green / Yellow	Suitable connector required	
Central Earth Bar		**4 mm² cable**		**Aircon Control**
	Suitable connector required	Green / Yellow	Suitable connector required	
Central Earth Bar		**70 mm² cable**		**Overhead Earth Bar**
	Suitable connector required	Green / Yellow	Suitable connector required	
Overhead Earth Bar		**16 mm² cable**		**Equipment Rack**
	Suitable connector required	Green / Yellow	Suitable connector required	

ADDENDUM G: SCHEDULE OF COMPLIANCE/NON-COMPLIANCE/INFORMATION

Technical Requirements		
Specification	Fully compliant/Non-compliant/ Noted	Comments (if applicable)
6.1 Container shell		
6.1.1		
6.1.2		
6.1.3		
6.1.4		
6.1.5		
6.1.6		
6.1.7		
6.1.8		
6.1.9		
6.1.10		
6.1.11		
6.1.12		
6.1.13		
6.1.14		
6.1.15		
6.1.16		
6.1.17		
6.1.18		
6.1.19		
6.1.20		

6.2 Co-locating containers partitioning		
6.2.1		
6.2.2		
6.2.3		
6.3 AC Distribution board		
6.3.1		
6.3.2		
6.3.3		
6.3.4		
6.3.4.a		
6.3.4.a		
6.3.4.a		
6.3.5		
6.3.5.a		
6.3.5.a		
6.3.6		
6.3.7		
6.3.8		
6.3.1 Type A: AC Distribution board - 3 phase Power		
6.3.1.1		
6.3.1.2		
6.3.1.3		
6.4 DC distribution board		

6.4.1		
6.4.2		
6.4.3		
6.4.4 Earthing		
6.4.5 Protective coating		
6.4.6 Labelling		
6.4.6.1		
6.4.6.1.a		
6.4.6.1.b		
6.4.6.1.c		
6.4.6.1.d		
6.4.6.1.d.i		
6.4.6.1.d.i.1		
6.4.6.1.d.i.2		
6.4.6.1.d.ii		
6.4.6.2		
6.4.6.3		
6.4.7. Single Feed Boards		
6.4.7.1		
6.4.7.2		
6.4.7.2.a		
6.4.7.2.b		
6.4.7.2.c		
6.4.7.2.d		
6.4.7.2.e		

6.4.7.2.e		
6.4.7.3		
6.4.7.4		
6.4.7.5		
6.4.7.6		
6.4.8 Type 1: DC Distribution board		
6.4.8.1		
6.4.9 Type 2: DC Distribution board		
6.4.9.1		
6.4.9.2		
6.4.10 Type 3: DC Distribution board		
6.4.10.1		
6.5 Materials and components		
6.5.1		
6.5.2		
6.5.2.a		
6.5.2.b		
6.5.2.c		
6.6. Accreditation of assemblies		
6.6.1		
6.7 Surge Protection		
6.7.1		
6.7.2		

6.7.3		
6.7.4		
6.7.5		
6.7.6		
6.7.6.i		
6.7.7		
6.7.8		
6.7.9		
6.7.10		
6.8. Circuit Breakers		
6.8.1		
6.9 Switch disconnector/on-load isolators		
6.9.1		
6.9.2		
6.10 Generator Connection Box		
6.10.1		
6.10.2		
6.10.3		
6.10.4		
6.10.5		
6.10.6		
6.10.7		
6.10.8		
6.11 Earthing		
6.11.1		

6.11.2		
6.11.3		
6.11.4		
6.11.5.a		
6.11.5.b		
6.11.6		
6.12 Ducting		
6.12.1		
6.12.2		
6.12.3.a		
6.12.3.b		
6.12.3.c		
6.12.3.d		
6.12.4		
6.12.4.a		
6.12.4.b		
6.12.4.c		
6.12.4.d		
6.13 Air conditioners		
6.13.1		
6.13.2		
6.13.3		
6.13.4		
6.13.5		
6.13.6		
6.13.7		

6.14 DC extractor fans and inlet louvers		
6.14.1		
6,14.2		
6.14.2.a		
6.14.2.b		
6.14.2.c		
6.14.3		
6.14.4		
6.14.5		
6.14.6		
6.14.7		
6.15 High Heat Load Container Positions		
6,15.1		
6,15.2		
6,15.3		
6,15.4		
6.16 Lights and Sockets		
6.16.1 AC lights		
6.16.1.1.		
6.16.1.2		
6.16.1.3		
6.16.1.4		
6.16.1.5		
6.16.2 DC Lights		

6.16.2.1		
6.16.2.2		
6.16.2.3		
6.16.2.4		
6.16.2.5		
6.16.3 AC Sockets Outlets		
6.16.3.1		
6.16.3.2		
6.16.3.3		
6.17 Additional Security		
6.17.1.1		
6.17.1.2		
6.17.1.3		
6.17.1.4		
6.17.1.5		
6.17.1.6		
6.18 Cabling		
6. 18.1		
6. 18.1.a		
6. 18.1.b		
6. 18.2		
6.19 General Items		
6.19.1		
6.19.2		
6.19.3		

6.19.4		
6.19.5		
6.19.6		
6.19.6.a		
6.19.6.b		
6.19.6.c		
6.19.6.d		
6.19.7		
6.19.8		
6.19.8.a		
6.19.8.b		
6.19.8.c		
6.19.8.d		
6.19.8.e		
6.19.8.f		
6.19.8.g		
6.19.9		
6.19.9.a		
6.19.9.b		
6.19.9.c		
6.19.9.d		
6.19.10		
6.19.11		
6.20. Additional Items		
6.20.1		
6.20.1.a		

6.20.1.b		
6.20.2		
7 EAS, Rectifiers and Batteries		
7.1.1		
7.1.2		
7.1.3		
7.1.4		
8 Delivery and Inspection		
8.1		
8.1.2		
8.1.3		
8.1.4		
8.1.5		
9 Warrantee		
9.1.1		
9.1.2		

---End of Addenda---