

Company Directive

STANDARD TECHNIQUE: SD5C/3

Relating to Low Voltage Connections to Multiple Occupancy Buildings

Policy Summary

This document specifies the requirements for LV connections to multi-occupancy buildings including flats and commercial buildings.

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Implementation Date:	July 2018
Approved by:	
	Policy Manager
Date:	

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IMPLEMENTATION PLAN

Introduction

This document specifies the requirements for connections to multi-occupancy buildings.

Main Changes

Information regarding the earthing arrangement label (SNE derived from a CNE network) added to section 4.5 – Earthing.

Impact of Changes

The changes are relevant to all staff involved with the design, and installation of connections to multi-occupancy buildings.

Implementation Actions

Managers responsible for staff involved in the design and installation of connections to multi-occupancy buildings shall brief them on the changes introduced by this document.

Implementation Timetable

This policy is implemented with immediate effect.

1.0 REVISION HISTORY

Document Revision & Review Table		
Date	Comments	Author
July 2018	<ul style="list-style-type: none"> • Earthing section updated to include earth arrangement label (SNE derived from a CNE network) and ordering details. • Arrangement diagram notes updated to reflect provision of new earthing label. 	S Davies
July 2017	<ul style="list-style-type: none"> • Additional Fire Safety information included in section 4.8 and Appendix A&B. 	A Hood
18/04/2016	<ul style="list-style-type: none"> • The requirement in the previous issue of this document (i.e. clause 3.4.3.2 in ST:SD5C) for the cross sectional area of the earth conductor to be equal in all incoming cables, has been removed • Clause 3.4.5.1 has been altered to provide clarification • Clause 3.4.5.2 has been altered to provide clarification. • Clause 4.2.1.1 has been altered to provide clarification • Clause 4.2.2.1 has been modified to align with WPDs losses strategy • Clause 4.2.2.2 and 4.2.2.3 have been modified to clarify the requirements for mains cable ducts • The bonding cable requirements specified in Clause 4.5.5 and Figure 22 have been modified • Figure 4 and Figure 5 have been modified to clarify the requirements for mains cable ducts • Mains cable entry arrangements (Figure 4 and 5) have been modified to show duct requirements • Distribution board arrangements (Figure 6 to 17) have been amended to show incoming cable sizes 	S. Treasure / A. Hood
29/01/2014	<ul style="list-style-type: none"> • References to ST:TP21P have been removed and replaced with ST:TP21E • References to ST:TP21D and ST:TP21E have been added to Appendix B 	A. Hood
14/01/2014	<ul style="list-style-type: none"> • Clause 3.4.4.3 that required the earth conductor rating of multiple incoming cables to be identical has been removed. This requirement was deemed to be impractical • Clause 3.4.5.1 has been modified to allow existing CNE type and existing non-LSF type cables to be retained where single occupancy buildings are converted to multi-occupancy • Clause 4.5.6 has been amended to allow SNE and CNE connections to be mixed in a single building under certain circumstances 	A Hood

2.0 INTRODUCTION

2.1 This document specifies WPDs requirements for the LV connection of multi-occupancy buildings. HV connection requirements are out of scope of this document. It is based on ENA Engineering Recommendation [G87](#).

2.2 Installers, developers, Independent Connection Providers (ICPs) and Independent Distribution Network Operators (IDNOs) may obtain a copy of G87 from the Energy Networks Association.

2.3 Building Network Operators

2.3.1 G87 introduces the concept of a Building Network Operator (BNO), the organisation that owns or operates the electricity distribution network within a multiple occupancy building, between the intake position and the customer installations.

2.3.2 The BNO may be a licensed Electricity Distributor (i.e. an IDNO) or an unlicensed Electricity Distributor as allowed for in the Electricity Act 1989 (as amended by the Utilities Act 2000) and in The Electricity (Class Exemptions from the Requirement for a License) Order 2001.

2.3.3 Further guidance on licensing requirements for BNOs is included in ER G87 and in section 4.1 of this document.

3.0 DESIGN REQUIREMENTS

3.1 General

3.1.1 This document shall be read in conjunction with ST:SD5A which specifies the general requirements for LV network design and ST:SD6B which specifies the requirements for large LV connections.

3.2 Load Estimates

3.2.1 For domestic connections, load estimates shall be carried out in accordance with ST:SD5A.

3.2.2 For commercial / industrial connections the customer / developer / installer shall specify their load requirements. The following ADMD values are typical:

- Small shop: 8kW
- Café / restaurant: 15kW
- Take away: 20kW
- Church (with infra-red heating): 50kW
- Beauty salon / tanning shop: 10kW
- Pub / bar: 20kW to 120kW (depending on size)
- Garage / workshop: 30kW (also consider welders and compressor motors)
- Village store / small supermarket: 20kW
- Small hotel / guest house: 20kW
- Small office: 20kW
- Residential care / nursing home: 100kW (but consider lift motors, heating etc.)

3.3 Voltage Limits

- 3.3.1 The maximum voltage drop and voltage rise values are specified in ST:SD5A. These values must be satisfied at the Supply Terminals (i.e. the terminals of the cut-out, multi-service distribution board or BNO switchgear adjacent to the Customer metering).
- 3.3.2 Where a BNO owns the network between WPDs equipment and the supply terminals WPD shall agree the maximum voltage drop and, where applicable, the maximum voltage rise, at the BNO / WPD interface. Typically up to 1.5% voltage drop and 0.25% voltage rise may be allowed across the BNO network.

3.4 Connection Arrangements

- 3.4.1 The three basic methods for providing connections to multi-occupancy buildings are described below:

3.4.2 Option 1; individual services originating from outside of the building

- 3.4.2.1 Each connection within the building is supplied from a dedicated service cable that originates from outside of the building. This arrangement is only applicable to single storey or two storey buildings where cable access can be afforded easily from the exterior of the building to the metering point at each individual premise. Services shall be accessible at all times and shall not be routed through parts of the building owned by other customers. This arrangement is shown in Figure 1.

3.4.3 Option 2; services originating at an intake position

- 3.4.3.1 Individual connections are distributed from an intake position located on the same floor that the cables enter building. This option is only suitable for single storey or low-rise building where:

- cable access can be afforded easily between the intake position and the metering, or;
- communal metering is installed at the intake position.

- 3.4.3.2 There are three possible versions of this arrangement (shown in Figure 2A, 2B and 2C) depending on the position of the metering and whether or not the BNO owns the incoming distribution board. Where the developer requires metering to be installed within individual properties, the distribution board and the risers shall be owned, operated and maintained by a BNO.

- 3.4.3.3 Normally only one intake position (e.g. intake room) is provided.

3.4.4 Option 3; services originating at a point within a building network

- 3.4.4.1 This arrangement is similar to Option 2 but in this case distribution boards are installed in several positions within the building, all of which are supplied from the intake position.

3.4.4.2 Four versions of this arrangement exist, depending on the position of the metering, and the number of incoming cables. These variations are shown in Figure 3A, 3B, 3C and 3D.

3.4.5 Building Conversions

3.4.5.1 Where a building is converted from single occupancy to multi-occupancy the requirements of this document shall be applied in full, with the following exception:

- Existing WPD owned Combined Neutral and Earth (CNE) incoming cables that are adequately rated may be retained, irrespective of whether they are meet the low smoke and fume requirements (defined in section 4.2) or not. For the avoidance of doubt, any additional and replacement incoming cables, shall comply with the full requirements of this document.

3.4.5.2 Where more than one premises within a building is combined together to form a single premises (owned by a single customer) the connection arrangement shall be re-assessed with a view to providing just one connection to the new premises. Where it is not reasonably practicable to provide a single connection, the wiring within the premises and any metal clad equipment (i.e. Class I equipment) shall be physically segregated to minimise the risk of the multiple connections being paralleled and to prevent hazardous touch potentials.

3.5 **Fire-fighting and other Standby Connections**

3.5.1 BS 9999, the code of practice for fire safety in the design, management and use of buildings, requires certain high rise buildings to have dedicated lifts and stairs for use by fire fighters. A second standby electrical supply must be provided for such facilities. This standby supply should be provided by a standby generator that is owned, operated and maintained by the owner of the building.

3.5.2 WPD should not provide fire-fighting or standby connections to multi-occupancy buildings as it cannot guarantee that these connections will be available when required. WPD's position aligns with the guidance in ENA Engineering Recommendation G87.

4.0 **INSTALLATION REQUIREMENTS**

4.1 **Intake / Meter Positions**

4.1.1 The requirements for the intake and metering positions shall be considered at an early stage of the building design and shall be agreed by WPD. Intake and metering positions shall:

- include sufficient space to enable WPD's equipment and also any equipment owned by the Meter Operator and / or BNO to be installed, maintained and replaced. The precise space requirements depend on the type of equipment that is to be installed.

- be easily accessible, kept free from obstructions and be well lit. It is not acceptable for the intake / meter positions to be located within a storage room or a broom cupboard;
- not be a confined space, as defined in the Confined Spaces Regulations 1997. For completeness the definition of a confined space is also reproduced below:

“confined space” means any place, including any chamber, tank, vat, silo, pit, trench, pipe, sewer, well or similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk”.

“specified risk” means a risk of –

(a) serious injury to any person at work arising from a fire or explosion;

(b) without prejudice to paragraph (a)-

(i) the loss of consciousness of any person at work arising from an increase in body temperature;

(ii) the loss of consciousness or asphyxiation of any person at work arising from gas, fume vapour or lack of oxygen;

(c) the drowning of any person at work arising from an increase in the level of liquid; or

(d) the asphyxiation of any person at work arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid”.

- include an adequate means of escape;
- be located inside a building or enclosure that is weatherproof, dry and naturally ventilated. It is not acceptable for intake positions or meter positions to be placed within toilets, bathrooms saunas, steam rooms etc.;
- have an ambient temperature normally between 5°C and 20°C and not exceeding 30°C. It is not acceptable for intake positions or meter positions to be located within cupboards or small rooms with a significant heat source (e.g. boiler, immersion heater etc);
- comply with all relevant regulations including Buildings Regulations and Fire Safety Regulations.
- not be placed where there is a significant risk of them being damaged or vandalised.

4.1.2 Electrical equipment shall be segregated from gas meters by at least 300mm and from gas pipes by at least 25mm.

4.1.3 Intake positions shall be located at ground level close to the point of entry of the incoming cable and consistent with maintaining an adequate bending radius for the cable.

4.1.4 Settlement metering may be installed within communal positions or at individual premises within the building. The metering / cut-out position must be installed between 0.5m and 1.8m above the finished floor level, in accordance with the Meter Operation Code of Practice Agreement (MOCOPA).

4.1.5 Settlement metering must be accessible to the customer. It is not acceptable for the metering for one connection to be located in part of a building that is owned (or is likely to be owned) by a different customer.

4.1.6 The wall on which Western Power Distribution's equipment and the meter operator's equipment is fixed shall be suitable for fixing and supporting the weight of this equipment. Where CT metering or a multi service distribution board is to be installed the wall shall be constructed from solid masonry (i.e. brick or block construction) and shall not be a lightweight (e.g. hollow) partition wall. Where whole current metering is to be installed the customer / developer shall securely fix suitable boarding (e.g. chipboard or plywood) to the back wall of the service / metering area so that meters and cut-outs can be easily screwed to this boarding.

4.1.7 Whole Current Metering

4.1.7.1 For whole current metering (typically rated up to 80A) the following wall space shall be dedicated to, and retained for, the metering equipment. No other equipment shall be installed within this space.

- 400mm high x 400mm wide (single phase) per customer connection.
- 400mm high x 500mm wide (three phase or split phase) per customer connection.

4.1.7.2 Additional space shall be provided for the BNO's equipment and cables and for Meter Operator's cables. Typical requirements for communal whole current metering and multi service distribution boards are given in Figure 6 to 18.

4.1.8 CT Metering

4.1.8.1 Minimum space requirements for CT metering are defined in Figure 4 and 5.

4.2 **Cable and Cable Entry Requirements**

4.2.1 General

4.2.1.1 New and replacement cables shall be SNE (separate neutral and earth) type. New WPD cables installed inside multi-occupancy residential buildings (i.e. flats) shall be low smoke and fume (LSF) type. In this context, external meter cabinets and similar enclosures fitted outside of the building are not considered to be inside the building.

4.2.2 Mains Cables and Mains Cable Entries

4.2.2.1 In accordance with WPD's losses strategy new incoming mains cables for multi-occupancy buildings shall be 185mm² or 300mm² wavecon, except where a mains cable connects to a 10 way MSDB. In this case 95mm² 4c wavecon is used instead.

- 4.2.2.2 Mains cables entering the building shall be installed within black uPVC smooth walled ducts with a minimum internal diameter of 125mm² and marked “Danger Electricity”. The duct shall originate immediately outside the building and end within a suitable draw pit inside the building, immediately below the meter / intake position. See Figure 4 for further information.
- 4.2.2.3 Where 95mm² 4 core wavecon cable is used, a slow bend duct may be used instead of the draw pit arrangement described above. Where this is the case, a black uPVC smooth walled duct with a minimum internal diameter of 150mm², marked with “Danger Electricity” shall be used. This arrangement is only suitable for a 10 way MSDB (in accordance with 4.2.2.1).
- 4.2.2.4 A draw cord shall be placed within each duct to enable the cables to be pulled through the duct. The maximum continuous length of duct shall be 10m. Where longer lengths are required then additional draw pits shall be installed at intervals of 10m (or less).
- 4.2.2.5 The minimum bending radii for mains cables are specified in Table 1.

Table 1 Minimum Bending Radii for Mains Cables

Cable Type	Minimum Bending Radius (mm)	
	Pulling In	Adjacent to Joints / Terminations
95 Wavecon	650	510
185 Wavecon	850	680
300 Wavecon	950	820

4.2.3 Service Cables and Service Cable Entries

- 4.2.3.1 Service cables used within multi-occupancy buildings that are owned, or will be adopted by WPD shall be either 25mm² or 35mm² copper split concentric type. WPD service cables shall be installed within black alkathene ducts with an internal diameter of 38mm, where they enter the building. Adequate access to service cables shall be provided to facilitate the installation and future replacement of the cables.

4.2.4 Solidal Cable Entries

- 4.2.4.1 The requirements for solidal cable entries are defined in ST:SD6B.

4.3 **Cable Risers and Laterals**

- 4.3.1 With the exception of Option 1, risers and laterals are owned, provided and maintained by the BNO.
- 4.3.2 Risers and laterals shall be designed, installed and maintained in accordance with BS8313 (code of practice for the accommodation of building services in ducts), BS9999 (code of practice for fire safety in the design, management and use of buildings) and, where appropriate, BS7671 (IET wiring regulations). Further guidance on BS9999 is included in section 4.8. Note, in BS8313 the term “duct” refers to a “space formed for the passage of cables, pipes etc.” whereas in the rest of this document it refers to a tube.

4.3.3 In addition to the requirements of BS8313, the housing / trunking for WPD owned cables shall satisfy the following requirements:

- Cables shall be easily accessible for the lifetime of the building. Each cable shall only be installed in communal areas of the building and within the individual premises it supplies. Cables shall not be routed through other premises within the building.
- Cable routes shall be as short as practical. Voltage drop considerations typically restrict service cables to 30m in length.
- Sufficient space shall be provided within the housing / trunking to allow cables to be replaced easily. At least 15% additional space shall be allowed for future additions.
- It shall be possible to access / replace the cables without removing other cables or services.
- The minimum distance between the outer surface of any cable and any obstruction shall be 25mm.
- Cables / cable ducts shall not be run in wall / partition cavities or in lift wells.
- Cables shall not be run in the same housings / trunking as other services or sources of heat.
- Cables shall be protected from accidental or malicious damage.
- Provision shall be made for thermal expansion of the cables.
- Sufficient ventilation and space shall be provided to ensure the cables do not overheat.
- The provision of ventilation shall not impair the building's resistance to fire.
- Each cable shall be marked with the relevant property number at each end and at all additional access points within the building.
- Cables shall be secured using appropriate cleats / fixings.

4.4 Cable Ratings

4.4.1 WPD cable ratings are specified in ST:SD8B. Where WPD cables are installed within ducts the appropriate duct rating shall be applied. Standard de-rating factors must be applied to the duct ratings where more than one cable is installed in the vicinity.

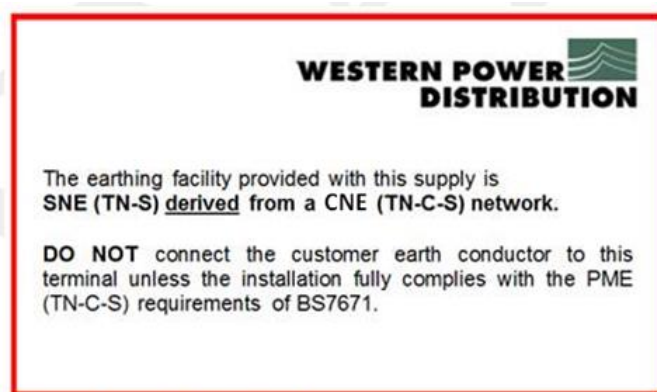
4.4.2 Table 2, which is derived from the 17th Edition of BS7671 (IET Wiring Regulations), specifies the maximum rating of WPD cables enclosed within risers or laterals.

Table 2 Current Rating (A) for Cables used within Risers / Laterals

Cable Type	Number of cables within the same riser / lateral										
	1	2	3	4	5	6	7	8	9	12	16
25mm ² CU split-concentric, 1ph	119	95	83	77	71	67	64	61	-	-	-
25mm ² CU split-concentric, 3ph	105	84	73	68	63	60	-	-	-	-	-
*35mm ² CU split-concentric, 1ph	146	116	102	95	87	83	78	76	73	65	60
*35mm ² CU split-concentric, 3ph	128	102	89	83	76	72	69	66	64	-	-
95mm ² 4 core wavecon	188	150	131	122	112	107	101	-	-	-	-
185mm ² 4 core wavecon	272	217	190	176	163	155	146	141	136	122	111
300mm ² 4 core wavecon	364	291	254	236	218	207	196	189	182	163	149

4.5 Earthing

- 4.5.1 WPD's requirements for HV and LV system earthing are specified in ST:TP21D. The customers and/or the BNO will be given the option to use WPD's earth terminal where it is safe to do so. The requirements and restrictions on the provision of earth terminals are defined in ST:TP21E.
- 4.5.2 Figure 19, 20, 21 and 22 show the requirements for earthing / bonding within multi-occupancy buildings.
- 4.5.3 New (and replacement) incoming cables to multi-occupancy buildings shall be separate neutral and earth (SNE) type.
- 4.5.4 Where the BNO / customer is given access to, and uses a WPD earth terminal, their bonding shall satisfy the requirements for PME (TN-C-S). This is because the SNE earth terminal is normally derived from a combined neutral and earth (CNE) network. See table 3 for details.
- 4.5.5 An earth arrangement label (SNE derived from a CNE network) shall be displayed in a prominent position on or near the cable termination (order reference WPD/W400134). Labels can be ordered from Latcham Direct Ltd via [WPD Contiki](#).



Order reference WPD/W400134

- 4.5.6 Where more than one incoming cable is provided within the same intake room the earth terminals of each of the incoming cut-outs, distribution boards or circuit breakers as applicable, shall be connected together using insulated copper earthing cable. The cross-sectional area of this cable shall, as far as reasonably practicable, be equal or greater than the copper equivalent cross-sectional area of the earth conductor within the largest incoming cable. Where different cut-out sizes are used and it is not possible to terminate the required cable to the incoming earth connection of the smaller cut-out/s, the size of the bonding conductor shall be reduced to the largest acceptable size for the smaller cut-out/s. Further information is included in Table 3.

* 35mm² copper split concentric cable is not a WPD stock item.
If this cable is required please contact the cable Policy Engineer.

Table 3 Minimum Cross-sectional Area of Earthing Cables and Bonding Cables

Incoming Cable Type	Minimum Earth Conductor Size for Interconnecting between WPDs Earth Terminals	Minimum Conductor Size for Customer's Main Protective Bonding Conductors (i.e. TN-C-S requirements)
25mm ² copper split concentric	16mm ² (copper)	10mm ²
35mm ² copper split concentric	16mm ² (copper)	10mm ²
95mm ² 4 core wavecon	70mm ² (copper)	25mm ²
185mm ² 4 core wavecon	120mm ² (copper)	50mm ²
300mm ² 4 core wavecon	120mm ² (copper)	50mm ²
Solidal Cables (SNE arrangement)	240mm ²	50mm ²

4.5.7 Where a single occupancy building is converted to a multi-occupancy building the earthing / bonding requirements specified in this document shall be satisfied by all the connections to the building (including any existing ones). In addition, different connections to the building should, utilise the same type of earthing, with the following exception:

- It is acceptable to mix existing “PME connections” with “SNE connections derived from a CNE network” since both these arrangements are considered to be a form of TN-C-S.

4.6 Protection

4.6.1 WPD shall provide a MSDB, cut-out or circuit breaker (e.g. MCCB) at the intake position, close to where the incoming cable enters the building. The associated fuses or circuit breaker settings shall be just above the agreed supply capacity for the premises and shall be capable of operating within 5s for solid faults at the outgoing terminals (Customer / BNO side of WPDs equipment).

4.6.2 WPD service cables (i.e. 25mm² and 35mm² copper split concentric cables) shall be protected against overload by fuses installed within associated cut-out or multi-service distribution board. The selected fuse rating shall be not be greater than the service cable rating, taking account of the installation method and proximity to other cables (see Table 2).

4.6.3 Note, the standard cut-out fuse rating used by WPD is 80A; however, this may be varied as long as the above criteria are satisfied.

4.7 Building Network

The Building Network Operator is responsible for design, installation and maintenance of the building network. The building network shall satisfy the requirements of Buildings Regulations, BS7671 (IET Wiring Regulations), BS8313 (code of practice for the accommodation of building services in ducts) and BS9999 (code of practice for fire safety in the design, management and use of buildings).

4.8 Fire Safety

4.8.1 Fire safety requirements for buildings are defined in BS9999 (code of practice on fire safety in the design, management and use of buildings). Section 38.2 of this standard specifies requirements for electrical services within the building. The following requirements are relevant to WPDs installation:

- Electrical risers in a Protected Stairway shall be separated from the protected stairway by 30 minute fire-resisting construction and access doors. These doors shall be kept locked and access shall be controlled by the building manager. A Protected Stairway is a stairway “discharging through a final exit to a place of ultimate safety including any exit passageway between the foot of the stair and the final exit”.
- Electrical risers in other stairways shall be enclosed in fire-resisting construction of a standard equivalent to the walls / floors etc. in that part of the building.
- Meters in a Protected Stairway shall be enclosed within a secure cupboard of 30 minute fire resisting construction.

4.8.2 Electrical equipment of any type can be a source of ignition / fire if overloaded or damaged. Where possible electricity meters and WPD owned switchgear (cut-outs, MSDBs etc.) shall not be located within a Protected Stairway in order to minimise the fire risk from such equipment.

4.8.3 It is essential that rooms / cupboards used for communal metering or housing WPD switchgear (cut-outs, MSDBs etc.) are not used to store combustible material, that they remain clear of other equipment / rubbish and are protected against vandalism. For this reason, all such rooms shall be kept locked. Where occupants of the building are provided with access to this area (e.g. to check their meter readings etc.) it is recommended that the doors are fitted with a self-locking latch (which can be opened without a key from inside the room) and an automatic door closer is fitted, so that the door self-closes and locks.

4.8.4 Whenever services penetrate a fire separating element of a structure/building, the fire resistance criteria of the element must be maintained. All openings for pipes, ducts, conduits or cables to pass through any part of a fire-separating element should be:

- Kept as few in number as possible
- Kept as small as practicable
- Fire-stopped

Generic types of fire stopping & fire sealing systems include coated stone wood batts/boards, sealant/mastic coatings, mortars and intumescent bags or pillows. Where WPD works make any changes to a fire-separating element it shall be made good before the works are completed. In most cases a fire resistant bag or pillow is the most efficient way of restoring the fire stop. Examples of generic fire stopping products are shown in Appendix B.

Whilst Fire Stopping and Sealing is the responsibility of the building owner, Engineering Design can offer technical advice as required.

5.0 COMMERCIAL REQUIREMENTS

5.1 Building Networks

5.1.1 BNOs can either be licensed or unlicensed. In accordance with The Electricity (Class Exemptions from the Requirement for a Licence) Order 2001, a BNO does not need to be licensed if he/she satisfies the relevant exemption class summarised below:

- (a) Class A (Small Distributor): The BNO does not at any time distribute more than 2.5MW to domestic consumers within the UK.
- (b) Class B (On-site Distribution): The BNO does not at any time distribute more than 1MW to domestic customers from a generating station embedded within his/her distribution system within the UK.
- (c) Class C (Distribution to Non-domestic Consumers): The BNO does not at any time distribute electrical power to domestic consumers within the UK.

5.2 Connection Agreements

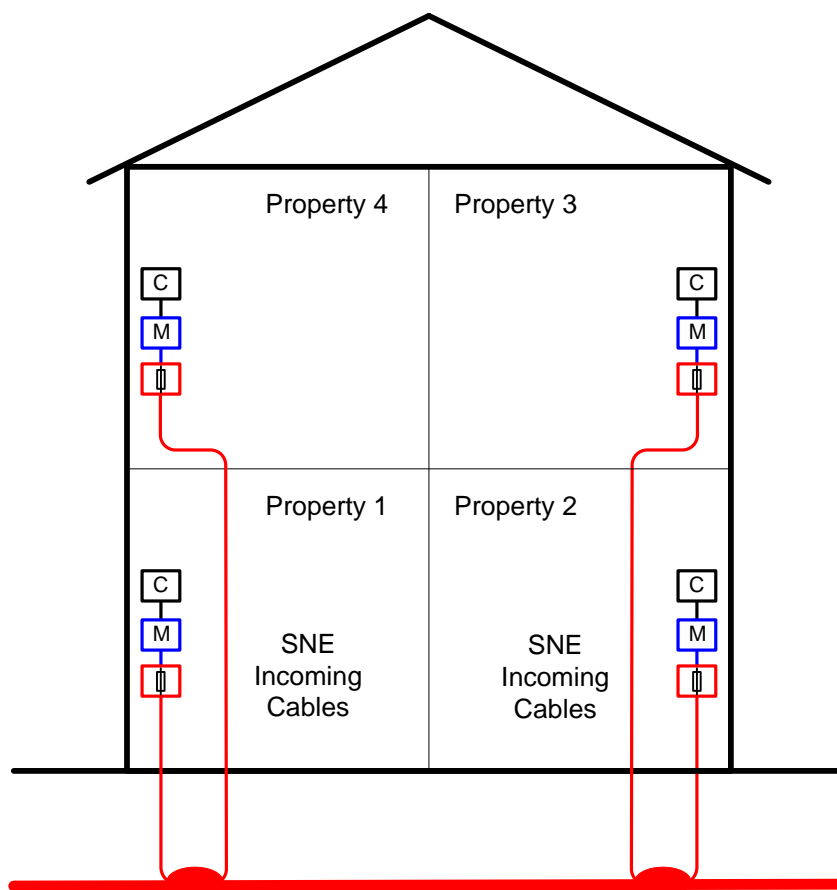
5.2.1 Where WPD provide a connection to a BNO, WPD shall enter into a connection agreement with the BNO. This Connection Agreement shall include a responsibility schedule that defines the ownership, maintenance, operation and control responsibilities of the electrical equipment at the boundary between WPD and the BNO. Further guidance is included in ST:NC1G.

5.3 Meter Point Administration Numbers (MPANs)

5.3.1 Where the BNO is licensed, i.e, the BNO is an Independent Network Operator (IDNO) the BNO shall raise and issue MPAN numbers for the customer connections.

5.3.2 Where the BNO is not licensed, the relevant WPD team shall raise MPAN numbers for the customer connections within the BNO network.

Figure 1 Option 1; Individual Services Originating from Outside of the Building

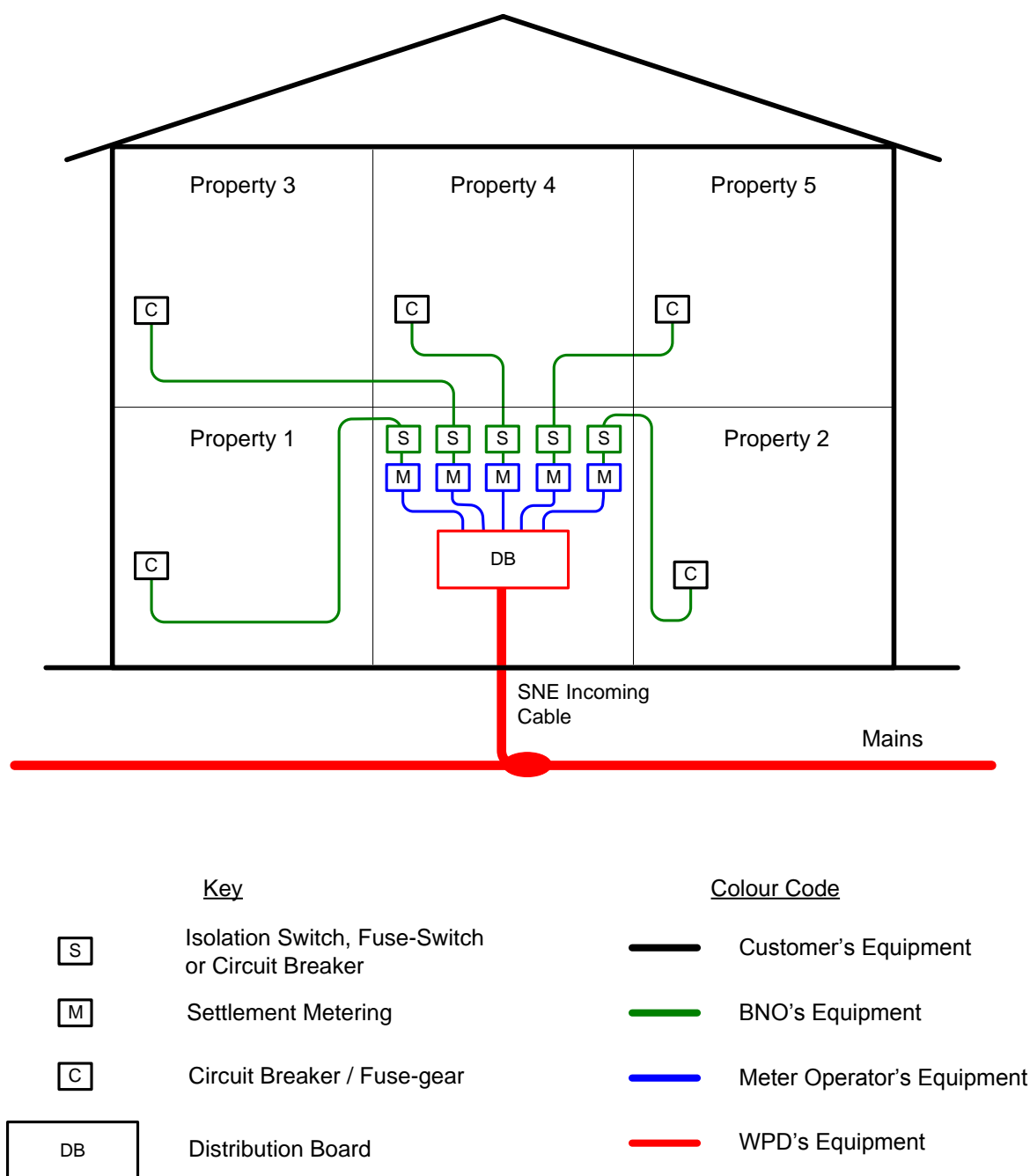


<u>Key</u>		<u>Colour Code</u>	
M	Settlement Metering		Customer's Equipment
⏻	Incoming Circuit Breaker or Cut-Out		Meter Operator's Equipment
C	Circuit Breaker / Fusegear		WPD's Equipment

Note:

- 1) This arrangement may only be used for single or two storey buildings.
- 2) Service cables may be run within accessible areas of the building or run outside of the building, as appropriate.
- 3) Each service cable installed within the building may only be routed through accessible communal areas of the building and must not be run within other premises (i.e. other than the premises to which it provides a connection).
- 4) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

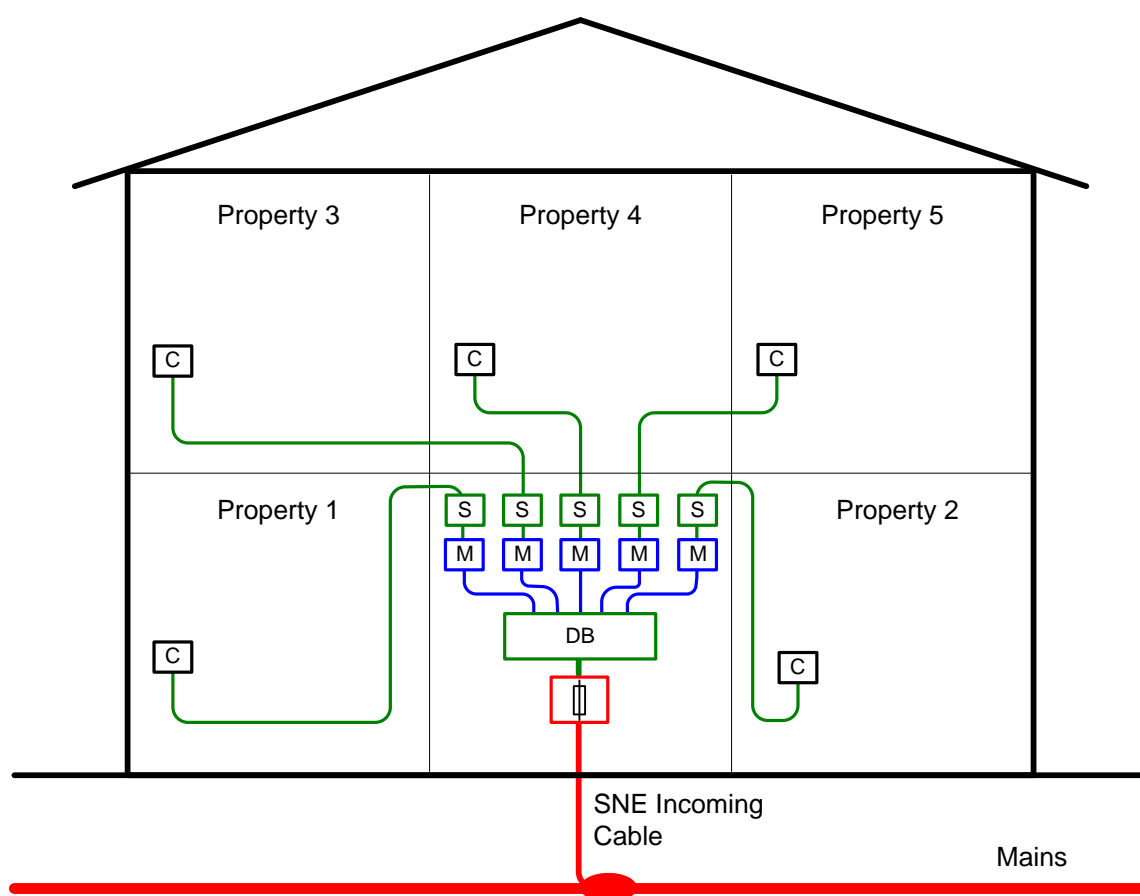
Figure 2A Option 2A; Services Originating from an Intake Position - Communal Metering from a WPD Distribution board












Note:

- 1) More than one incoming cable and DB may be provided, if required.
- 2) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 3) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

Figure 2B Option 2B; Services Originating from an Intake Position - Communal Metering from a BNO Distribution Board.

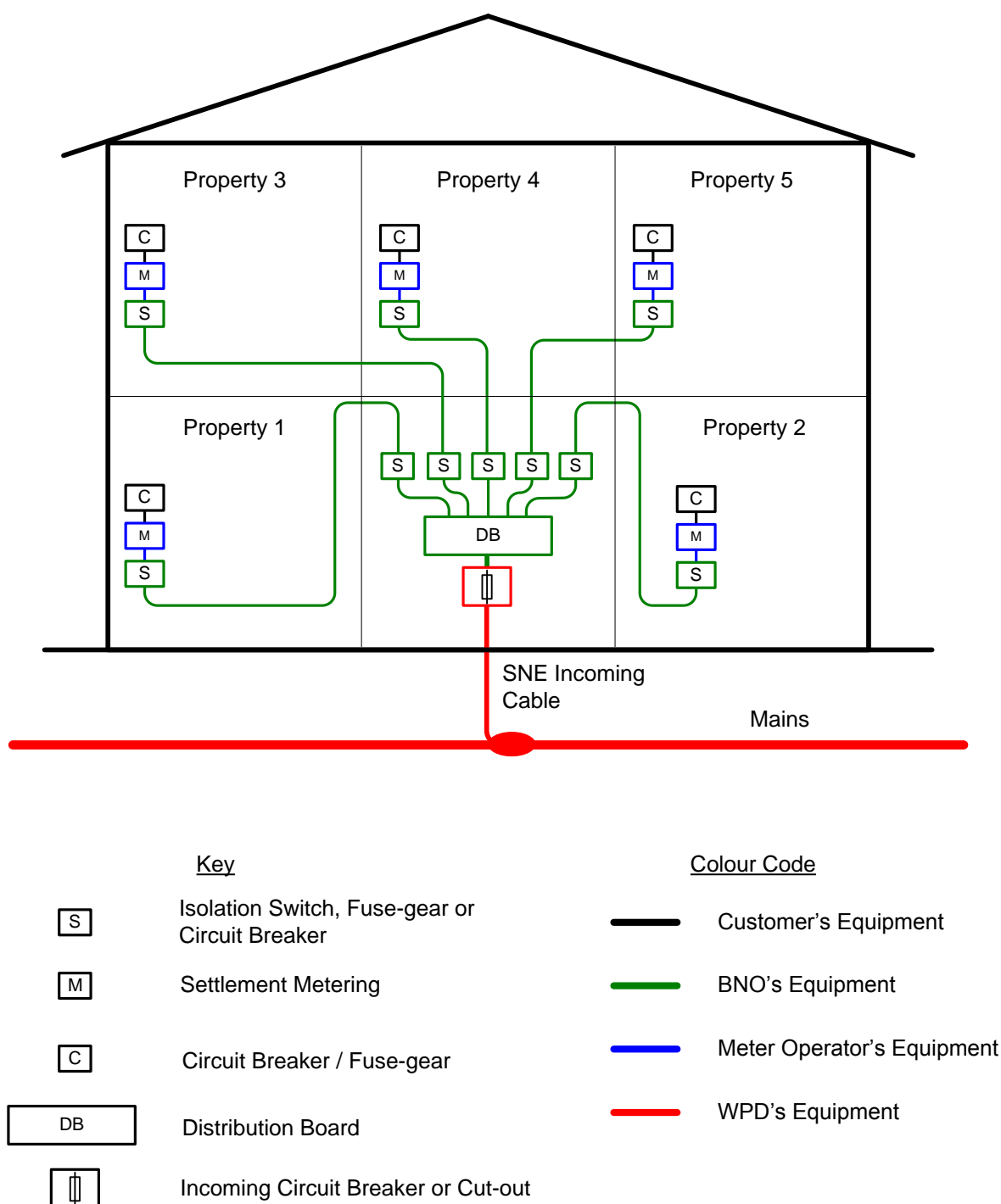


<u>Key</u>		<u>Colour Code</u>	
	Isolation Switch, Fuse-Switch or Circuit Breaker		Customer's Equipment
	Settlement Metering		BNO's Equipment
	Circuit Breaker / Fuse-gear		Meter Operator's Equipment
	Distribution Board		WPD's Equipment
	Incoming Circuit Breaker or Cut-out		

Note:

- 1) More than one incoming cable and DB may be provided, if required.
- 2) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 3) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

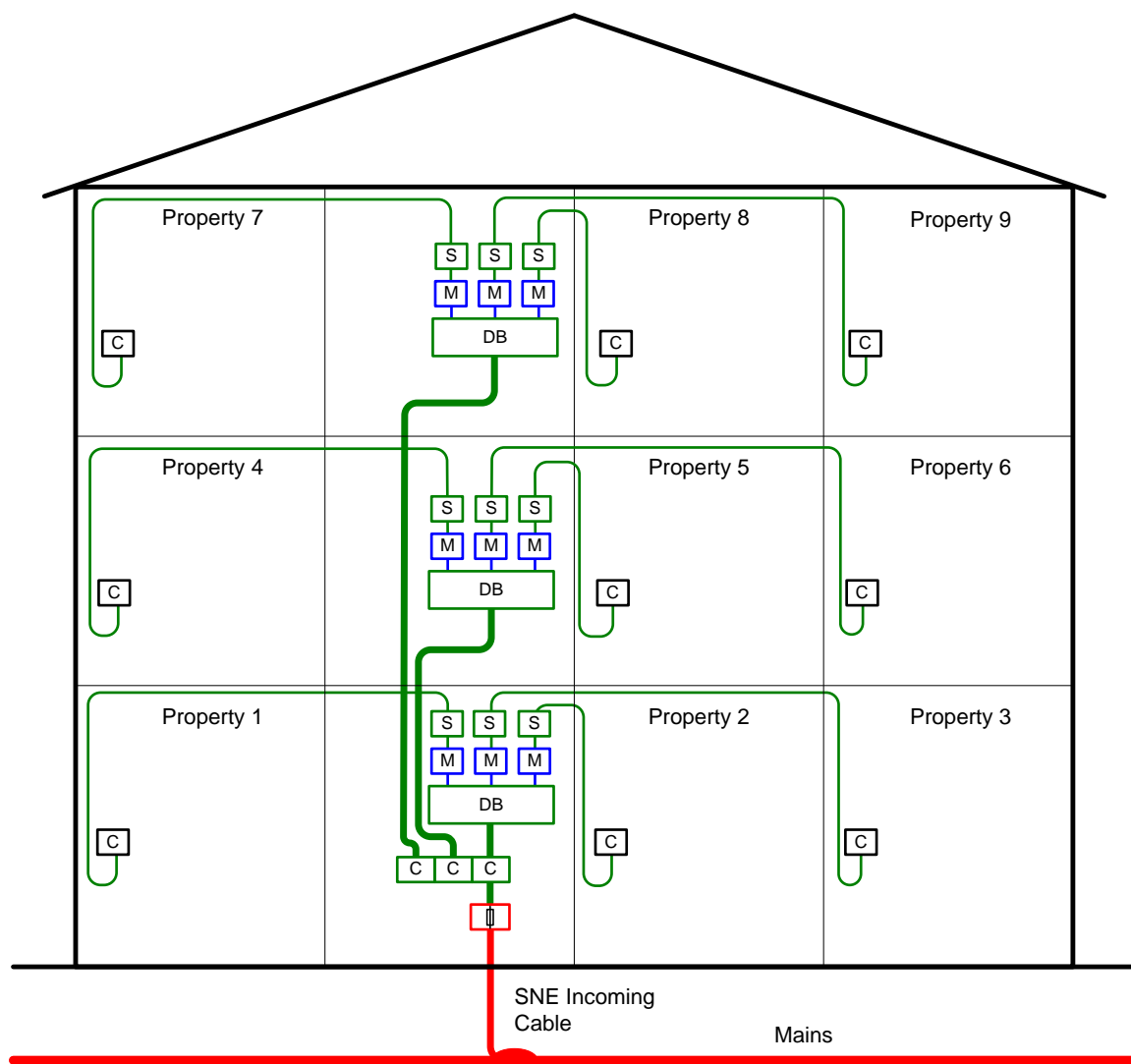
Figure 2C Option 2C; Services Originating from an Intake Position - Metering at Individual Properties












Note:

- 1) More than one incoming cable and DB may be provided, if required.
- 2) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 3) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

Figure 3A Option 3A; Services Originating from within a Building Network – Single Incoming Circuit - Communal Metering

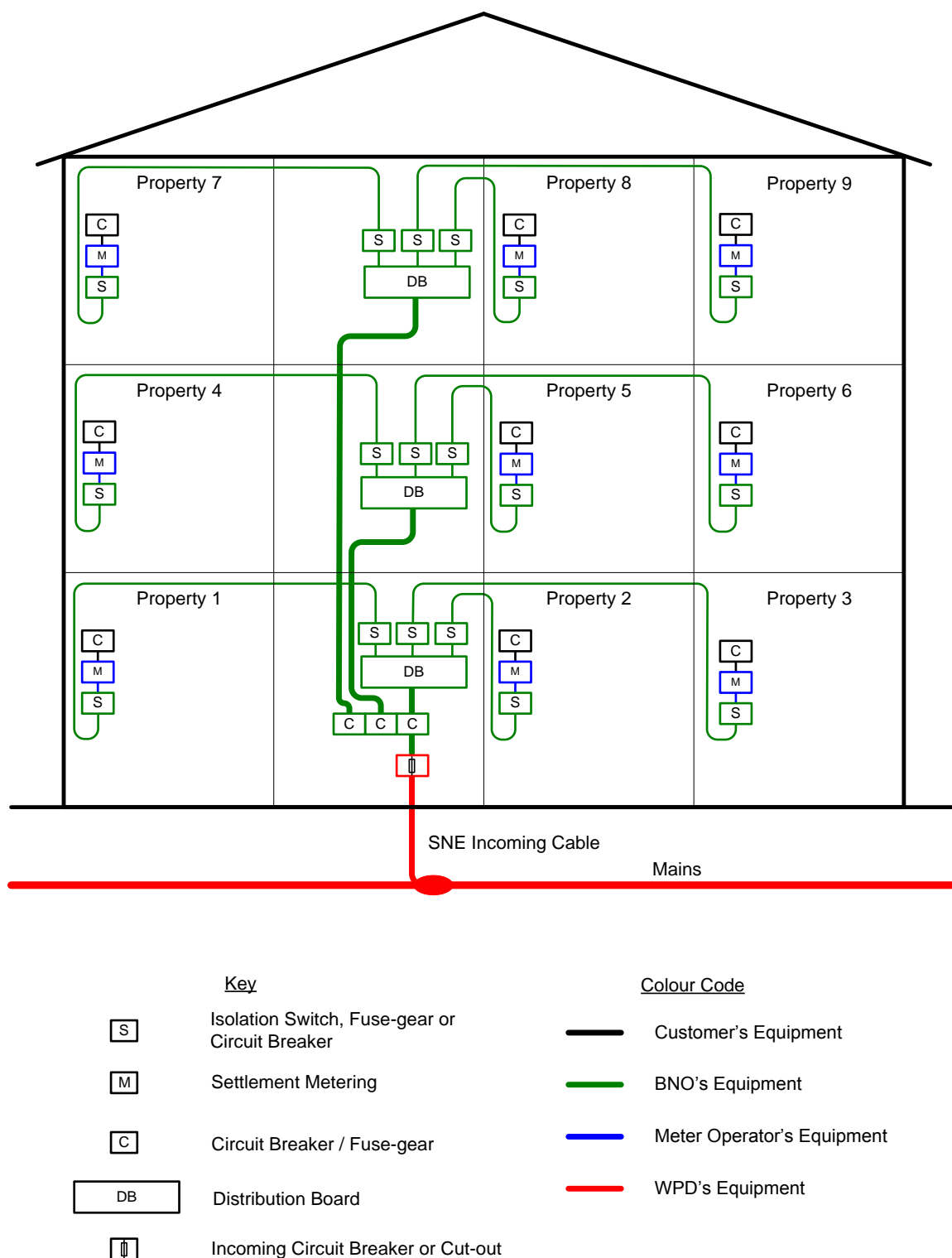


Key		Colour Code	
	Isolation Switch, Fuse-gear or Circuit Breaker		Customer's Equipment
	Settlement Metering		BNO's Equipment
	Circuit Breaker / Fuse-gear		Meter Operator's Equipment
	Distribution Board		WPD's Equipment
	Circuit Breaker or Cut-out		

Note:

- 1) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 2) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

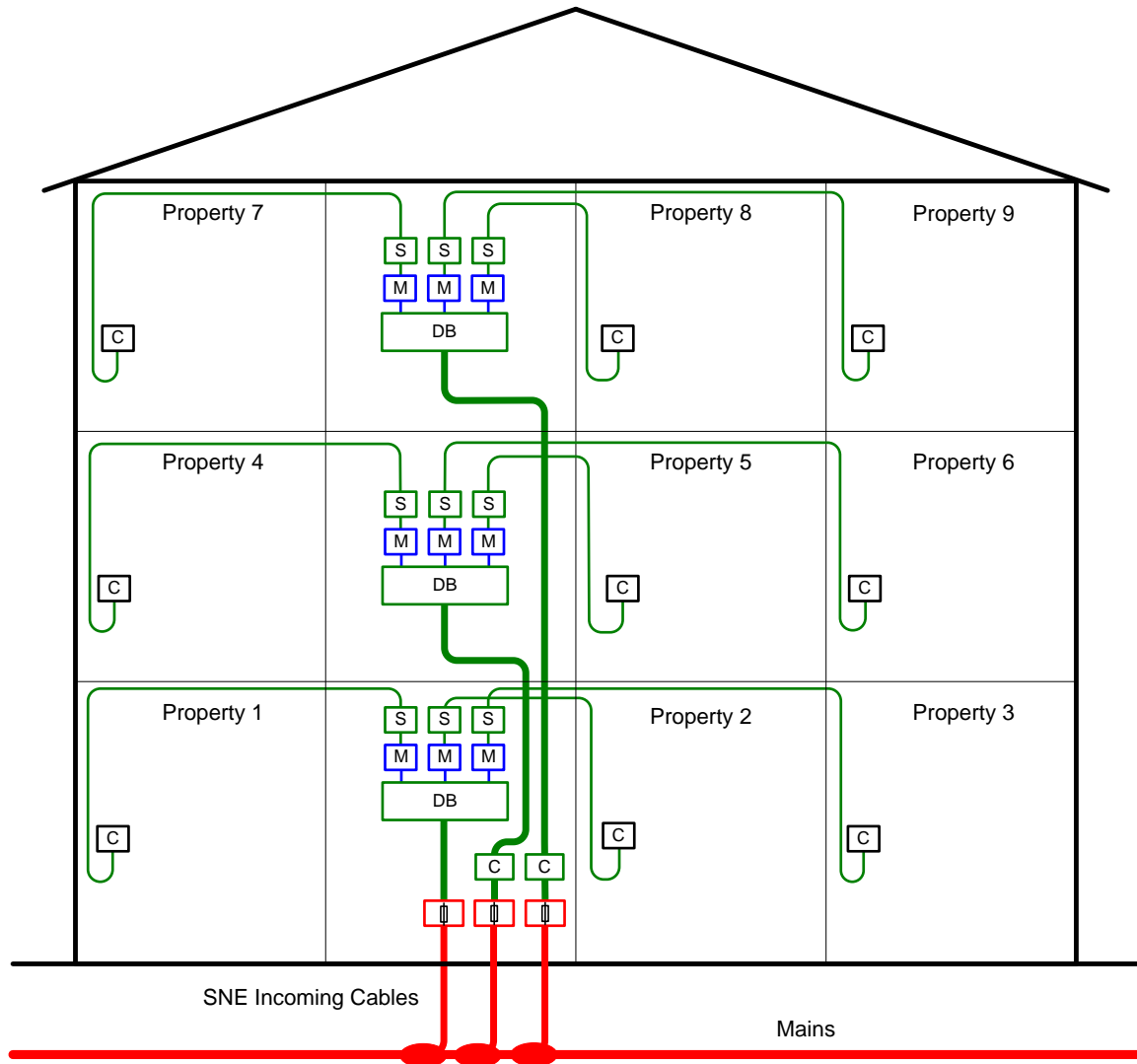
Figure 3B Option 3B; Services Originating from within a Building Network – Single Incoming Circuit - Metering at Individual Properties



Note:

- 1) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 2) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

Figure 3C Option 3C; Services Originating from within a Building Network – Multiple Incoming Cables – Communal Metering

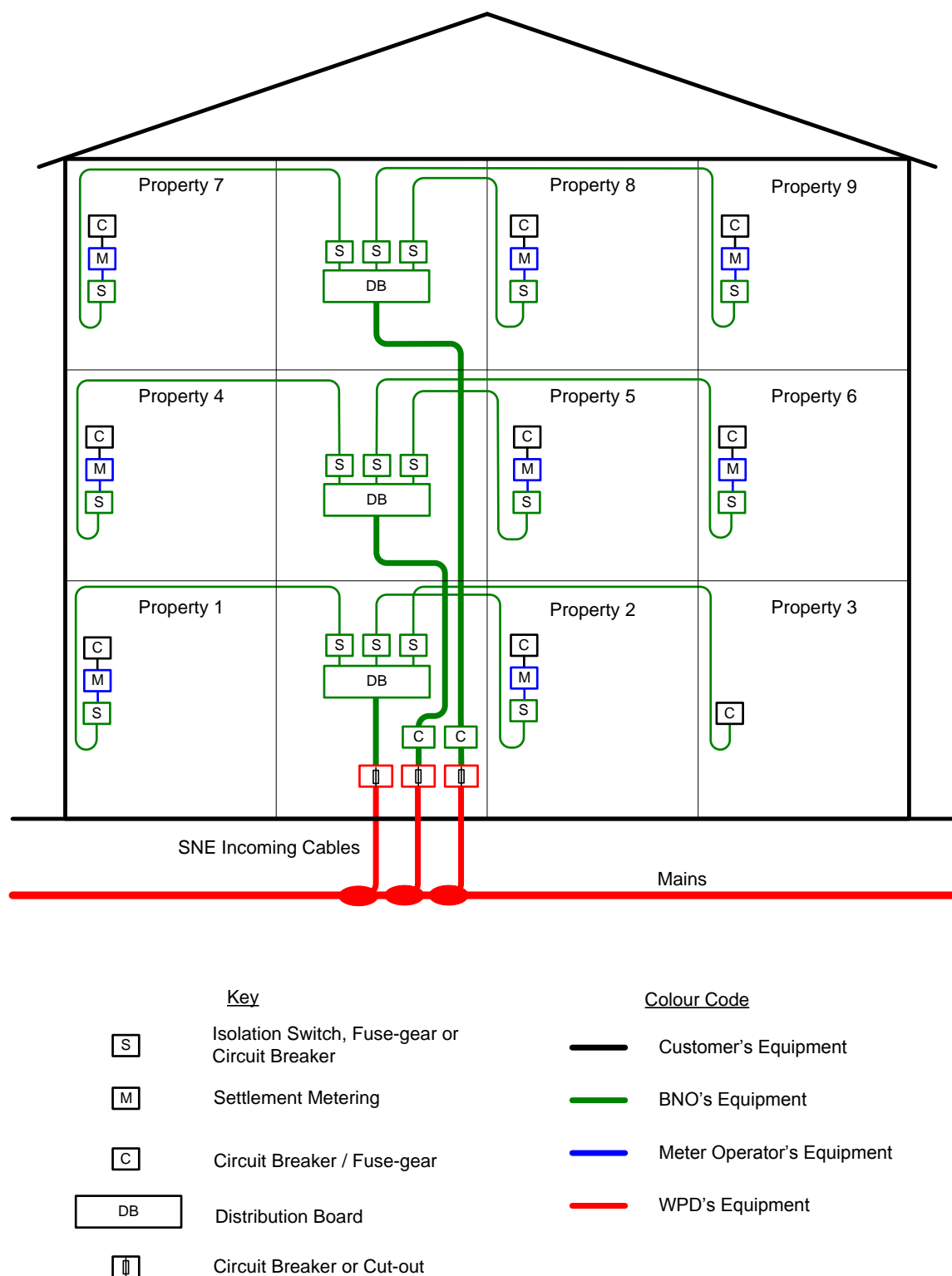


Key		Colour Code	
	Isolation Switch, Fuse-gear or Circuit Breaker		Customer's Equipment
	Settlement Metering		BNO's Equipment
	Circuit Breaker / Fuse-gear		Meter Operator's Equipment
	Distribution Board		WPD's Equipment
	Circuit Breaker or Cut-out		

Note:

- 1) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 2) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

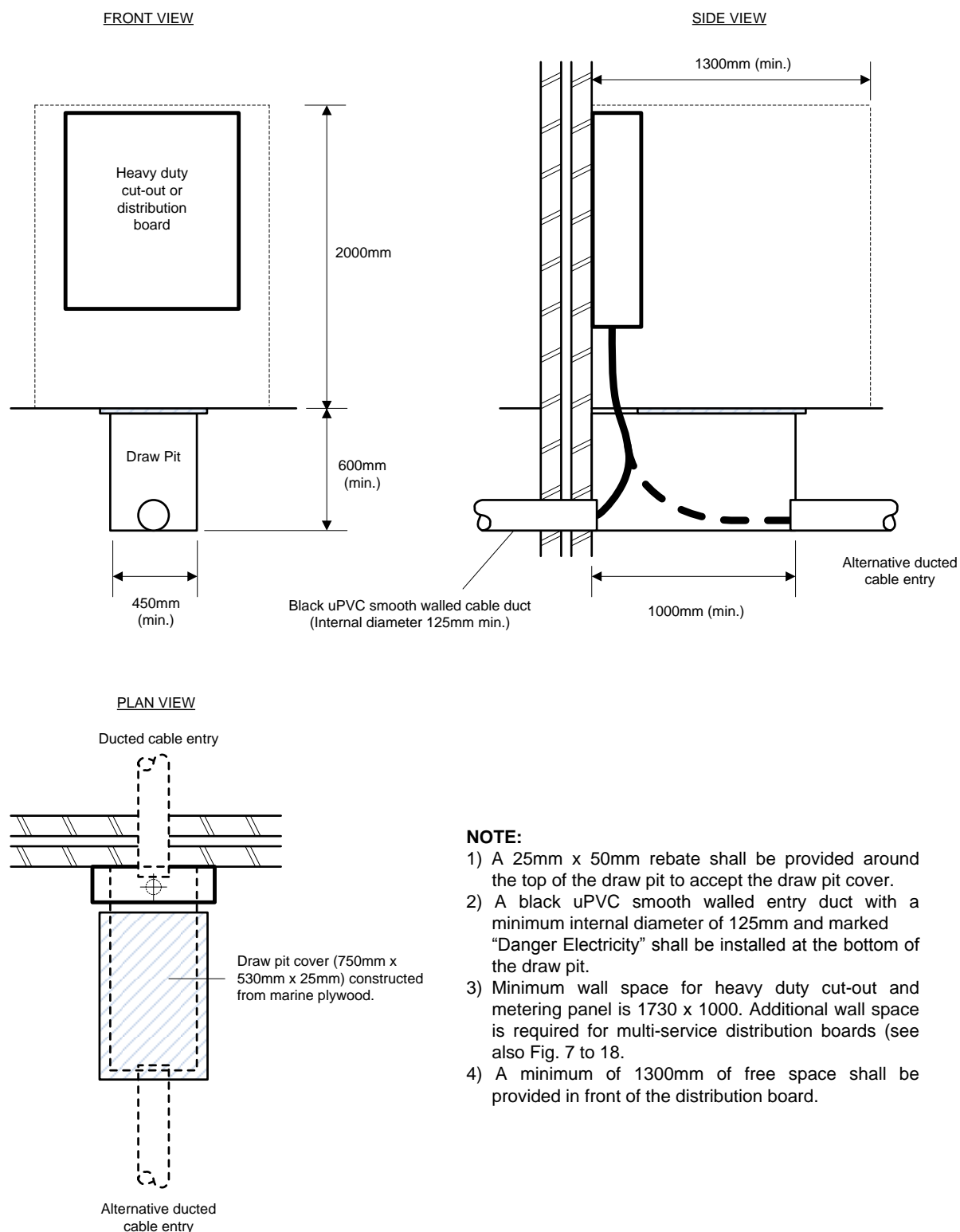
Figure 3D Option 3D; Services Originating from within a Building Network – Multiple Incoming Cables - Metering at Individual Properties



Note:

- 1) Cables should only be routed through accessible communal areas of the building and should not be run within other premises (other than the premises to which it provides a connection).
- 2) In the case of residential buildings (e.g. blocks of flats) new, WPD owned, incoming cables shall be LSF type.

Figure 4 Mains cable entry requirements (Draw Pit Arrangement)



NOTE:

- 1) A 25mm x 50mm rebate shall be provided around the top of the draw pit to accept the draw pit cover.
- 2) A black uPVC smooth walled entry duct with a minimum internal diameter of 125mm and marked "Danger Electricity" shall be installed at the bottom of the draw pit.
- 3) Minimum wall space for heavy duty cut-out and metering panel is 1730 x 1000. Additional wall space is required for multi-service distribution boards (see also Fig. 7 to 18).
- 4) A minimum of 1300mm of free space shall be provided in front of the distribution board.

**Figure 5 Mains cable entry requirements (slow bend duct arrangement)
- only suitable for 95mm² wavecon cable**

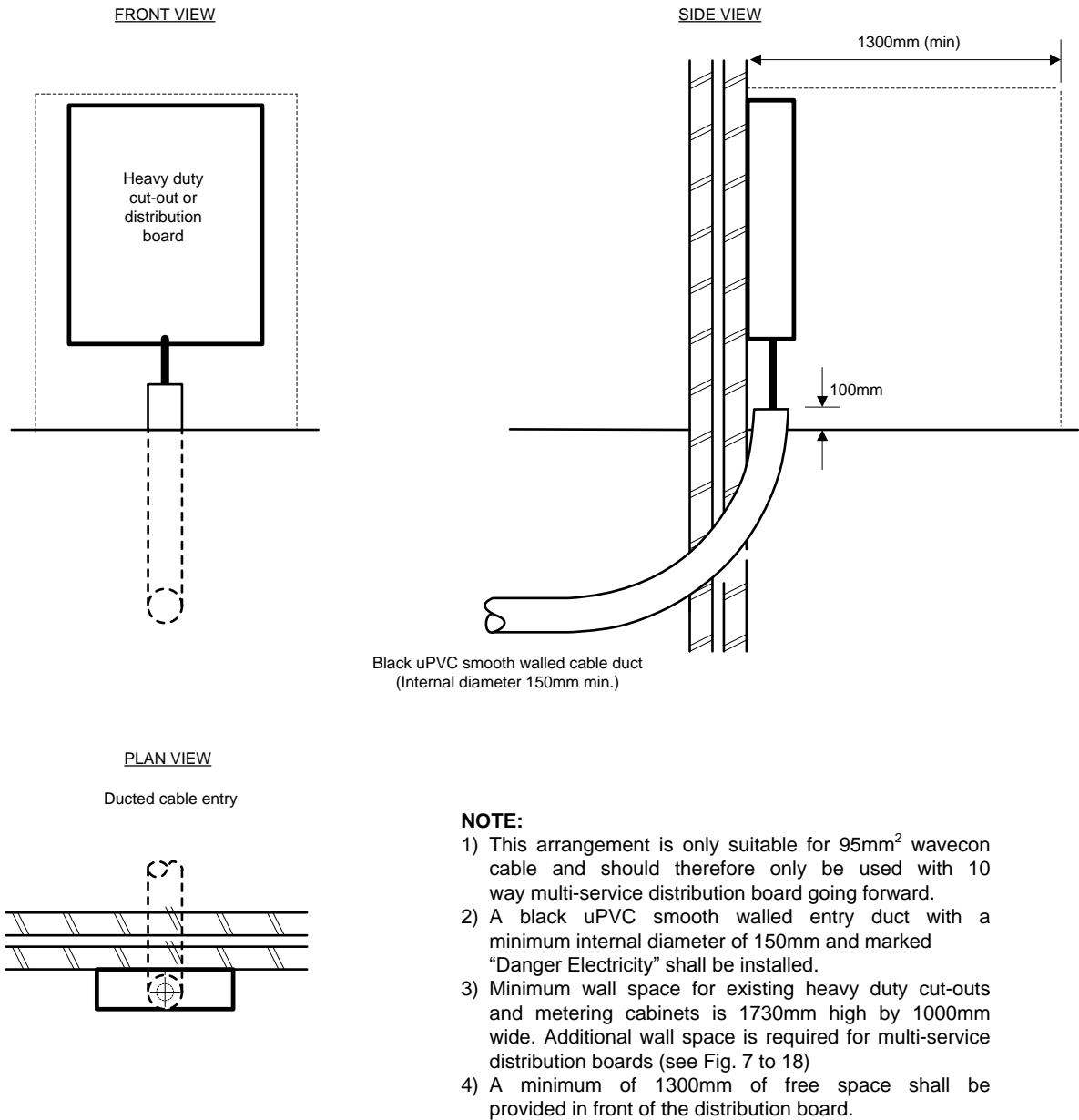
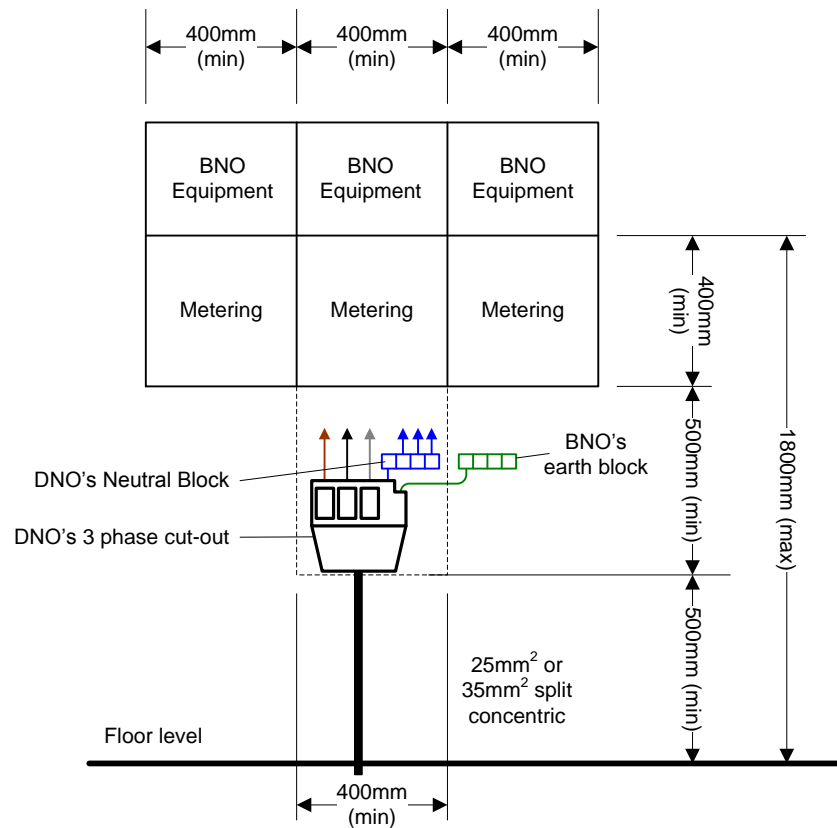


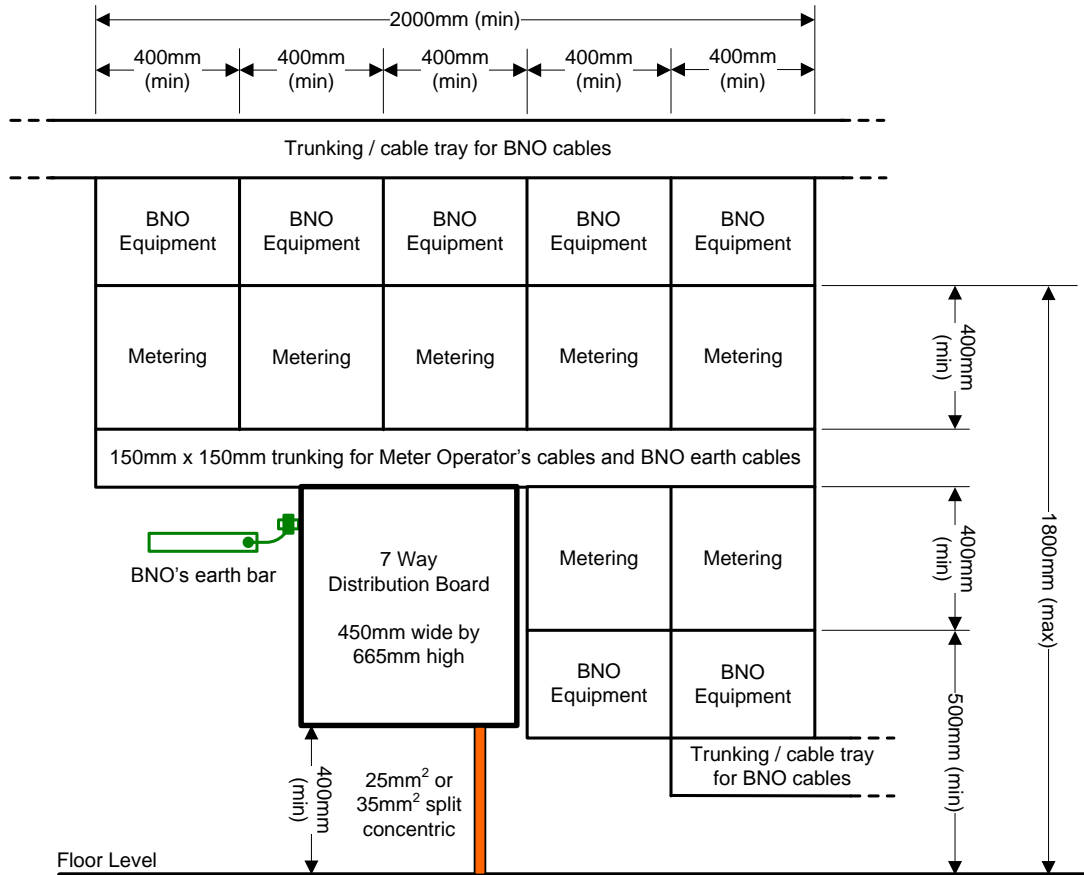
Figure 6 Typical Arrangement for 3 sets of Communal Single Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Suitable for 25mm² or 35mm² copper split concentric incoming cable.

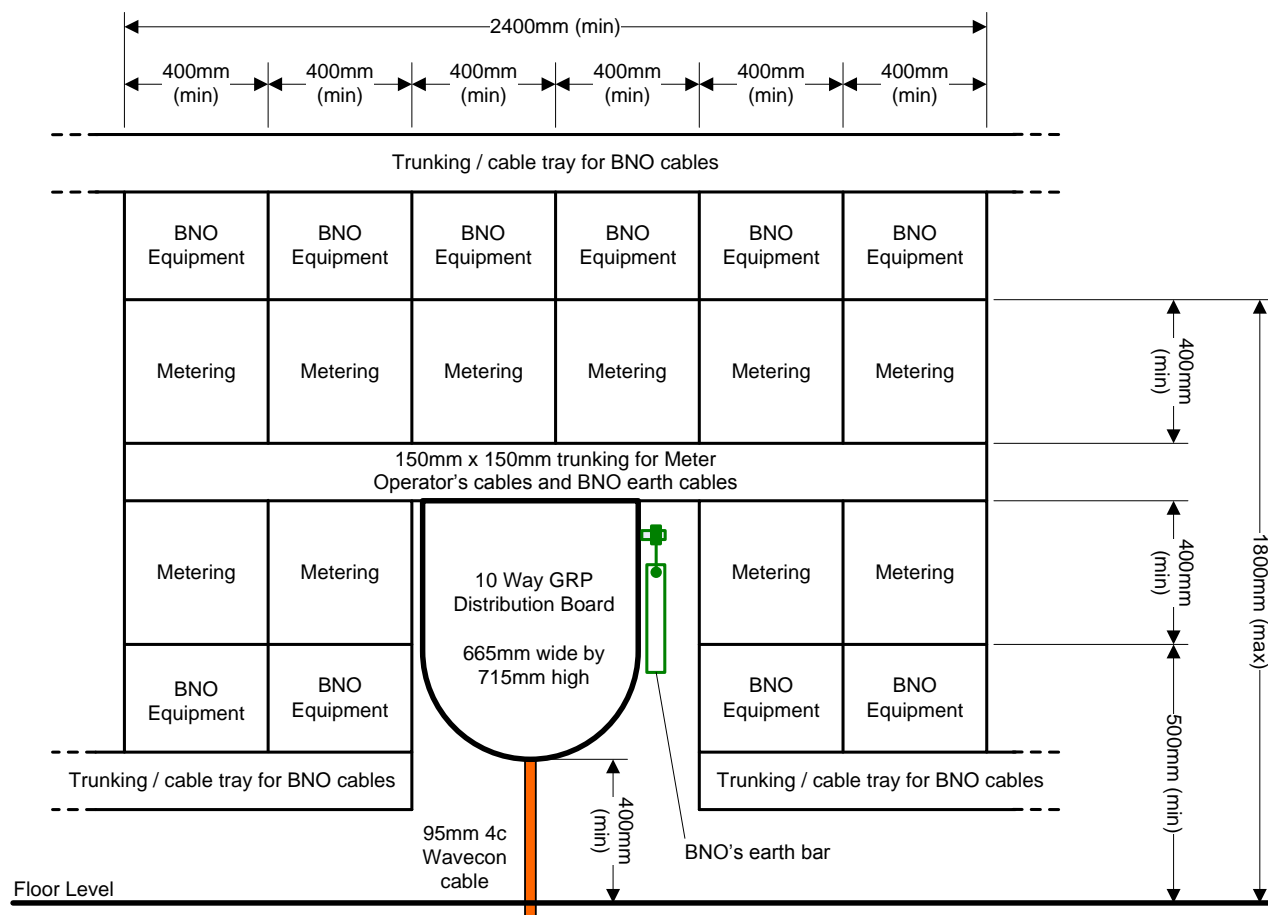
Figure 7 Typical Arrangement for 7 Way MSDB with Communal Single Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall be not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Suitable for 25mm² or 35mm² copper split concentric incoming cable.

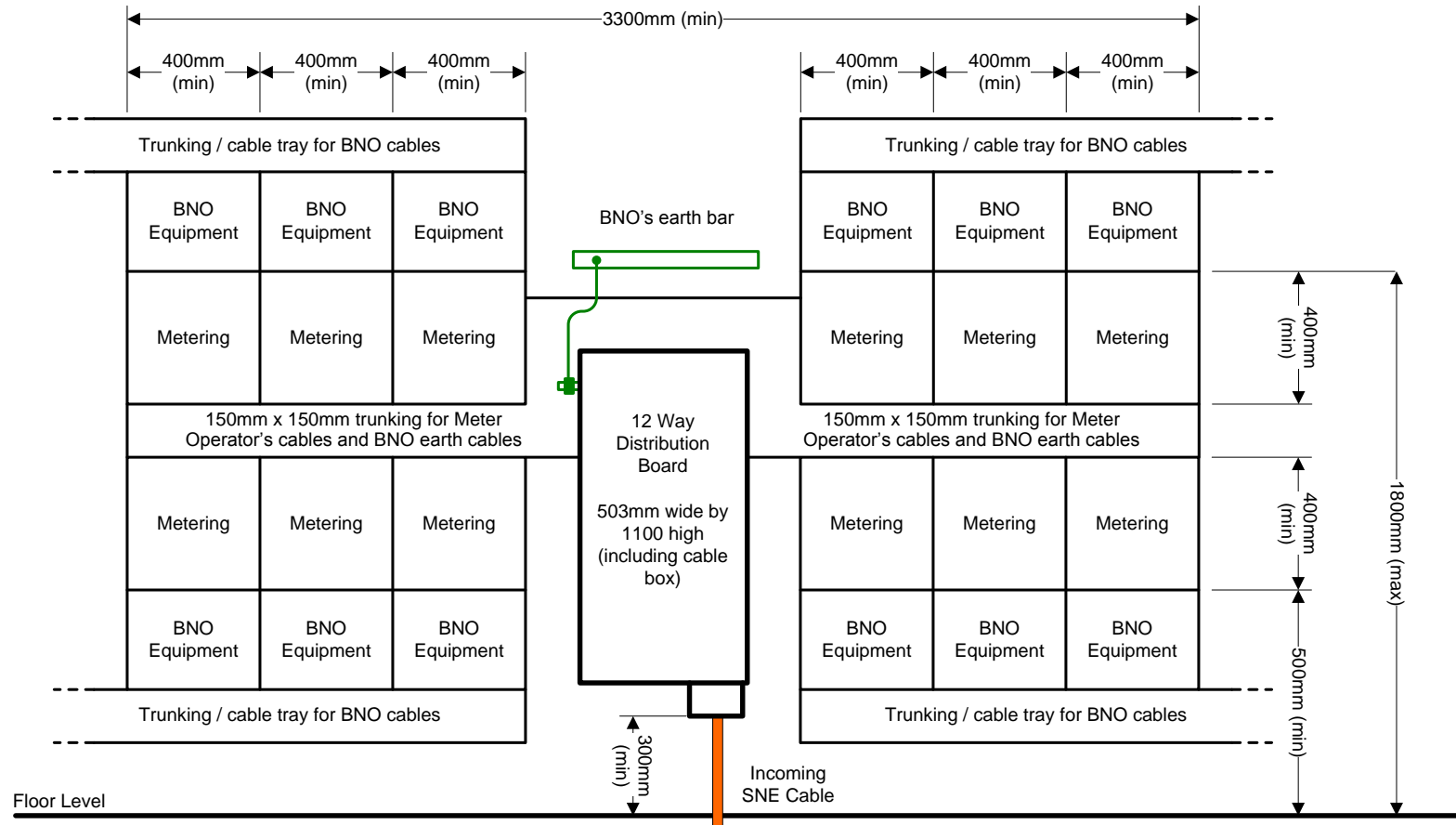
Figure 8 Typical Arrangement for 10 Way MSDB with Communal Single Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional wall space is required where the communal metering is placed on more than one wall.
- 4) Only suitable for 95mm² 4c wavecon incoming cable.

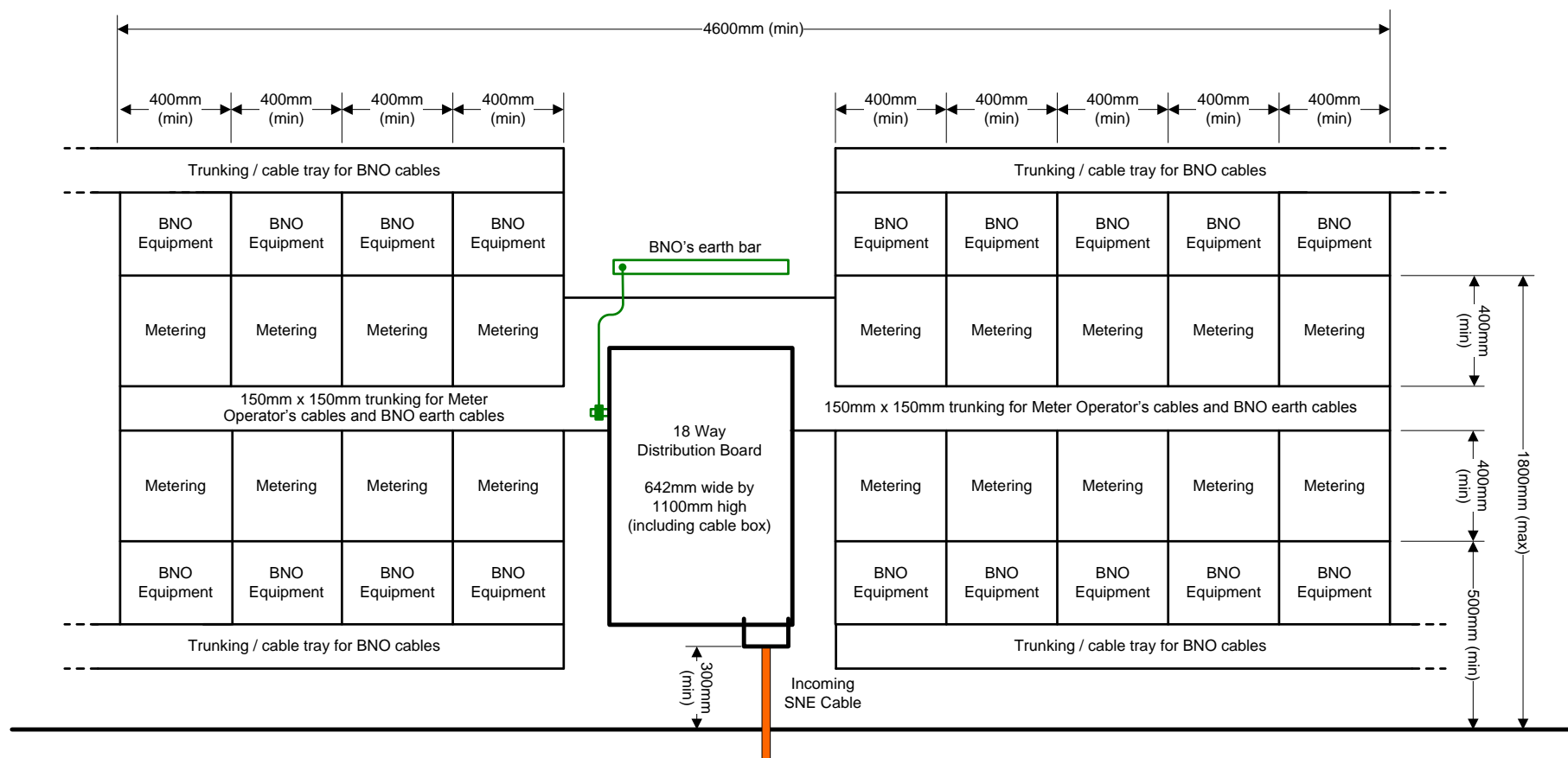
Figure 9 Typical Arrangement for 12 Way MSDB with Communal Single Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall be not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

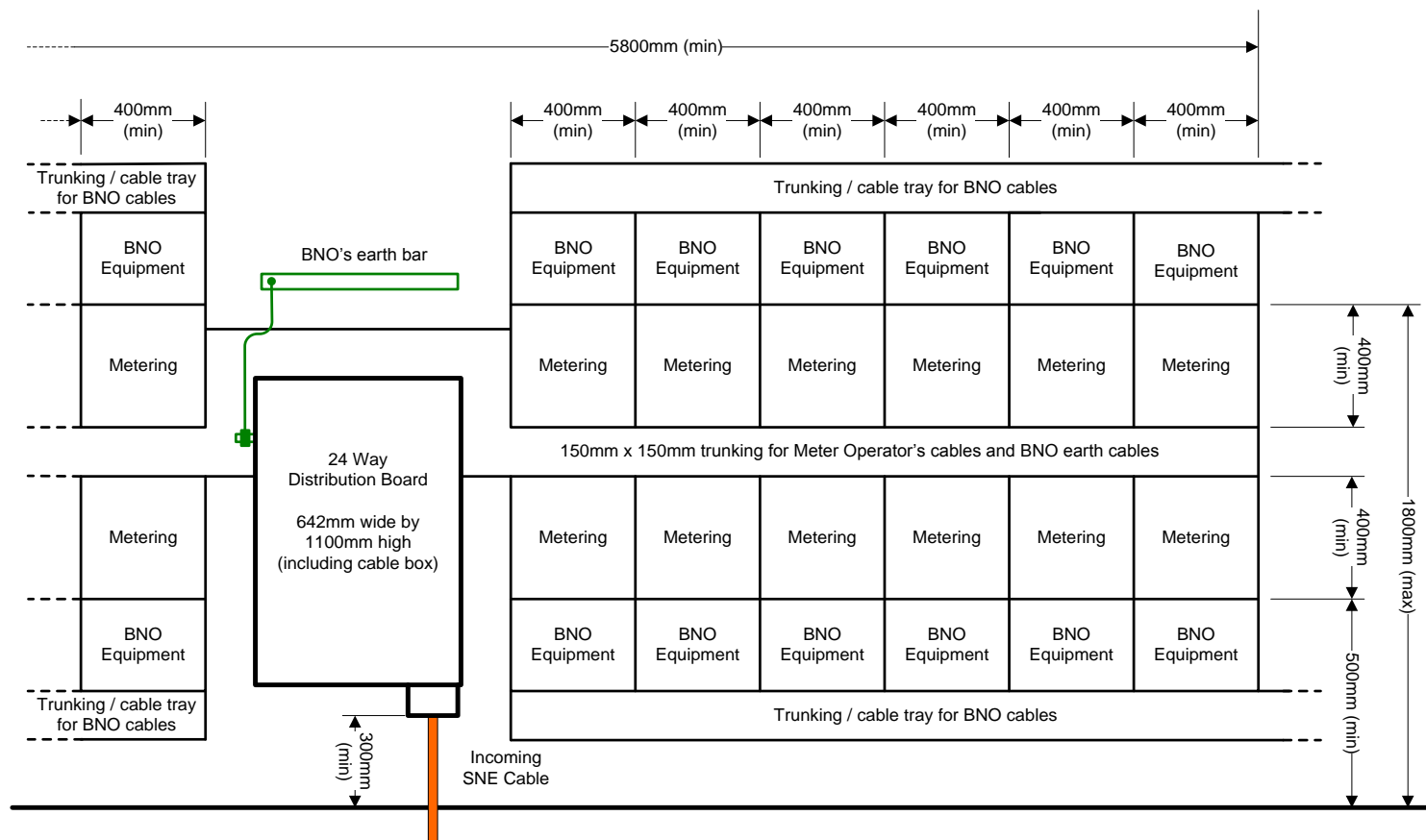
Figure 10 Typical Arrangement for 18 Way MSDB with Communal Single Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall be not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

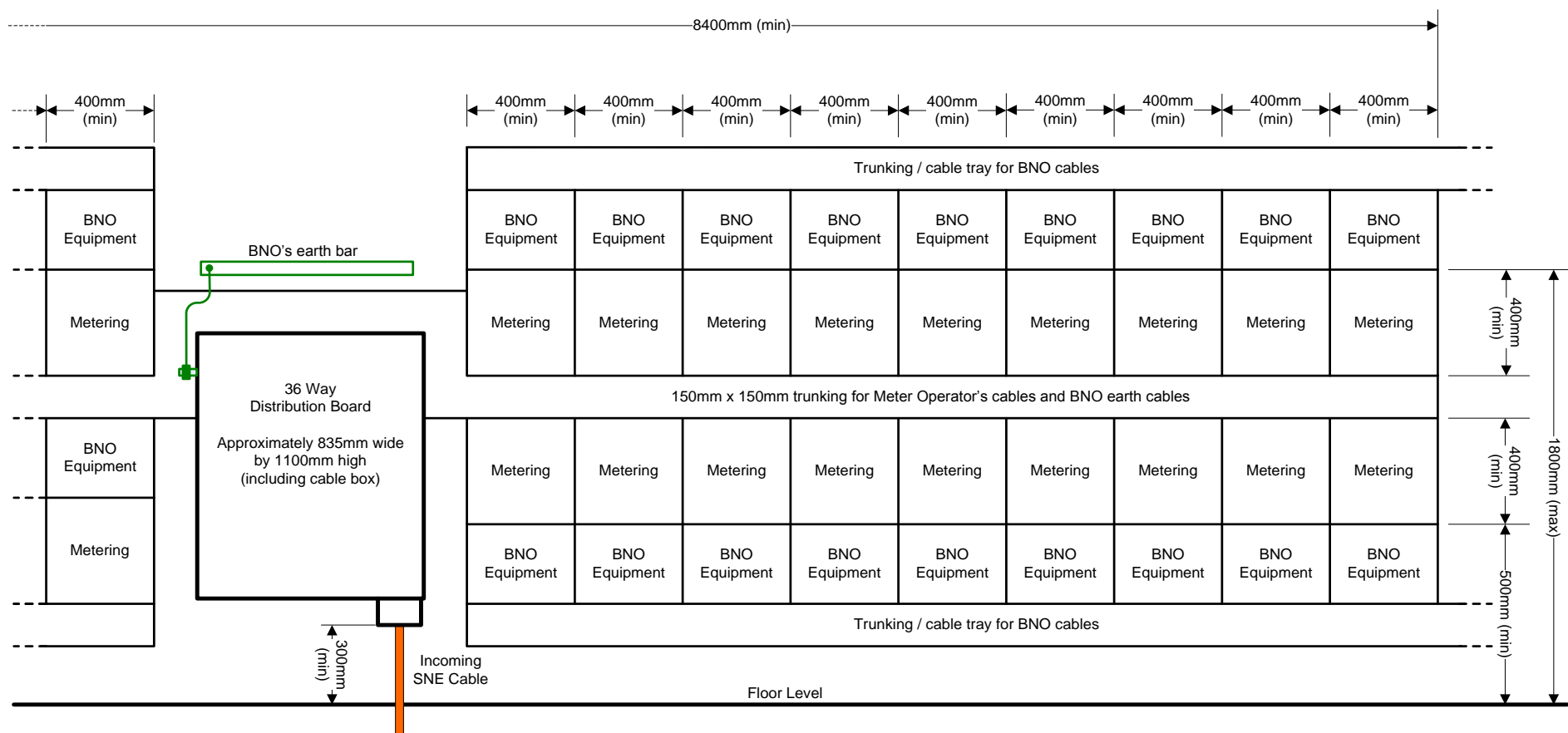
Figure 11 Typical Arrangement for 24 Way MSDB with Communal Single Phase Whole Current Metering



Note:

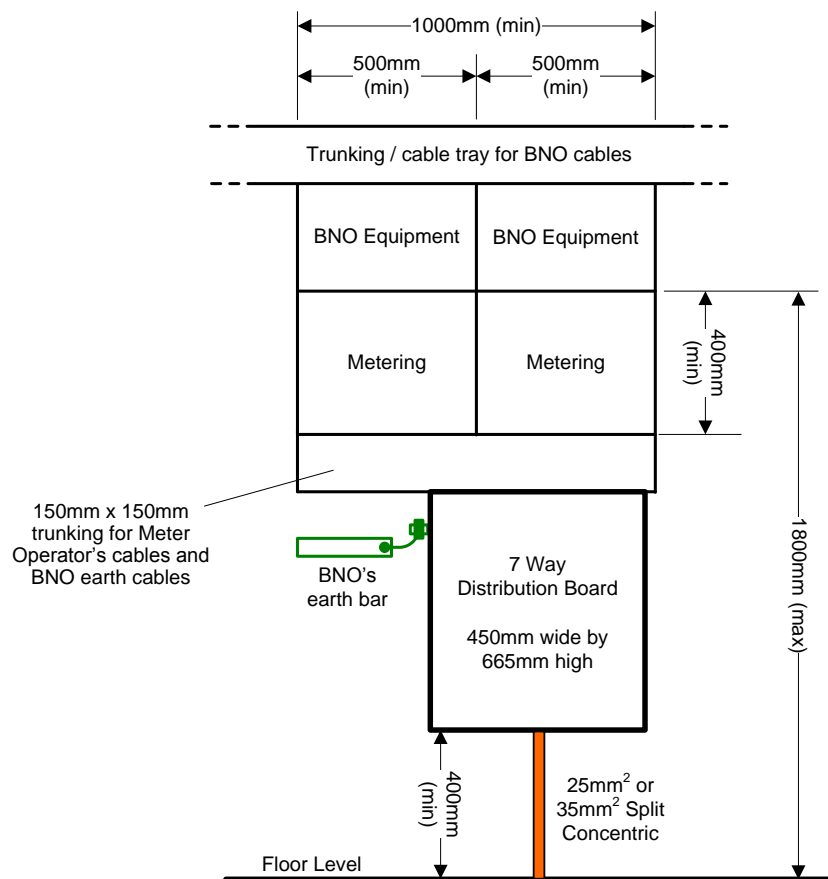
- 1) Diagram only shows 14 of the 24 sets of metering.
- 2) Space specified / reserved for metering shall not be used for other purposes.
- 3) Trunking / cable tray shall be provided by the building owner / developer.
- 4) Additional space is required where the communal metering is placed on more than one wall.
- 5) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

Figure 12 Typical Arrangement for 36 Way MSDB with Communal Single Phase Whole Current Metering



- 1) Diagram only shows 20 of the 36 sets of metering.
- 2) Space specified / reserved for metering shall not be used for other purposes.
- 3) Trunking / cable tray shall be provided by the building owner / developer.
- 4) Additional space is required where the communal metering is placed on more than one wall.
- 5) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

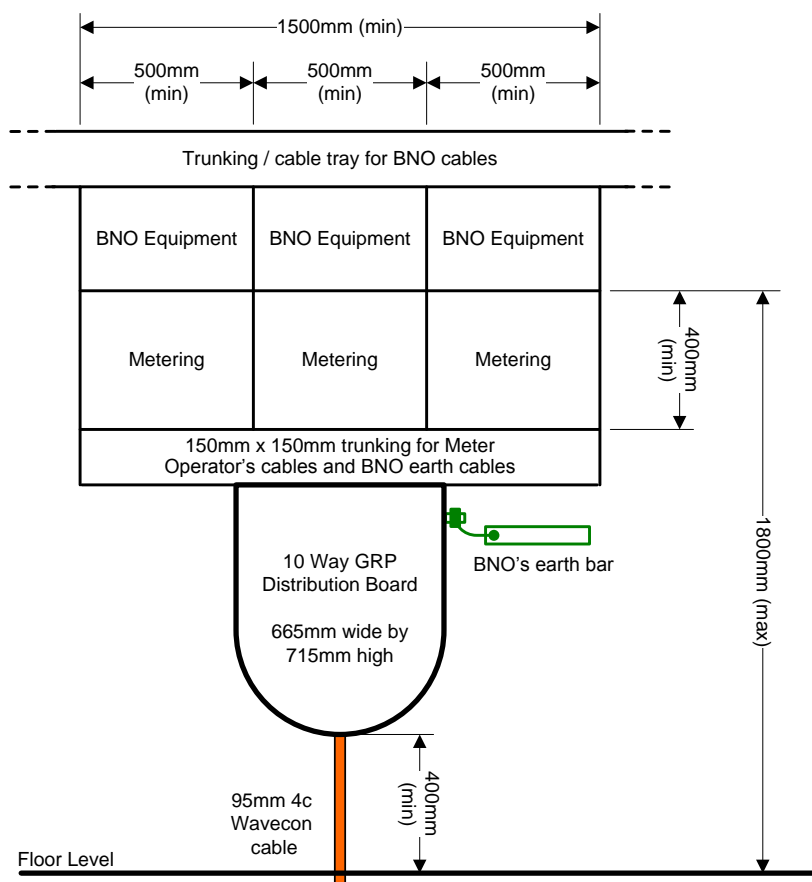
Figure 13 Typical Arrangement for 7 Way MSDB with 2 sets of Communal Three Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 25mm² or 35mm² copper split concentric incoming cable.

Figure 14 Typical Arrangement for 10 Way MSDB with 3 sets of Communal Three Phase Whole Current Metering



Note:

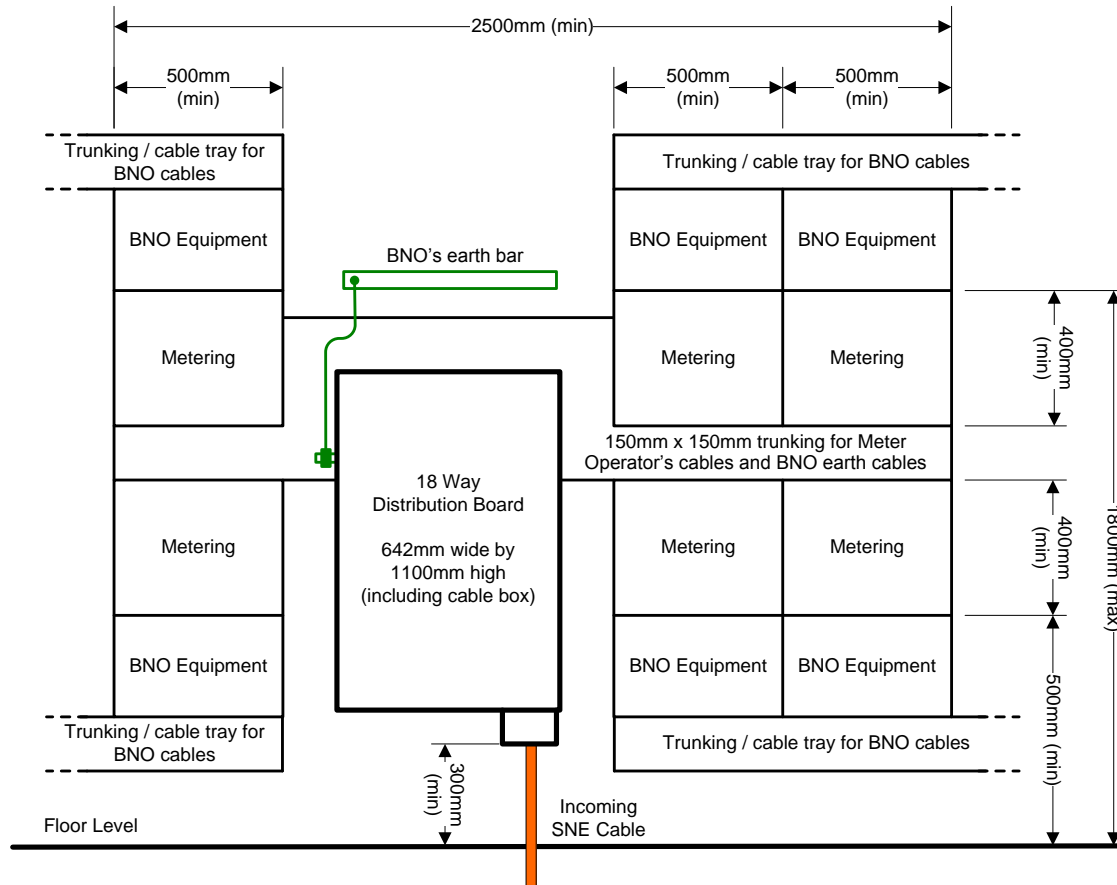
- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Only suitable for 95mm² 4c wavecon incoming cable.

Diagram illustrating the proposed cable tray layout for the BNO room. The layout shows a 1800mm wide cable tray system. The components and dimensions are as follows:

- Trunking / cable tray for BNO cables:** The main horizontal tray, 1800mm wide.
- BNO Equipment:** Two units, each 500mm (min) wide.
- Metering:** Two units, each 500mm (min) wide.
- 12 Way Distribution Board:** 503mm wide by 1100 high (including cable box).
- BNO's earth bar:** Connected to the Distribution Board.
- 150mm x 150mm trunking for Meter Operator's cables and BNO earth cables:** Supporting the main tray.
- Trunking / cable tray for BNO cables:** The bottom horizontal tray, 1800mm wide.
- Incoming SNE Cable:** Enters from the bottom, passing through a 300mm high opening in the floor level.
- Floor Level:** Indicated at the bottom of the diagram.
- Dimensions:**
 - Overall width: 1800mm (min).
 - Overall height: 1800mm (max).
 - Equipment height: 400mm (min).
 - Trunking height: 500mm (min).
 - Opening height: 300mm (min).

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

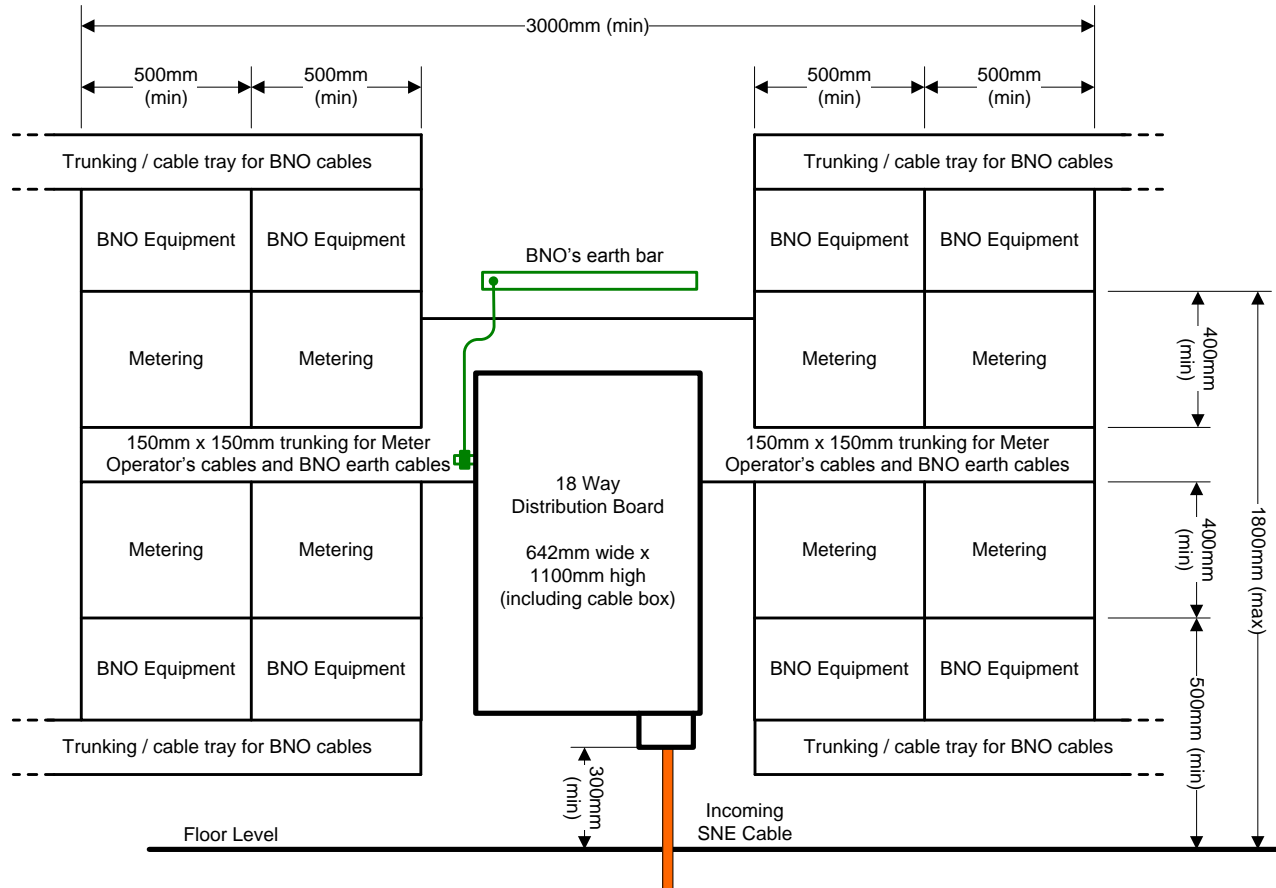
Figure 16 Typical Arrangement for 18 Way MSDB with 6 sets of Communal Three Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

Figure 17 Typical Arrangement for 24 Way MSDB with 8 sets of Communal Three Phase Whole Current Metering



Note:

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

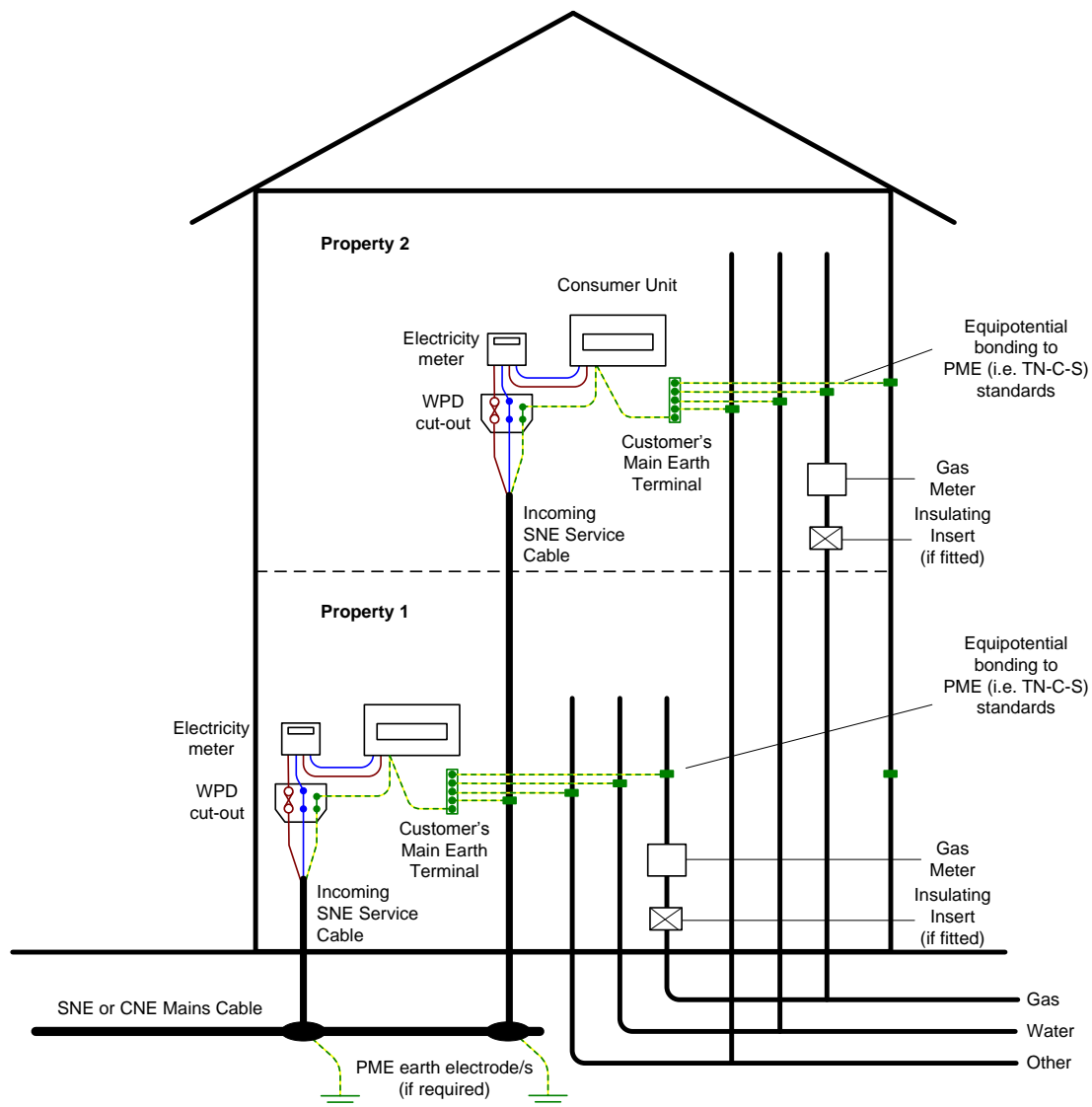
The diagram illustrates the layout of BNO equipment and associated components. It features two main rows of equipment, each consisting of three BNO Equipment units and three Metering units. The equipment is housed in a 36 Way Distribution Board, which is 835mm wide x 1100mm high (including cable box). The layout includes various cable trays and dimensions for installation.

Dimensions and Layout:

- Overall Width:** 4200 (min)
- Equipment Spacing:** 500mm (min) between equipment units.
- Equipment Height:** 400mm (min) for the top row of equipment, 400mm (min) for the bottom row of equipment, and 500mm (min) for the metering units.
- Trunking / Cable Tray:** 150mm x 150mm for Meter Operator's cables and BNO earth cables.
- Trunking / Cable Tray for BNO cables:** Located above and below the equipment rows.
- BNO's earth bar:** A green line indicating the earth bar connection.
- 36 Way Distribution Board:** 835mm wide x 1100mm high (including cable box).
- Incoming SNE Cable:** A red line indicating the incoming cable.
- Floor Level:** Indicated by a horizontal line at the bottom.
- Overall Height:** 1800mm (max) for the total height of the equipment and associated components.

- 1) Space specified / reserved for metering shall not be used for other purposes.
- 2) Trunking / cable tray shall be provided by the building owner / developer.
- 3) Additional space is required where the communal metering is placed on more than one wall.
- 4) Suitable for 185mm² or 300mm² 4c wavecon incoming cable.

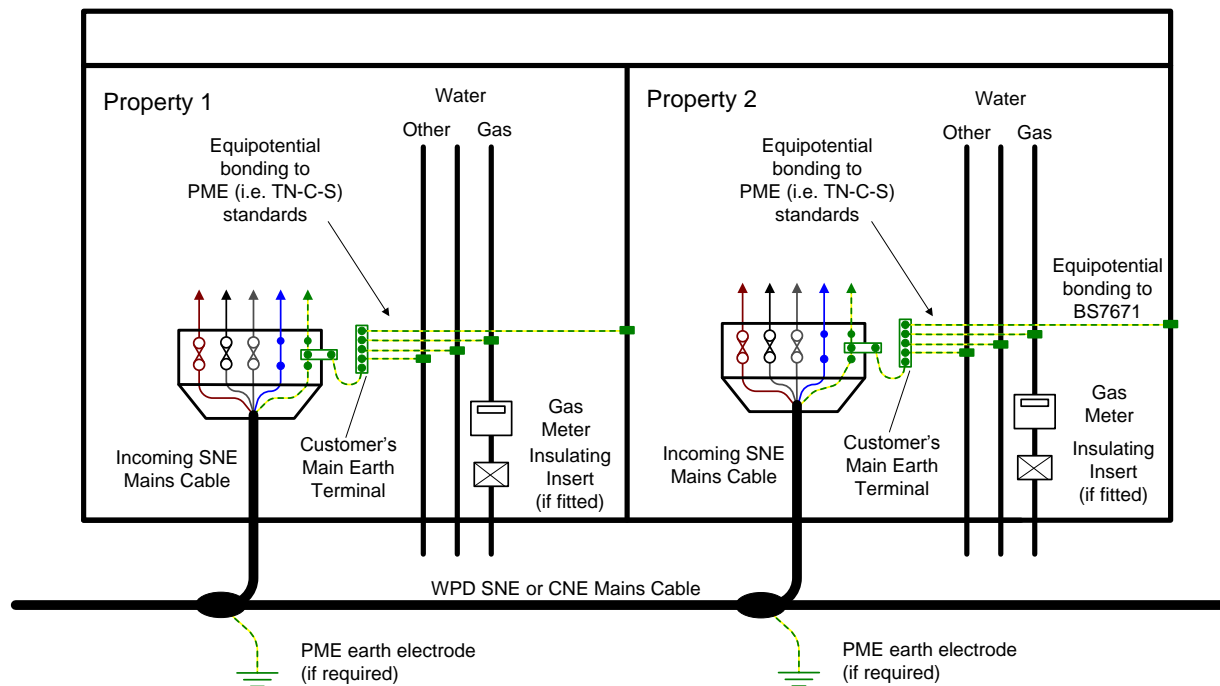
Figure 19 Bonding Requirements: Services Originating Outside of the Building – (Services comprising 25mm² and 35mm² Split Concentric Cables)



Notes:

1. This arrangement is suitable for flats, apartments and small commercial properties utilising service type cable (i.e. 25mm² or 35mm² copper split concentric cable).
2. Customer equipotential bonding shall be to PME (TN-C-S) standards.
3. An SNE derived from a CNE network earth arrangement label shall be fitted at each cut-out position.

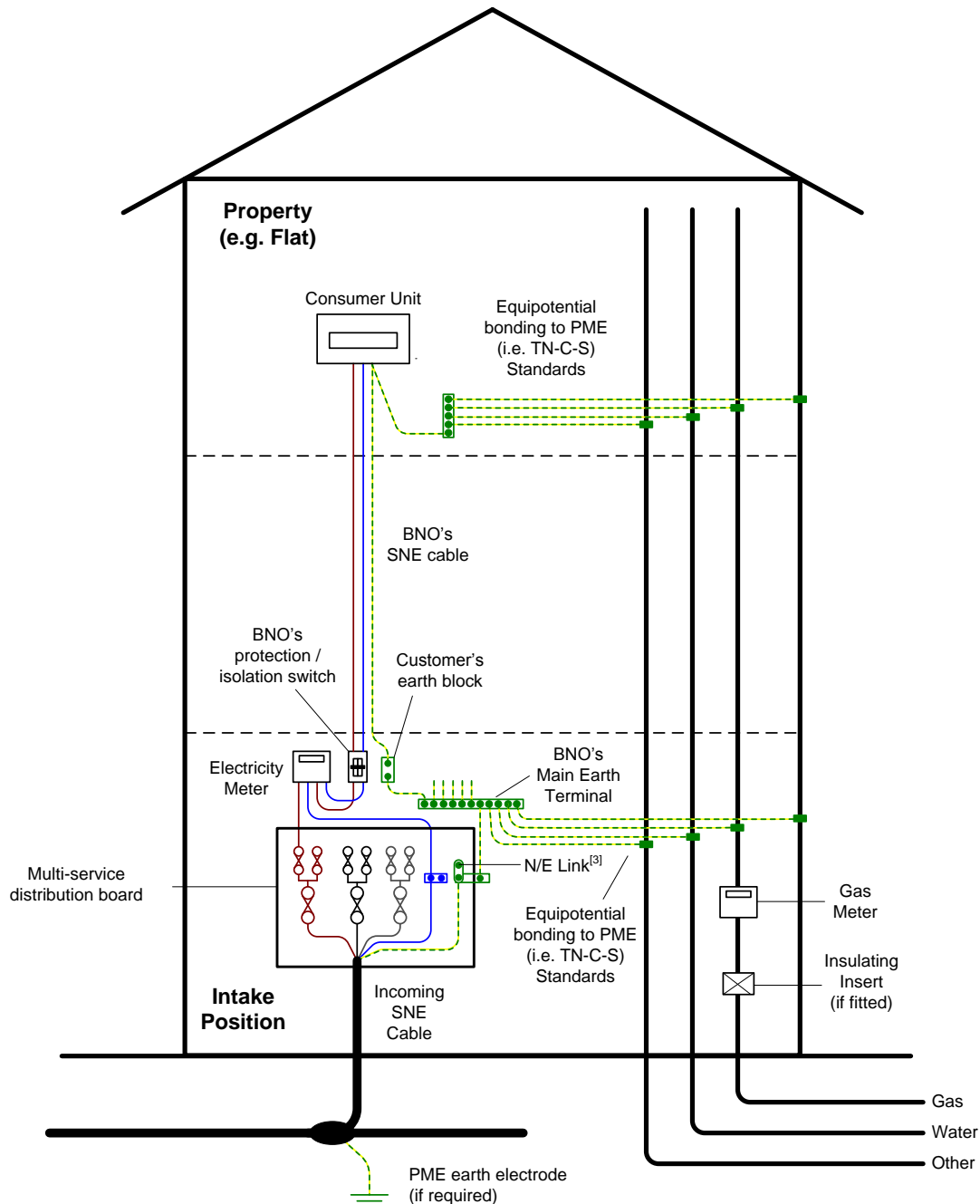
Figure 20 Bonding Requirements: Services Originating Outside of the Building – (Commercial Arrangement with Services comprising 95mm², 185mm² or 300mm² 4 core Wavecon)



Notes:

1. This arrangement is suitable for commercial properties utilising mains type cable (i.e. 95mm² or 185mm² or 300mm² 4 core wavecon).
2. Customer equipotential bonding shall be to PME (TN-C-S) standards.
3. A SNE derived from a CNE network earth arrangement label shall be fitted at each cut-out position.

Figure 21 Typical Bonding Requirements: Services Originating at an intake position or within a Building Network – Single Incoming Circuit

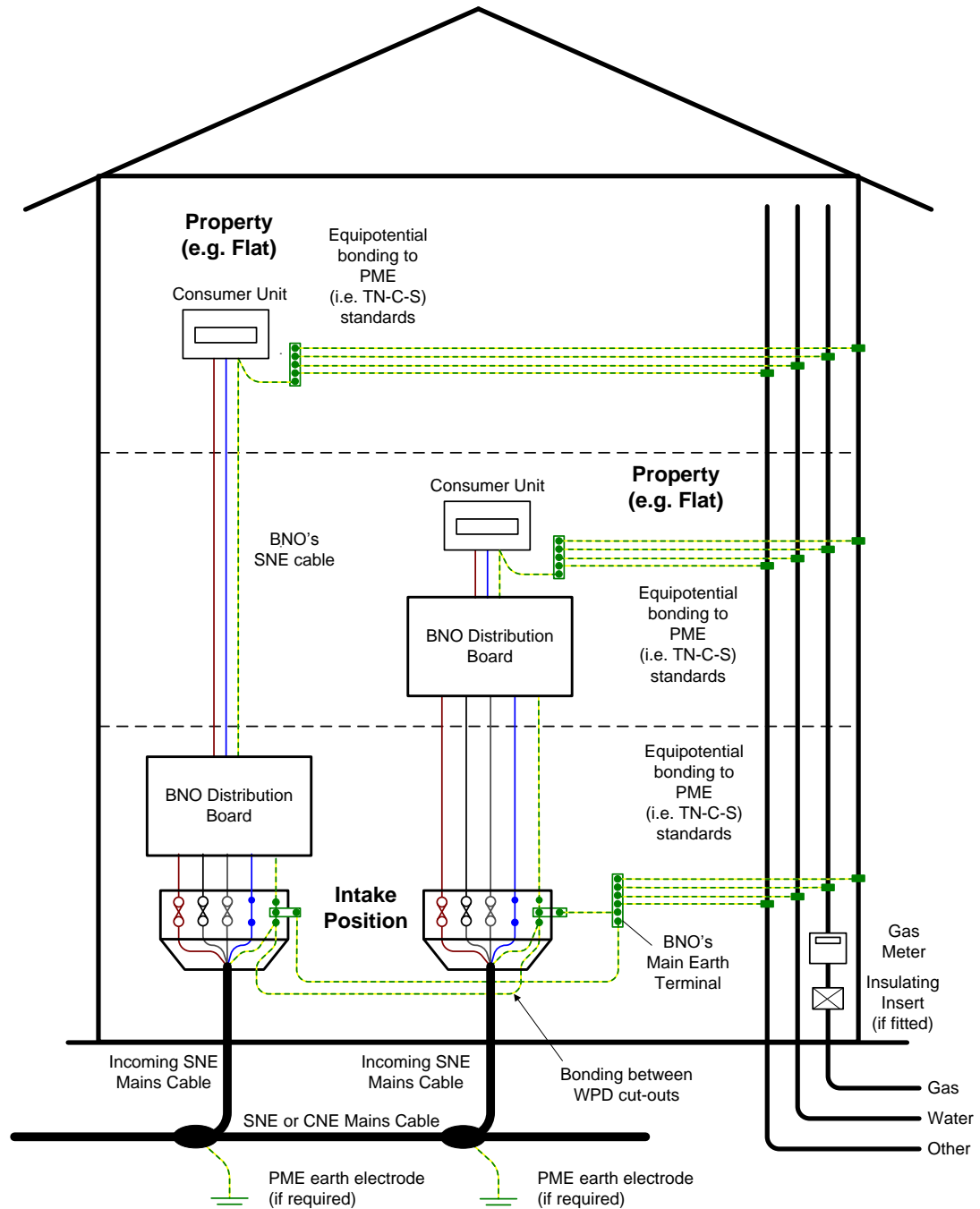


Notes:

1. Equipotential bonding to be suitable for TN-C-S (PME) wiring systems.
2. An SNE derived from a CNE network earth arrangement label shall be fitted at each meter position.
3. MSDB N/E Link to be in the open position.

Figure 22

Typical Bonding Requirements: Services Originating at an intake position within a Building Network – Multiple Incoming Circuits within the same Intake Room



Notes:

1. Equipotential bonding to be suitable for TN-C-S (PME) wiring systems.
2. An SNE derived from a CNE network earth arrangement label shall be fitted at each new cut-out position.
3. The incoming earth terminals of the incoming cut-outs (or circuit breakers) shall be connected together using insulated copper earth conductor with a minimum cross-sectional area no smaller than the cross-sectional area of the earth conductor within the largest incoming cable, so far as is reasonably practicable. See clause 4.5.6 and Table 3 for further clarification.

Rising and Lateral Mains in Multi Occupancy Buildings

Ownership

The four licence areas that make up WPD have a history of providing electricity connections to a single point of connection within multi occupancy buildings. In smaller developments these are then fed to individual units by submain cables and in larger developments by a system of rising and lateral (R&L) mains.

Responsibility and ownership of submain cables has changed through time so installations should be viewed on their individual merit. Current WPD practice is not to install submain cables.

Responsibility and ownership of R&L mains has never been accepted by the licencees and is always established as part of the building structure. This position has been tested through an Ofgem determination by a landlord and the licence holder for the London area and details are given below.

Within the wording of Ofgem determination RBA/TR/A/DET/159 Ofgem held that the R&L mains within specific multi occupancy buildings was the responsibility and ownership of the building landlord. The determination relied on the fact that there was no proof that the R&L mains were installed by the DNO but then went further to comment that it is not reasonable for a DNO to own and operate a system of R&L mains within a building.

National Guidance

In 2010 the Electricity Networks Association published Engineering Recommendation G87. This document provided a national framework for multi occupancy buildings and aligned, so far as it could, with arrangements for gas and water installations. It balanced the long term needs of the DNO to access and maintain its assets whilst giving building owners freedoms with the Building Regulations. In simple terms it established the installation in three parts, an intake position owned by the DNO, a system of mains owned by the Building Network Owner (see below) and a termination point for each individual supply.

Building Network Owner

The organisation that owns or operates the electricity distribution network within a Multiple Occupancy building between the Intake Position and the Customers' Installations is known as the Building Network Owner (BNO). Whilst the BNO may be either a DNO, a licenced distributor or a third party licence exempt company it is normal within the WPD area for the role to be taken by a third party company who will often be the landlord or the facilities company responsible for the building.

It is important to note that the requirement is to own and operate the building network, a task which will include the regular inspection and maintenance of the installation. WPD does not undertake this inspection and maintenance task and cannot be regarded as the BNO.

Enhancements to WPD policy

With the issue of Engineering Recommendation G87, WPD made changes to its relevant policies. Standard Technique ST:SD5C “Low Voltage Connections to Multiple Occupancy Buildings” was issued and included the following design requirements:

- All WPD cables within new residential multiple occupancy buildings will be Low Smoke and Fume (LSF) type.
- All WPD cables within new multiple occupancy buildings will be separate neutral and earth type.

Advice to Property Owners and Building Network Operators

WPD policy in this area is summarised within ST:SD5C which is freely available for download from the WPD technical information website (www.westernpowertechinfo.co.uk).

Examples of Fire Stopping and Fire Sealing products and constructions



Mortar used in concrete floor



Coated Stone batts/boards



Pillows in horizontal tray



Pillows in vertical tray

APPENDIX C

SUPERSEDED DOCUMENTATION

This document supersedes ST:SD5C/2 dated July 2017 which has now been withdrawn.

APPENDIX D

ASSOCIATED DOCUMENTATION

Electricity Act 1989

Electricity, Safety, Quantity and Continuity Regulations 2002

BS 31, Specification steel conduit and fittings for electrical wiring.

BS 731, Flexible Steel Conduit

BS 4648, Cable Trunking

BS 6099, Conduits for electrical installations

BS 6946, Specification for metal channel cable support systems for electrical installation

BS 5588, The Building Regulations 1985 B2/3/4 Fire Spread.

ST:SD8B - Relating to Cable Ratings

ST:SD5A - Design of Low Voltage Domestic Connections

ST:TP21D - 11kV, 6.6kV and LV earthing

ST:TP21E - Provision of WPD earth terminals to customer LV installation

APPENDIX E

KEY WORDS

Flats, Multi-occupancy, Dwellings, Connection, Supply Terminals, BNO, Building Network Operator, MPAN, Distribution Board, Cut-out.