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## IMP/001/010 – Code of Practice for Standard Arrangements for Customer Connections

### 1. Purpose

The purpose of this document is to state CE Electric UK's policy for the standard arrangements for the provision of connections for supplies of electricity to Customers. This document also describes key assumptions made in the preparation of this document and sets out to provide clarity across the organisation with respect to alignment of practice across legacy companies.

This code of practice also helps to ensure the company achieves its requirements with respect to the Electricity Safety, Quality, and Continuity (ESQC) Regulations 2002, the Electricity at Work (EAW) Regulations 1989, our Distribution Licences and The Distribution Code.

### 2. Scope

This document specifies the connection voltage (Low Voltage (LV) and High Voltage (HV)) and standard connection arrangements that are applicable to different size loads. Extra High Voltage (EHV) arrangements are outside the scope of this document and shall be considered on an individual basis in accordance with the principles laid down in the appropriate design policy.

This document describes the generic principles and connection configurations that should be applied when designing a new customer connection and when modifying an existing connection. Each connection shall be individually designed based on the principles contained in this document and take into account the capability of the existing network and the Customers requirements. Policy on the connection of embedded generation can be sought from other internal policy documentation<sup>1</sup>, The Distribution Code and the Engineering Recommendations<sup>2</sup> associated with the connection of generation plant.

### 3. Code of Practice

#### 3.1. Assessment of Relevant Drivers

The key internal business priorities relating to the standard arrangements for Customer connections are:

- Employee Commitment,
- Financial Strength,
- Customer Service,
- Regulatory Integrity.

The external business drivers relating to standard arrangements for Customer connections are detailed in the following sections.

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<sup>1</sup> IMP/001/007 – Code of Practice for the Connection of Distributed Generation

<sup>2</sup> Engineering Recommendation G59/1 and Engineering Recommendation G75/1

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### 3.1.1 Requirements of the Electricity Act 1989 (as amended)

The Electricity Act 1989 (as amended) ('the Act') lays down the core legislative framework for CE Electric UK's operations as a distributor. Specifically, it gives force to the ESQC Regulations 2002, and in section 9 creates the key obligation to develop and maintain an efficient, co-ordinated and economical system of electricity distribution. Discharge of this obligation shall be supported in this document by describing policy for the efficient connection of customers to the wider network.

It should be noted that section 17(2)(c) of the Act relieves CE Electric UK from the obligation to maintain, or offer to provide, a connection where unreasonable in all the circumstances to do so. This means that connection offers need not exactly reflect customers' stated preference, particularly if it would be less safe than these standard arrangements.

### 3.1.2 Requirements of The Electricity Safety, Quality and Continuity Regulations

The Electricity Safety, Quality and Continuity (ESQC) Regulations 2002 (Statutory Instrument no. 2665, January 31<sup>st</sup> 2003) impose a number of obligations on the business, mainly relating to quality of supply and safety. All the requirements of the ESQC Regulations that are applicable to the provision of supplies to Customers shall be complied with and CE Electric UK's distribution networks shall be designed to comply with these requirements.

Reg. No	text	Application to this policy
3(1)(a)	...distributors...shall ensure that their equipment is sufficient for the purposes for and the circumstances in which it is used; and	this will be achieved by defining policy for the efficient connection of customers to the wider network, specifically by laying down functional requirements for connection assets
6	A...distributor shall be responsible for the application of such protective devices to his network as will, so far as is reasonably practicable, prevent any current, including any leakage to earth, from flowing in any part of his network for such a period that that part of his network can no longer carry that current without danger.	in this policy, this will be achieved by defining requirements for interface protection
23(1)	...[the] network shall be: (a) so arranged; and (b) so provided, where necessary, with fuses or automatic switching devices, appropriately located and set; as to restrict, so far as is reasonably practicable, the number of consumers affected by any fault in [the] network	
24(4)	Unless he can reasonably conclude that it is inappropriate for reasons of safety, a distributor shall, when providing a new connection at low voltage, make available his supply neutral conductor or, if appropriate, the protective conductor of his network for connection to the protective conductor of the consumer's installation.	this will be achieved by defining appropriate earthing terminals to be made available

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25(2)	A distributor shall not give his consent to the making or altering of [a connection from [that] distributor's network to a consumer's installation, a street electrical fixture or another distributor's network], where he has reasonable grounds for believing that - (a) the consumer's installation, street electrical fixture or other distributor's network fails to comply with British Standard Requirements or these Regulations; or (b) the connection itself will not be so constructed, installed, protected and used or arranged for use, so as to prevent as far as is reasonably practicable, danger or interruption of supply.	this will be achieved by defining requirements for the interface between our public network and other networks or customers' installations
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### 3.1.3 The Building Regulations 2000-2004

Part P of the Building Regulations (electrical safety) applies only beyond metering at the point of connection to the end customer. Therefore, any work CE Electric UK carries out within buildings as part of its licensed distribution business is not covered. However, CE Electric UK also needs to have regard to part B (fire protection): this is generally addressed by the detailed description of standard arrangements in this policy.

### 3.1.4 Requirements of the Electricity at Work Regulations 1989

The Electricity at Work Regulations 1989 place obligations on the business relating to the safety of plant and equipment used on the distribution system. It requires that plant and equipment is designed, constructed and operated within the limits of its capability.

### 3.1.5 Requirements of Distribution Licences (YEDL and NEDL)

The Distribution Licences contain a number of conditions to be complied with which are relevant to system design.

In particular, Condition 5 requires the distribution system to be developed to a standard not less than that set out in Engineering Recommendation P2/5 (1978) – Security of Supply. Guidance Note 1 to the Distribution Code states that ER P2/5 does not apply to the supply connection of a Customer, and that these supply connections shall be considered on their own merits by discussion between the Customer and the network operator.

Distribution Licence Condition 9 requires the licensee to at all times have in force and to implement and comply with a Distribution Code.

### 3.1.6 Requirements of The Distribution Code

Each Distribution Licence holder is required to hold, maintain and comply with a Distribution Code. Both NEDL and YEDL currently do this by adopting The Distribution Code of Licensed Distribution Network Operators of Great Britain.

The Distribution Code covers all material technical aspects relating to connections to and the operation and use of the Distribution Systems of the Distribution Network Operators (DNOs). The Code is prepared by The Distribution Code Review Panel and is specifically designed to:

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(a) Permit the development, maintenance and operation of an efficient co-ordinated and economic system for the distribution of electricity.

(b) Facilitate competition in the generation and supply of electricity.

The Distribution Planning and Connection Code specifies the technical and design criteria and the procedures which shall be complied with in the planning and development of the distribution systems. It also applies to Users of the distribution systems in the planning and development of their own systems in so far as they affect the NEDL and YEDL systems. Annex 1 of The Distribution Code lists the key engineering documents that should be consulted, as appropriate, when designing a customer connection.

It also sets out principles relating to the design of equipment and its operating regime. Equipment on CE Electric UK's systems and on User's systems connected to the distribution systems shall comply with relevant statutory obligations, international and national specifications and Electricity Networks Association technical specifications and standards.

### 3.1.7 Metering Requirements

All connections to final customers from CE Electric UK's distribution system require energy to be accounted for in accordance with the Balancing and Settlement Code. This shall generally be through the provision of an appropriate meter in accordance with BSC sections K and L by the registered supplier.

Unmetered connections may only be provided in line with the guidance contained within the Electricity (Unmetered) Supply Regulations 2001 (Statutory Instrument 2001, No 3263) and the guidance contained within the Balancing and Settlement Code Procedure on Unmetered Supplies in Supplier Meter Recording System, BSCP520, version 5.0, 29 June 2004. Section 3.5.2.2 provides further detail on unmetered supplies. In addition, the principles for the connection of unmetered supplies contained in the YEDL Policy for Unmetered Connections, INC/002, shall be followed by CE Electric UK.

Connections to embedded networks also require metering, to the same standard as a direct connection for a final customer with the same capacity requirement. Guidance on registration and other settlement matters can be obtained from Network Trading.

### 3.2. Key Code of Practice Requirements

The objectives of this code of practice are:

- To ensure that all new Customer connections are made in such a way as to prevent danger to the public and our staff.
- To minimise as far as reasonably practicable the impact on quality of supply to our Customers due to faults and planned outages on our networks.
- To provide robust network connections and extensions that will be sufficiently future proof to meet the realistic requirements/expectations of the Customer.
- To minimise as far as reasonably practicable any adverse impact of the power quality experienced by other connected Customers.

### 3.3. Connection of Customers

#### 3.3.1. General

This section outlines the system arrangements to be adopted in providing connections up to and including 20kV.

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The standard connection arrangements described in Section 3.5 below and shown in Appendix 1 and 2 should meet the requirements of the majority of Customers.

In a small number of cases special connection arrangements, which are not strictly in accordance with the standard arrangements, may be more appropriate and can be considered where there are benefits to both CE Electric UK and the Customer. Any such deviations shall be agreed with the Implementing Officer.

### 3.3.2. Embedded Distribution Networks

The requirements of this document apply in full to connections to Embedded Networks, with the following exceptions:

- multiple points of connection to an Embedded Network are permitted where efficient and economical, so long as:
  - the IDNO demonstrates to the satisfaction of the Implementing Officer that they have adequate design and operational practices to avoid inadvertent parallels across the CE Electric UK network;
  - no switching is carried out that may affect the CE Electric UK network (e.g. any parallels across the HV system) without the permission of the CE Electric UK control engineer; and
  - CE Electric UK's interface protection is set up to maintain the integrity of CE Electric UK's distribution network, as for any other connection
- all connections to Embedded Networks shall comply with ER P2/5. Unlike connections to individual premises, general networks with more than one customer lie beyond the CE Electric UK point of connection. Arrangements subject to common-mode failure are therefore not permitted for Embedded Networks above 1 MVA, as detailed in Appendix 1.

## 3.4. General Requirements

### 3.4.1. System Development

CE Electric UK's distribution systems are developed primarily through new connections. The general objective is to obtain a simple, robust, economical and efficient network, taking into account the initial capital investment, system losses, maintenance and operation costs over the life of the asset. In general, development of the LV and HV systems shall seek to improve the quality and reliability of supply provided to Customers and to reduce potential Customer Minutes Lost (CML) and Customer Interruptions (CI). The connection arrangement and nature of a Customer's new or additional load shall not disadvantage, or put at material greater risk, supplies to other Customers connected to that part of the distribution system.

### 3.4.2. Co-ordination with Customers' System

Customer connections shall where practicable and economically viable, be designed such that both CE Electric UK's and the Customers' systems form part of an economic, co-ordinated, and efficient system with flexibility to facilitate any future load increase that can be reasonably anticipated. This is achieved by applying consistent design approaches and the use of standard connection arrangements, switchgear and buildings.

### 3.4.3. Power Quality

Where the Customer's installation is likely to comprise load that produces voltage distortion, unbalance or harmonics, the connection design should take into consideration the requirements of Engineering Recommendations P28, P29 and G5/4 as appropriate.

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Any extra costs incurred by CE Electric UK as a result of providing a connection suitable for such 'abnormal' loads shall be borne by the Customer following the principles in the appropriate Distribution Licence Condition 4 Statement.

#### 3.4.4. Ownership of Equipment

CE Electric UK shall retain ownership of the connection and protection equipment, which is essential for the continuity and efficiency of its distribution systems and to meet Distribution Licence obligations, based on the following principles:

- a) CE Electric UK shall own the switchgear and associated equipment essential to ensure the integrity of its system.
- b) CE Electric UK shall own the switchgear and excess energy protection required to meet its obligations under the Electricity Safety, Quality and Continuity Regulations 2002.
- c) CE Electric UK shall provide and maintain a means of emergency disconnection for HV Customers, or Customers fed from a LV circuit breaker (circuit breaker), as required under Electricity at Work Regulation 12. These emergency disconnection facilities shall normally comprise a push button arranged to disconnect the supply by tripping the appropriate item of switchgear. The push button(s) shall be located at the nearest practicable point to the supply terminals. This will be dependent on the Customer's connection arrangement, as follows:
  - HV Customer – Trip HV circuit breaker
  - LV Customer with dedicated HV/LV transformer – Trip HV circuit breaker
  - LV Customer supplied from shared HV/LV transformer – Trip LV circuit breaker.

Where this facility requires a Direct Current (D.C.) tripping supply, CE Electric UK shall provide the tripping battery and associated equipment. CE Electric UK tripping circuits shall not be extended beyond the substation premises. If the Customer requires the emergency tripping facility to be extended to some other location, they shall provide the additional apparatus (including any remote tripping battery), except that CE Electric UK shall provide any interposing relay required at the substation at the Customer's expense.

- d) For connections with meters connected via current transformers, CE Electric UK shall own the metering connections, including current and voltage transformers, test terminal block and multicore cable from switchgear to test terminal block.
- e) For connections with whole current metering, the CE Electric UK supply terminals will be the outgoing terminals of the fused cut-out.
- f) For connections with current transformer metering, the input to the metering equipment shall be from CE Electric UK's metering current and voltage transformers. A separate test terminal block shall be provided by CE Electric UK for each supply terminal together with the associated multicore cable(s).
- g) For un-metered connections, the CE Electric UK supply terminals will be the outgoing terminals of the fused cut-out.
- h) The ownership of metering equipment is dependent upon contractual arrangements with the Supplier and Meter Operator.

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- i) The Customer shall own all other equipment, including that required for protection of his HV circuits connected to the supply terminals and for operation and protection of the remainder of his electrical installation. Provided that appropriate indemnities are agreed with the Customer and incorporated in the Connection Agreement, it is permissible for CE Electric UK to provide signals to the Customer from protection current transformers and voltage transformers owned by CE Electric UK as required by the Customer as part of a protection scheme for his installation.

CE Electric UK's equipment and the position of the supply terminals are indicated on the drawings in Appendices 1 and 2 for HV and LV connections respectively. The supply terminals on the Customer's premises shall normally be at the outgoing terminals of our equipment, unless otherwise agreed in writing.

All the standard arrangements minimise CE Electric UK's ownership of equipment on Customers' premises. This reduces as far as possible, problems of access, third party damage, operation and maintenance, whilst allowing the Customer to install and own equipment to his own specifications (which may not necessarily match CE Electric UK specifications).

Responsibility for construction, commissioning, operation, maintenance, repair and eventual replacement of equipment shall normally follow ownership. In appropriate cases however, the Customer may be authorised to open and close CE Electric UK's interlocked switchgear under instruction from the appropriate CE Electric UK Control Centre in order to restore his supply.

### 3.4.5. Substation Accommodation and Access

For all the standard arrangements in Appendix 1 and arrangements 4 – 6 in Appendix 2, the Customer shall normally be required to provide and maintain the substation accommodation designed to meet the requirements of both CE Electric UK (to house their distribution equipment) and the Meter Operator (for their metering equipment). CE Electric UK requires long term security of tenure where the Customer's substation allows CE Electric UK operational benefits for other Customers. The Meter Operators' equipment shall be located adjacent to the supply terminals. For standard arrangements 1 – 3 in Appendix 2, the Customer shall normally be required to provide or arrange for the provision of a suitably secure, weatherproof environment in which to locate CE Electric UK equipment and equipment owned by the Meter Operator. All substation sites, accommodation and access shall be provided in accordance with the guidance contained in the Policy on Operational Property, CNS/003, and its subsidiary documentation.

The metering shall be readily accessible to the Customer, the Meter Operator and CE Electric UK. The Customer shall permit the Meter Operator and CE Electric UK to install such metering equipment as may be reasonably required on the premises. The Customer shall also allow the Meter Operator and CE Electric UK access to such equipment at all times and shall refrain from interfering with such equipment and the connections to such equipment.

Substations should normally be located on the curtilage of the Customer's premises at ground level with 24-hour vehicular access. In order to minimise safety risks and facilitate operational access, new substations shall not be situated in the basements or on the roofs of buildings unless there are no other reasonably practicable sites. A new substation shall only be located on a roof or in a basement where a risk assessment indicates that the resultant safety and operational risks are deemed to be acceptable by the Design Manager. During the design and installation of new substations, the guidance contained within the Construction, Design and Management Regulations shall be followed, in particular, the guidance relating to the future maintenance, renewal and disposal needs of the substation.

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All substations and their associated housings shall be installed and arranged in accordance with the guidance set out in the following Distribution Business Documentation:

- DSS/012 Policy for flood risk mitigation at substations
- DSS/015 Policy for the renewal of outdoor HV substations
- DSS/028 Policy for the enclosure of ground mounted distribution substations
- DSS/031 Policy for fire mitigation at operational premises

The Customer shall not normally have access to CE Electric UK equipment except in special cases where the Customer is given permission to operate such equipment or where it is inappropriate to restrict access, for example, a connection arrangement that is provided at LV.

### 3.4.6. Single Point of Connection

As permitted under s17(2)(c) of the Act, which relieves CE Electric UK from its obligation to offer to provide a connection on request where unreasonable in all the circumstances, connection shall be made available to a Customer at only one location on any given premises. Specifically, it would be unreasonable to offer multiple connections to one premises where there is a credible risk that they might become interconnected.

Where the connection comprises multiple supply terminals, they shall be situated at one location on those premises. This ensures that:

- a) There is a single location on a Customer's premises where all supplies can be disconnected in an emergency.
- b) There is only one location on a Customer's premises that needs to be secure.
- c) The cost of operation and maintenance is minimised.

Back-up connections from the CE Electric UK distribution system for emergency power etc. are therefore not permitted. Instead, customers shall be reminded that stand-by generators or batteries may be used to provide emergency supplies in accordance with BS 5588.

Where multiple LV connections are provided at one location, due consideration also needs to be taken of:

- a) The mixing of SNE and CNE systems.
- b) Neutral current diversion issues with two PME connections.

### 3.4.7. Extensions to CE Electric UK Equipment

Where equipment (i.e. cable and overhead circuits, switchgear, transformers, protection and control systems) is to be installed by suitably accredited independent connection providers for adoption by CE Electric UK, then such equipment shall comply with appropriate CE Electric UK's equipment standards. CE Electric UK shall approve the design of systems and specification of equipment, as part of the design approval process in support of competition in connections.

### 3.4.8. The Distribution Code

The connection arrangement for each Customer shall take account of the requirements in the Distribution Code. The requirements in relation to security of supply are particularly relevant.

Connections to CE Electric UK's networks that supply only one Customer require special consideration of costs and the Customer's requirements for the level of security of supply. Guidance has been agreed with Ofgem, which is set out in full in the Distribution Code (Guidance Note 1).

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In summary, this states that ER P2/5 does not apply to the design of a supply connection to an individual Customer, and that it will be for each Customer to decide, in negotiations with us, the level of security required. Where, as a result of applying this guidance, the connection to a single Customer is provided at a level of security less than that prescribed in ER P2/5 there is no need to seek derogation from Ofgem.

It must be emphasised that this relaxation applies only to a connection that supplies a single Customer. Any part of a connection arrangement that supplies more than one Customer should comply with the normal requirements of ER P2/5.

CE Electric UK's policy is that a Customer shall normally be provided with the offer of a connection that complies with the requirements of ER P2/5 for the equivalent demand group. Where, in the course of discussions with the Customer it is apparent that they are willing to consider a lower standard of security, and such an arrangement is agreeable to both parties, is practicable and offers cost benefits, the Customer can be provided with a connection offer to an agreed lower security standard. In such circumstances the Customer shall be made aware of the potential implications of the lower security standard in writing, and his acceptance of these shall be recorded in the Connection Agreement.

Connections to Customers which offer a standard of security higher than that specified in ER P2/5 may be provided in special situations, for example where a Customer specifically requires a higher standard of security or where consideration of system losses resulting in a more economic design (for example with duplication of long circuits). In such situations any additional funding required from a Customer will be determined in line with the appropriate NEDL or YEDL Licence Condition 4 statement.

Under the Distribution Planning Code (DPC 6.2), connections for entry to or exit from CE Electric UK's system shall incorporate a means whereby CE Electric UK can disconnect the User's equipment. Such facilities are provided on the standard arrangements described in section 3.5.

### 3.4.9. Technical Requirements

The continuous summer rating of equipment, with no account being taken of cyclic overload capability, should normally be used when determining the capacity of the new assets used to provide a new connection. An assessment of the capability of other, new or existing network assets, forming part of the wider network, should be based on the appropriate demand curve and seasonal asset capability. Care shall be taken when selecting items of plant for a connection to ensure that the rating of that plant is sufficient for the situation and configuration in which it is to be used. All new HV and LV connections shall comply with the requirements of all current policy relevant to the design of the HV and LV systems.

### 3.4.10. Choice of Connection Voltage

The connection voltage will depend upon the type and size of the Customer's demand, and shall be determined by CE Electric UK and agreed with the Customer as part of the connection application process. This shall normally be at low voltage in accordance with Section 3.5.2 unless the Customer's maximum demand is expected to exceed 1MVA within a relatively short period<sup>3</sup> of time, or where the nature of the Customer's load will cause disturbance to other Customers. In situations where the Customer explicitly requests a higher capacity LV supply e.g. supply to a supermarket, a supply at LV up to 1.6MVA can be made available.

Connections greater than 1MVA (or in some situations 1.6 MVA) shall normally be provided at HV. The actual supply capacity available will be dependent upon the voltage of the HV network at the point of connection and the spare capacity on that part of the system.

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<sup>3</sup> For example within a two year period

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The 6kV system is a legacy system with limited load capability, and therefore new connections at this voltage will not generally be provided. Where the HV system runs at 6kV or a combination of 6kV and 11kV, it is preferable to provide a connection at 11kV, however a 6kV connection may be provided where it is significantly more economical to do so. Where a 6kV busbar is provided only for the benefit of one customer, including an Embedded Network, this shall not subsequently be developed to connect other customers. Where the provision of a connection would require the installation of a new primary substation, the connection shall be provided at 11kV. In order to facilitate future conversion from 6kV to 11kV, all new HV equipment connected to the 6kV network should be capable of operating at 11kV. This will require the use of dual ratio transformers.

Connections greater than approximately 630A<sup>4</sup> (12MVA at 11kV and 22MVA at 20kV) shall normally be provided at EHV.

### 3.4.11. Connection Capacity

The capacity that can be provided by a particular connection arrangement at a given point on the network is dependent on a number of factors including, the capacity of transformers, switchgear, cable (influenced by its installation method and proximity to other cables) and overhead lines, the voltage at the point of connection and the characteristics of the existing and additional demand. Hence it is not possible to state definitive values for the capability of individual connection arrangements. Approximate capacities are provided throughout this document to give guidance to Design Engineers of the typical demand that can be provided by each connection arrangement. It is important to note that switchgear ratings should be considered to be absolute.

### 3.4.12. Information Required for Proposed New Connections

To assist in the production of the Distribution Load Estimates and to enable updating of generation details, the following information shall be kept electronically in an internally accessible format:

For loads greater than 1MVA:

- The name of the primary substation that will supply the new or additional load.
- The name of the organisation requesting the new or additional demand.
- Whether the load is additional or new.
- The magnitude of the additional or new load.
- The 'likely' magnitude of the additional or new load.

For all generators greater than 16A per phase:

All generation data as detailed in IMP/001/007 - Code of Practice for Connection of Distributed Generation.

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<sup>4</sup> i.e. the rating of a typical primary HV CB

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## 3.5. Standard Arrangements

The appropriate connection arrangement will depend on the Customer's existing, proposed, and likely future load and security requirements, and on the spare capacity available in the existing CE Electric UK system. All Customer connections shall fully comply with this code of practice document. The Customer shall be made aware of, and agree to, any additional risks or conditions affecting the quality and security of their supply as a result of accepting a connection arrangement which is not one of the standard arrangements. All such agreements shall be documented in the Connection Agreement.

The standard connection arrangements are described below, and illustrated in the diagrams contained in Appendix 1 and 2.

### 3.5.1. Protection at the CE Electric UK/Customer Interface

These common principles shall apply to all points of connection:

- CE Electric UK shall provide interface protection to safeguard the integrity of its network, in accordance with its statutory duty under section 9 of the Electricity Act 1989 (as amended) to develop and maintain an efficient, co-ordinated and economical system. This shall include reasonable precautions against:
  - overload of service equipment or other assets, consistent with ESQC regulation 6;
  - faults on the customer's system causing protection operation on CE Electric UK's system (other than at the interface), consistent with ESQC regulation 23(1); and
  - where appropriate, danger caused by Customers' generation attempting to energise a faulted network.
- CE Electric UK shall also provide a means of isolation. This shall generally be achieved by removing fuses from their carriers (separate isolating switches are not required), or by isolating metered circuit breakers, as appropriate to the individual connection; and
- the customer need not install his own protection in series with CE Electric UK's protection, if he accepts that the equipment and scheme used to protect the distribution system will also protect his system. This is permitted under BS 7671 regulation 473-02-02.

CE Electric UK's protection may therefore be used to control a Customer's circuit, provided that it is a single unteed circuit (e.g. supplying a single transformer, a section of busbar or single piece of switchgear) and that the Customer grants an indemnity for use of the protection equipment and for the adequacy of the protection scheme to protect his equipment.

Where the Customer considers that the CE Electric UK protection scheme does not adequately protect their assets, or where the Customer does not provide adequate indemnity, they shall install their own protection and control equipment.

It should be noted that it is the Customer's responsibility to ensure that the cable is suitable for the purposes and circumstances in which it will be used. Specifically, it shall be able to withstand the maximum prospective fault current that can be expected on that part of the network to which it is connected.

These principles shall be applied in respect of connections to Embedded Networks. It should be noted that Ofgem has determined (paragraph 6.8 of Ofgem determination S/23/R/155) that protective measures should be applied by the owner of electric lines and apparatus; and that distributors are not obliged to provide protection for plant or equipment owned by a Customer (or other third parties).

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This reinforces the point already made in this policy, that CE Electric UK shall provide a scheme to protect its network, which customers or other distributors may also use, at their choice and risk, if the characteristics of that scheme also protect the downstream assets.

EAW regulation 12 requires that, '...where necessary to prevent danger, suitable means...shall be available for cutting off the supply of electrical energy to any electrical equipment'. A trip facility for the relevant CE Electric UK equipment shall be provided where there are significant assets on customers' premises controlled by CE Electric UK switchgear. This includes:

- customers' HV switchboards controlled by CE Electric UK metered circuit breakers;
- HV/LV transformers controlled by CE Electric UK RMUs; or
- LV tails from a circuit breaker.

### 3.5.2. Connection of High Voltage Customers

This section describes the standard connection arrangements for Customer connections provided at HV. In addition to the general requirements applicable to both HV and LV, the following issues should be considered.

Customer's equipment shall be located as close as is reasonably practicable to the supply terminals in order to minimise the length of cable. The cable shall be installed in a controlled environment, where there is negligible risk of any future interference. To ensure protection discrimination, the maximum length of HV cable between the CE Electric UK interface protection and the first Customer's protection shall be 20m.

Customers connected at HV shall be advised of the network's maximum fault level at the point of connection. Generally switchgear with a short circuit rating of 20kA or 16kA for 3 seconds will be adequate for connections made directly to a primary substation or distribution substation installation respectively. There will be a few special cases, for example where generation plant or large motors are connected, where higher switchgear ratings may be required.

In situations where the Customer is not able to tolerate short interruptions to his equipment, the Ring Main Units (RMUs) used in the HV arrangements may be substituted for extensible switchgear.

Switchboards that are jointly owned by Customers and CE Electric UK impose undesirable procedural and procurement implications and shall be avoided wherever it is reasonably practicable and economical to do so. In those circumstances where a jointly owned switchboard is the only reasonably practicable option, for example to facilitate unit protected incoming feeders, the following shall apply:

- a) The switchgear specification and manufacturer are approved by CE Electric UK.
- b) CE Electric UK does not incur any additional costs.
- c) Acceptable terms are negotiated covering responsibility for maintenance and eventual replacement, and these shall be written into the Connection Agreement.

In the case of jointly owned switchboards, where failure of any battery on the joint board would impact on other Customers or incur risk of damage to CE Electric UK equipment, the battery shall be owned by CE Electric UK. In cases where failure of the battery only impacts on the Customer, the Customer shall own the joint board battery.

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Connection Agreements with a Customer for a non-firm capacity in excess of the firm capacity of the connection shall normally be avoided, as they may require continuous monitoring of the system and/or the Customer's load during outages. Where a Customer requires a non-firm connection capacity in excess of the available firm capacity, a load management scheme providing both alarm and trip signals shall be applied following consultation with the Design Manager. The details of such schemes shall be recorded in the Connection Agreement and on an operational interface drawing retained at the substation.

The metering circuit breakers shall be equipped with protection, in accordance with the guidance contained in the "Code of Practice for The Protection of High Voltage Networks (TS1)" (DSS/007/001).

The Customer shall provide a 230V single-phase AC supply for lighting, heating, and battery charging together with a 13-amp socket outlet to provide a supply for testing equipment. This shall normally be derived from a transformer supplied from that substation. Only in exceptional circumstances should a separate supply be provided from the LV network (at the Customer's cost), in which case a notice identifying the source of the LV supply shall be fixed to any Earth Fault Indicator in the substation.

In appropriate cases the Customer may be authorised by CE Electric UK to close the normally open circuit breaker to restore his supply if it is located as part of the equipment that forms the Customer's connection.

### 3.5.2.1. Connections up to approximately 160A at 6 & 11kV and 100A at 20kV (Arrangements 1 and 2)

Arrangement 1 is the standard arrangement for all situations and shall be the first arrangement considered for Customers requiring a connection of this size of load. Arrangement 2 may be proposed if the Customer does not want the level of security provided by Arrangement 1. CE Electric UK will however, consider moving to Arrangement 1 from Arrangement 2 at their own cost dependent on the cost implications and benefits to network performance. It is worth noting that Arrangement 2 should not be offered where there is an existing tee between two circuit breakers or switches and where the total load between those circuit breakers or switches would exceed 1MW, i.e. the resulting network shall always continue to comply with the requirement of P2/5. All connections to the existing HV network will be dependent on the capacity available in that network. It may be necessary, in some circumstances, to implement substantial network re-configuration or reinforcement in order to accommodate the Customers new load requirements.

The table below details the capacity of connections currently available through the use of single Ring Main Units.

<b>Voltage</b>	<b>Capacity</b>	
6.6kV	160A	1.6 MVA
11kV	160A	3.0 MVA
20kV	100A	3.5 MVA <sup>5</sup>

CE Electric UK's standard arrangement for a connection up to 160A is to use a 200A rated Ring Main Unit\*. Above 160A extensible switchgear will be needed to give the required connection capacity. In either case, emergency push button tripping facilities shall be provided together with relay protection in accordance with current design practice.

<sup>5</sup> At 20kV, a RMU is used that has been manufactured to have a 3.5MVA capability

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If it is likely that the Customer will require additional capacity in the short to medium term such that his maximum demand will exceed 160A, the Customer should be encouraged to agree to the use of extensible switchgear, rated at up to 630A and move to Arrangement 4. Similarly, unless there is no possibility of future expansion, the Customer should normally be encouraged to provide a switchroom large enough to facilitate future development to Arrangement 4.

\* Note: The protection relays and current transformers forming part of the RMU are such that the maximum setting that can be applied is 200A. Current protection design policy requires that an overcurrent setting of 125% should be applied and therefore the normal current is limited to 160A.

These arrangements are permitted for Embedded Network connections below 1 MW, as they would otherwise be inconsistent with ER P2/5, being subject to a single outage (of the outgoing CE circuit breaker), unless two RMUs are provided and the required demand is within the capability of each one. Bulk connections up to 1 MW (or the capability of a 1000 kVA transformer) can be provided under LV arrangements 5 & 6 .

### 3.5.2.2. Development of existing connections > 160A at 6 & 11kV and >100A at 20kV (Arrangement 3)

This arrangement shall only be used when developing an existing HV connection and where it provides an economical alternative to providing the Customer with one of Arrangements 4 – 7. The normal supply is via the dedicated primary feeder, with the alternative supply being provided by the existing network connection. It may be necessary to adopt different protection settings on the normal and alternative supplies. The dedicated feeder shall not be connected in parallel with the alternative network connection under normal operating conditions and interlocking at the Customers supply terminals would be required to ensure this.

At its discretion CE Electric UK may parallel the normal and alternative supplies, for example when maintaining CE Electric UK equipment, provided this is acceptable to both parties. This arrangement provides a manual switched 'non firm' connection as the alternative will, in the vast majority of cases, be incapable of supplying the full load that can be provided by the dedicated feeder. The implications for the Customer associated with such an 'non firm' connection arrangement shall be written into the Customer's Connection Agreement (refer to section 3.5.1).

Note: The 'non firm' capacity of the connection is governed by the rating of the dedicated circuit. The firm capacity is governed by the rating of the circuits in the alternative feeders, the demand already connected to those feeders and the capacity of the existing substation equipment.

This arrangement is permitted for Embedded Network connections where required demand is within the firm capacity, as it would otherwise be inconsistent with ER P2/5.

### 3.5.2.3. Connections >160A – at 6kV and 11kV and >100A at 20kV (Arrangement 4)

The standard connection arrangement for the provision of supplies greater than that afforded by Arrangement 1 is shown as Arrangement 4. The supply capacity provided by this arrangement, as with those in Arrangements 1 - 3, will depend on the available capacity in the existing network. The capacity available on the normal and switched alternative network feeder should be capable of supplying the full load requirements of the Customer in addition to the general network demand connected to the feeder. The realistic maximum capacities of the network feeders in this arrangement are often restricted, and it may be cheaper to move to Arrangement 5 rather than reinforce the existing HV system.

If the capacity of the switched alternative network feeder is restricted, then this dictates the firm capacity of the connection. Where a Customer has agreed to the provision of a connection, with firm and non-firm capacities, a load management scheme providing both alarm and trip signals shall be installed. The details of such schemes shall be recorded in the Customer's Connection Agreement.

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Note: The capacity of the connection is governed by the rating of the circuits in the feeders and the demand already connected to them.

This arrangement is permitted for Embedded Network connections below 1MW, as it would otherwise be inconsistent with ER P2/5, being subject to a single outage (of the outgoing CE Electric UK circuit breaker).

#### **3.5.2.4. Connections up to approximately 400A Switched Firm (Arrangement 5)**

The standard arrangement, which provides a manual switched firm connection in situations where it is more economical than Arrangement 4, is shown as Arrangement 5. The capacity provided by this arrangement is limited by the capacity of the HV circuits, although voltage drop may also be a limiting factor: reference should be made to the appropriate CE Electric UK standard to establish circuit ratings.

The capacity available on both the normal and switched alternative network feeder shall be sufficient for supplying the full load requirements of that Customer.

An emergency push button tripping facility shall be provided to enable the Customer to open the metering circuit breaker.

The circuit breakers shall be equipped with protection, in accordance with the guidance contained in the "Code of Practice for The Protection of High Voltage Networks (TS1)" (DSS/007/001). In appropriate cases the Customer may be authorised by CE Electric UK to close the normally open circuit breaker to restore his connection if it is located part of the equipment that form the Customer connection.

Note: The capacity of the connection is governed by the rating of the circuits and spare primary substation capacity.

This arrangement is permitted for Embedded Network connections below 1MW, as it would otherwise be inconsistent with ER P2/5, being subject to a single outage (of the outgoing CE Electric UK circuit breaker).

#### **3.5.2.5. Connections up to approximately 400A Continuous Firm (Arrangement 6)**

The standard arrangement, which provides a continuous firm connection, is shown as Arrangement 6. The capacity provided by this arrangement is limited by the capacity of the HV circuits as illustrated in the table in section 3.5.1.4.

The capacity available on both the normal and switched alternative network feeder should be sufficient for supplying the full load requirements of that Customer.

Where the Customer requests supply terminals at the primary substation, such that the Customer owns the circuits to their site, CE Electric UK will provide metering circuit breakers at the source substation provided that the ownership and suitability of the protection for the Customer's circuits is agreed. Section 3.5.1 refers.

Emergency push button tripping facilities shall be provided for each metering circuit breaker together with relay protection in accordance with current design practice.

The circuit breakers shall be equipped with discriminating protection (unit or directional overcurrent), in accordance with the guidance contained in the "Code of Practice for The Protection of High Voltage Networks (TS1)" (DSS/007/001). Where feeder circuits operate in parallel, switchable protection settings shall be provided. It is the provision of this type of protection that permits parallel operation of both circuits and hence ensures the uninterrupted continuity of Customer supplies under first circuit outage conditions.

If providing this arrangement, it is essential to open early discussions with the customer on protection at the interface, specifically to understand the relative roles of incoming CE Electric UK and customer-owned circuit breakers (if any).

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Under this arrangement, the HV feeders are dedicated to the specific Customer (by protection requirements as well as any commercial considerations). Where development of an efficient network requires the use of any spare capacity on the incoming circuits, arrangement 7 shall be used, noting that this can be used as a future upgrade path from arrangement 6.

This arrangement is permitted for Embedded Network connections, on the basis that (as for other Customers) the HV feeders are dedicated to the development.

### **3.5.2.6. Connections up to approximately 400A Continuous Firm providing additional Network Capacity (Arrangement 7)**

This standard arrangement, which provides a continuous firm connection to a Customer and provides additional capacity to supply other network demand is shown as Arrangement 7. The arrangement is similar to Arrangement 6 in that it provides a continuous firm connection to an individual Customer but has the additional feature of facilitating network reinforcement directly from the new busbar.

Arrangement 7 would generally be more expensive than Arrangement 6 and should only be considered where there is an identifiable need to reinforce the distribution network in the area. The additional network assets at the remote ends of the circuits should be funded by CE Electric UK as they would be required to provide the network support rather than to meet the Customer's requirements.

The details of Arrangement 6 are also applicable to Arrangement 7.

This arrangement is permitted for Embedded Network connections.

### **3.5.3. Connection of Low Voltage Customers**

This section describes the standard connection arrangements for Customer connections provided at LV. The standard arrangements described in the following sections, and shown in Appendix 2, should meet the requirements of the majority of LV Customers. In addition to the general requirements applicable to both HV and LV, the following issues should be considered.

Where the Customer's proposed load is approaching the limit of a particular connection arrangement, the Customer shall be made aware of the constraint and, where appropriate, encouraged to agree a connection arrangement with greater capacity to cater for load growth.

Customers shall provide accommodation adjacent to the supply terminals to house suitable means of isolation, and where appropriate, protection for their installation. Unless a Customer has an unmetered connection agreement, they shall also provide suitable accommodation for metering equipment adjacent to the point of connection. Where appropriate, the total multicore cable route length from metering current transformers at the supply terminals shall be as short as reasonably practicable.

Where whole-current metering is used, meters shall be sited directly above CE Electric UK's cut-out, with the length of (CE Electric UK) tails to the meter not exceeding 1m.

Where an Industrial Service Unit, Heavy Duty Cut-out or LV circuit breaker is installed, CE Electric UK's metering test terminal block shall be mounted on a separate panel adjacent to the metering position, from which the Meter Operator shall run a multicore cable to his adjacent metering panel.

The rating of Customer's busbars and connections up to the Customer's sub-circuit fuses shall be of adequate rating to be protected by CE Electric UK's fuses, assuming a maximum symmetrical three-phase short-circuit level of 16MVA excluding any contribution from the Customer's plant.

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To ensure discrimination between HV and LV protection, the maximum length of LV tails from a transformer shall be 10m. For supplies from the general network, protection discrimination on the CE Electric UK system shall be secured by grading with fuses at the substation. The maximum length of tails from cut-out fuses or an LVCB shall be 20m, which provides for clearance in 5s, all in accordance with BS 7671.

A Customer's three phase loads shall be balanced as closely as possible over the three phases. If the nature of a Customer's load is such that unbalance cannot be avoided, but can be maintained within acceptable limits at the point of common coupling with other Customers, then this is acceptable provided the loading on each phase of the connection does not exceed the nominal rating of any conductor forming the connection.

Customers should be encouraged to aim for a power factor of between 0.95 lagging and unity on their electrical systems in order to contribute to maintaining an efficient electrical distribution network.

The declared voltage for new LV connections shall be 230V (single phase) and 400V (three phase).

Where CE Electric UK installs any additional equipment to meet any special needs of a Customer, the additional expenditure (including capitalised maintenance charges and an appropriate return) shall be chargeable to the Customer following the principles in the appropriate Distribution Licence Condition 4 Statement.

In accordance with ESQC regulation 24(4), earthing terminals shall be made available unless unsafe to do so, as detailed in the earthing policy. Service cables with combined neutral and earth conductors shall be used only where a distributor is PME along its length.

### 3.5.3.1. Standard LV Service Arrangements

The standard LV service arrangements, together with their approximate capabilities, are shown in Appendix 2 and detailed below:

Arrangement 1 - Up to 20kVA (80A) single-phase †	}	Connection from the LV network
Arrangement 2 - Up to 60kVA (80A) 3-phase ‡		
Arrangement 3 - 60kVA up to 330kVA (80-465A) *		
Arrangement 4 - 330kVA up to 500kVA (465-700A)	}	Connection via a HV/LV substation on Customer's premises
Arrangement 5 - 330kVA up to 1000kVA (465-1400A)		
Arrangement 6 - 1000kVA up to 1600kVA (1400-2200A)		

In general, all services will be provided by cable connection, although this does not preclude the provision of overhead supply services for domestic connections where an underground connection would be uneconomic.

The kVA capabilities of the connection arrangements are based on a nominal LV network voltage of 240V.

† 100A single-phase cut-outs are normally fitted with an 80A fuse as standard, this may be changed to other values only in accordance with current CE Electric UK fusing policy.

‡ Although 3-phase 100A cut-outs are capable of supplying balanced loads up to 72kVA, the use of an Industrial Service Unit or Heavy Duty Cut-out (Arrangement 3) is preferred above 60kVA, thereby providing the Meter Operator with the facility to fit Current Transformer (CT) metering.

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\*The continuous capacity of a 300 mm<sup>2</sup> waveform laid in proximity to another similarly loaded cable is around 430 A, rather than the 465 A of a single cable quoted on the specification sheet. It will be possible to use the full capacity only where load profiles and installation conditions permit

It is important to note that the specification of equipment used on the LV network has, in the past, varied significantly and, as the capacity afforded by these arrangements may be dependent upon the capability of existing assets, the capability of these connection arrangements may be reduced from those values stated above and individual assessments are often required. Reference should be made to the appropriate CE Electric UK standard to establish circuit ratings.

### 3.5.3.2. Connection from the LV Network (Arrangements 1, 2 and 3)

The preferred method of providing LV connections shall be via LV underground cables that comply with the current CE Electric UK Specification. Where LV overhead services are proposed they shall also comply with the current CE Electric UK Specification. All new LV connections shall comply with the current CE Electric UK design policy and shall make available to the Customer, via an earth terminal, the supply neutral conductor or, if appropriate, the network Protective Conductor for connection to the protective conductor of the Customer's installation, unless unsafe so to do (e.g. for petrol stations).

The connection arrangement shall be in accordance with Arrangements 1, 2 or 3 of Appendix 2.

The supply terminals shall be as close as practicable to the service entry into the Customer's site. Where a Customer provides accommodation remote from the point where the service enters his site, any additional expenditure involved shall be recovered from the Customer.

Outdoor meter cabinets create issues of vandalism and interference, while indoor positions create issues of fire risk and inadvertent contact. Both are permissible, so long as appropriate precautions are taken. Specifically, indoor positions shall be located so as to provide air circulation and minimise the risk of damage (including moisture ingress).

It is not permitted for cut-outs etc. to be installed in below-ground chambers, as these assets are not approved for this duty.

The standard arrangement for single-phase connections up to approximately 20kVA is shown in Arrangement 1 of Appendix 2. Where an outdoor cabinet is used, then either a 25 mm<sup>2</sup> concentric in an external duct or a 35 mm<sup>2</sup> concentric in a duct in the internal cavity shall be used. The service cable shall be terminated in a single phase 100A cut-out with 80 A fuses to the current CE Electric UK Specification.

CE Electric UK does not require the installation of double-pole isolating switches after the meter. Switches fitted by CE Electric UK at the customer's request, whether under fault conditions or to facilitate revitalisation, shall be treated as engineering contracting work and CE Electric UK will not maintain ownership of such assets.

Unmetered connections may only be provided in line with the guidance contained within the Electricity (Unmetered) Supply Regulations 2001 (Statutory Instrument 2001, No 3263) and the guidance contained within the Balancing and Settlement Code Procedure on Unmetered Supplies in Supplier Meter Recording System, BSCP520, version 5.0, 29 June 2004.

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The key requirement of both these documents is that, subject to other conditions, an unmetered supply may be given where:

- (a) the electrical load is of a predictable nature, and
- (b) either -
  - (i) the electrical load is less than 500W; or
  - (ii) it is not practical for a supply of electricity to be given through an appropriate meter at the premises due to:
    - (aa) the anticipated metering costs in the particular case being significantly higher than the usual metering costs associated with that size of electrical load;
    - (bb) technical difficulties associated with providing such a meter in the particular case; or
    - (cc) operation of law so as to prohibit or make excessively difficult the provision of such a meter in the particular case.

Subject to other regulations, an unmetered supply shall only be given where the authorised distributor, authorised supplier and the Customer have agreed to such a supply.

The preferred arrangement for three phase connections up to 60kVA is shown in Arrangement 2 of Appendix 2. The service cable shall be terminated in a three-phase 100A cut-out to the current CE Electric UK Specification.

The preferred arrangement for three phase connections above 60kVA and up to approximately 330kVA is shown in Arrangement 3 of Appendix 2. The service cable shall be terminated in an Industrial Service Unit or Heavy Duty Cut-out to the current CE Electric UK Specification.

For connections of 100kVA and above a Customer shall provide substation accommodation if required to do so.

These arrangements are permitted for Embedded Network connections. It shall be the IDNO's responsibility to provide accommodation for interface protection and metering. These shall be the same equipment as for the equivalent industrial/commercial customer. Multiple connections of these types shall not be permitted to a single Embedded Network, due to the risk of inadvertent parallel. Instead, a bulk connection under LV arrangements 5 or 6 shall be provided.

### **3.5.3.3. Connection from a substation on Customer's Premises (Arrangements 4, 5 & 6)**

Where a Customer requires additional capacity that cannot be provided via their existing arrangement, a connection as shown in Arrangement 4 of Appendix 2 may be used to provide a supply of between 330kVA and 500kVA. In this arrangement the Customer will not usually have access to the metering circuit breaker which will be located in an enclosure provided by the Customer on their site. The metering equipment shall be contained in an enclosure adjacent to the metering circuit breaker. No more than two cables shall be used to connect the CE Electric UK LV fuseboard to the metering circuit breaker.

The preferred standard arrangement for connections from 330kVA up to 1000kVA is shown in Arrangement 5 of Appendix 2. These substations shall be treated as general network substations so long as spare capacity is available from the transformer, and fuseways shall be provided in addition to the LV circuit breaker required for the specific large customer connection.

The preferred standard arrangement for connections from 1000kVA up to 1600kVA is shown in Arrangement 6 of Appendix 2. This arrangement may also be used for connections below 330kVA where there are economic benefits or the Customer requests it, but in these circumstances the Customer shall be provided with the protection settings on our equipment to enable the Customer to grade their system accordingly.

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The enclosed LV circuit breaker cabinet shall also house metering CTs that comply with the current CE Electric UK Specification. The supply terminals shall be at the outgoing terminals of the LV circuit breaker.

The rating of the transformer and circuit breaker shall be as follows:

Connection capacity up to	Minimum transformer rating	Circuit breaker rating
315kVA	315kVA	800A
500kVA	500kVA	800A
800kVA	800kVA	1250A
1000kVA	1000kVA	1600A
1600kVA	1600kVA	2500A

If the Customer has not been granted access to CE Electric UK equipment, the metering equipment shall be contained in an enclosure adjacent to the CE Electric substation. The Customer shall provide a suitable point of isolation and protection, however, it may not be possible to fully grade this protection with CE Electric UK's LV circuit breaker. The Customer's cable between the supply terminals and his point of isolation shall be suitable for terminating in the LV circuit breaker and comply with BS 7671 as appropriate.

The new substation on the Customer's premises shall be located as close as practicable to the entry of CE Electric UK's HV mains cable to the Customer's curtilage. Where the Customer provides accommodation remote from this point, the additional expenditure involved shall be chargeable to the Customer.

All LV circuit breakers shall be provided with an emergency trip button in the Customer's enclosure.

Arrangement 4 does not generally apply to Embedded Network connections, as accommodation for the interface protection and metering cannot readily be provided: arrangements 5 and 6 may be used instead.

#### 3.5.3.4. Limitations to Maximum Demands of Standard Arrangements

In addition to situations where existing LV fuseboards limit the maximum size of the LV fuse to 400 A, there will be some cases where the transformer size is less than 750/800kVA and the maximum size of the LV fuse is restricted to 400A or less to obtain discrimination with the HV fuse. All fuses shall be used in conjunction with the guidance contained in the current CE Electric UK fusing policy.

#### 3.5.3.5. Multiple Occupancy Buildings

Where up to three supplies, including any landlord's supply of <5kVA, of up to 20kVA each are to be provided at a common point, the preferred arrangement is as for a three phase connection as shown in Arrangement 2 of Appendix 2. The service cable shall be terminated in a three phase 100A cut-out, with one single-phase 100A cut-out fitted with an 80A fuse where necessary for the landlord's supply, to the current CE Electric UK Specification.

Where more than three communal supplies are required, a single service intake position shall be established, with metering either:

- a proprietary three-phase multiple-way distribution unit, with the appropriate number of ways and overall rating complying with the current CE Electric UK Specification. Diversity shall not be applied to the rating when such a unit is used for multiple commercial premises; or

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- a single meter to the relevant specification for commercial/industrial premises. Under such situations, CE Electric UK shall provide a single connection to the building, allowing the landlord (or equivalent body) to re-sell electricity to individual occupiers as they deem fit. A single MPAN shall be issued for that single meter: any further metering arrangements shall be the landlord's concern.

CE Electric UK shall not own nor operate any risers and laterals beyond the supply terminals, although they may be installed for the customer on an engineering contracting basis.

These installations are fundamentally different to the general public network, requiring different equipment to be purchased and different methods of installation (for example, there is no ENA technical specification for LSF/LSOH cables). They are also subject to regulations that do not apply to the core activity of electricity distribution. It is therefore inappropriate for CE Electric UK's licensed distribution business to take on this work.

Other service providers are better suited to such work, being familiar with the requirements for safe installation within buildings, and being used to the electrical, civil and mechanical aspects of running cables on cable trays, through fire barriers, etc. The issue is not electrical but civil and mechanical. In particular, fire precautions require installation methods not found on the general network.

Further, under the EU Electricity Directive, brought into British law through the Utilities Act 2000, it is explicitly provided that parties other than the host electricity distributor may own and operate local distribution networks such as those in multiple occupancy buildings.

Taking all this into consideration, it is no longer reasonable in all the circumstances for CE Electric UK's licensed distribution business to provide risers and laterals beyond the supply terminals. This position will be reflected in due course in national policy.

Discrete connections to mobile telephone base stations (or equivalent) in larger sites are not permitted unless clearly separate from premises fed from the main connection, and thereby posing no safety risk.

### 3.6. Assumptions

This code of practice is aimed at ensuring that the networks of both YEDL and NEDL are extended in such a way at all voltages to provide a safe and secure supply of electricity to all our Customers in line with the requirements of statutory legislation.

The following assumptions have been made:

- The current business goals for the security, safety and continuity of operation of the networks do not change.
- All CE Electric UK internal documentation referred to in this code of practice is revised to accommodate the alignment of NEDL and YEDL legacy policies

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### 3.7. Implementation and Monitoring of this Code of Practice

All business divisions involved in the provision of new Customer connections for additional or new loads are responsible for the implementation of this code of practice, however, the main accountabilities for implementation and monitoring of this code of practice lie with:

Designation	Role
Call to Quote Manager	The manager appropriate to the part of the network where the policy is being applied, who is accountable for the implementation of this policy. Will ensure responsible persons are appointed to implement this policy.
Design Manager (Network Integrity)	The manager appropriate to the part of the network where the policy is being applied, who is accountable for the implementation of this policy. Will ensure responsible persons are appointed to implement this policy.
Policy Production Manager	Responsible for monitoring compliance of all business divisions with this policy.

### 3.8. Planned Code of Practice Review

This code of practice shall be proposed for review on a biennial basis or at any time when external or internal influences drive a change in policy e.g. a change in legislation, learning points from the initial implementation stage.

The following responsibilities shall apply to code of practice control and review:

Designation	Responsibility
Publication Manager	Responsible for issuing a quarterly report to the Policy Production Manager (or representative) detailing policies scheduled for biennial review within the next 6 months
Policy Production Manager	Responsible for assessing the continued applicability of this code of practice and for amending this document and communicating any changes in policy.

### 3.9. Superseded Documents

The following documents have been superseded by this code of practice, all copies of which should be destroyed.

Company	Document	Version and Date
CE Electric UK	Code of Practice for Standard Arrangements for Customer Connections	IMP/001/010, version 2.0, 11/02/05

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## 4. References

### 4.1. External Documentation

Reference	Title	Version and date
2002 No. 2665	<i>The Electricity Safety, Quality and Continuity Regulations 2002</i>	31 <sup>st</sup> January 2003
The Act	<i>Electricity Act</i>	1989
	<i>Factories Act</i>	1961
EAW	<i>Electricity at Work Regulations</i>	1989
	<i>HSE Guidance Note GS24, Electricity on Construction Sites</i>	
ER P2/5	<i>Engineering Recommendation P2/5, Security of Supply</i>	1978
	<i>The Distribution Code and The Guide to the Distribution Code of Licensed Distribution Network Operators of Great Britain</i>	Issue 5, August 2004
	<i>Department of Trade and Industry Electricity Distribution Licence: Standard Conditions</i>	August 2001
2001 No. 3263	<i>Electricity (Unmetered) Supply Regulations 2001</i>	1 <sup>st</sup> October 2001
BSCP520, version 5.0	<i>Balancing and Settlement Code Procedure on Unmetered Supplies in Supplier Meter Recording System</i>	29th June 2004
	<i>Engineering Recommendation G59/1, Recommendations for the Connection of Embedded Generating Plant to the Public Electricity Supplier's Distribution Systems</i>	1995
	<i>Engineering Recommendation G75/1, Recommendations for the Connection of Embedded Generating Plant to Public Distribution Systems Above 20kV or with Outputs Over 5MW</i>	2002
	<i>Engineering Recommendation G5/4, Planning levels for harmonic voltage distortion &amp; the connection of non-linear equipment to transmission systems &amp; distribution networks in the United Kingdom</i>	2001
	<i>P28, Planning limits for voltage fluctuations caused by industrial, commercial and domestic equipment in the United Kingdom</i>	1989

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*P29, Planning limits for voltage unbalance in the UK for 132kV and below* 1990

## 4.2. Internal documentation

<b>Reference</b>	<b>Title</b>	<b>Version and date</b>
<i>IMP/001/205</i>	<i>Code of Practice for the Standard of Security on the NEDL and YEDL Distribution Systems</i>	01/08/00
<i>IMP/001/006</i>	<i>Code of Practice for the Economic Development of Underground Systems for Housing Estates</i>	03/05/00
<i>IMP/001/009</i>	<i>Code of Practice for the Provision of Emergency Trip Control of High Voltage Supplies to Customers</i>	16/09/00
<i>IMP/001/007</i>	<i>Code of Practice for the Connection of Generation Plant</i>	14/09/99
<i>DSS/007/001</i>	<i>Code of Practice for the Protection of HV Networks (TS1)</i>	29/03/00
<i>DSS/007/007</i>	<i>Code of Practice for the Setting of Protection (TS16/17)</i>	08/06/01
<i>IMP/001/002</i>	<i>Code of Practice for the Economic Development of the LV System</i>	06/09/99
<i>IMP/001/003</i>	<i>Code of Practice for the Economic Development of the 11kV System</i>	02/09/99
<i>CNS/003</i>	<i>Policy on Operational Property</i>	
<i>INC/002</i>	<i>Policy for Unmetered Connections</i>	04/12/00
<i>DSS/012</i>	<i>Policy for Flood Risk Mitigation</i>	22/10/02
<i>DSS/015</i>	<i>Policy for the Renewal of Outdoor HV Substations</i>	29/07/04
<i>DSS/028</i>	<i>Policy for the Enclosure of Ground Mounted Distribution Substations</i>	29/07/04
<i>DSS/031</i>	<i>Policy for Fire Risk Mitigation at Operational premises</i>	18/05/04

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## 5. Definitions

<b>Term</b>	<b>Definition</b>
<i>LV</i>	<i>Means a voltage up to and including 1000V</i>
<i>HV</i>	<i>Means a voltage greater than 1000V, but less than 33,000V</i>
<i>EHV</i>	<i>Means a voltage at 33,000V and above</i>
<i>MPAN</i>	<i>Metering Point Administration Number (the unique identifier under settlements for a point of connection)</i>
<i>YEDL</i>	<i>Yorkshire Electricity Distribution plc</i>
<i>NEDL</i>	<i>Northern Electric Distribution Limited</i>
<i>CE Electric UK</i>	<i>CE Electric UK Funding Company and all subsidiaries within it except CE UK Gas Holdings Limited.</i>
<i>Customer</i>	<i>A person who is already connected to or is seeking a connection to CE Electric UK's distribution system.</i>
<i>Customer's Substation</i>	<i>A substation building provided by the Customer on his site containing our plant.</i>
<i>Embedded Network</i>	<i>A distribution system owned and operated by an IDNO connected to the CE Electric UK licensed distribution system</i>
<i>Firm</i>	<i>The maximum connection capacity that can be secured by the connection arrangement following the outage or loss of the largest item of plant in the system. It only relates to connections that comprise dual or multiple circuits.</i>
<i>IDNO</i>	<i>Independent Distribution Network Operator: a person other than CE Electric UK who owns and operates a distribution network within the CE Electric UK distribution services area</i>
<i>Implementing Officer</i>	<i>The person responsible for implementing this policy on relevant sections of the network, as identified in section 3.7</i>
<i>Non-firm</i>	<i>The connection capacity that can be secured by the connection arrangement when the distribution system is operating without any outages or restriction applied. It will generally be greater than the Firm capacity.</i>
<i>Protective Conductor</i>	<i>A conductor which is used for protection against electric shock and which connects the exposed conductive parts of equipment with earth.</i>

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## 6. Authority for Issue

### 1. Code of Practice Author

I sign to confirm that I have completed and checked this code of practice and I am satisfied with its content.

		Sign	Date
Dave Miller	Network Investment Engineer	Dave Miller	19/12/2005

### 2. Sponsor

I sign to confirm that I am satisfied with all aspects of the content and preparation of this code of practice and submit it for approval and authorisation.

		Sign	Date
Mark Nicholson	Network Policy Manager	Mark Nicholson	20/12/2005

### 3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this code of practice and submit it for approval and authorisation.

		Sign	Date
Alan Creighton	Network Investment	Alan Creighton	20/12/2005
Iain Miller	Network Development Manager	Iain Miller	20/12/2005
Darrell Johnson	Design Manager	Darrell Johnson	20/01/2006
Joe Hart	Manager, Call to Quote	Joe Hart	20/01/2006

### 4. DBD Assurance

I sign to confirm that this code of practice has been assured for issue on to the DBD system

		Sign	Date
Sean Johnson	Safety Engineer	Sean Johnson	13/01/2006

### 5. Approval

Approval is given for the content of this code of practice

		Sign	Date
Peter McCormick	Network Services and Safety Director	Peter McCormick	06/02/2006

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## 6. Authorisation

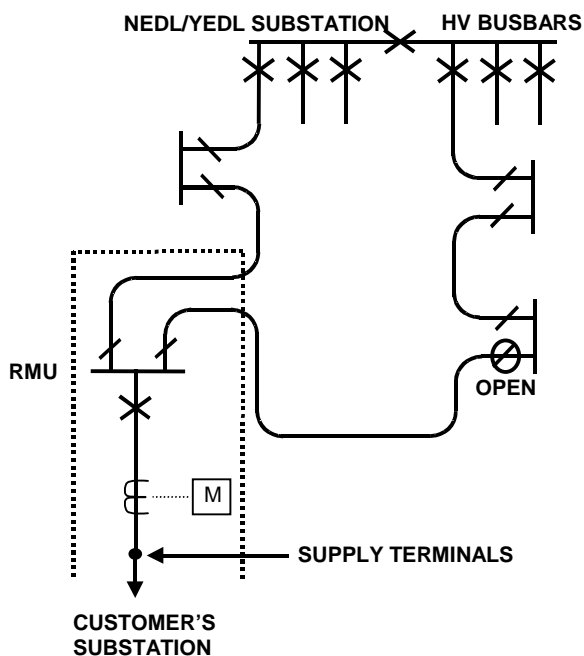
Authorisation is granted for publication of this code of practice

		Sign	Date
Phil Jones	Strategy & Investment Director	Phil Jones	07/02/06

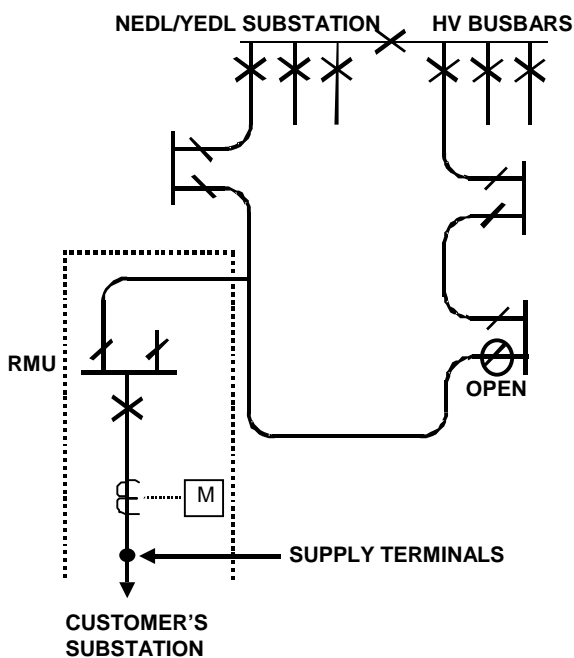
<b>Document reference</b>	IMP/001/010				
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## Appendix 1 - High Voltage Standard Connection Arrangements

### Arrangement 1 – Up to 160A HV arrangement, (100A at 20kV)

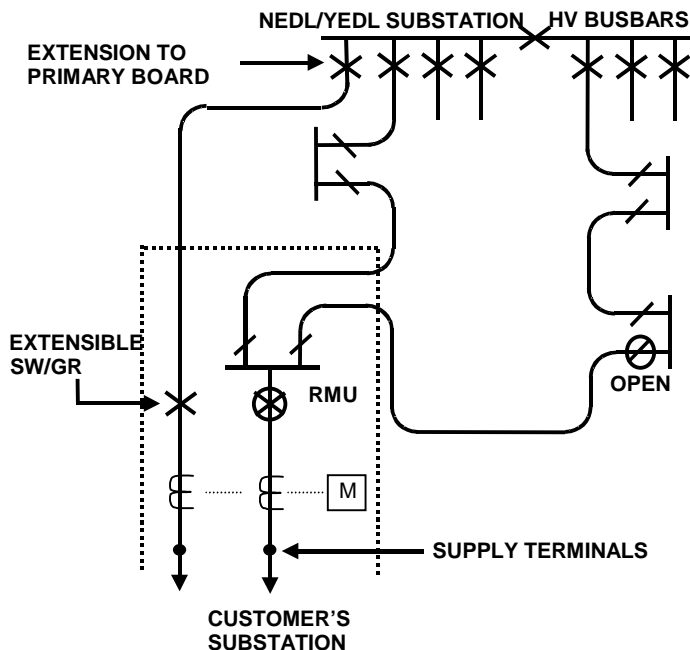


### Arrangement 2 – Alternative, non-preferred arrangement - Up to 160A HV, (100A at 20kV)

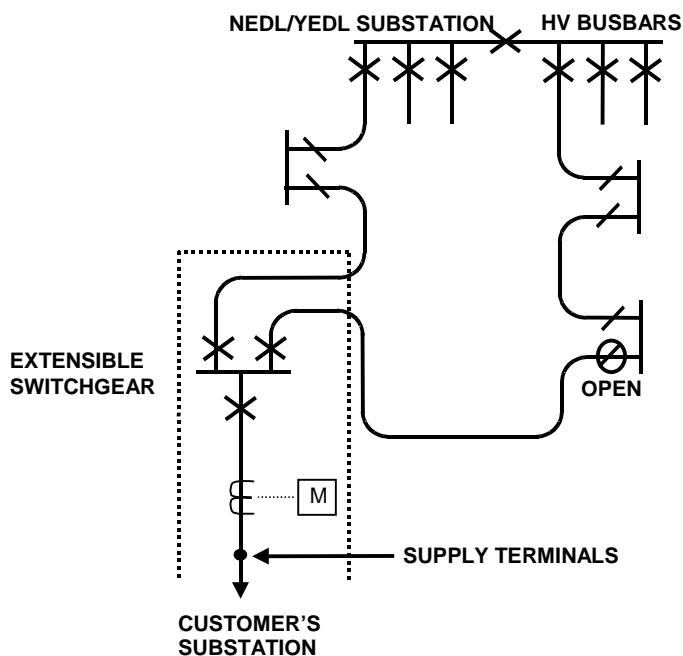


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**Arrangement 3 – Increase in existing RMU supply > 160A at 6kV and 11kV and >100A at 20kV**

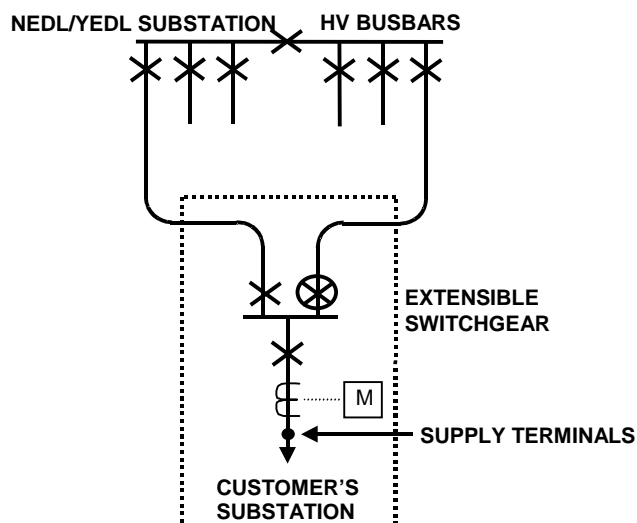


**Arrangement 4 - Extensible switchgear connection >160A at 6kV and 11kV and >100A at 20kV, load dependant upon capability of switchgear and network**

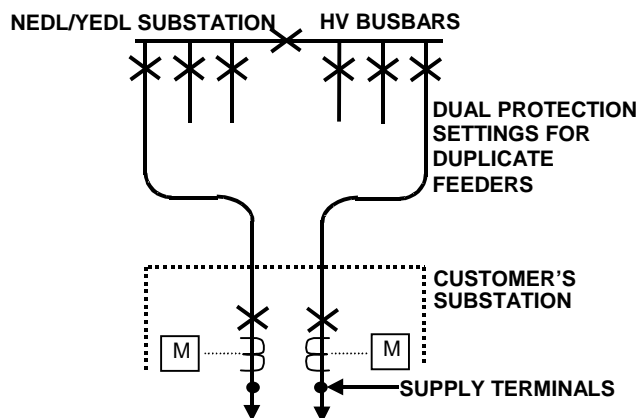


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## Arrangement 5 – Connections up to approximately 400A switched firm supply

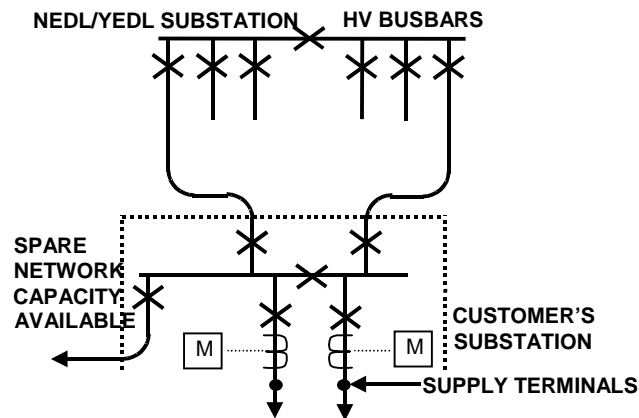


## Arrangement 6 - Connections up to approximately 400A continuous firm supply



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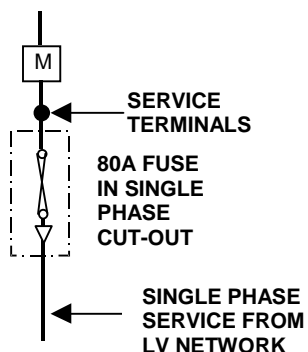
**Arrangement 7 – Connections up to approximately 400A continuous firm supply with additional network capacity**



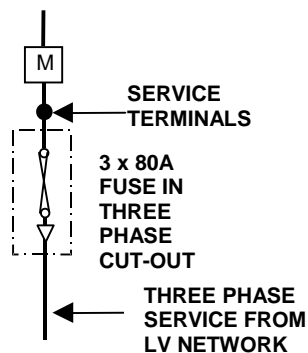
<b>Document reference</b>		IMP/001/010					
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## Appendix 2 – Low Voltage Service Arrangements

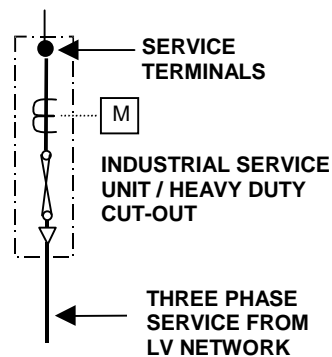
### Arrangement 1 – Example single phase supply up to approximately 20kVA



### Arrangement 2 – Example 2 or 3 phase balanced supply up to approximately 60kVA

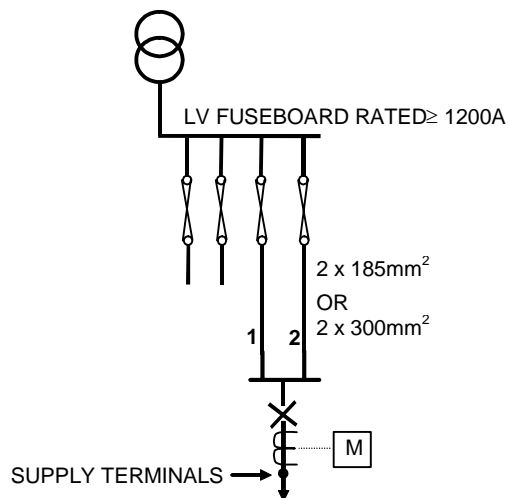


### Arrangement 3 – Example 3 phase balanced supply >60kVA up to approximately 330kVA

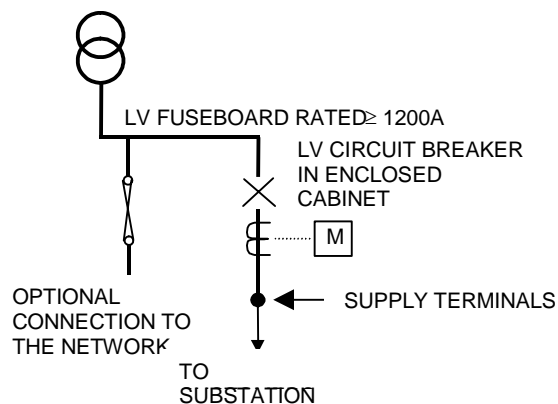


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## Arrangement 4 – Example 3 phase balanced supply 330kVA up to approximately 500kVA



## Arrangement 5 – Example 330 to 1000kVA supply, bulk LV connection



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## Arrangement 6 – Example 1000 to 1600kVA supply, single customer connection

