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The Network Code

Version 1.2c

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Preface

1. Background

In accordance with Legal Notice 511 of 2004 (LN 511/2004), Electricity Regulations 2004 (ER):

a. Enemalta Corporation (EMC) is designated the distribution system operator (DSO) in Malta and shall be responsible for dispatching generation plant and for balancing the distribution system.

b. The DSO shall prepare and publish a Network Code (NC) subject to the approval of the Malta Resources Authority (MRA), establishing the basic technical design and operational requirements for the connection to the distribution system of generators, consumers' installations and direct lines.

EMC shall publish, and regularly update, names of contact persons, their telephone numbers and email addresses on its website and other official publications, to ensure safe and reliable dispatch of generating plant and operation of the distribution system.

2. Use of the distribution system

Use of the distribution system may involve any of the following transactions:

a. A connection at entry or exit from the distribution system. An entry point is the connection between the distribution system and a generator. An exit point is the connection between the distribution system and the customer's installation.

b. Use of the distribution system to transport electricity between entry and exit points.

c. Construction of a connection point.

d. Work and/or operation associated with equipment at the interface with the distribution system.

3. The Network Code

3.1 In order to ensure safety and interoperability, users of the distribution system shall comply with the relevant sections of the NC, the requirements of the ER, and other relevant legislation that comes into force from time to time. Users shall also be required to enter into technical and other agreements; for example, customers and generators shall be required to have connection agreements with EMC.

3.2 The NC allows access to the network for generators and auto-producers who wish to use the network. Such access is granted in a non-discriminating way to existing and future generators.

3.3 The categories of users are listed below:

i. Generators and auto-producers with generating plant ≥ 8MVA and connected to the distribution system, are to be synchronised at 33kV and are subject to dispatch

ii. Generators and auto-producers with generating plant >1.6 MVA and <8MVA, and connected to the distribution system are to be synchronised at 11kV and are subject to dispatch if ≥5MW

iii. Generators and auto-producers with generating plant ≤1.6 MVA and connected to the distribution system, are to be synchronised at 400V or 11kV and are not subject to dispatch

iv. Auto-producers who are not connected to the distribution system

v. Customers with stand-by generating plant not (but which may be) connected to the distribution system

vi. Medium voltage customers ≥ 8MVA are connected at 33kV

vii. Medium voltage customers >3.2MVA and <8MVA are connected at 11kV

viii. Low voltage customers ≤3.2MVA are connected at 400V

4. Structure of the Network Code

The NC is divided into six parts as follows:

a. The Distribution General Conditions (DGC) sets out the legal framework guiding the operation of the NC.

b. The Distribution Planning Code (DPC) contains details of the standard supply offered as well as the design principles to which the distribution system is constructed. The DPC enables users to obtain from EMC certain information on the distribution system in certain circumstances.

c. The Distribution Connection Conditions (DCC) provides details of the technical and other requirements to be met by those requiring connection to the distribution system.

d. Generator Requirements (GR) sets out the rules and operating conditions for generators connected to the distribution system.

e. The Distribution Operating Code (DOC) deals with the various operational matters affecting users such as providing forecasts of demand, planning distribution system outages, generation outages, reporting of operational changes and events, safety matters and procedures for dealing with emergency situations.

f. The Distribution Data Registration Code (DDRC) summarises in tabular form the data requirements under the NC.

DGC Distribution General Conditions

DGC1 Introduction

DGC1.1 Whilst each code in the NC contains the rules and provisions relating specifically to that code, there are provisions that are of more general application. These are covered in the code, Distribution General Conditions (DGC).

DGC2 Objective

DGC2.1 The DGC contain provisions that are of general application to all provisions of the NC. Their objective is to ensure, to the extent possible, that the various sections of the NC apply consistently to all electricity customers.

DGC3 Scope

DGC3.1 The DGC apply to all users.

DGC4 Assistance in implementation

DGC4.1 EMC is responsible to implement and enforce the NC. In order to do this EMC may need access across boundaries, services, and facilities from users or to issue instructions to users, for example to isolate or disconnect plant or apparatus. It is considered that these cases will be exceptional and it is not, therefore, possible to envisage precisely or comprehensively what EMC might reasonably require in order to carry out its duty to implement and enforce the NC.

DGC4.2 All users are required to abide by the NC and also to provide EMC with such rights of access, services and facilities and to comply with such instructions as it may reasonably require to implement and enforce the NC.

DGC5 Unforeseen circumstances

DGC5.1 If circumstances arise which the provisions of the NC have not foreseen, EMC shall to the extent reasonably practicable in the circumstances, consult promptly and in good faith with affected users in an effort to reach agreement as to what should be done. If agreement cannot be reached in the time available EMC will determine what is to be done.

DGC5.2 Whenever EMC makes a determination, it shall have regard, wherever possible to the views expressed by users, and in any event, to what is reasonable in all the circumstances.

DGC5.3 Each user shall comply with all instructions given to it by EMC following such a determination provided that the instructions are consistent with the current technical parameters of the particular user's system registered under the NC. EMC shall promptly refer all such unforeseen circumstances and any such determination to the Network Code Review Panel in accordance with DGC7.2.

DGC6 Hierarchy

DGC6.1 In the event of any conflict between the provisions of any direction of the MRA on the one hand and the provisions of the NC on the other, the provisions of MRA's direction shall prevail (provided that such direction or ruling is binding upon the person to whom it is addressed).

DGC6.2 In the event of any conflict between the provisions of the NC and any contract, agreement or arrangement between EMC and a user, the provisions of the NC shall prevail unless the NC expressly provides otherwise.

DGC7 Network Code Review Panel

DGC7.1 EMC shall establish and maintain a Review Panel, which shall be a standing body, to carry out the functions referred to in DGC7.2.

DGC7.2 The Review Panel shall:

a. Keep the NC and its working under review.
b. Review all suggestions for amendments to the NC, which the MRA or any user may submit, to EMC for consideration by the Review Panel from time to time.
c. Recommend to EMC amendments to the NC that the Review Panel feels are necessary or desirable and the reasons for the recommendation.
d. Issue guidance in relation to the NC and its implementation, performance and interpretation when asked to do so by any user.
e. Consider what changes are necessary to the NC arising out of any unforeseen circumstances referred to it by EMC under DGC5.

DGC7.3 The Review Panel shall consist of:

a. A chairperson appointed by EMC
b. 2 representatives appointed by EMC
c. A person representing independent generators
d. A person representing medium voltage customers.

DGC7.4 The Review Panel shall establish and comply at all times with its own rules and procedures relating to the conduct of the business, such rules and procedures to be known as the constitution and rules of the Review Panel, which shall be approved by EMC.

DGC7.5 EMC shall submit all proposed amendments to the NC (regardless of which party proposes such amendments) to the Review Panel for discussion. Any amendments

DGC7.6 Any amendments to the NC which are recommended by the Review Panel have to be submitted by EMC to MRA for approval.

DGC8 Communications between EMC and users

DGC8.1 Unless otherwise specified in the NC the methods of operational communication and data transfer shall be agreed between EMC and users from time to time.

DGC9 Emergency situations

DGC9.1 Users should note that the provisions of the NC may be suspended, in whole or in part, pursuant to any directions given and/or orders made by the Minister responsible for resources under the provisions of the MRA Act of 2000.

DGC10 Code responsibilities

DGC10.1 The NC sets out the procedures and principles governing the relationship between EMC and all users of the distribution system.

DPC Distribution Planning Code

DPC1 Introduction

DPC1.1 The Distribution Planning Code (DPC) specifies the technical and design criteria and the procedures to be complied with by EMC in the planning and development of the distribution system. It also applies to users in the planning and development of their installations in so far as they affect the distribution system.

DPC1.2 The users' requirements may necessitate the reinforcement of or an extension to the distribution system work being identified by EMC subject to the relevant charges in the 'The Electricity Supply Regulations' (ESR), 1939 published under Government Notice 223 of the 21st May 1940 and amended in Government Legal Notices since that time, and subsequent related publications.

DPC1.3 The time required for the planning and development of the distribution system shall depend on the type and extent of the necessary reinforcement and/or extension work, the time required for obtaining planning permission and any order issued by the authority responsible for transport in virtue of section 4 chapter 81 of the Laws of Malta, including any associated hearings, and the degree of complexity in undertaking the new work while maintaining satisfactory security and quality of supply.

DPC1.4 Reference is made in the DPC to EMC supplying information or advice to users. For avoidance of doubt, unless the context otherwise requires such information or advice, shall be provided by EMC as soon as practical following a request by the user (whether during the application for connection process or otherwise).

DPC2 Objectives

DPC2.1 The objectives of the Distribution Planning Code are to:

a. Enable the distribution system to be planned, designed and constructed to operate economically, securely and safely.
b. Facilitate the use of the distribution system by others and to specify a standard of supply to be provided.
c. Provide sufficient information for a user to assess opportunities for connection and to plan and develop his or her installation so as to be compatible with the distribution system.
d. Formalise system planning data requirements.

DPC3 Scope

DPC3.1 The Distribution Planning Code specifies the planning and design requirements for the distribution system.

DPC3.2 The users to whom the Distribution Planning Code applies, are those who use or intend to use the distribution system and comprise the following:

a. All generators.

b. All customers including those with non-metered supplies who are connected to the distribution system.

DPC4 Design standards

DPC4.1 Frequency

DPC4.1.1 The nominal frequency of the distribution system voltage is 50Hz. Under normal operating conditions the mean value measured over 10s of the fundamental frequency shall be within a range of:

a. 50Hz ± 1% (i.e. 49.5 to 50.5Hz) during 99.5% of a year

b. 50Hz –5/+4% (i.e. 47.5 to 52.0Hz) during 100% of the time

DPC4.2 Voltage

DPC4.2.1 The distribution system network will operate at the nominal voltages indicated in Table DPC1.

Table DPC1

Distribution Nominal Voltages

Low Voltage (LV)	230 Volts – phase to neutral 400 Volts – phase to phase
Medium Voltage (MV)	11,000 Volts (11kV) 33,000 Volts (33kV)
High Voltage (HV)	132,000 Volts (132 kV)

DPC4.2.2 EMC shall operate the distribution system so as ensure that the voltage at the supply terminals, as defined in MSA EN 50160:2001, ‘Voltage characteristics of electricity supplied by public distribution systems’, complies with that standard. In line with these standards the low voltage range tolerance shall be 230V +/- 10% (phase-neutral). The resulting voltage at different points on the system depends on

several factors, but can be expected to be in accordance with Table DPC2 under steady state and normal operating conditions.

Table DPC2

Operating Voltage Range

Nominal Voltage (phase-phase)	Steady-state Tolerance	Impulse Voltage
400V	$\pm$ 10%	6kV
11kV	+2, -5%	75kV
33kV	+5, -10%	170kV
132kV	$\pm$ 6%	650kV

DPC4.2.3 The distribution system and any user connections to that system shall be designed to enable normal operating frequency and voltages supplied to customers to comply with MSA EN 50160:2001 and the NC. Characteristics of the voltage, frequency, dips, interruptions, unbalance and harmonics are set out in this CENELEC approved standard. It should be noted that the standard describes the main characteristics of the voltage that may be expected at the supply terminals under *normal* operating conditions.

DPC4.3 Design principles (LV)

This section sets out design principles for users (excluding generators) connected at low voltage and having single phase or three phase supplies.

DPC4.3.1 Any user’s installation, which complies with the provisions of the ESR and subsequent related publications, shall be deemed to comply with the requirements of the NC as regards design and safety.

DPC4.4 Design principles for all other Users (MV and HV) not included in DPC4.3

DPC4.4.1 Specification of Equipment, Overhead Lines and Underground Cables

a. The principles of design, manufacture, testing and installation of distribution equipment, overhead lines and underground cables, including quality requirements, shall conform to applicable statutory obligations and shall comply with relevant MSA, CENELEC standards, IEC publications, European and British Standards. Further advice will be made available upon request to EMC.

b. Equipment shall be suitable for use at the operating frequency, with the intended operating voltage range and at the design short-circuit rating of the EMC’s distribution system to which it is connected having due regard to fault carrying capabilities and making and breaking duties. In appropriate circumstances, EMC will provide details of the system to which the connection is to be made.

c. Cables, overhead lines, transformers and other equipment shall be operated within the thermal rating conditions contained in the appropriate standards' specifications and other relevant publications, taking into account the intended use.

DPC4.5 Earthing requirements

DPC4.5.1 The treatment of the neutral is different for the various supply voltages. The present treatments for voltages higher than low voltage are described in Table DCP3 but these could change in the future.

DPC4.5.2 The electrical installation of all consumers connected at low voltage shall be protected by a TT System (unless otherwise advised, as for example in the case of larger installations, where the system may be TN-S; or in areas where Consumers are connected on a TN-C-S system), in line with the requirements of the ESR or subsequent related publications. The neutral conductor is earthed at the LV winding of MV to LV transformers. Multiple earthing of the neutral conductor is not permitted.

DPC4.5.3 For voltages above LV the following applies:

Table DPC3
Neutral Treatment

Voltage (ph-ph)	Neutral Treatment
11kV	Directly earthed or earthed through a 5-ohm resistor so as to limit single-phase earth fault current to 1200 Amps (typical).
33kV	Directly earthed or earthed through an impedance so as to limit single-phase earth fault current to 2600 Amps (typical).
132kV	Effectively earthed

DPC4.6 Security of supply

DPC4.6.1 EMC shall use reasonable endeavours to maintain a supply from the system. This cannot be ensured, since faults, planned maintenance and new works outages and other circumstances outside EMC's control can cause interruptions. On such occasions, EMC shall use reasonable endeavours to restore the supply or connection as soon as practicable, but shall be under no liability for any direct or indirect damage or associated loss incurred by the user.

DPC4.6.2 Restoration times for different outage types are as follows:

Fault Outages: EMC shall endeavour to restore access to the system within twenty-four hours. In major storm conditions or when the distribution system suffers major damages or multiple faults the outage duration may be longer and, in such circumstances, EMC shall endeavour to keep the user informed of progress.

Planned Outages: EMC shall endeavour to give three days notice of planned supply interruptions. In some situations – to facilitate emergency repairs or local outages affecting a small number of customers – shorter notice may be given, and in some cases no notice at all.

Supply Curtailments: In some circumstances, it may be necessary to request customers to reduce load or to use standby supplies where appropriate. In these situations EMC shall endeavour to maintain access to the system. In extreme cases where this may not be possible EMC shall endeavour to provide prior notice to the user.

Load Shedding: In extreme situations there may be generation shortages and load shedding may be required. In these circumstances it shall not be possible for EMC to notify customers.

DPC4.6.3 EMC may disconnect users under certain circumstances. These circumstances shall include:

a. Where the customer's installation or use of electricity is such as to interfere with the satisfactory pperation of the distribution system or to cause disturbance to other customers.
b. Where EMC considers that the customer's installation is in a dangerous condition.
c. Where alterations, repairs, renewal or maintenance of the distribution system or EMC assets or means of connection require the de-energisation of the connection point.
d. Where a customer extends supply for use by another party whom EMC considers to be a separate customer.

e. In any other circumstances in which discretion is necessary or appropriate to enable EMC to comply with the NC and/or to operate the distribution system in accordance with good industry practice or is required by any law, direction, rule or regulation having the force of law.

DPC5 Transfer of planning data

DPC5.1 Planning information to be provided by users

DPC5.1.1 DPC5.1 applies to all customers where EMC considers it appropriate and generators and auto-producers with generating plant over 1MW.

DPC5.1.2 Users of the distribution system shall provide sufficient planning data/information as can reasonable be expected to be made available, when requested by EMC from time to time to enable EMC to comply with the requirements under its distribution licence.

DPC5.1.3 Users of the distribution system shall provide planning data for specific future time periods updated annually as necessary and including projected demand requirements, anticipated changes in maximum demand, or generating capacity as appropriate.

DPC5.1.4 In addition to periodic updates of planning information a user shall give adequate notice of any significant change to his system or operating regime to enable the EMC to prepare its development plans and implement any necessary system modifications. In the event of unplanned changes in a user's system or operating regime a user shall notify EMC as soon as is practically possible to ensure any necessary measures can be implemented.

DPC5.1.5 Users shall also provide details of reactive compensation plant directly or indirectly connected to the distribution system other than at low voltage, including its rating and operational control.

DPC5.1.6 Users may be required to provide EMC with detailed data relating to the interface between their system and that of the distribution system covering circuit parameters, switchgear and protection arrangements of equipment directly connected to or affecting the distribution system to enable EMC to assess any implications associated with these points of connection.

DPC5.2 Information to be exchanged

DPC5.2.1 On the request of a user, EMC shall provide such information, as may be reasonably required, on the design and other characteristics of the distribution system.

DPC5.2.2 Where EMC proposes to make certain modifications to its system or where it has received information from a user under DPC5.1 above, which may impact on other User installations then EMC, will notify the user of the proposal, subject to any constraint of confidentiality or timing.

DPC5.2.3 EMC shall provide information on request to users regarding the local network conditions to enable them to determine their protection requirements.

DPC5.2.4 Information may be exchanged between EMC and the user on fault infeed levels at the feeding busbar or point of connection to the distribution system as appropriate, in the form of three-phase and single-phase earth short circuit infeed.

DPC5.2.5 Information shall be exchanged between EMC and the user on demand transfer capability where the same demand can be supplied from alternate user points of supply and the arrangements (manual or automatic) for transfer under planned/fault outage conditions.

DPC5.3 Planning studies

DPC5.3.1 In order to facilitate connections to the distribution system EMC shall prepare on request a study showing the implications of a connection at a particular point on the system.

DPC5.3.2 Under the terms of the distribution licence EMC may levy a reasonable charge for the planning study as in the ESR and subsequent related publications if such charges are approved by the MRA.

DPC 5.3.3 Users or potential users shall provide to EMC information regarding the proposed facility including load details, interface arrangements, proposed connection point and import/export requirements.

DPC5.3.4 The studies shall be prepared within reasonable time after the date of receipt of the information or the agreement of the person making the request to pay for the cost of the study.

DPC5.3.5 Details of the procedures for application for connection to the distribution system are contained in the ESR and subsequent related publications.

DPC5.3.6 Rules applied by EMC in determining the connection requirements are outlined in the ESR and subsequent related publications.

DPC5.3.7 Where such information is available EMC shall provide on request a statement of present and future circuit ratings, forecast power flows and loadings on part or parts of the distribution system specified in the request and shall include fault levels at each distribution node covered by the request. EMC may levy a charge for the provision of this statement as approved by the MRA.

DPC5.4 Distribution system planning report

DPC5.4.1 In accordance with LN 511/2004, every two years EMC must submit to the MRA a report called the distribution system planning report detailing how it plans over the following 5 calendar years to:

a. Meet predicted demand for electricity supplied through the distribution network.
b. Improve supply reliability to its customers.

DPC5.4.2 In fulfilling the requirements of DPC5.4.1, the report must include the following information

a. Existing generation and network capacity.
b. The historical and forecast overall system actual and peak demand and peak seasonal demand at the primary substations in the distribution system.
c. A description of flexible options for meeting forecast demand.
d. Where a preferred option for meeting forecast demand has been identified a reasonable detailed description of that option, including estimated cost.
e. A description of the nature, timing, cost and expected performance of the distribution system reliability improvement programs.
f. An evaluation of the supply reliability improvement programs undertaken in the preceding years.

DCC Distribution Connection Conditions

DCC1 Introduction

DCC1.1 It is necessary to require certain minimum technical, design and operational criteria to be met by users' plant and apparatus in order to maintain, insofar as is permitted by good industry practice, stable and secure operation of the distribution system for the benefit of all users and for the protection of the distribution system and users' plant and apparatus directly connected to the distribution system.

DCC1.2 The Distribution Connection Conditions establish certain principles and standards relating to the provision of the connection, method of connection, and technical and performance standards. Prospective consumers who have submitted an application to EMC to obtain a supply of electricity at their premises from the distribution system, will be referred to as 'Applicants'. At present the process for the connection of applicants to the distribution system is specified in the ESR and subsequent related publications.

DCC1.3 The Distribution Connection Conditions specify the information to be provided by users to ensure that adequate provision can be made by EMC for new connections or increases in existing load. It also applies to future generators who would operate in parallel with the distribution system, where a connection is required. Prospective users shall provide EMC in good time with all the details set out in this section.

DCC1.4 In conjunction with the Connection Conditions, there are connection agreements, which are bilateral agreements between EMC and each user, and which contain the detail specific to each user's connection to and use of the distribution system. The connection agreements require the user and EMC to comply with the terms of the NC.

DCC2 Objective

DCC2.1 The Connection Conditions define the minimum standards for the method of connection to the distribution system and the technical, design and operational standards to which users connecting to the distribution system shall comply.

DCC2.2 The Connection Conditions specify the technical arrangements required at the ownership boundary between the distribution system and the installation of the user and is applicable at all voltage levels covered by the NC.

DCC2.3 The Connection Conditions outline the types of signals and indications that will be required to be made available to EMC by each user.

DCC3 Scope

DCC3.1 The Connection Conditions apply to EMC and to all users connected to or planning a connection to the distribution system.

DCC4 Information required for connection

DCC4.1 For connections at low voltage it is possible in most cases to assess whether a proposed connection is acceptable, and to determine the necessary supply arrangements, from analysis of the following data:

a. Maximum kVA requirements
b. Single or three phase requirement.
c. Type of electrical loading of equipment to be connected, such as number and size of motors, appliances, tools, air conditioning equipment and also the nature of any disturbing loads such as welding equipment etc.
d. The date when the connection is required.

If a preliminary examination of this data indicates that more detailed information is reasonably required then it shall be provided to EMC upon request.

DCC4.2 For connections at high and medium voltages the provisions of DCC4.1 also apply. Additionally, the following information may be required as detailed in the Distribution Data Registration Code (DDRC) schedule:

a. All types of demand

i. Maximum active power requirements.
ii. Maximum and minimum reactive power requirement.
iii. Type of load and control arrangements (e.g. type of motor start, controlled rectifier or large motor drives)
iv. Maximum load on each phase.
v. Maximum harmonic currents that may be imposed on the distribution system.
vi. Details of cyclic load variations or fluctuating loads as detailed below.

b. Disturbing loads

Comprehensive breakdown of any existing and additional equipment which will be connected to the installation including details of disturbing loads. These are loads which have the potential to introduce harmonics, flicker or unbalance to the system. This could adversely affect the supply quality to other customers. Disturbing loads could be non-linear loads, power converters/regulators and loads with a widely fluctuating demand. The type of load information required for motive power loads, welding equipment, harmonic producing/non linear loads and generating equipment can be obtained from EMC on request.

Compensating equipment will need to be installed with disturbing loads and EMC will have to be given full details and mode of operation to ensure that the emission limits specified in DCC6.7 are not exceeded.

c. Fluctuating Loads

Details of cyclic variation, and where applicable the duty cycle, of active power (and reactive power if appropriate), in particular:

i. the rates of change of active power and reactive power, both increasing and decreasing;
ii. the shortest repetitive time interval between fluctuations in active power and reactive power; and
iii. The magnitude of the largest step change in active power and reactive power, both increasing and decreasing.

DCC4.3 In some cases, more detailed information may be required to permit a full assessment of the effect of the user's load on the distribution system. Such information may include an indication of the pattern of build up of load and a proposed commissioning programme. This information shall be specifically requested by EMC when necessary and shall be provided by the user within a reasonable time.

DCC4.4 Users shall contact EMC in advance if it is proposed to make any significant change to the connection or load, install or operate any generating equipment or do anything else that could affect the distribution system or require alterations to the connection.

DCC4.5 Users shall provide EMC with any information reasonably required by EMC about the nature, or use by the users, of electrical equipment on the users' premises.

DCC5 Connection arrangements

DCC5.1 Connection voltage

DCC5.1.1 The system voltage at which a connection will be made will take into consideration the following factors:

a. The prospective power through the connection.
b. Satisfactory operation of the installation.
c. Isolation of disturbance from/to other Customers.
d. Cost of connection.
e. Life cycle costs.

DCC5.2 Ownership boundaries

DCC5.2.1 The point or points at which supply is given or taken between the distribution system and the user's installation shall be the terminals of the user's incoming/outgoing switchgear. The metering point where incoming or outgoing active and/or reactive energy is metered shall also be the incoming/outgoing terminals of the user's switchgear which are connected to the distribution system, except that in the case of transformer(s) supplying only 1 customer at low voltage, the meter shall be installed at the high voltage side of the distribution transformer(s).

DCC5.2.2 EMC's responsibility extends up to the end of the connecting cable or cables from the network which is/are terminated by EMC on the user's switchgear.

DCC5.2.3 Metering equipment will be supplied, owned and installed by EMC as close as technically and practically possible to the user's incoming/outgoing switchgear terminals, except for the case of dedicated substations as explained in DCC5.2.1.

DCC5.2.4 In the case of heavy current low voltage connections, EMC may require the user to provide space for metering current transformers on the incoming/outgoing terminals of the user's main circuit breaker.

DCC5.2.5 In the case of high and medium voltage connections the metering equipment will be installed on the terminals of the EMC's switchgear which connects directly to the user's installation, or on the interconnecting cable and as close as practically possible to the EMC's switchgear. Irrespective of the type of metering installed the user is to be given access to the information recorded by the metering equipment at any time.

DCC5.2.6 Connections for entry to and exit from the distribution system shall incorporate a means of disconnection of the user's installation by EMC.

DCC5.3 Appointment of a warranted electrical engineer

DCC5.3.1 When a user takes over a low voltage connection in excess of 300A per phase, he must appoint a warranted electrical engineer to be present during commissioning to take responsibility for the installation on behalf of the user. The engineer may then delegate responsibility for the installation to competent persons appointed by the user.

DCC5.3.2 When a user takes over a connection at medium voltage he must appoint a warranted electrical engineer to take responsibility for the medium voltage installation on his behalf. For this purpose the user will have to give full particulars of the engineer to EMC and the engineer will remain responsible for the installation. Should the engineer decide to discontinue giving his service to the user, then the user will be responsible to appoint another engineer and inform EMC accordingly giving full particulars of the new engineer.

DCC5.4 Information to be provided by EMC

Based on the information provided by the user for a connection to the distribution system, EMC shall prepare a scheme for the connection. The estimated cost of the connection will be worked out and communicated to the user and the following information will be made available to the user on request.

a. The nominal voltage at which the connection is to be made.
b. Method of connection, extension and/or reinforcement details.
c. The normal impedance to source at the point of connection.
d. Method of earthing.
e. Maximum connection capacity.
f. Individual customer limits relating to:
   i. Harmonic distortion
   ii. Voltage flicker
   iii. Unbalance
g. An estimated lead time for providing the connection following acceptance of application and/or signing of contract/agreement.

DCC6 Technical requirements for connections

DCC6.1 Connection standards

DCC6.1.1 A connection to the distribution system may be by means of an overhead line, an underground cable or a combination of both. The network configuration at the connection point may take a number of forms suitable to the nature of the load and network arrangements. EMC will however take the final decision on the configuration of the extension on the distribution system side of the connection.

DCC6.1.2 For users connected at low voltage, installations shall comply with the ESR and subsequent related publications. Design and testing of installations must also comply with the ESR and subsequent publications and EMC may seek evidence that the Equipment has been tested for compliance with relevant standards.

DCC6.1.3 High and medium voltage equipment connected to the network must be designed, manufactured, tested and installed in accordance with all applicable statutory obligations and shall conform to the relevant MSA, CENELEC or IEC standards current at the time of the commissioning of the installation.

DCC6.1.4 If there is no relevant MSA specification, such other relevant standard which is in common use in the European Union, as current at the date of the user's applicable connection agreement, shall apply. If EMC considers it necessary, however, EMC may notify applicants that supplemental specifications and/or standards shall be complied with, in which case user plant and apparatus shall so comply.

DCC6.1.5 All medium and high voltage installations must be tested and certified by a warranted electrical engineer appointed by the user and EMC may seek evidence that the equipment has been tested for conformance with the relevant standards.

DCC6.1.6 All equipment in an installation connected to the distribution system shall be suitable for use at the operating frequency of the distribution system and at the voltage and short-circuit rating of the distribution system as shown in Table DCC1 (See Section DCC6.5) at the connection point.

DCC6.1.7 Before entering into a connection agreement it will be necessary for EMC to be reasonably satisfied that the user's system at the boundary with the distribution system shall comply with the appropriate requirements of the NC.

DCC6.2 Protection requirements

DCC6.2.1 Users shall ensure that faults in the user's plant and apparatus do not unreasonably cause disturbances to the distribution system or to other users. Without limiting this obligation, a user shall prior to connection of the user's installation to the distribution system, install the protection equipment specified in DCC6.2.4.

DCC6.2.2 Faults on the distribution system can cause damage to user's plant and apparatus. These faults could result in a loss of a phase, over voltage or under voltage. The user shall take account of established practices to protect his installation and install protection equipment compatible with the protection systems used by EMC in that particular section of the network. The adequacy of the protection installed by the user is the user's responsibility.

DCC6.2.3 The user's protection arrangements at the ownership boundary, including types of equipment and protection settings, shall be compatible with existing system conditions and the distribution system protection practice as specified by EMC at the time of application. In particular:

a. The maximum clearance times (from fault current inception to arc extinction) shall be within the limits established by EMC in accordance with the protection and equipment short circuit rating policy adopted for the distribution system.
b. The distribution system is not equipped with automatic reclosing systems because of the prevalence of underground systems in which faults are predominantly permanent, however the user should be aware that following an unexpected interruption of supply to his installation, EMC may re-energise the supply system without notifying the user.
c. It should be stressed that users should be aware that disconnection of one or two phases only of a three-phase system may be effected by distribution protection arrangements mainly related to the low voltage system for certain faults.

DCC6.2.4 The minimum protection required for a user's installation connected to the distribution system will vary according to type, size, method of connection (loop, spur, etc) and earthing of the user system. A new connection may require all or some of the following protection facilities:

a. Overcurrent protection
b. Earth fault protection
c. Intertripping

d. Other.

DCC6.2.5 Where interface circuit breakers are used particularly in the larger low voltage installations and in medium voltage installations they shall be fitted with relays of a type acceptable to EMC. These relays shall have three phase overcurrent elements and an earth fault element and shall have IDMT time current characteristics (standard inverse) and definite time complying with the most recent edition of IEC 60255. Maximum permissible relay settings at the ownership boundary, necessary to provide discrimination with distribution equipment, will be provided by EMC, and these settings may be reviewed at any time in the future by EMC. Distribution protection aims to minimise the impact of faults including voltage dip duration and must not be adversely affected by customers' protection limitations.

a. In order to ensure satisfactory operation of the distribution system, protection systems, operating times, discrimination and sensitivity at the ownership boundary shall be agreed between EMC and the user during the application for connection process, and may be reviewed from time to time by EMC.
b. In order to cover a circuit breaker, or equipment having similar function, failing to operate correctly to interrupt fault current on the system, back-up protection by operation of other circuit breakers or equipment having a similar function shall normally be provided.
c. Unless EMC advises otherwise, it is not acceptable for users to limit fault current infeed to the distribution system by the use of protection and associated equipment if the failure of that protection and associated equipment to operate as intended in the event of a fault, could cause equipment owned by EMC to operate outside its short circuit rating.

DCC6.2.6 Protection relays shall be commissioned by the user who shall ensure that the settings are below the maximum permitted levels. In certain cases EMC may wish to witness these tests and it shall be the responsibility of the user to ensure that sufficient notice is given to EMC in such cases. Users shall ensure that the protection settings remain below the maximum permitted levels. This may require regular testing of the relays.

DCC6.2.7 Single phase 40A and three phase 60A Low Voltage supplies (services) are protected by a 40A and three 60A fuse, Type IIA to BS 1361 of 1971. These fuses are installed by EMC in a service box just upstream of the connection point as defined in DCC 5.2.1. Similarly three phase low voltage supplies in excess of 60A per phase and up to 500A per phase are protected on the EMC's side by means of HRC cartridge fuses, having a category of duty of 415 AC46, Class Q1 to BS 88.

Customers are to ensure that their overall protection devices discriminate satisfactorily with the EMC's fuses.

Customers must also ensure that their low voltage installations are adequately earthed and in particular the earth fault protection system of 40A single phase and 60A three phase services should include an earth electrode and a residual current protection device having an earth fault sensitivity of 30mA.

DCC6.3 Earthing

DCC6.3.1 Earthing of the part of the user's installation that is connected to the distribution system shall be compatible with the standard earthing arrangements specified for the various system voltages in DPC 4.5.

DCC6.3.2 Medium voltage installation earthing methods proposed by users would have to be approved by EMC to ensure compatibility with the distribution system arrangements.

Earthing arrangements for Low Voltage supplies of up to 60A three phase are specified in DCC 6.2.7. For larger low voltage installations the installations' earthing system may be bonded to the earthing system in the EMC's 11/0.4kV substation. EMC will give approval for such a connection on receiving a written request subject to the following conditions:

a. That the earth conductor from the customers' installation is solidly bonded to the substation earth and means will be provided for its disconnection at a convenient place in the substation.
b. That EMC will inform the customer if the substation earth is to be disconnected for testing purposes.
c. That EMC absolves himself of any responsibility for maintaining an effective earth to the premises.

Users having low voltage installations exceeding 60A three phase may also opt to have their own independent earthing system together with appropriate earth fault protection equipment.

DCC6.3.3 Users shall take precautions to limit the occurrence and effects of circulating currents in respect of neutral points connected with earth where there is more than one source of energy.

DCC6.4 Voltage regulation and control

Voltage regulation and control extensions or connections to the distribution system shall be designed such that they do not prevent the necessary control of voltage on the distribution system. Information on the voltage regulation and control arrangements shall be made available by EMC if required by the user.

DCC6.5 Short-circuit levels

DCC6.5.1 The short circuit rating of user's equipment at the connection point shall not be less than the design fault Level of the distribution System as shown in Table DCC1 below. The choice of equipment for connection at low voltage may take into account attenuation in the service lines. EMC shall take the user's connected system and apparatus in the design of its system.

Table DCC1
Design Short Circuit Ratings

System Voltage Connection	Short Circuit Level (RMS Symmetrical)	Short Circuit Level (MVA)
400V (Domestic)	20 kA[1]	13.86MVA
400V (Industrial/Commercial)	45 kA[2]	31.18MVA
11kV	18.4 kA	350.6MVA
33kV	25 kA	1428.9MVA

1. This figure applies to services connected to the distribution system very close to 11/0.4kV substations. In general the fault level will fall below 10kA at around 30m from the substation in question.
2. This figure is applicable at users' low voltage switchboards installed in the immediate vicinity of distribution substations equipped with 1.6 MVA, 11/0.4kV transformers.

DCC6.5.2 The user's incoming supply shall be controlled by a main circuit breaker, which shall be in accordance with a recognised international standard acceptable to EMC.

DCC6.5.3 Insulation Levels: The design of an operators' equipment connected to the distribution system shall be such as to enable it to withstand, under test, the AC and impulse (1.2/50 μS) voltages indicated in Table DCC2.

Table DCC2

Insulation Levels

System Voltage in which Equipment is used	AC Withstand Level	Impulse Level
400V	3kV	/
11kV	28kV	75kV
33kV	70kV	170kV

DCC6.6 Voltage disturbances

DCC6.6.1 Users of the distribution system should not generate voltage disturbances at a level that would affect other users. Users should in their own interest select equipment that is capable of functioning satisfactorily in the presence of disturbances at the levels permitted in MSA EN 50160:2001.

DCC6.6.2 It is a condition of connection that equipment connected directly or indirectly to the distribution system shall confirm to the requirements of EU Directive 89/336/EEC (the EMC Directive) as amended.

DCC6.6.3 Loads and installations shall comply with the following emission limits. Special conditions for generators are outlined in GR5.1.

a. Voltage Flicker

i. Frequency of occurrence: 0.22 per min – 600 per min

System Voltage	P_{st}	P_{lt}
400V, 11kV and 33kV	0.7	0.5

P_{st}: Short Term Flicker Severity – an index of visual severity evaluated over a 10 minute period.

P_{lt}: Long Term Flicker Severity – an index of visual severity evaluated over a 2 hour period.

ii. Frequency of occurrence: 0.02 per min – 0.22 per min
- Magnitude of up to 3% is permitted.

iii. Frequency of occurrence: =< 0.02 per min
- Magnitude of up to 5% is permitted.

b. Harmonic Distortion

i. Individual Harmonic Orders:

% Harmonic Voltage Distortion
(rms voltage as a % of rms value of the fundamental component)

Harmonic Order	400V	11kV	33kV
2	0.70	0.50	0.25
3	0.75	0.50	0.25
4	0.70	0.50	0.25
5	2.00	1.00	0.50
6	0.50	0.50	0.30
7	2.00	1.00	0.50
8	0.50	0.50	0.30
9	0.50	0.50	0.25
10	0.50	0.75	0.25
11	1.50	1.50	0.75
12	0.50	0.50	0.30
13	1.50	1.50	0.75
14	0.50	0.50	0.50
15	0.50	0.75	0.25
16	0.75	0.75	0.25
17	0.75	0.75	0.50
18	0.50	0.50	0.25
19	1.00	0.50	0.25

ii. Total Harmonic Distortion

System Voltage	% Harmonic Voltage Distortion
400V	2.5
11kV	2.0
33kV	1.5

c. Unbalance

The unbalance caused by the connection of an individual installation shall not exceed 1.3% at the point of common coupling (PCC).

DCC6.6.4 Under fault and circuit switching conditions the rated frequency component of voltage may fall or rise transiently. The rise or fall in voltage will be affected by the method of earthing of the neutral point of the distribution system and voltage may fall transiently to zero at the point of fault. Sections 2 and 3 of MSA EN 50160, as amended from time to time, contains additional details of the variations and disturbances to the voltage which shall be taken into account in selecting equipment from an appropriate specification for installation on or connected to the system.

GR Generator requirements

GR1 Introduction

GR1.1 The Generator Requirements (GR) are applicable for all generators that can be connected to the distribution system.

GR1.2 In addition to meeting the requirements of the GR, generators shall also comply with the requirements of the General Conditions, the Planning Code, the Connection Conditions and other relevant sections of the NC.

GR1.3 Prospective generators shall initiate discussions at a sufficiently early stage in design to allow EMC to examine the impact of the generating unit/s on the distribution system.

GR1.4 EMC may refuse permission for the connection of a generating unit at a point on the distribution system or require revision to design or technical parameters of the generation unit, or impose certain restrictions in order to ensure that security and quality of supply standards as specified in DPC4 are maintained. In such instances, EMC shall provide sufficient supporting information to justify the refusal or the required revisions.

GR2 Specific rules for generators

GR2.1 The integrity of the distribution system and the security and quality of supply to existing users shall not fall below the relevant standard as a result of generators operating in parallel (synchronised) with the distribution system. Conditions for operation shall guarantee the safety of:

- Members of the general public
- Personnel
- Distribution Equipment

Supply quality to other customers shall not fall below the relevant standard as a result of the presence or operation of generating units.

GR2.2 The conditions to which generating units operating in parallel with the distribution system must comply are to be agreed with EMC. This also applies to protection conditions and requirements to protect the distribution system.

The generator is responsible for protection of his personnel and equipment and the efficient operation of his generating units.

GR2.3 Where a generating unit is to be installed in a premises, EMC shall be duly informed. EMC shall have the right to inspect generating installations to ensure that the requirements are met. In some cases EMC may require a demonstration by operation of the generating unit. Such demonstrations shall be by agreement with the user.

GR3 Provision of information

GR3.1 Information required from generators

Generators shall provide EMC with information on (a) the generating plant and (b) the proposed interface arrangements between the generating plant and the distribution system. The information required by EMC before entering into an agreement to connect any generating plant to the distribution system is shown below and is detailed in Schedules 1 (a), 1 (b) and 1 (c) in the Distribution Data Registration Code (DDRC):

a. Generating plant data:
   - i. Terminal Volts (kV)
   - ii. Rated kVA
   - iii. Rated kW
   - iv. Maximum Active Power sent out (kW) and Reactive Power requirements (kVAr)
   - v. Type of generating Plant – synchronous, asynchronous, etc.
   - vi. Type of prime mover
   - vii. Anticipated operating regime of generation e.g. continuous, intermittent, peak lopping
   - viii. Fault Level Contribution – a calculation sheet showing the fault current available from the Generators due to a metallic three-phase short circuit at the main incoming Circuit Breaker when all the Generators are operating. Account should be taken of any large motors in the installation (ref: IEC 60909)
   - ix. Method of voltage control
   - x. Generator transformer details, as applicable, and
   - xi. Requirements for Top-up Supplies and/or Standby Supplies

Details will also be required on the following parameters:

i.	Inertia Constant	MW secs/MVA (whole machine)
ii.	Stator Resistance	
iii.	Direct Axis Reactances	Sub-transient Transient Synchronous
iv.	Time Constants: Direct Axis	Sub-transient Transient
v.	Zero Sequence	Resistance Reactance
vi.	Negative Sequence	Resistance Reactance
vii.	Generator Transformer	Resistance Reactance MVA Rating Tap Arrangement Vector Group Earthing

b. Other plant and equipment details:

A comprehensive schedule of installed new equipment including details of disturbing loads as per DCC4 is required.

c. Interface arrangements

i. The means of synchronisation between EMC and user
ii. Details of arrangements for connecting with earth that part of the generating plant directly connected to the distribution system
iii. The means of connection and disconnection which are to be employed, and
iv. Precautions to be taken to ensure the continuance of safe conditions if any earthed neutral point of the generator system operated at medium voltage become disconnected from earth.

GR3.2 The details of information required will vary depending on the type and size of the generating unit or the point at which connection is to be made to the distribution system. The generator, at the reasonable request of EMC, shall provide this information.

GR3.3 EMC will use the information provided to model the generator unit to determine a technically acceptable method of connection. If EMC reasonably concludes that the nature of the proposed connection or changes to an existing connection requires more detailed analysis then further information than that specified in GR4.1 may be required.

GR3.4 Additional information may be required from generators larger than 1MW or connected at a voltage level of 11kV or above. This may include:

a. Technical Data

i. Generating Plant information (impedance per unit on rating)

Type of prime mover
Rated MVA
MW
Type of excitation system

ii. Automatic Voltage Regulator (AVR)

A block diagram for the model of the AVR system including the data on the gains, forward and feedback gains, time constraints and voltage control limits.

iii. Speed Governor and Prime Mover Data

A block diagram for the model of the generating plant governor and system control and turbine rating.

iv. Generator Excitation System

b. Capacity and Standby Requirements

i. Registered capacity and minimum generation of each generating unit and power station in MW.
ii. Generating unit and power station auxiliary demand (active and Reactive Power) in MW and MVAr, at registered capacity conditions.
iii. Generating unit and power station auxiliary demand (active and Reactive Power) in MW and MVAr, under minimum generation conditions.

GR3.5 In normal circumstances the information specified above will enable EMC to assess the connection requirements. Occasionally additional information may be required. In such circumstances, the generator shall make available information at the reasonable request of EMC.

GR4 Information provided by EMC

GR4.1 EMC shall prepare a statement as per DCC5.4 for generators applying for connection to the distribution system.

GR4.2 Where generator paralleling or power export is intended the following additional information shall be provided including:

a. Interface protection settings
b. Equipment, cabling, switchgear, metering requirements
c. Substation site and building requirements (dimensions, access, planning permission, earthing, lighting and ventilation)

GR5 Technical requirements

GR5.1 Generating plant performance requirements

a. All generators shall comply with the relevant sections of the NC.

b. For generators, the electrical parameters to be achieved at the generating unit terminals shall be specified by EMC with the offer for connection.

c. Protection associated with generating plant shall be required to co-ordinate with the distribution system protection regarding:

i. clearance times for fault currents
ii. Protection settings of the controlling circuit breaker

Protection settings shall not be changed without agreement with EMC.

These protection requirements are additional to normal interface protection requirements of the user.

d. The emission limit for voltage fluctuations and flicker at the PCC caused by switching or continuous operation of wind turbine installations is P_{st}= 0.35 and P_{lt} = 0.35 where:

P_{st}: Short Term Flicker Severity – an index of visual severity evaluated over a 10 minute period.

P_{lt}: Long Term Flicker Severity – an index of visual severity evaluated over a 2 hour period.

These values are consistent with IEC 61000-3-7.

e. For generators the total harmonic voltage distortion (THVD) limit is given in the table GR1 below:

Table GR1

Generator Total Harmonic Voltage Distortion Limit

System Voltage	Total Harmonic Voltage Distortion (%)
400V	2.5
11kV	2.0
33kV	1.5

EMC shall provide a schedule of individual harmonic distortion limits where appropriate.

GR6 Islanding

GR6.1 It is conceivable that a part of the distribution system, to which generators and auto-producers are connected can, during emergency conditions, become detached (islanded) from the rest of the system.

GR6.2 In such cases of Islanding the generator or auto-producer's installation must immediately detach itself from the rest of the distribution system at the connection point and remain detached unless authorised by EMC as per GR10.

GR7 Generating plant commissioning tests

GR7.1 Where the generating plant requires connection to the distribution system in advance of the commissioning date, for the purposes of testing, the generator shall comply with the requirements of the connection agreement. The generator shall provide EMC with a commissioning programme, approved by EMC if reasonable in the circumstances, to allow commissioning tests to be co-ordinated.

GR8 Standby generators

GR8.1 Parallel operation with the distribution system is generally not permitted for standby generators. Specific agreement of EMC is required for parallel operation.

GR8.2 Customers with standby generation shall ensure that any part of the installation supplied by the generating plant has first been disconnected from the distribution system and remains disconnected while the generating plant is connected to the installation. Methods of changeover and interlocking shall meet these requirements.

GR9 Metering

Metering equipment will be installed at the boundary of the generator's or auto-producer's installation as described in DCC5.2.3 to take measurements of energy, power (and any other unit as necessary) flowing from the network to the generator's installation or vice versa or in both directions separately if this is the case. The generator or auto-producer may have to provide space in his switchgear to enable EMC to install equipment to obtain such voltage, current, frequency and any other unit component necessary to enable EMC to meter and monitor the user's installation. EMC may also decide by agreement with the user for the latter to provide such measuring information.

GR10 Notice Required for Synchronisation

Generators and auto-producers whose total generating plant is rated above 1MW have to obtain clearance from EMC before they synchronise their generators to the distribution system so as to ensure complete system stability and security.

DOC Distribution Operating Code

DOC1 Introduction

DOC1.1 EMC schedules or dispatches the generator facilities to provide adequate electrical supply to meet demand. Generators and auto-producers with plant rated at 5MW or greater are subject to dispatch by EMC.

DOC1.2 The Operating Code covers a number of specific aspects for which information exchanged and detailed operating procedures at the interface with users are required.

DOC2 Demand forecasting

DOC2.1 Introduction

DOC2.1.1 In order for EMC to operate the distribution system efficiently and to ensure maximum system security and system stability, there is a need for low and medium voltage customers when EMC considers it appropriate, and generators with plant rated over 1MW to provide loading and generator output information to EMC.

DOC2.1.2 The information to be provided under DOC2 is required to enable EMC to compile short to long-term demand forecasts.

DOC2.1.3 Where demand data is required from the users, this means MW demand of electricity at the connection point. EMC may in certain cases specify that the demand data shall include MVA demand.

DOC2.1.4 The information to be provided to EMC shall be in writing or any other suitable means of electronic transfer that enables the recipient to retain information.

DOC2.2 Objectives

DOC2.2.1 The objectives of DOC2 are to:

a. Set out the demand forecast and the generating plant output information to be provided by users to enable EMC to operate the distribution system.
b. Specify the information to be provided by users to EMC to enable it to comply with its obligations under the ER.

DOC 2.3 Information flow and co-ordination

DOC2.3.1 EMC shall co-ordinate demand forecast information to enable the distribution system to be planned, designed and constructed to be operated economically, securely and safely, especially where demand is greater than 5MW at any connection point.

DOC2.3.2 All Generators and Auto-producers having generation output in excess of 1MW shall provide forecast information to EMC.

DOC 2.4 Demand Forecast Data

DOC2.4.1 Generating units greater than 1MW shall provide EMC with information regarding output and planned shutdowns for specified future periods. This shall be provided on an annual basis when required by EMC. The information is given in Schedules 3(a) and 3(b) of the Distribution Data Registration Code (DDRC).

DOC2.4.2 Medium voltage customers where EMC considers it appropriate shall provide to EMC information regarding demand and planned shutdown for specified future periods. This shall be provided on an annual basis when requested by EMC. The information required is given in Schedule 2 of the DDRC.

DOC3 Operational Planning

DOC3.1 Introduction

DOC3.1.1 Distribution Operating Code 3 (DOC3) is concerned with the co-ordination of planned outages of plant and apparatus which affect the operation of the distribution system or require the commitment of EMC resources.

DOC3.1.2 The means of providing the information to EMC and its confirmation includes any non-transitory written form, or any other suitable means of electronic transfer which enables the recipient to retain information.

DOC3.1.3 In order for EMC to fulfil the requirements of DOC3 it should be noted that the information to be provided by the generators subject to dispatch will form the basis of Operational Planning under this DOC3.

DOC3.2 Objective

The objective of DOC3 is to set out the operational planning procedure and typical timetable for the co-ordination of outage requirements for plant and apparatus to be provided by users to enable EMC to operate the distribution system.

DOC3.3 Scope

DOC3.3.1 DOC3 applies to the following users of the distribution system:

a. All generators that may be connected to the distribution system
b. Medium voltage customers connected to the distribution system where EMC considers it appropriate.

DOC3.4 Provision of Information

DOC3.4.1 Information on all generating plant shall be provided, where specified, directly to EMC. This information to be provided to EMC is shown in Schedule 3(a) and Schedule 3(b) of the DDRC.

DOC3.5 Timescales and data

DOC3.5.1 EMC and each user shall determine detailed implementation of data gathering and timescales. Due recognition shall be given by EMC to voltage levels and capacities of plant and apparatus when assessing information requirements.

DOC3.5.2 The information may be required for different timescales as may be determined by EMC's planning needs.

DOC3.6 Information from generators

DOC3.6.1 Generators and auto-producers with plant rated at 5MW or greater are subject to dispatch by EMC. These shall not synchronise without first obtaining permission from EMC and shall abide with instructions given by EMC with regards to active and reactive power output. In addition, generators subject to dispatch shall inform EMC of operations and/or events according to the requirements of DOC5.

DOC 3.6.2 Information from generators or auto-producers greater than 1MW and not subject to dispatch shall include details of planned outages for maintenance or other purposes as well as the expected time of return to service.

DOC3.6.3 No generator shall synchronise without first obtaining permission from EMC unless prior agreement has been reached with EMC.

DOC3.7 Information to Users

DOC3.7.1 EMC shall advise medium voltage customers or generators who may be significantly affected by particular outages of distribution plant and apparatus, of the likely dates and duration of the outages. If there are objections from users, these shall be considered by EMC and alternative arrangements proposed if possible.

DOC4 Demand Control

DOC4.1 Introduction

DOC4.1.1 Distribution Operating Code 4 (DOC4) is concerned with provision to be made by EMC or users of the distribution system, in certain circumstances, to permit reductions in demand in the event of insufficient generating plant to meet demand or to avoid disconnection of customers or in the event of break down and/or operating problems on any part of the distribution system.

DOC4.1.2 The demand control procedures should ensure that hardship to users and customers is minimised and that in so far as practicable, all parties affected are treated equitably.

DOC4.1.3 Where demand control is exercised by EMC it shall be done in a manner that in so far as reasonably practical does not discriminate against any customers or supplier and shall use reasonable endeavours to ensure that the burden is shared fairly among customers. Exemptions may apply to vital and priority customers as approved by the MRA.

DOC4.2 Methods of demand control

DOC4.2.1 Customers demand may be disconnected automatically at selected locations in accordance with the requirements of the generating stations, in the event of a sudden fall in frequency. Such an arrangement shall be carefully coordinated as part of an overall scheme and may take into account any operational requirements or essential load.

DOC4.2.2 Deliberate reduction of voltage may be used to achieve a temporary reduction in Demand.

DOC4.2.3 Customers may be required to provide manual disconnection facilities. When required by EMC to disconnect load, the customer shall abide by the instructions of EMC and the instructed disconnection must be carried out without undue delay. Once a disconnection has been applied at the instruction of EMC, reconnection shall not be applied until EMC instructs it to be done.

DOC4.2.4 Emergency manual load shedding may be carried out on the distribution system for reasons of shortfall in supply or other reasons.

DOC4.2.5 In the event of sustained period of shortfall then planned rota load shedding may be used to share the available power among affected customers. EMC will endeavour to keep Customers updated with any means of communication at his disposal.

DOC5 Operational Communications and Liaisons

DOC5.1 Introduction

Distribution Operating Code 5 (DOC5) sets out the requirements for the exchange of Information in relation to operations and/or events on the distribution system or the installation of any user connected to the distribution system which have had or may have had, or will have or may have an operational effect on the distribution system or the installation of any other user.

DOC5.2 Objective

To provide for the exchange of information so that the implications of the operation and/or event can be considered and the possible risks arising from it can be assessed and appropriate actions taken by the relevant party in order to maintain the integrity of the total system and the user's installation. DOC5 does not seek to deal with any actions arising from the exchange of information, but only with the exchange.

DOC5.3 Scope

DOC5 applies to the following users of the distribution system:

a. Customers connected to the distribution system where EMC considers it appropriate.
b. All generators and auto-producers with a generating capacity greater than 1MW.

DOC5.4 Procedure

DOC5.4.1 EMC and users connected to the distribution system shall nominate persons and/or contact location and agree on communication channels for the necessary exchange of information to make effective the exchange of information required by DOC5.

DOC5.4.2 SCADA equipment may be required at the user's site for the transmission of information and data to and from the EMC's Control Centre. The requirement to provide this information shall normally be included in the relevant connection agreement.

DOC5.4.3 Information between EMC and users shall be exchanged on the reasonable request of either party. The request may follow a specific operation, or be in accordance with a prior agreement to exchange information on particular type of events.

This does not preclude the voluntary exchange of information, which may be perceived as being relevant to the operation of the distribution or user installation in accordance with good industry practice.

DOC5.4.4 In the case of an operation on the distribution system, which will have or may have in the opinion of EMC an operational effect on the installation of a user connected to the distribution system, EMC shall notify the user.

DOC5.4.5 In the case of an operation on the installation of a user connected to the distribution system, which will or may have an operational effect on the distribution system, the user shall notify EMC in accordance with the procedure agreed to in DOC5.4.1.

DOC5.4.6 A notification under DOC5 shall be of sufficient detail to describe the operation, although it need not state the cause, and to enable the recipient of the notification reasonably to consider and access the implications and risks arising and shall include the name of the individual reporting the operation. The recipient may ask questions to clarify the notification.

DOC5.4.7 A notification under DOC5 shall be given as far in advance as possible to allow the recipient to consider and access the implication and risks arising.

DOC 5.5 Significant incidents and event reporting

DOC5.5.1 Where an event on the distribution system has had or may have had a significant effect on the user's installation or where an event in the user's installation has had or may have had a significant effect on the distribution system, the event shall be deemed to be a significant incident by EMC in consultation with the user. Significant incidents shall be reported in writing to the affected party in accordance with the provisions of DOC5.5.

DOC 5.5.2 A significant incident shall include events, which result in, or may result in, the following:

a. Voltage limits outside statutory limits
b. System frequency outside statutory limits; or
c. System stability failure

DOC5.5.3 EMC and each user specified in DOC5.3 shall nominate officers and establish communication channels to ensure the effectiveness of this DOC5.

DOC5.5.4 Communication shall, as far as possible, be direct between the user and the operator of the distribution system. However, this does not preclude communication with the users' nominated representative.

DOC5.5.5 In the case of an event, which has been reported to EMC and subsequently has been determined by EMC to be a significant incident, a written report shall be given to EMC by the user.

DOC5.5.6 A report shall be in writing or in electronic form and shall be sent to EMC or the user, as the case may be. It shall contain confirmation of the notification together with more details relating to the significant incident including information which has become known relating to the significant incident since the notification. The report shall, as a minimum, contain those matters specified in DOC5.7.

DOC5.5.7 The report shall be given as soon as reasonably practical after the notification under DOC5.

DOC5.6 Joint investigations

DOC5.6.1 Where a significant incident has been declared and a report submitted under DOC5 either party or parties may request in writing that a joint investigation be carried out.

DOC5.6.2 The composition of such an investigation panel shall be appropriate to the incident to be investigated and agreed by all parties involved.

DOC5.6.3 A joint investigation shall only take place where all parties affected by it agree to it. The form and rules of, and procedures for, and all matters relating to the joint investigation shall be agreed at the time of a joint investigation and in the absence of agreement the joint investigation shall not take place.

DOC5.7 Matters to be included in a written report of a significant incident

DOC5.7.1 Matters applicable to EMC and generators

a. Date and time of significant incident,
b. Location,
c. Equipment involved,
d. Brief description of significant incident,
e. Details of any demand control undertaken,
f. Conclusions and recommendations if applicable.

DOC5.7.2 Matters applicable to EMC

Effect on users where appropriate:

a. Duration of incident; and
b. Estimated date and time of return to normal service

DOC5.7.3 Matters applicable to generators

Effect on generation including, where appropriate:

a. Generation interrupted,
b. Frequency response achieved,
c. MVA performance achieved, and
d. Estimated date and return to normal service.

DOC6 Monitoring, Testing and Investigation

DOC6.1 Introduction

DOC6.1.1 In order to properly discharge its responsibilities in respect of safe, secure and economic operation of the distribution system and in accordance with its license conditions EMC shall organize and carry out monitoring, testing and investigation on the effect of the user’s electrical apparatus or electrical installation on the distribution system.

DOC6.2 Objective

DOC6.2.1 The objective is to specify EMC's requirements to test and/or monitor the distribution system to ensure that users are not operating outside the technical parameters required by the Distribution General Codes and Operating Codes.

DOC6.3 Scope

DOC6.3.1 DOC6 applies to the following users of the distribution system:

a. All generators.
b. All customers who are connected to the distribution system.

DOC6.4 Procedures

DOC6.4.1 EMC shall, from time to time, determine the need to test or monitor the quality of supply at various points on the distribution system.

DOC6.4.2 The requirement for specific testing and/or monitoring may be initiated by the receipt of specific complaints as to the quality of supply on the distribution system.

DOC6.4.3 Where testing or monitoring is required at the connection point with a user then EMC shall advise the user involved and EMC shall make available the results of such tests to the user.

DOC6.4.4 Where a user is found to be operating outside the technical limits specified in the Distribution General Code, then the user shall rectify the situation or disconnect the apparatus causing the problem from its electrical system connected to the distribution system immediately or within such time as agreed with EMC.

DOC6.4.5 Continued failure to rectify the situation shall result in the user being disconnected in accordance with the connection agreement.

DOC6.4.6 EMC shall, from time to time, monitor the effects of the user on the distribution system.

DOC6.4.7 The monitoring shall normally be related to the amount of active power and reactive power or flicker or harmonics transferred across the connection point.

DOC6.4.8 Where the user is exporting or importing active power or reactive power in excess of those defined in the connection agreement or causing disturbances, EMC shall inform the user and the user shall restrict the power transfer to within the specified parameters.

DOC6.4.9 EMC may check from time to time that users are in compliance with agreed protection requirements and protection settings.

DOC7 Safety Co-ordination

DOC7.1 Introduction

DOC7.1.1 Distribution Operating Code 7 (DOC7) specifies the safety management system criteria to be applied by EMC to meet statutory requirements and distribution license conditions and obligations.

DOC7.1.2 Similar criteria and standards of safety management systems shall be provided by other users of the distribution system when carrying out work or tests at the operational interface with EMC.

DOC7.2 Objectives

DOC7.2.1 To lay down the safety management criteria to be applied to ensure safety of persons working on the distribution system and at or across operational and ownership boundaries.

DOC7.3 Scope

DOC7.3.1 DOC7 specifies the safety management criteria that applies to EMC and the following users of the distribution system

a. Generators.
b. Medium voltage customers.
c. Any other party reasonably specified by EMC including users connected at medium or low voltage for appropriate sections of DOC7 when necessary.
d. Agents of EMC or users working on the distribution system or at or across operational boundaries.

DOC7.4 Procedures

DOC7.4.1 The safety management principles and procedures (safety management system) for ensuring the health and safety of all relevant personnel shall be specified by

EMC and users for work on their respective systems or plant or apparatus connected to them.

DOC7.4.2 There shall be joint agreement by EMC and users on which safety management system is to be used for sites or locations where an operational boundary exists and proper documentation of the safety precautions to be taken shall be maintained.

DOC7.4.3 There shall be written authorization of personnel who do the work of control, operation, work or testing of plant or apparatus forming part of or connected to the distribution system.

DOC7.4.4 There shall be joint agreement between EMC and users, which specifies responsibility for system or control equipment, which shall ensure that only one party is responsible for any item of plant or apparatus at any one time.

DOC7.4.5 EMC and each user shall at all times have nominated a person or persons responsible for the co-ordination of safety on the respective systems.

DOC7.4.6 EMC and each user shall maintain a suitable system of documentation which records all relevant operational events that have taken place on the distribution system or other system connected to it and the co-ordination of relevant safety precautions for work.

DOC7.4.7 System diagrams which show sufficient information for control personnel to carry out their duties shall be exchanged between EMC and user as required.

DOC7.5 Safety at the EMC/user interface

DOC7.5.1 The following procedures set down the basic safety requirements at the operator and EMC interfaces. These procedures are necessary to ensure the safety of all who may have to work at either side of the interface or on the interface (boundary).

a. Written rules for safe working and communicating procedures shall be available and used by all persons who may have to work at or use the facilities provided at the interface.
b. Electrical equipment connected to either side of the interface and interface equipment shall be under the control of a named person at either side.
c. Each item of equipment shall be controlled by only one identifiable person at any one time.

d. Adequate means of isolation shall be provided at the interface to allow work to be carried out safely at either side of the interface.

e. Where necessary to prevent danger adequate facilities for earthing shall be provided at either side of the interface to allow work to be carried out safely at the interface or at either side of the interface.

f. Adequate working space, adequate means of access and egress and, where necessary, adequate lighting shall be provided at all electrical equipment on or near which work is being done in circumstances which may cause danger.

g. All electrical equipment shall be suitably identified where necessary to prevent danger.

DOC7.6 Safety rules

DOC7.6.1 Operation and maintenance of the users' equipment shall only be carried out by authorized personal. Before first commissioning the plant, operating procedures shall be agreed with EMC.

DOC7.6.2 Instructions for operating and/or earthing the users' electrical equipment shall be clearly displayed in the users' medium and high voltage switchroom.

DOC7.6.3 The 'Distribution Safety Code of Practice' publication details the safety procedures to be observed for all personnel working on or in close proximity to distribution system plant or equipment.

DOC7.6.4 Electrical installations and equipment shall comply with BS7671, 'Electrical installations in buildings', more commonly known as the 'Wiring Regulations'.

DDRC Distribution Data Registration Code

DDRC1 Introduction

DDRC1.1 The various sections of the NC require users to submit data to EMC.

DDRC1.2 The Distribution Data Registration Code (DDRC) provides a series of schedules summarising all requirements for information of a particular type. Each user is then referred to the appropriate schedule for a statement of the total data requirements in his case.

DDRC1.3 The DDRC specifies procedures and timings for the supply of data and subsequent updating. Where the timings are covered by detailed timetables laid down in other sections of the NC they are not necessarily repeated in full in the DDRC.

DDRC1.4 In the case of a generator seeking a connection to the EMC's distribution system then irrespective of the potential arrangements for scheduling and dispatch, discussions on connection shall be with EMC.

DDRC2 Scope

The users to which the DDRC applies are:

a. Generators
b. Medium voltage customers
c. Low voltage customers where EMC considers it appropriate.

DDRC3 Procedures and Responsibilities

DDRC3.1 Unless otherwise specified or agreed by EMC each user shall submit data as defined in DDRC5 below and attached schedules. Failure to submit correct data shall be considered to be a breach of the NC and will allow disconnection of the defaulting User.

DDRC3.2 Data changes are reviewed annually to ensure continued accuracy or relevance. EMC shall initiate this review in writing and the user shall respond in writing.

DDRC3.3 Where possible data shall be submitted on standard forms forwarded to the user by EMC.

DDRC 3.4 If a user wishes to change any data item then this must first be discussed with EMC in order for the implications to be considered and the change if agreed (such agreement not to be unreasonably withheld), be confirmed by the submission of a revised data form or by verbal means with confirmation in writing.

DDRC3.5 From time to time EMC may change its data requirements. Appropriate users shall be advised of these changes as they occur and with a reasonable timescale by which to reply.

DDRC4 Data to be Registered

DDRC4.1 Schedules 1(a), 1(b), and 1(c): Generating unit data.

DDRC4.2 Schedule 2 – Demand forecasts – as described in DOC2, demand and generation forecasts for the users defined in the scope.

DDRC4.3 Schedule 3(a) and (b) – Operational planning – as described in DOC3, outage planning information.

DDRC4.4 Schedule 4(a) and (b) – System design information – comprising system technical data.

DDRC4.5 Schedule 5 – Load characteristics – comprising the forecast data for load points indicating for example, the maximum load, the equipment that comprises the load and the harmonic content of the load.

DDRC5 Data Schedules

The schedules applicable to each class of user are as follows:

Schedule Number	Title	Applicable to:
1(a)	Generating Unit Data	All generators and auto-producers
1(b)	Generating Unit Data	Generators except auto-producers and standby generators
1(c)	Generating Unit Data	Generators connected at medium voltage
2	Demand Forecasts	Generators greater than 1MW; Customers connected at medium voltage
3(a)	Operational Planning (Scheduled Outages)	All generators and auto-producers
3(b)	Operational Planning (Plant and Apparatus)	For all medium voltage customers, generators and auto-producers
4(a)	System Design Information	All generators and auto-producers; Medium voltage customers if advised by EMC
4(b)	System Design Information	Generators operating in parallel with the system
5	Load Characteristics	All generators; Medium voltage customers

Schedule 1(a)

Generating unit data

For all generators and auto-producers including standby generators that may be connected to the distribution system in agreement with EMC.

Data Description	Units
Site Details	Text
Contact name	Text
Generator make	Text
Type of generating unit	Text
Type of prime mover	Text
Anticipated operating regime	Text
Terminal volts	kV
Rated kVA	kVA
Rated kW	kW
Maximum active power sent out	kW
Reactive power required	kVAr
Fault level contribution	MVA
Method of voltage control	Text
Generator transformer details	Text

Schedule1(b)

Generating unit data

For generators with parallel (synchronised) operation

Data Description		**Units**
Engineering details to include: Relevant voltage levels Generator size and winding configuration Transformer size and, ratio, and winding configuration Circuit breaker location Maximum three phase short circuit level (amps) Location of alternate electricity supplies CT/VT ratios and locations Synchronising and interlocking arrangements Relay types and location Power factor correction location		Text/ Schematic Diagram
Inertia constant		MWs/MVA (Whole Machine)
Stator resistance		
Direct axis reactances	Sub-transient Transient Synchronous	
Time constants: direct axis	Sub-transient Transient	
Zero sequence	Resistance Reactance	
Negative sequence	Resistance Reactance	
Generator transformer	Resistance Reactance MVA Rating Tap Arrangement Vector Group Earthing	
Impulse levels (BIL) and power withstands at each voltage level		Schedule
Fault current available due to metallic three phase short circuit at the main incoming circuit breaker		Calculation sheet
Interface Arrangements		Text/ Diagrams
Details protection circuit and trip circuit supervision		Text/ Diagrams
Details of relays to be used including measuring range, proposed settings and calculations used to determine relay settings		Text
Details of power factor correction		Text/ Diagrams.

Schedule 1(c)

Generating unit data

For generators greater than 1MW

Data Description	Units
Type of prime mover	Text
Rated MVA	MVA
Type of excitation system	Text
Automatic voltage regulator. A block diagram for the model of the AVR system including data on the gains forward and feedback time constants and voltage control limits.	Diagram Text
Speed governor and prime mover data. A block diagram for the model of the generator plant governor detailing the governor flyball and system control and turbine rating and maximum power.	Diagram Text
Capacity and standby requirements. Registered capacity and minimum generation of each generating unit and power station.	MW
Generating unit and power station auxiliary demand (active and reactive power) at registered capacity conditions.	MW MVAr
Generating unit and power station auxiliary demand (active and reactive power) under minimum generation conditions	MW MVAr

Schedule 2

Demand forecasts

(a) Generating units larger than 1MW

Data Description	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Electricity output (annual half-hour maximum active power output (MW))						
Forecast electricity generation (MWh)						
Planned shutdown periods Date: start of shutdown						
Planned shutdown periods Date: end of shutdown						

Note: Year 0 is current year.

(b) Medium voltage customers where EMC considers it appropriate

Data Description	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Electricity demand (annual half-hour maximum power out (MW) and power factor						
Annual energy forecast requirement (MWh)						
Planned shutdown periods Date: start of shutdown						
Planned shutdown periods Date: end of shutdown						

Note: Year 0 is current year.

Schedule 3(a)

Operational planning - Scheduled outages

For all generators and auto-producers

Data Description	Units	Time Period	Type of Data
For individual generating units the unit number and generating plant capacity. Preferred outage dates earliest start date latest finish date.	MW	0 to 52 weeks	Committed outage programme
For individual generating units the unit number and generating plant capacity. Preferred outage dates earliest start date latest finish date.	MW	Years 2 to 3	Provisional outage programme
For individual generating units the unit number and generating plant capacity. Preferred outage dates earliest start date latest finish date	MW	Years 4 to 7	Indicative outage programme

Schedule 3(b)

Operational planning - Plant and equipment

For medium voltage customers and all generators and auto-producers

Data Description	Units	Time Period Covered
Users provide EMC with details of proposed outages which may affect the performance of the distribution system, details of trip testing, risks of the trip and other information where known which may affect the security and stability of the distribution system	Dates	0 to 52 weeks
Users provide EMC with details of proposed outages which may affect the performance of the distribution system, details of trip testing, risks of the trip and other information where known which may affect the security and stability of the distribution system.	Dates	Years 1 to 2

Schedule 4(a)

System design information

All generators and auto-producers; Medium voltage customers if advised by EMC

Data Description	**UNITS**
Reactive Compensation Reactance of any capacitor banks and any series reactors Rating of individual shunt reactors (not associated with cables)	 Ω MVAr
Rating of individual capacitor banks Details of any automatic control logic such that operating characteristics can be determined. Point of connection to the system	MVAr Text / Diagrams
Lumped Network Susceptance Details of the equivalent lumped network susceptance of the user installation referred back to the connection with the distribution system including: shunt reactors which are an integrated part of a cable system and which are not normally in or out of service independent of the cable. Excluding: independently switched reactive compensation connected to the user installation and any susceptance of any user Installation inherent in the active and reactive demand.	MVAr
Fault Infeeds Maximum and minimum short circuit infeeds into the system X/R ratio under maximum and minimum short circuit conditions (contribution from rotating plant) *Equivalent network information at the request of EMC* *Interconnection Impedance*	 R+jX

Schedule 4(b)

System design information

For generators operating in parallel with system

Data Description	**Units**
Interconnection Impedance:	
Positive sequence resistance	%
Zero sequence resistance	%
Positive sequence reactance	%
Zero sequence reactance	%
Susceptance	
If EMC considers that the impedance is low, then more detailed information will be requested.	
Circuit Parameters	Text / Diagrams
Switchgear	Text / Diagrams
Protection Arrangements: Protection settings	Text / Diagrams
Transient Over-voltage Effects.	

Schedule 5

Load characteristics

All generators; Medium voltage customers

Data Description	**UNITS**
Types of Demand: Maximum active power demand Maximum and minimum reactive power requirement	 kW kVAr
Type of Load and Control Arrangements: Type of starter employed; Controlled rectifiers; Large motor drives;	Text / Diagram
Maximum load on each phase at the time of maximum demand	Amps/Phase
Maximum phase unbalance	Amps/ Phase
Maximum harmonic content	% of harmonic number
Fluctuating Loads: Rate of change of active and reactive power both increasing and decreasing	 W/s, kVAr/s
Shortest repetitive time interval between fluctuation in active and reactive power	Secs
Largest step change in active and reactive power both increasing and decreasing	KW, kVAr
Disturbing Loads:	Text

Glossary and Definitions

In the NC the following words and expressions shall, unless the subject matter or context otherwise requires or is inconsistent there with, bear the following meanings:

AC	Alternating Current.
Active Power	The product of voltage and the in-phase component of alternating current (normally measured in kilowatts (kW) or megawatts (MW).
Apparatus	All equipment in which electrical conductors are used, supported or of which they may form a part.
AVR	Automatic voltage regulation.
Auto-producer	A natural or legal person or customer generating electricity essentially for his own use but who may export energy to the distribution system.
Back-up Protection	That protection system which will open a circuit breaker or other fault-current interrupting device in the absence of the current protection operation of another protection system.
CENELEC	European Committee for Electrotechnical Standardisation.
Circuit Breaker	A mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also of making, carrying for specified time and breaking currents under specified abnormal circuit conditions, such as those of short circuit.
Commissioning	The final process of testing part of a system prior to that part of the system being considered suitable for normal use.
Connection Agreement	An agreement between EMC and each user setting out terms relating to a connection with the distribution system.
Connection Point	The physical point at which a user’s plant or apparatus is joined to the distribution system.
Control Centre	EMC’s location from which remote monitoring and control of the distribution system plant is centralised.
Customer	A user whose premises is connected to the distribution system for the main purpose of obtaining a supply of electricity at that premises.
Demand	Unless otherwise stated, the demand expressed in MW or MVAr of active power and reactive power respectively.

Dispatch	The issue of instructions for generating units by the EMC Control Room to achieve specific active power and reactive power outputs within registered data parameters and by stated times.
Distribution Connection Conditions (DCC)	That portion of the NC which is identified as the Distribution Connection Conditions.
Distribution Data Registration Code (DDRG)	That portion of the NC which is identified as the Distribution Data Registration Code.
Distribution General Conditions (DGC)	That portion of the NC which is identified as the Distribution Operating Code.
Distribution Licence	The licence issued to Enemalta Corporation to distribute electricity.
Distribution Operating Code (DOC)	That portion of the NC which is identified as the Distribution Operating Code.
Distribution Planning Code (DPC)	That portion of the NC which is identified as the Distribution Planning Code.
Distribution System	The system which consists of electric lines, electricity plant, transformers and switchgear and which is used for conveying electricity to final customers.
Distribution System Operator (DSO)	The manager responsible for operating, ensuring the maintenance of and developing the distribution system.
Disturbing Loads	Loads which have the potential to introduce harmonics, flicker or unbalance into the system.
Earthing	A way of providing a connection between conductors and earth by an earthing device.
Earthing Device	A means of providing a connection between a conductor and earth of adequate strength and capability for the intended purpose.
Electricity Regulations (ER)	The Electricity Regulations as published in Legal Notice 511 of 2004.
Electricity Supply Regulations (ESR)	The Government Notice 223 of 1940 and subsequent amendments by various Government Legal Notices since that time.
EMC	Enemalta Corporation.
Equipment	Plant and/or apparatus.
Event	An unscheduled or unplanned occurrence on or relating to an electricity supply system including, without limiting that general description faults, incidents and breakdowns.

Fault level	Prospective current that would flow into a short circuit at a stated point on the system and which may be expressed in kA, or, if referred to a particular voltage, in MVA.
Flicker	Impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.
Generating Plant	A power station including any generating unit therein.
Generating Unit	Any apparatus which produces electricity.
Generator	A person who generates electricity under licence or exemption under the ER.
Generator Requirements (GR)	That portion of the NC which is identified as the generator requirements.
Good Industry Practice	The standard of practice attained by exercising that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected from a skilled and experienced operator engaged in the same type of undertaking under the same or similar circumstances.
Harmonics	Sinusoidal currents with a frequency equal to an integer multiple of the fundamental frequency of the connection voltage.
High Voltage (HV)	A voltage, used for the supply of electricity, whose lower limit of nominal rms value is 35kV or higher.
IEC	International Electrotechnical Commission.
kVA	Kilovolt-amp.
Low Voltage (LV)	A voltage, used for the supply of electricity, whose upper limit of nominal rms value is 1kV.
Medium Voltage (MV)	A voltage, used for the supply of electricity, whose nominal rms value is greater than 1kV and up to 33kV.
Metering Point	Point on network where energy metering equipment is installed and is usually the demarcation point between the distribution network and the user's installation.
MRA	Malta Resources Authority.
MVAr	Megavar (1,000,000 vars).
MW	Megawatt (1,000,000 watts).
Network Code (NC)	The document produced by the Distribution Section of Enemalta pursuant to Legal Notice 511 of 2004: Electricity Regulations.
Network Code Review Panel	The panel with the functions set out in DGC7.

Normal Operating Frequency	The number of AC cycles per second, expressed in Hz at which the system normally operates, ie. 50Hz.
Operation	A scheduled or planned action carried out on a system.
Operational Effect	Any operation which causes the distribution system, or the system of other users, to operate (or be at a materially increased risk of operating) differently from the way in which they would or may have operated in the absence of such effect.
Ownership Boundary	The boundary between the distribution system and equipment owned by the user.
Planned Outage	An outage of generating plant or of part of the distribution system other than a forced outage.
Plant	Fixed and movable items used in the generation and/or supply and/or distribution of electricity other than apparatus.
Point of Common Coupling (PCC)	The point on the distribution system which is electrically nearest to the connection point and from which other customers' loads are, or may be, connected.
Protection	The provisions for detecting abnormal conditions in a system and initiating fault clearance or actuating signals or indications.
Reactive Power	The product of voltage and current and the sine of the phase angle between them which is normally measured in Kilovars (kVAr) or Megavars (MVAr).
Registered Capacity	The normal full load capacity of a generating unit as declared by the generator less the MW consumed when producing the same.
Registered Data	Data referred to in the schedules to the Distribution Data Registration Code.
Safety Management	The procedure adopted by EMC or a user to ensure the safe operation of its system and the safety of personnel required to work on that system.
Safety Procedures	The procedures specified within a safety management system.
SCADA	Supervisory Control and Data Acquisition.
Scheduling	The procedure for determining intended usage of generating plant.
Significant Incident	Events which have had or may have an operational effect on the distribution system or a user's Installation.
Standby Generator	Generating plant to be used by a customer in the event of power supply failure. Such plant is normally not connected to the distribution system but may be connected with the EMC's permission.

Substation	An 11kV/0.4kV transformer, distribution switchgear, fuseways and connections, and the building in which they are housed.
System Stability	The state of the system whereby predicted changes in load and generation can be accommodated without any detrimental effect on the system.
Tests	Those tests which involve simulating conditions or the controlled application of irregular, unusual or extreme conditions on the total system or any part of it, but not including routine testing, commissioning or recommissioning tests.
THVD	Total Harmonic Voltage Distortion.
TN-C-S System	An electrical system consisting of a single source of electrical energy and an installation in which the neutral and protective functions are combined in a single conductor in a part of the system.
TN-S System	An electrical system consisting of a single source of electrical energy and an installation in which there are seperate neutral and protective conductors throughout the system.
TT System	An electrical system consisting of a single source of electrical energy and an installation in which the source of energy has one point which is directly earthed, and the exposed-conductive-parts of the installation are connected to earth electrodes which are electrically independent of the earth electrodes of the source.
Unbalance	(see Voltage Unbalance).
User	A term used in various sections of the NC to refer to the persons using the EMC distribution system, more particularly identified in each section of the NC.
Voltage Dip	A sudden reduction of the voltage to a value between 90% and 1% of the declared voltage followed by a voltage recovery after a short period of time.
Voltage Fluctuations	A series of rapid voltage changes which may be regular or irregular.
Voltage Unbalance	In three-phase network, a condition in which the rms values of the phase voltages or the phase angles between consecutive phases are not equal.