Varming
Consulting Engineers Ltd.

Design Approach

Electrical Service Specification
for
Templar Place SHD,
Balbriggan,
Co Dublin

INDEX

Electrical

Executive Summary

The proposed development comprises a Build to Rent (BTR), Strategic Housing Development (SHD) as follows: Demolition of the existing buildings (former shopping centre and associated structures). Construction of 3 no. apartment blocks (Blocks A - C) ranging in height from 3 to 6 storeys (with Block B over 3 no. lower courtyard floors) providing a total of 101 units (19 no. studios, 41 no. 1-beds, 41 no. 2-beds). Provision of Resident Support Facilities/Resident Services and Amenities, 2 no. retail units, car parking (at ground floor car park), cycle parking, ESB substation/switch room, plant, bin stores, open space, landscaping, boundary treatments, all associated site works and services provision.

Objective

This report outlines the nature, scope and configuration of the various electrical engineering services and systems.

The purpose of this report is to provide an overview of the proposed electrical services to be installed in the new dwellings and to confirm the electrical design strategies proposed maximise the Building Energy Rating (BER) while providing the most robust, durable and maintainable systems as possible.

Introduction

The site works associated with residential development include the provision of, 2 No. Telecoms Suppliers, Public Lighting, Electric Car Charging and ESB

All piped and ducted services work will be concealed were possible within stud partitions, floors and ceilings.

Varming Consulting Engineer's site inspector has met with the utility provider's on site to ascertain the spare capacity available within the local utility infrastructure.

Routes of proposed telecoms, mains water and ESB duct services have been reviewed and agreed on site with each provider.

A full DEAP analysis for each apartment has been completed which verified that each apartment will achieve the A2/A3 Building Energy Rating required to achieve full compliance with NZEB.

The Environmental Strategy for the development of each dwelling is to provide energy efficient systems and to employ a holistic approach to the integration of the building, its energy systems and its users. Templar project team recognises the need for this development to be designed and operated in a manner that reduces the environmental impact of the building, while achieving it in an economical manner and maintaining an internal environment that is comfortable and enjoyable for all occupants.

Varming Consulting Engineers are a member of the Templar project design team for this project.

Overview

The following is an overview of the compliance checks that have implemented for each dwelling.

Internal Environment

The internal environment in each apartment has achieved specific compliance with the requirements of the 2019 Building Regulations, Part L – Conservation of Fuel & Energy for Apartments, CIBSE Guidelines and the Works Requirements for naturally ventilated spaces.

BER Rating

The envelope of each apartment is designed with consideration to the integration of solar strategies in terms of glazing, daylight and architectural aesthetics and to ensure that an A2/A3 Building Energy Rating (BER) is achieved for each apartment in full compliance with Technical Guidance Document L- Conservation of Fuel and Energy – Dwellings (2019)

Utility Use

All apartment utility costs will be paid for by the residents/tenants individually. Each apartment will be provided with individual smart meters where available by the service provider. It is generally found that through the incorporation of 'all in rents' which include utilities, this encourages bad behaviour in energy consumption.

Throughout the building common area's, the development will incorporate low energy light bulbs and movement sensors to switch off lights once spaces are out of use

Proposed Electrical Services

Electrical Supply, Electrical Centres and Electrical Distribution (NSBE 61)

All ESB ducting shall be installed in accordance with ESB Networks specifications.

All metering shall be installed in accordance with the I.S. 10101:2020 regulations & ESB Networks specifications.

Each apartment shall be provided with an individual consumer unit to which all sub-circuits within the apartment shall be connected. Each meter located within a remote central switch gear assemble.

A dedicated switchgear assembly to house each electrical meter for each of apartments will be provided.

Distribution board (switch gear assemblies) shall comply with I.S. EN 61439-1.

Consumer units shall comply with I.S. EN 61439-3 and shall have their enclosure manufactured from metallic or non-metallic materials complying with IS EN 60695-2-11.

All required life safety secondary electrical supplies shall be via a dedicated back up diesel generator, as per BS 9999, Be quiet in operation generating no more than 75 dB at full power. Life safety systems are not limited to sprinkler pumps (EN 12845), smoke extract fans (BS 7346-8) and the required automatic transfer switch (EN 60947-6-1 and section 1)

Power Services

All socket outlets shall be white flush mounting shuttered three pin 13A type conforming to B.S. 1363 Part 2:1995. They shall have their compliance verified by ASTA. Socket outlets in the kitchen shall be switched. Socket outlets in the kitchen shall be mounted 1.1 m. above floor level and in all other rooms shall be mounted 0.45 m. above floor level. Sockets shall be secured by cup-head chrome plated screws. Of white plastic finish and will be installed to fit flush with the back box.

All power cables shall be contained entirely within non-metallic conduit, both horizontal and vertical, all conduits shall be concealed within internal stud framing. No electrical services are to be located on party walls.

All circuits, including socket outlet circuits, shall of radial design and no ring main circuits shall be provided. The following circuits shall be provided within each apartment:

The circuit/circuits to the fire alarm and carbon monoxide system wired in 1.5mm2 PVC/PVC twin and earth cable (visual identifiable from lighting & general services T&E cabling) with ringing wire. This circuit shall terminate on a dedicated MCB's. Wiring for the fire alarm shall be in accordance with I.S. 10101: 2020 and the relevant manufacturer's instructions.

The radial circuit/circuits for the immersion heater shall be wired in 2.5mm2 PVC/PVC twin and earth cable protected by 20A MCB.

The cooker circuit shall be wired in 6.0mm2 PVC/PVC twin and earth cable protected by 32A/B type MCB.

All external wiring from control centre should be hard wired in accordance with I.S. 10101: 2020 requirements.

Radial circuit shall be provided for Mechanical Ventilation installation wired in 2.5mm2 PVC/PVC twin and earth cable protected by a 10A RCBO and terminating in a 20A unswitched fused spur outlet (fused at 3A)

All socket circuits and the immersion circuit shall be protected by dedicated, 20amp/30mA/B type RCBOs sensitivity.

All circuits, including lighting circuits, shall be provided with an individual neutral. The use of " borrowed" neutrals constitutes an unsafe practice and is prohibited. The circuits are generally as below:-

Circuit	Rating (Amps)	Cable Size
Lighting Circuit 1./Kitchen Fan	10A RCBO	1.5 sq.mm.
Lighting Circuit 2 / fan (if applicable)	10A RCBO	1.5 sq.mm.
Cooker Circuit	32A MCB	6.0 sq.mm.
Fire Detector System	10A MCB	1.5 sq.mm.
Kitchen Socket Circuit 1	20A RCBO	2.5 sq.mm.
Kitchen Socket Circuit 2	20A RCBO	2.5 sq.mm.
Radial Socket Circuit 1	20A RCBO	2.5 sq.mm.
Radial Socket Circuit 2	20A RCBO	2.5 sq.mm.
Bed Room Socket Circuit	20A RCBO/Arc Fault Detection Device (AFDD)	2.5 sq.mm.
All Electrical Incomers	Electrical Surge protection	Wired Internally
Cylinder Circuit	20A RCBO	2.5 sq.mm.
Heat Pump Circuit	20A RCBO	6.0 sq.mm.

Table 1:- Apartment/Dwelling Circuits

Circuits marked RCBO shall be provided with a separate RCBO exclusively for the protection of that circuit.

Each bedroom socket circuit shall be provided with a separate RCBO/AFDD exclusively for the protection of that circuit.

All cables shall comply with I.S. 201. Each coil of cable delivered on site shall be new and bear the maker's sealed label which shall state clearly the maker's name, megohm grade and normal details of the wire. The core identification colour of all cables and wires shall comply with the core colour scheme specified in I.S. 10101:2020.

All cables shall be either harmonised or be an approved national type.

Harmonised cables shall carry the <HAR> mark plus name of national approvals body e.g. BASEC, VDE.

Approved national cable shall carry the name of the relevant national approvals body. For house wiring type cables this is the BASEC mark only.

All wiring shall, as far as possible, be concealed. All such wiring must be carried out in a safe, neat and workmanlike manner. The surface wiring should, wherever practicable, be concealed by, for example, mounting it at high level behind plinths of kitchen units or in the void below worktops.

Cables shall be run from the consumer unit to the ceiling space. Cables rising to the ceiling space space shall either be recessed.

All plastic conduits shall enter their respective boxes each box for at least 5 mm. and shall extend at least 100 mm. into the ceiling cavity. On walls which are to be dry-lined the conduit shall be secured by means of a sufficient number of crampets or saddles.

All wiring will be concealed in a plastic conduit containment system. Conduit will be secured to building surfaces by means of saddles and/or screws and not by other means such as self-adhesive tape. Cables will be run to outlets via conduits within a dedicated service zone at high level within the ground and first floor ceiling space.

All wiring in close proximity to hot water pipes must be protected by covering the pipes with insulation.

A dedicated exhaust air heat pump will provide constant mechanical extract ventilation for each apartment. A fused spur connection will be provided for each exhaust air heat pump suitably rated for the load.

Sockets shall be provided under kitchen worktops where space is provided for an appliance such as fridge, washing machine etc. A single socket shall be provided at high level for a cooker hood, where this is supplied.

All socket outlets located in inaccessible locations (e.g. under worktops or at high level for cooker hoods) shall be provided with an isolating switch, clearly labelled in accordance with IS 10101:2020. These isolating switches shall be located over the worktops or as close as possible to the relevant socket.

One twin socket shall be installed in hallway.

Socket outlets in the kitchen shall be mounted 1.1 m. above floor level and in all other rooms shall be mounted 0.45 m. above floor level.

Sockets shall be secured by cup-head chrome plated screws.

Socket outlets shall be white plastic flush mounting shuttered three pin 13A type conforming to B.S. 1363 as shall be provided at the locations indicated on the drawings.

A 45A/60A white plastic flush mounted cooker switch of approved pattern, shall be provided in the kitchen adjacent to the cooker position at a height of 1.2 m. above floor level. A 20mm. conduit shall be sunk in a wall chase from the cooker switch to a point centrally behind the cooker 0.45m.above floor level, and shall terminate in a standard outlet box with flat outlet cover. The cooker circuit E.C.C. shall be secured first at the earthing terminal of the cooker switch.

Switch and socket outlet boxes shall be metal with earth terminal. They shall finish, flush with the finished wall surface. This may necessitate a deep box in instances where additional insulation has been provided on the inside of a wall.

On walls which are to be dry-lined, or in studding, boxes shall be fixed in position with two non- corroding woodscrews. On walls which are to be rendered and skimmed the boxes

shall be fixed either by two non-corroding woodscrews or a hard sand and cement mix. Neither "HILTI" type fixings nor Masonry nails shall be used in any event. Plaster depth boxes shall not be used.

A standard 32 mm deep outlet box with 20 Amp dual switch with neon indicator for the immersion heater shall be provided outside and as near as possible to the hot press. It shall be located at a mounting height of 900mm to 1200mm above finished floor level. The Dual Switch shall be to B.S. 3676.

The immersion heater shall be fitted with both control thermostat and non-resetting thermal cut-out.

The flex shall exit the back of the outlet box and pass through the stud partition or wall entering the hot press just below the bottommost shelf. The flex shall be clipped neatly along the sides and shelf of the hot press so that the flex does not touch the side of the cylinder. The cylinder shall be installed in such a way that the immersion group faces towards the non-hinged side of the hot press door opening.

Surge protection (class 2) shall be provided within each consumer unit as per the requirements of I.S. 10101:2020.

Photovoltaics (PV)

The PV array for the communal areas for both block A & B shall be installed as per manufactories details. Each PV array shall interfaced with the communal areas electrical distribution system. The power yield from each array shall reduce the total electrical power consumed within each of the applicable buildings.

The proposed PV array for each building shall be as outlined below;

Block A – 7.6kW Peak Power- 22Panels (340W).

Block B – 8.2kW Peak Power- 24Panels (340W).

Block C – 2.0kW Peak Power- 6Panels (340W).

The installation shall conform to ESB Networks connection and disconnection criteria as laid out in ‘Conditions Governing the Connection and Operation of Micro-generation’. All solar pv products comply with EN 61215:2005 “Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval”

Lighting

The circuit/circuits serving all lighting shall be wired in 1.5mm2 twin and earth PVC/PVC cable and protected by 10A/ 30mA/B type RCBO, Each circuit shall serve approximately 50% of the lighting points.

Internal light fittings will be standardised as much as possible to reduce the number of spare lamp and fittings that must be kept for maintenance.

Low energy LED light fittings have been specified that will last longer, require less replacement activities and should result in lower running costs.

The proposed external lighting scheme within the development will support the accessibility and use of the external and public space within the development.

Standardisation of light fittings within the development, especially LEDs, will reduce the storage space needed and reduce the replacement activities.

Low energy LED light fittings should result in lower running costs.

PIRs will be used for all transient & BOH spaces which are seldom occupied.

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Emergency Lighting and Exit Signs

A system of escape route emergency lighting will be provided within the building in compliance with IS 3217:2008 & A1 2013 and will utilise self-contained, non-maintained, emergency LEDs, and self-contained, maintained exit sign luminaires. All emergency luminaires and exit signs shall be supplied complete with Compliance Certificates to EN 60598-2-22 for the particular luminaire.

Each applicable electrical distribution board shall contain a central test unit (CTU), this shall provide the method of testing the emergency lighting within the development.

Public Lighting

The site lighting for the development has been designed to provide a safe environment for pedestrians, cyclists and moving vehicles, to deter anti-social behaviour and to limit the environmental impact of artificial lighting on existing flora and fauna in the area. Photocells will be incorporated into the external lighting to help reduce operating hours of lights public lighting is controlled via photocells and timeclock to ensure energy efficiency is achieved

Communications:

The development will benefit from building technology and systems throughout to help manage the building and keep it secure.

Within this, residents will have access to a resident portal that will allow communication with the onsite team (maintenance, room bookings) but also access to a community page (for events etc).

The mobile app will provide an efficient interface for obtaining services at Cross Avenue, as well as enhancing the resident experience and satisfaction

Telephone and Data Services

Each apartment will be fitted with twin telephone & data points (RJ45) which will be interchangeable. These will be wired in Cat 6 standard cable. Cat 6 standard cable shall be of Euroclass classification DCA S1B A2 B2.

All communications cables will be terminated into a communications box within each apartment which will be located adjacent the electrical consumer unit at the front door to

each unit. These cables are then terminated as indicated on the drawings, where the utility providers will terminate in their services.

It is envisaged to apply to both Eir & Virgin Media for utility services to this site for Telephone & broadband use.

TV Utilities

Where available local area TV utilities services and broadband network will include Virgin Media's and EIR underground ducting and cabling network which will be extended to dedicated apartments via externally mounted outdoor TV junction boxes. One Cat 6 cable will be installed from the TV junction box to individual outlets within the apartments.

Each apartment will be fitted with twin co-axial outlets in the dining & the living rooms. These will be wired in screened co-axial cable.

All television cables will be terminated into the same communications box within each apartment which will be located adjacent the electrical consumer unit at the front door to each unit where the utility providers will terminate in their services.

Protection Access Control Strategy ,Security and Fire Alarm

Each apartment building will benefit from various security components, comprising the following:

CCTV & Fob & Key Access:

CCTV:

The development will benefit from CCTV monitoring and access control systems, with monitors located on site in the management suite. Appropriate signage will be erected across the site to comply with GDPR. Access to the video footage will be only allowed via authorised individuals as required.

Fob Access:

- Each apartment block access will be via a controlled fob system, with fobs issued by the management team.
- Lost Fobs: Fobs will be unbranded for the residents, should they lose these outside the estate and thus compromise access into the buildings. The system will, however, allow for these lost fobs to be made inactive.
- CCTV & Fob Access/Spaces: Spaces where CCTV will be in place and fob access will be required includes:
    - Main entrances/lobby space
    - Amenity spaces
    - Car parking and bicycle storage
    - Refuse areas

Key Access:

Certain areas of the estate will be key access for additional security. This will include the management suite

24hr Security Line:

Outside of the above working hours, a 24-hour emergency line will be available to the residents to contact a licenced security company.

Car Parking:

The development will include site security measures for resident's cars.

Electric Vehicle Charging (EVC)

The development will include EV charging points within the residents carpark to cater for E-car demand of the residence. A full re-charge can take from one to eight hours using a standard charge point. Future proofing of all carparking spaces to enable EV will be accommodated within the infrastructure

Providing e-car charging points will allow occupants of Block A-C in Templar Place to benefit from the ever-improving efficient electric car technologies

Fire Alarm:

The fire alarm equipment chosen shall have the option for the provision of a detector base incorporating volt-free relay contacts in lieu of a standard base.

The detectors shall be mains operated with rechargeable lithium cell back-up and interlinked. Electricity supply shall be taken from a designated MCB on consumer unit.

The number and location of detectors are generally as follows:

- One smoke detector on landing at top of stairway, One smoke detector in hallway at bottom of stairway.
- One heat detector in kitchen.
- One smoke detector in living room
- One smoke detector in each bedroom.

Each apartment will be provided with the following carbon monoxide detectors:

- One carbon monoxide detector in kitchen appliance and one carbon monoxide detector in hall adjacent to bedrooms

An addressable landlord fire alarm system, shall be installed within each of the apartments, a sounder base shall be provided at each bed head location and a heat detector with remote indictor shall be installed within the hall way as per IS 3218 L3X requirements. All wiring for the landlord fire alarm shall be to BS 7629-1:2015+A1:2019 (120 minute/ Red/ Enhanced)

Heat Pumps

Exhaust Air Heat pumps(EAHP) will be installed within each apartment as the most energy efficient system. A dedicated electrical supply will be extended from the consumer unit to the external Air Source Heat Pump, sized to meet the load and start up current

Exhaust Air Heat Pump Controls Section

The EAHP controls system in each apartment shall be supplied and installed in each apartment and amenity space.

The EAHP controls may be split into three individually controlled zones including space heating , ventilation and hot water heating.

The individual items of plant controlled are:

- EAHP pump runs to maintain hot water
- Temperature sensor in corridor ground floor
- Temperature sensor in corridor first floor (where applicable)
- Temperature stat on cylinder
- Constant mechanical extract ventilation

Earthing and Bonding

Earthing and bonding arrangements shall comply with the requirements of I.S. 10101:2020

The Earth bar of the consumer unit shall be used in place of a separate external neutral block. It shall be fitted with two double screw terminals to accept the incoming 16 sq. mm. main earth lead and 16 sq. mm. neutralising lead to the approval of the Engineer.

Earth continuity conductors shall be brought to all switch and lighting points in accordance with IS 10101:2020

Connections of bonding leads to pipes and of the earthing lead to the earth rod shall be made by means of approved clamps. All earthing clamps shall be of an approved non-ferrous design having a separate terminal for the cable. Pipes must be thoroughly scraped and cleaned before a clamp is fitted.

Testing And Certification

The entire electrical installation will be fully inspected, tested and certified for each apartment and any other electrical installation forming part of the works, as required by I.S. 10101:2020.

Testing shall include both pre and post connection tests. A completion certificate and test record sheets shall be provided in respect of each completed installation in accordance with the I.S. 10101:2020.

The electrical installation has been completed and fully tested;

The completion certificate has been completed and signed confirming that all pre and post connection tests have been completed in accordance with I.S. 10101:2020;

All test record sheets have been completed and signed

All equipment that is the property of ESB Networks i.e. the cut-out, electricity meter and isolator have been installed by that body;

All electrical connections to ESB Networks equipment have been completed and that no connections that rely on the use of temporary connectors are left in situ.

Testing shall include the electrical commissioning of the smoke detectors and electrical supply.

All documentation relevant to the electrical installation shall be included in the Safety File to be handed over Focus Ireland in accordance with the requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013.

Underground Services

Where electrical services cables are required to be laid underground they shall be accommodated in underground ducts with surface boxes provided at suitable points to facilitate future renewal and maintenance. The ducting installation shall be in accordance with the colour coding and other details specified in the Code of Practice for Avoiding Danger from Underground Services published by the Health and Safety Authority (H.S.A.). Suitable marking tape shall be laid for subsequent identification.

All underground cables shall be PVC/SWA/PVC to BS 6346 or cables with equivalent mechanical protection.

Each cable shall be identified along its route by means of suitable robust labels wrapped around its sheath. This identification shall be at all accessible points i.e. in switch rooms and at access chamber positions.

Standards and Codes

The following design codes, standards and guidance documents will be adhered to where applicable in the design, installation and commissioning of the Electrical Engineering Services including:-

- Irish Building Regulations – Technical Guidance Documents;
- Irish Statute and Legislative Requirements; Irish
- European and British Standards
- Chartered Institute of Building Services Engineering, CIBSE Guides
- BSRIA Guidelines
- Institute of Plumbing Guidelines
- OFTEC Guideline
- Local city council bye-laws
- Electricity Supply Regulations
- I.S. 10101:2020 National Rules for Electrical Installations
- IEC International Electro-technical Commission
- Lighting Guidelines – CIBSE

Procedure For Obtaining Electricity Supply Services Before Commencement Of Electrical Installation

This Section outlines the procedure for obtaining an electricity supply and for connection of the completed electrical installation by ESB Networks (ESBN).

Electricity Supply to be connected

ESB Networks require electricity meters to be located at a central point within each of the 3no of blocks, with a dedicated switchgear assemble to house each electrical meter for each of apartments/dwellings.

It will be necessary to arrange for the incoming electricity supply point to be installed It should be noted that this process may take a considerable amount of time and an early application to ESB Networks is strongly advised.

Meter cabinets and ducting for underground electricity services must comply with the requirements of the most recent edition of the ELECTRICAL SERVICES GUIDEBOOK – Housing Schemes, current edition published by ESB Networks.

All procedures and forms are available on the ESB website www.esb.ie/esbnetworks

Completion of the Electrical Installation Works

A completion certificate will be provided to the Electrical Safety Supervisory Body (ESSB) i.e. RECI or ECSSA as appropriate, quoting the relevant MPRN

Further to the ESB Networks gaining access to the apartment to facilitate connection. ESB Networks will either connect meter tails to meter or supply and install new meter and isolator. If new meter and isolator provided, ESB Networks will connect meter to incoming side of isolator. They will seal both meter and the incoming side of the isolator.

Post-connection tests will be completed on each apartment as required by the I.S. 10101 National Rules for Electrical Installations and completes and signs that part of the completion certificate.

The provision of an electricity supply also enables the following:

- Commissioning of central heating system
- Testing of fire alarm system

On Handover Of Apartment

Tenant applies to an electricity supplier licensed by the CER for supply in their own name on allocation of apartment.

The builder notifies his electricity supplier of his intention to close the electricity on completion. On day of handover he takes final meter reading and closes the electricity account.

It is important that all connections to the ESB network are permanently made by ESB Networks and no apartment must be left on temporary connectors.

No property will be accepted for handover unless this procedure has been complied with, and all electrical installations and connections are fully certified prior to issue of hall door keys to the Employer.

Electrical Testing and Commissioning

Objective

The objective of this section of the report is to identify the strategy that will be implemented in the testing and commissioning of each dwelling in regard to electrical systems

Testing and Commissioning

It is important to ensure that the electrical systems installed within each new apartment are tested to ensure that the installed systems comply with the design specification and in addition, to ensure that any problems identified during testing are resolved prior to each house being handed over.

Before commencing any test on the electrical systems, a pre-testing verification process will be implemented to ensure that each system has been inspected and all components are installed to the manufacturer's requirements.

Preliminary checks, cleaning, setting to work and regulation of the individual systems shall generally be in accordance with the relevant parts of the following publications:-

- CIBSE Commissioning Codes (Series A, B, C, R and W).
- BSRIA AG1/2001.1: Pre-commission cleaning of pipework systems(
- BSRIA Application Guide AG2/89: The Commissioning of Water Systems in Buildings
- HVCA TR/6: Guide to good practice for site pressure testing of pipework.
- HVCA DW/TM2: Internal cleanliness of new ductwork installations.
- HVCA publication DW/143: A practical guide to ductwork leakage testing.
- IS 10101:2020 National Rules for Electrical Installations

Any defects of workmanship, materials, performance, design of equipment, maladjustments or other irregularities which become apparent during inspection, testing or commissioning will be rectified and the relevant part of the re-testing or commissioning procedure shall be repeated.

CE Marking

The CE conformity marking is the manufacturer's declaration that the selected equipment meets the essential requirements of the relevant European health, safety and environmental protection legislation, that is in practice by many of the Product Directives and provides the end user/client the additional assurance that the selected product/equipment are based on a certified production quality system. For example, all electrical equipment detailed within our report where appropriate complies with the Low Voltage Directive and the EMC Directive.

All electrical equipment detailed in this report have been selected on their proven track record in regard to durability, robustness and maintainability..

Figure 1: CE Marking