

DESIGN GUIDE AND SPECIFICATION FOR STREET LIGHTING

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1. STREET LIGHTING

1.1. GENERAL

All developments must be provided with an approved form of Street Lighting prior to being considered eligible for adoption. It should be noted that the Highway Authority will not be responsible for any street lighting erected in non-adoptable situations.

Proposals for street lighting must be included with the drawings and specifications to be incorporated in the Section 38 Agreement. The provision of street lighting will be the responsibility of the Developer and all proposals must have the approval of the Engineer prior to works commencing.

The Developer must ensure that all relevant street lighting is operational before occupation of dwellings.

1.2. REGULATIONS AND BRITISH STANDARDS

1.2.1. Street lighting designs must comply with the current editions of the following: -

BS5489-1 : Code of practice for the design of road lighting Part 1:
Lighting of roads and public amenity areas

- BS EN 13201 Road Lighting.
- BS EN 13201-2 : 2003 Part 2 : Performance requirements.
- BS EN 13201-3 : 2003 Part 3 : Calculation of performance.
- BS EN 13201-4 : 2003 Part 4 : Methods of measuring performance.

1.2.2. Street lighting designs should be in accordance with the current editions of the following professional guidance documents: -

- ILP Professional Lighting Guide PLG02 The application of conflict area on the Highway
- ILP Technical Report TR12 Lighting of pedestrian crossings.
- ILP Technical Report TR25 Lighting for traffic calming features.
- ILP Technical Report TR30 Passive Safety
- ILP Technical Report TR23: Lighting of Cycle Tracks
- ILP General Publication GP10: Safety During the Installation and Removal of Lighting Columns and Similar Street Furniture in Proximity to High Voltage Overhead Lines

1.2.3. All components and materials must comply with the relevant British Standards and carry a suitable CE mark. Street Lighting and associated electrical installations must comply with the following:-

- The current edition of the IET Regulations (BS7671) with particular reference to section 559/10 requirements for outdoor lighting installations, highway power supplies and street furniture.
- The requirements of the R.E.C. with particular reference to requirements for obtaining a metered supply for loads exceeding 500w originating from a single electrical exit point.
- G39/1 (Regional Electricity Companies publication) with particular regard to sighting of columns in the vicinity of overhead lines.
- The Electricity at Work Regulations.
- Guidance Note GS6 (HSE) – Avoidance of Danger from Overhead Electricity Lines.
- GP03 Code of Practice for Electrical Safety in Highway Electrical Operations
- Should overhead electricity lines cross the site the Developer must seek approval from the Electricity Generator and/or Supplier as appropriate before erecting any columns in the vicinity of the lines.
- Where columns are sited in the vicinity of high voltage overhead lines a warning notice "DANGER HIGH VOLTAGE OVERHEAD CABLES" must be fixed to the columns adjacent to the lines as a warning to Street Lighting operatives carrying out future maintenance requirements. The sign is to be manufactured from 3mm thick approved plastic substrate material and fixed by an approved method.
- To comply with safety requirements during maintenance operations the engineer may in some instances require the installation of hinged lighting columns.

1.3. DESIGN REQUIREMENTS

- 1.3.1. Compliance with this specification will still leave a wide range of choice for the Developer. All products complying with British Standards are not necessarily acceptable and therefore proposals must be submitted at an early stage to the Engineer for approval.
- 1.3.2. The Developer's lighting design proposals must be submitted for approval to the Engineer and shall include the following:
 - Illuminance data in the form of grid diagrams where area calculation method has been used.
 - Straight Line Calculation if appropriate.
 - Electrical cable calculations where appropriate.

- Written equipment specification including all information needed to identify exact luminaire used, and to ensure installation will meet the requirements of this document.
- Any drawings submitted should be in an AutoCAD format or similar and must be to an appropriate scale when printed.

It should be noted the preferred design software for submission of design calculations is lighting reality.

- 1.3.3. It is essential to ensure that the type and heights of lighting columns are appropriate for the development proposals. Local distributor roads will require mounting heights of 8m or 10m. Mounting heights on proposed bus routes must be a minimum of 6m. Mounting heights of 6m will also be required on other estate roads, unless otherwise agreed with the Engineer.
- 1.3.4. A column mounting height of 8m or 10m is to be used for industrial estate roads unless directed otherwise by the Engineer
- 1.3.5. Columns shall be positioned at the back of footways/footpaths, or verges within the adopted highway approximately 1.8m from carriageway edge.
- 1.3.6. Columns must not obstruct footways/footpaths, vehicular accesses or be sited in potentially hazardous positions. They shall be sited in accordance with the recommendations in BS 5489 2013 and subject to the conditions of Statutory Undertakers. Particular regard should be given to safety clearances from lighting columns and any overhead electricity line which may cross the development.
- 1.3.7. Where a new road is constructed connecting to an existing highway it may be necessary for the Developer to upgrade the existing lighting or provide additional columns as directed by the Engineer. The lighting layout at the junction should take consideration of the recommendations within ILP "Professional Lighting Guide PLG02 the Application of conflict areas on the highway".
- 1.3.8. Due to the range of lamps and lamp sizes acceptable for residential development the Developer is advised to contact the Engineer to agree the type, wattage and colour temperature of the light source to be used prior to commencing design.
- 1.3.9. It should be noted that the Highway Authority will not be responsible for any Street Lighting erected in non-adoptable situations.
- 1.3.10. Street Lighting for residential areas shall be designed in accordance with BS5489-1 : Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas.

- 1.3.11. Where columns are to be looped from an REC supply point within a Column the Developer shall provide a fused cut-out incorporating a separate HRC fuse (BS88) to protect the outgoing looped circuit, (see standard details). This method of connection shall be limited to 6 No. columns and a maximum load of 500w and should comply with the regional electricity company requirement for unmetered supplies.
- 1.3.12. A suitably approved Feeder Pillar shall be provided when connecting more than 6 number columns or a load greater than 500w.
- 1.3.13. All public lighting cable networks should be fully detailed on a schematic diagram outlining connection type and circuit protection to be provided, this information should be accompanied by cable calculations in accordance with current edition BS7671 IET wiring regulations ideally produced using a suitable proprietary software package.
- 1.3.14. The Feeder Pillar shall incorporate a suitable double pole, lockable switch, Fuseboard, the enclosure is to be protected with a suitably agreed external vandal resistant locking mechanism. All internal distribution switching and ancillary equipment should be supplied by the feeder pillar manufacturer prewired and suitably labelled.
- 1.3.15. The distribution board shall incorporate suitable circuit protection such as HRC fuses, MCB's or RCBO's as appropriate. It should be noted RCBO's may need to be utilised where the electricity connection company is not providing a PME earth at the point of supply,

1.4. LIGHTING EQUIPMENT ON BUILDINGS

- 1.4.1. Consideration should be given to attaching lighting units to buildings to reduce street clutter. Where lighting units are to be attached to a building, an agreement will be required between the freeholder of the property, any existing tenants and the highway/lighting authority, this agreement must also be in perpetuity. It may also be necessary to enter into an agreement with all the other properties within a street/development in case of future redesign of the lighting schemes.
- 1.4.2. It is important that during the design of wall mounted schemes that measures are put into place to reduce stray light, as this could be considered as nuisance.
- 1.4.3. Developers should inform buyers of properties with wall mounted street lights, of their legal responsibilities with regards to the lighting units and their associated supply cables.

1.5. TYPE OF LANTERNS

1.5.1. The Highway Authority have a policy of installing luminaires using Light Emitting Diodes (LED) as the light source and as such should be used. If a suitable LED solution is not available alternative proposals should be submitted to the Engineer for approval. Consideration will be given to Best Value when selecting light sources and also by not compromising the quality of the lighting installation. However there are a number of essential criteria any lantern promoted should comply with to ensure approval and should be submitted to the engineer for approval unless it is shown on the pre-approved luminaire list below.

1.5.2. Essential criteria are as follows:

1.5.2.1. General requirements

- The luminaire optic impact rating shall be a minimum of IK08
- The luminaire LED module tightness shall be a minimum of IP66
- The luminaire control gear enclosure tightness shall be a minimum of IP66
- The luminaire guarantee shall be equal to, or greater than, 14 years and shall include: maintenance of ingress protection, mechanical integrity, driver/control gear, photocell, electrical wiring, and the LED modules. The LEDs shall be considered as failed if more than 15% of the LEDs within any module have failed.
- The luminaire shall fully comply with BS EN 60598-1, or equivalent
- The luminaire shall have integral gear
- All electrical equipment shall be installed so that levels of radio interference as stated in BS EN 55014-1, or equivalent, are not exceeded.
- The luminaire body/frame and canopy shall be made of high-quality die-cast aluminium
- The luminaire shall be tested in accordance with current British and European Standards, or equivalent, to ensure compatibility with the various LED/Driver/optical components - and specifically in respect of heat dissipation and operation with thermal limits of these components
- The luminaire shall be designed to effectively control thermal management suitable for use at an ambient temperature of 25 degree Celsius
- The luminaire shall have a valid BSCP520 operational charge code
- The luminaire shall incorporate surge protection to 10kV
- The luminaire carries a current CE mark

- Life testing of LED light sources shall be in accordance with LM-80 and details of life testing/valid certification has been provided
- Photometric measurement shall be in accordance with LM-79-08 and details of photometric measurement/valid certification has been provided
- Compliance with EN60598-1:2008 and EN60598-2-3:2003 and valid certification has been provided
- Compliance with NEN-EN-IEC62471 (2006-07) Group 1 classification and valid certification has been provided
- The LED lumen depreciation shall be no more than 20% at the rated life of the luminaire (rated life as stated in E2)
- The LED failure fraction shall be no more than 10% at the rated life of the luminaire (rated life as stated in E2)
- The LED colour temperature shall be between 3600K and 4400K and have a maintained colour stability within a maximum 5-step MacAdam ellipse
- The driver manufacturer's standard guarantee shall be equal to or greater than 8 years
- The driver shall have a minimum survival rate of 90% at 60,000 hours operation at an ambient temperature of 25 degrees Celsius
- The driver shall be provided with Constant Light Output enabled
- The driver shall be capable of two way dialogue and control via DALI protocol
- The drive shall incorporate the facility to allow standalone part night dimming

1.5.2.2. Specific requirements of P Class luminaire (Residential streets generally 6m and below mounting height)

- The luminaire weight shall not exceed 11.0kg
- The luminaire shall not exceed a maximum aerodynamic resistance (SCx) of 0.07m²
- The luminaire shall have a minimum rated life of 70,000 hours
- The luminaire shall be suitable for post-top mounting onto a 60mm-76mm column shaft or spigot. On occasion where the diameter is less than 60mm the luminaire must include a suitable free of charge adaptor
- The luminaire shall have a minimum glare classification of G1 at 5 degree inclination
- The LED shall have a minimum S/P Ratio of 1.50

1.5.2.3. Specific requirements of M Class luminaire (Traffic routes generally 8m and above mounting height)

- The luminaire weight shall not exceed 18.0kg
- The luminaire shall not exceed a maximum aerodynamic resistance (SCx) of 0.12m²
- The luminaire shall have a minimum rated life of 60,000 hours
- The luminaire shall be suitable for side-entry mounting onto a 60mm-76mm diameter bracket arm and shall be provided on occasion with a free of charge adaptor if required
- The luminaire shall be suitable for post-top mounting onto a 60mm-76mm column shaft or spigot. On occasion where the diameter is less than 60mm the luminaire must include a suitable free of charge adaptor

1.5.3. An approved list of luminaires can be obtained from the engineer or from Stockton Borough Council Web Site.

1.6. ROAD LIGHTING COLUMNS

1.6.1. All road lighting columns shall comply with BS EN 12767, BS EN 40, in addition all passively safe column shall comply with BD94/07 and EN12767.

1.6.2. Residential areas shall generally utilise Hot Dipped Galvanised Steel columns with a mounting height of 6m. The column shall be suitable for post top mounting of the luminaire.

1.6.3. In areas not accessible to maintenance vehicles, a steel hinged raising and lowering column shall be used and be suitable for post top mounting of the luminaire. This column should have the hinging mechanism in the base section of the column. An approved lowering tool is to be provided to the engineer prior to adoption of the installation in allowing for future sustainable maintenance.

1.6.4. If in extreme cases a bracket is required for residential areas the bracket shall incorporate an anti-rotational device in addition to fixing studs and not project more than 450mm with a 5 degree uplift and shall be supplied with lighting column as a mounting solution.

1.6.5. Traffic routes not requiring a passively safe solution shall generally utilise Hot Dipped Galvanised Steel columns with a mounting heights of 8m or 10m, if 12m columns are required Galvanised Sheet Steel columns shall be used. The column shall be suitable for post top mounting of the luminaire.

- 1.6.6. If a bracket is required for a traffic route the bracket shall incorporate an anti-rotational device in addition to fixing studs and not project more than 1 meter with a 5 degree uplift and shall be supplied with lighting column as a mounting solution.
- 1.6.7. All rigid columns are to be provided with an agreed tamper resistant locking mechanism.
- 1.6.8. All columns shall be provided with a minimum cable entry slot 150mm long x 75mm wide and a minimum door size opening of 115mm x 600mm.
- 1.6.9. Lighting columns manufactured from alternative materials including stainless steel, extruded 6000-grade aluminium and advanced polymer composite materials are now becoming available. Each of these materials offers the potential of long service life with minimal maintenance requirements and can be considered, subject to the approval of the Engineer.
- 1.6.10. Where it is known that lighting columns are to be used to support additional loads such as traffic signs, flower baskets, banners / flags and decorations the column shall be designed to carry the additional load.

1.7. ADDITIONAL REQUIERMENTS FOR PASSIVELY SAFE INSTALLATIONS

- 1.7.1. Where the traffic speed is 40 mph or above a passive risk assessment should be undertaken in line with Institution of Lighting Professionals ILP document TR30: Guidance on the Implementation of Passively Safe Lighting Columns and Signposts and to determine any requirements for the use of passively safe equipment and also determine the appropriate class of passively safe equipment. This risk assessment should be submitted with the design for approval.
- 1.7.2. In addition Passively Safe columns shall be supplied with root protection in accordance with the Manufacturer's recommendation. The base of the column shall have a Low Density Polyethylene (LDPE) protector which extends above ground level fitted to prevent damage to the root protection during installation and provide further mechanical protection during the life of the column.
- 1.7.3. To provide electrical disconnection, and ensure safety in the event of a vehicular collision with passively safe lighting equipment, all passively safe equipment shall utilise a passively safe disconnection system.
- 1.7.4. The disconnection system shall be fully compliant with the requirements of BS EN 12767, ILP document TR30 "Guidance on the Implementation of Passively Safe Lighting Columns and Signposts" and shall be

compatible with lighting columns, illuminated sign posts, or traffic signals.

- 1.7.5. The Preferred method of electrical disconnection system shall comprise an impact sensor located within passively safe equipment base compartment, a monitoring unit, and sensor cable.
 - 1.7.5.1. Each unit shall be capable of monitoring multiple items of equipment on an individual circuit and shall isolate the complete circuit in the event of a collision with a single item of passively safe equipment.
 - 1.7.5.2. To provide optimum safety the system shall provide electrical isolation within a maximum disconnection time of 0.4 seconds under fault condition.
 - 1.7.5.3. To provide optimum safety to Maintenance Operatives the disconnection system shall utilise 24Vdc Extra Low Voltage (ELV) for the sensor circuits. In particular systems utilising 230Vac for the sensor circuits SHALL NOT be permitted.
 - 1.7.5.4. The system shall be feeder pillar-based or column based rather than chamber-based as this improves operative safety whereby otherwise maintaining the equipment in the verge and in the proximity of a live carriageway is a greater risk.
- 1.7.6. Should there only be a small number of passive items required or there is a need for No Energy (NE) type columns or signs consideration would be given to the use of in ground chambers to accommodate mechanical separation or a complete chamber based systems.
 - 1.7.6.1. Should the chamber be to provide mechanical separation to avoid the cable acting as a tether which is a requirement for NE class equipment a solution which utilises a renterable jointed system would be preferred.
 - 1.7.6.2. Should the chamber be providing electrical isolation with or without mechanical separation all equipment shall be IP68 and installed in accordance with manufacturers instruction. In addition suitable prior notice shall be provided to the Engineer to allow an inspection of the installation be undertaken during the installation phase.
- 1.7.7. In all instances where chambers are being utilised the chamber SHALL be provided with a suitable soakaway and positive drainage tied into the highway drainage system. Unless ground conditions throughout the ducted system network can be guaranteed as being suitably well drained to the satisfaction of the Engineer, at which point the positive drainage may with extreme mitigation be omitted.

1.8. COLUMN PROTECTION/IDENTIFICATION

- 1.8.1. Where specified by the engineer for aesthetic or location specific reasons non-Passively safe Street Lighting columns shall be hot dipped galvanised to BS 729. Following erection columns shall be T washed, and have one coat of Mebopro 80, or similar approved product, and one coat of Ameron Steelbond 2134 applied before handover. The colour to be grey to RAL 18B25 unless agreed with the engineer.
- 1.8.2. A 2 pack epoxy resin protective coating, to the approval of the Engineer, shall be painted over the base section of the column for a distance equal to the planting depth plus 150mm.
- Columns are to have numbers painted on one side of the column facing the general direction of oncoming traffic or as otherwise directed by the Engineer.
 - The numbers shall be black and painted on a yellow background using appropriate stencils and located at 1.8m above ground level. The height of the numbers shall be 40mm. The size of yellow background shall be adequate to accommodate the numbers.
 - The type of paint used shall be submitted to the Engineer for approval purposes.
 - The column identification will comprise of up to 8 digits and the actual numbers will be provided by the Engineer.

1.9. ERECTION OF COLUMNS, BRACKET ARMS AND LANTERNS

- 1.9.1. The columns/lanterns are to be erected in the locations as shown on the approved drawings.
- 1.9.2. Columns shall be erected with adequate mechanical handling plant. Where cranes are used, it shall be ascertained that these, together with any associated equipment, are suitable for the loads to be lifted.
- 1.9.3. Tower ladders or equivalent mechanical platforms shall be used for any work undertaken at higher levels.
- 1.9.4. Holes shall be excavated by hand or approved mechanical means to the appropriate column planting depth. The width of holes shall be kept to a minimum compatible with the ground conditions.
- 1.9.5. Developer shall take due care to avoid damage to existing sewers, drains and services and ensure there is an appropriate safety clearance from any underground or overhead electricity line in the proximity of the works.
- 1.9.6. Prior to erecting columns:-

- 1.9.7. The excavations shall be examined to ensure that it is firm and clear of obstructions, water, rubble and loose soil.
- 1.9.8. The roots of steel columns shall be examined to ensure that the protective coatings are complete. Any bare or corroded patches shall be cleaned and treated in black bituminous paint.
- 1.9.9. The columns shall be visually examined for defects. Defective columns shall be placed aside for examination and for replacement if required by the Engineer.
- 1.9.10. Columns shall be erected in strict compliance with the Code of Practice for the erection of Street Lighting equipment as published by the Highway Electrical Academy.

TABLE Indicative column depths

MOUNTING HEIGHT OF COLUMNS	INDICATIVE PLANTING DEPTH
6m	1000mm
8m	1200mm
10m	1500mm
12m	1800mm

- 1.9.11. Columns shall be correctly aligned in the vertical position.
- 1.9.12. Single arm columns shall be installed with the door openings facing away from oncoming traffic. The doors on columns in the central reservation shall face in the same direction along the centre line of the central reservation.
- 1.9.13. After erection, column excavations shall be backfilled with concrete class C20P. Unless specified otherwise the concrete shall be brought up within 150mm of the ground surface. The pavements/surfaces are then fully reinstated.
- 1.9.14. Bracket arms shall be fixed to the columns at the site of installation. The method of securing the bracket arm must be positive such that the arm cannot rotate once fixed. Any screws, bolts, washers used to locate or secure the bracket arm shall be manufactured from Stainless Steel and protected with grease.
- 1.9.15. The bracket arm and lantern shall be in line and at right angles to the kerb when fixed to the column.
- 1.9.16. Lanterns shall be fixed firmly to the bracket arms.
- 1.9.17. The whole of the equipment shall be effectively earthed and all exposed metal parts of columns, lanterns and equipment shall be earthed in accordance with the current Edition of the IET Regulations (BS7671).

1.10. INTERNAL WIRING OF COLUMNS

- 1.10.1. The Developer shall (via the Electricity supplier) fix the fused cut-outs onto the baseboard provided in the control gear compartment. Only brass screws shall be used.
- 1.10.2. Internal wiring from the fused cut-out to the lantern, control gear and photoelectric cell shall be single or multicore copper conductor cables, 600/1000 volt grade PVC insulated and sheathed and shall comply with BS 6004.
- 1.10.3. All earth continuity bonding conductors shall be sized in accordance with the requirement of the IEE Regulations.
- 1.10.4. Internal wiring shall be suitably sized with a minimum size of 1.5mm².

1.11. PHOTO ELECTRIC CONTROL (PECU)

- 1.11.1. The PECU shall be a miniature type or suitable to fit a standard NEMA socket.
- 1.11.2. The unit shall have a minimum guarantee of 6 years and be capable of switching a 10 amp inductive load with a switching ratio of 1 to 0.5 operating within a temperature range of -20 to +70. The switch setting shall be clearly identified at 20/20 lux and operate between the voltage variations from 200v to 260v AC. The unit shall be hermetically sealed with an IP67 rating utilising a self cleaning configuration contained within an impact resistant translucent housing.
- 1.11.3. The switching mechanism shall incorporate an Electronic Triggering Circuit utilising a transformer power supply capable of withstanding a 1.5KV flash test providing a voltage regulation of 20% or better combining a relay and triac operation in a parallel mode.
- 1.11.4. The Photocell Electronic Control Unit (PECU) shall have a valid BSCP520 operational charge code
- 1.11.5. The PECU shall be a miniature one-part type and be supplied with a switching regime 20/20 Lux with a 1:1 ratio
- 1.11.6. The PECU manufacturer guarantee period shall be a minimum of 12 years.

1.12. FUSED CUT OUTS

- 1.12.1. Cut-outs shall be a modular system and all components shall connect together to give the appearance of being a singular unit.
- 1.12.2. All incoming and outgoing SWA cables shall be terminated onto a removable single brass plate using BW compression glands and be provided with blanking plugs where required, or armouring securing

clamp with suitable brass gland plate. The plate shall come pre-drilled with minimum M6 earth studs complete with fitting and locking arrangement for crimp terminals to allow connection of protective conductors and extraneous bonding conductors, both internal and external. The exposed SWA shall be insulated outside the cut-out using a shroud over the top of the cable outer insulation. The gland plate shall come with the glands suitably stopped up with a PVC bung, which can be removed or left in place in the spare glands.

- 1.12.3. The conductor terminations shall be shrouded and only removed with the use of a tool with a separate terminal available for earthing which shall be wired with an appropriately sized flexible green/yellow bonding conductor to the gland plate, the conductor size shall be minimum 6mm².
- 1.12.4. The isolator shall be 32 Amp double pole. The fuse carrier shall be minimum current rating of 32 Amps and be of the BS 88 barrel type Part 2 Class Q1 type A (not ST or LST).
- 1.12.5. For further details of the typical layouts of fuse isolators in the base compartment refer to standard detail drawings
- 1.12.6. The unit shall come pre-wired between the fuse carriers, isolators and the incoming cable terminations with line, earth and neutral terminals fitted with suitable separators.
- 1.12.7. The fuse cut out shall be complete with a cast brass earth plate suitable for terminating XPLE/SWA/PVC cables.
- 1.12.8. Any separable parts that allow access to live terminations must be held together by slot headed bolts or screws, with a lock washer. A removable insulating shroud shall be installed with the unit, covering all line conductors. All fixing bolts or screws shall be non-corrodible.
- 1.12.9. Cut-outs shall have tinned brass terminals capable of taking cable conductors up to 25mm². Each cable terminated onto the gland plate shall be labelled in accordance with the SHW 1400 Series. Cut-outs shall have a minimum rating of IP31.
- 1.12.10. The access cover to the isolator and fuse carrier shall be translucent and be hinged and have the facility to be locked of using a miniature padlock.

1.13. FUSES

- 1.13.1. A separate fuse to BS 88: Part 2 shall be provided in the road lighting column fuse unit for each lantern and where indicated, any spur to an illuminated traffic sign with the following ratings:
 - LED luminaire = 6 Amp.

- Sign light unit = 6 Amp.
- Downward fused spur circuit = 10 Amp (minimum).

1.14. UNDERGROUND AND DUCTED CABLE

- 1.14.1. All cables shall be supplied in ducts in accordance with standard details drawing.
- 1.14.2. The ends of the cables at termination points shall be identified at the time of laying by means of an approved cable identification label with indelible marking of black lettering on a white/yellow background, in accordance with standard detail drawings showing the following information:
 - 1.14.3. Feeder Pillar reference number e.g. "Feeder Pillar FP11."
 - 1.14.4. Circuit reference number e.g. "Circuit 5L1."
 - 1.14.5. Origin or destination e.g. "FC 11/5/1" or "TC 11/5/2"
- 1.14.6. Cables shall only be laid when the ambient temperature is above 0 degrees C.
- 1.14.7. Cables shall not be bent to an internal radius of less than 12 times the external diameter of the cable or less than the radius recommended by the manufacturer.
- 1.14.8. All lighting cables shall be 600/1000 Volt with XLPE insulation and black PVC sheathing with steel wire strip armouring to BS 5467.
- 1.14.9. All passively safe sensor cables shall be loop feeder cable 600/1000 Volt with Polyethylene insulation and orange Polyethylene sheathing with steel wire strip armouring to BS6346 / 87 or in line with manufacturer instructions.
- 1.14.10. All conductors shall be of high conductivity copper of equal cross-sectional area, the conductors shall be identified by colour throughout its length in accordance with BS 7671. The Contractor shall provide the Engineer evidence that the cable length delivered to site has been tested at the place of manufacture and complies with the testing requirements of BS 5467. All cable sizes shall be in accordance with the electrical design schematic diagrams.
- 1.14.11. Cables shall comply with the characteristics for cable and armour resistance contained within table below or is similar to and reviewed by the Engineer.
- 1.14.12. The maximum size of underground cables for Street Lighting and sign public lighting distribution circuits shall be 6mm²
- 1.14.13. Table 1.14.1 – Cable Characteristics

Cable size and type	Cable Conductor resistance	Cable Value Armour resistance
70mm ² 5core	0.268	0.90
70mm ² 3core	0.268	1.80
50mm ² 5core	0.387	1.10
50mm ² 3core	0.387	2.00
35mm ² 5core	0.524	1.60
35mm ² 3core	0.524	2.30
25mm ² 5core	0.727	1.80
25mm ² 3core	0.727	2.50
16mm ² 5core	1.15	2.20
16mm ² 3core	1.15	3.50
10mm ² 3core	1.83	4.00
6mm ² 3 core	3.080	6.70

1.14.14. Permitted Cables to be used.

- 1mm² 2-core PVC/PVC cable with copper conductors.
- 1.5mm² 5-core Lapp Olflex Robust 200 cable with copper conductors.
- 2.5mm² Twin & Earth cable with copper conductors.
- 6mm² 3-core XLPE – SWA – cable with copper conductors.
- 10mm² 3-core XLPE – SWA – cable with copper conductors.
- 16mm² 3-core XLPE – SWA – cable with copper conductors.
- 16mm² 5-core XLPE – SWA – cable with copper conductors.
- 25mm² 3-core XLPE – SWA – cable with copper conductors.
- 25mm² 5-core XLPE – SWA – cable with copper conductors.
- 35mm² 3-core XLPE – SWA – cable with copper conductors.
- 35mm² 5-core XLPE – SWA – cable with copper conductors.
- 50mm² 3-core XLPE – SWA – cable with copper conductors.
- 50mm² 5-core XLPE – SWA – cable with copper conductors.
- 70mm² 3-core XLPE – SWA – cable with copper conductors.
- 70mm² 5-core XLPE – SWA – cable with copper conductors.

1.15. CABLE JOINTS

1.15.1. Cable joints shall not be permitted unless associated with cables over 35mm² in diameter and with prior approval from the engineer.

1.15.2. Armoured Cable Terminations

- 1.15.2.1. Cables shall be individually terminated and secured at cut-outs and other electrical apparatus by means of a brass gland and lock nut to BS 6121 or armouring securing clamp with suitable brass gland plate and thereafter suitably shrouded.
- 1.15.2.2. The armouring securing clamp arrangement or compression gland and plate assembly shall incorporate a non-ferrous earthing terminal.
- 1.15.2.3. All metal gland parts shall be brass and the gland shall consist of gland body with an armour-clamping cone and locking ring, armour nut, brass skid washer.
- 1.15.2.4. The gland shall be of such a design that during assembly no torque will be induced in the cable sheath or armour. In addition, over tightening of the seals when clamping armour wires shall be prevented.
- 1.15.2.5. Each gland shall be locked onto equipment gland plates with suitable brass locknuts. In addition, at every gland a polychloroprene shroud shall be fitted over the gland for additional protection.
- 1.15.2.6. Each cable terminated onto the gland plate shall be labelled using the maintenance numbers to identify where the cable runs to / from.
- 1.15.3. Passively safe sensor armoured cable terminated in HE and LE passively safe columns shall be terminated by means of a suitable gland as specified above, but including earth continuity bonding via earth tags in line with manufacturer's instructions.

1.16. FEEDER PILLARS

- 1.16.1. Feeder pillar backboards shall be fitted with pre-wired switch gear incorporating main isolator switch, fused switches, distribution boards, contactor (where applicable), passively safe 24Vdc disconnection equipment, heaters with thermostats, and internal lights and 13A socket with internal wiring in accordance with the following requirements:
 - Enclosures shall be connected using interconnecting seals. Trunking shall not be used.
 - All distribution boards shall be Class II.
 - All internal wiring shall be enclosed within the enclosures except for ancillary items which shall be contained within flexible PVC duct.
 - All earthing terminations shall be made inside the enclosures with the exception of the doors and the feeder pillar shell which shall be bonded to a gland plate.

- All earth bonding shall be in accordance with the current edition of BS7671 IET wiring regulations.
- For switch gear, contactors, and current carrying conductors diversity shall not be applied to the selection of equipment. The minimum rating shall be 100 Amps unless shown on the contract drawings, or higher loads are required by the Design Schematic Drawings. A minimum additional 20% capacity should be included.
- Contactors shall be motor start category and rated to carry the load required by the Electrical Design Schematic plus 20% and be rated to a minimum of 100 Amps.
- All fused switches to allow the neutral conductor to 'make' first and 'break' last.
- All isolators shall have a lock off facility.
- Protective devices shall be as required on the Electrical Design Schematic Drawings.
- RCBO's (Residual Current Circuit Breaker with Overload Protection) shall be Type C with a minimum breaking capacity of 10kA.
- All RCD's (Residual Current Device) / RCBO's shall have a rated tripping current as indicated on the electrical design schematics.
- All RCBO's specified as 'DP' in the electrical design schematics shall be double pole type.
- All internal wiring to be tri-rated appropriately sized stranded PVC single sheath unless otherwise stated, minimum size of 1.5mm².
- All internal current carrying wiring shall be colour coded appropriate for the phase conductor.
- The distribution boards shall be marked with the current rating and type of protective device.
- Outgoing cables shall be terminated using BW glands mounted on a 3mm brass gland plate and terminated inside a separate enclosure housing 'klippon' terminals and labelled in accordance with standard detail drawings
- The distribution board, outgoing klippon units, and spacing on the gland plate shall have spare ways as required by the design
- Brass gland plates shall be bonded to earth inside the enclosures.
- Interior feeder pillar lights shall be LED or PL fitted to the roof of the shell and shall be equivalent 2ft PL for shells up to 1.5 metre wide and 4ft PL for shells over 1.5 metres in width.
- Anti-condensation heaters shall be controlled by an anti-tamper thermostat set to 5 degrees and with a rated power output.

- 13 Amp sockets and lighting switches shall be a minimum of IP56.
 - Within feeder pillars all 13 Amp sockets shall be protected by a 30mA double pole RCBO.
- 1.16.2. Pillars shall be manufactured from 5mm thick mild steel sheet and hot dipped galvanised to BS EN 1461 following fabrication and incorporate the following features:
- 18mm thick exterior grade ply backboard treated with clear water repellent paint.
 - Suitable heavy duty lifting lugs
 - Fitted with industry standard stainless steel 'wedge' type lock c/w covers and security bungs
 - The lock shall be operated by use of a standard triangular key.
 - Designed for planted root installation.
 - A4 document holder fitted to the inside of the door.
 - Designed to offer a minimum ingress protection of IP34.
 - Pillars shall be installed with a concrete base around the root in accordance with the manufacturer's instructions, with duct details through the formation as required.
 - Feeder pillar shall be provided with a suitable number of 100mm internal diameter orange street lighting duct 90 degree duct slow bends and 1 no. 100mm internal diameter black Statutory Undertaker duct 90 degree slow bend.
 - An appropriate suitable hard standing shall be provided at the opening side of the feeder pillar to allow for maintenance operations. The size and specification shall be submitted to the Engineer for approval.
 - Feeder Pillar locations should be considered in context of other street furniture so as to reduce the potential impact of street clutter and to reduce any impact on the visually impaired.
 - Feeder pillars shall be equipped with a waterproof information chart (ego screen printed laminated plastic or as otherwise approved by Engineer) securely fixed to the inside of the door giving a permanent record of:
 - The feeder cable distribution board, outlet or lighting circuit protected by each protection device.
 - The rating of each protection device.
 - The phase(s) to which outgoing cables are connected.
 - Schematic cable layout for all equipment and cables fed from pillar.

1.17. CABLE DUCT

- 1.17.1. Cable ducts shall be 50 or 100mm internal diameter of twin wall construction as specified, ribbed on the outer profile and smooth internal profile manufactured from polythene or polyethylene, wall thickness 5mm minimum and supplied in 6 metre lengths complete with couplings, orange in colour, inscribed "STREET LIGHTING" at 1m intervals. All ducts shall be self-coloured in accordance with National Joint Utilities Publication No. 4.
- 1.17.2. 100mm internal diameter smooth-bore flexible duct/s shall be used to for all main cable ducts.
- 1.17.3. 50mm internal diameter smooth-bore flexible duct/s shall be used to connect each item of street furniture requiring an electrical supply to the adjacent joint chamber or main cable ducts.
- 1.17.4. All ducts shall be installed in accordance with Stockton Borough Council's standard detail's and general requirements for the avoidance of doubt if a non-standard installation is required this should be proved by the engineer.
- 1.17.5. A line and level survey of the existing drainage is to be undertaken in the vicinity of the proposed cross carriageway duct crossing to determine the depth the ducts are to be installed. This is to be agreed with Stockton Borough Council prior to installation.
- 1.17.6. Collars should be used to join consecutive lengths of ducts. They should axially align and firmly hold the ducts.
- 1.17.7. A yellow, self-coloured PVC or polythene plastic tape for cable marking, not less than 0.1 mm thick and 150 mm wide with the wording "Street Lighting Cables Below" printed in black along the full length so as to occupy not less than 75% of its available length and occurring at least at 1 m intervals, shall be laid approximately 250 mm above any power supply cable. Where several cables are laid in one trench, only one line of marker tape need be installed.
- 1.17.8. On completion of cabling, ducts shall be left with a draw rope in place and re-sealed with split plugs, or a suitable alternative material, to adequately seal the ducts against the ingress of foreign matter.

1.18. REQUIREMENTS FOR STREET LIGHTING DUCT CHAMBERS

- 1.18.1. All disconnection chambers housing passively safe equipment should be provided with positive drainage.
- 1.18.2. Drawpit chambers for all cross carriageway duct crossings shall be provided in accordance Stockton Borough Council specification and standard details.

- 1.18.3. Covers, gratings and frames for drawpit and joint chambers shall comply with BS EN 124. Chamber cover bolts shall comply with BS 4190 and be galvanised in compliance with Clause 1909. Frames and covers shall be D400 load class.
- 1.18.4. Frames for chamber cover gratings for drawpit and joint chambers shall be set in quick setting mortar of equivalent strength, to be agreed with Stockton Borough Council.
- 1.18.5. Four sets of lifting keys shall be delivered to Stockton Borough Council for each type of drawpit and chamber supplied.
- 1.18.6. Drawpit and disconnection chambers shall be clearly identified by the legend 'STREET LIGHTING' in accordance with the lettering requirements of SHW Clause 1532.14.

1.19. ELECTRICITY SUPPLY

- 1.19.1. The Developer must make satisfactory arrangements with the electricity supplier for the electricity supply for the street lighting installation and to ensure that all necessary cross-road ducts are provided before the carriageways are constructed.
- 1.19.2. Should a developer decide to appoint an alternative DNO or IDNO to the local DNO for the provision of the supply cable network onto a site it would be the responsibility of the appointed DNO to respond to any future network supply faults as no reciprocal agreement between DNO's are currently in place. If this were the case the street lighting would have to be placed on a loop with a direct feed via a feeder pillar to the local DNO's cables. It must be stated at the time of the street lighting submission if an alternative DNO is to be used.

1.20. COMPLETION OF WORKS

- 1.20.1. The lighting works shall be carried out to an approved standard and completed prior to the occupation of properties. The Developer shall be responsible for the protection of units after erection and until such time as the lighting works are taken over.
- 1.20.2. The Highway Authority will accept responsibility for energy charges when installation is satisfactorily complete and following the issue of the part 2 Certificate (Refer to Clause 3.9.2).

1.21. TEST CERTIFICATE

- 1.21.1. Prior to the issue of the Part 2 Certificate the whole of the street lighting network shall be tested in accordance with the IEE Regulations and recorded on forms ET1 and ET2 respectively (see Appendix).
- 1.21.2. This information shall be submitted to the Engineer together with the data collection record sheet, (see Appendix) and "as fitted" electrical records drawings showing full details of all electrical circuits and cable runs.

1.22. STREET FURNITURE – SIGNAGE

- 1.22.1. The specification for street furniture requiring electrical services will comply with the following:
 - In allowing for sustainable maintenance, agreement is required from the Engineer as to the manufacturer and unit type proposed for the installation; this could accommodate for either internally or externally illuminated sign light units.
 - Suitably designed for weight and windage, hot dipped galvanised tubular steel.
 - 32a DP combined isolator and fuse unit (cut out) in the base of the signpost as a means of local independent electrical isolation.
 - Miniature photo electric cell (PEC) fitting in accordance with Clause 11.10.
 - All unique external unit referencing will be allocated for identification
 - purposes in accordance with Clause 11.6.
 - Class 1 diamond grade legends on either GRP, steel, or aluminium base units.
 - External site protective coating application in accordance with Clause 11.5.
 - The minimum mounting height shall be 2.45 metres to underside of sign plate.
- 1.22.2. The bollard should be internally illuminated and be able to deflect in the event of an accident returning to an upright and operational state. The sign face should be able to be overlaid with any of the standard regulatory traffic signs D610, D616, D611, D606, D606, D609, D955, D609 and Opal plain aspect. The unit should also be able to accommodate sided option, to facilitate the adding of a secondary non-illuminated roundel to the rear aspect for applications where instructions are required to both traffic flows.

In addition, the side should be as follows:

- BS EN 12899-2 Compliant
- 12 Year Guarantee
- Luminance Class L1
- All reflective material meets BS 8408: 2005
- IP Rating 44
- Passively Safe

1.23. DISCONNECTION OR TRANSFER OF STREET FURNITURE

1.23.1. The developer is required to contact the authority engineers to seek approval to remove or alter any local authority owned assets. The authority reserves the right to insist any work affecting existing lighting assets is undertaken by their agent with the full cost being borne by the developer.

2. APPENDICES

2.1. Documentation

Prior to the issue of the Part 2 Certificate for each Street Furniture item with an electrical supply the following must be submitted to the Engineer:

- 2.1.1. Data Verification form (DV)
- 2.1.2. Electrical Test Certificate (ET1)
- 2.1.3. Electrical Test Certificate (ET2) where applicable
- 2.1.4. The location of underground cable routes for supply purposes must be submitted as "fitted drawings" in an approved format.
- 2.1.5. TEES VALLEY COUNCIL'S TEST & INSPECTION CERTIFICATE –
INTERNAL COLUMN/SIGN WIRING

2.2. Documentation Examples

2.2.1. ET1 INTERNAL - COLUMN WIRING / SIGN WIRING / BOLLARD WIRING

TEST AND INSPECTION CERTIFICATE- INTERNAL - COLUMN WIRING / SIGN WIRING / BOLLARD WIRING (ET1)																	
Column / Sign / Bollard, Location / Reference No.:																	
Type / Height of column:					Bracket:		P/T		S/E		TW						
Wattage of Lantern:					Control Gear:		R		I								
Supply of Source:			PL		EB		Type of Earthing:		S		PME						
Rating Amps:					M.C.B Class				Circuit Protection Fuse								
									B.S. Type:								
									R.C.D Rating / Time:								
Maximum permitted Earth Fault Loop Impedance (Ohms)																	
VISUAL INSPECTION																	
Identification of conductors:					Size		Correct		Failure		Reason						
Size of Circuit Conductors:																	
Earth Terminal:																	
Earthing Conductors:																	
a) Main Equipotential bonding connector																	
b) Armour earthing continuity conductor																	
c) Circuit protective conductor																	
Earth cables sleeved :-																	
Insulation of live parts (e.g I.P.2.X.)																	
Fuse unit of live shroud																	
Neutral Shroud																	
Is Capacitor fitted ?					YES		NO		Is light working ?		YES		NO				
ELECTRICAL TESTING																	
Insulation Resistance Phase / Protective							M ohms		External loop impedance ZE							Ohms	
Neutral Protective							M ohms		Earth loop impedance ZS							Ohms	
Polarity Satisfaction					YES		NO		R1 + R2 Resistance							Ohms	
									Zs By Calc							Mst	
Nominal Voltage							volts		ELI TEST INST No.								
Earth Electrode							ohms		MEG OHM INST No.								
RCD (Where applicable)							msec.										
<u>Comments / Corrective Action / Description of Minor Works.</u>																	
I CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THE ABOVE INSTALLATION HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE CURRENT EDITION OF THE IEE WIRING REGULATIONS.																	
PRINT NAME				SIGNATURE				DATE									

2.2.2. ET2 LIGHTING CABLE NETWORK

TEST AND INSPECTION LIGHTING CABLE NETWORK (ET2)																															
Location :							Ref No :																								
Source : (F / pillar / column / E) :							Circuit :																								
Cable :							System and Earthing Type:																								
1.	Visual Inspection : Satisfactory ? Yes <input style="width: 40px;" type="text"/> No <input style="width: 40px;" type="text"/>																														
2.	Earth Electrode Resistance (OHMS) (where applicable)		B.S Type		Rating Amps																										
3.	Insulation Resistance (OHMS) <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">BRN-GRY</td> <td style="width: 10%;">BRN-BLA</td> <td style="width: 10%;">BLA-GRY</td> <td style="width: 10%;">BRN-BLU</td> <td style="width: 10%;">BLA-BLU</td> <td style="width: 10%;">GRY-BLU</td> <td style="width: 10%;">BRN-E</td> <td style="width: 10%;">BLA-E</td> <td style="width: 10%;">GRY-E</td> <td style="width: 10%;">BLU-E</td> </tr> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>											BRN-GRY	BRN-BLA	BLA-GRY	BRN-BLU	BLA-BLU	GRY-BLU	BRN-E	BLA-E	GRY-E	BLU-E										
BRN-GRY	BRN-BLA	BLA-GRY	BRN-BLU	BLA-BLU	GRY-BLU	BRN-E	BLA-E	GRY-E	BLU-E																						
4.	Polarity Satisfactory ? Yes <input style="width: 40px;" type="text"/> No <input style="width: 40px;" type="text"/>																														
5.	Earth Fault Loop Impedance (OHMS) <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																														
	Source : Remote End :																														
6.	RCD Operaton (where applicable) : <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																														
	Manufacturers Value																														
7.	Voltage drop (@ full load - V): <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>																														
	Source Voltage : Remote End Voltage : Volt Drop :																														
8.	Comments / Corrective Actions / Description of Minor Works - TEST INSTRUMENTS NUMBERS : <div style="border: 1px solid black; height: 100px; margin-top: 5px;"></div>																														
I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THE ABOVE INSTALLATION HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WOTH THE CURRENT EDITION OF THE IEE WIRING REGULATIONS																															
PRINT NAME SIGNATURE DATE																															

2.2.3. Propriety Test Certificate Example Minor Works

MINOR ELECTRICAL INSTALLATION CERTIFICATE		MIC -
Issued in accordance with <i>British Standard 7671-Requirements for Electrical installation</i>		
DETAILS OF THE CLIENT		
Client Name: <input style="width: 90%;" type="text"/>	Employer: <input style="width: 90%;" type="text"/>	
Address: <input style="width: 95%;" type="text"/>		
Postcode: <input style="width: 30%;" type="text"/>	Telephone: <input style="width: 60%;" type="text"/>	
Contract Ref: <input style="width: 30%;" type="text"/>	Works completion date: <input style="width: 60%;" type="text"/>	
LOCATION OF MINOR WORKS		
DESCRIPTION OF MINOR WORKS		
Details of departures, if any from BS 7671		
INSTALLATION DETAILS		
System type TN-C-S <input style="width: 50%;" type="text"/> TN-S <input style="width: 50%;" type="text"/> TT <input style="width: 50%;" type="text"/> OTHER* <input style="width: 50%;" type="text"/> <small>*Other source of supply to be detailed in comments box</small>	Method of protection against indirect contact <input style="width: 95%;" type="text"/>	Protective device for the modified circuit Type BS <input style="width: 50%;" type="text"/> Rating <input style="width: 50%;" type="text"/> A EDF <input style="width: 50%;" type="text"/> FP <input style="width: 50%;" type="text"/>
Comments on existing installation including adequacy of earthing and bonding arrangements <input style="width: 95%;" type="text"/>		
Details of wiring system Cable type <input style="width: 50%;" type="text"/> Ref. method <input style="width: 50%;" type="text"/> csa of phase conductors <input style="width: 50%;" type="text"/> mm csa of cpc <input style="width: 50%;" type="text"/> mm Where protection against indirect contact is ADS Maximum disconnection time <input style="width: 50%;" type="text"/> secs Maximum permitted value of Z_e <input style="width: 50%;" type="text"/> Ω		
ESSENTIAL TESTS		
Confirmation that the necessary tests have been carried out: <input style="width: 50%;" type="text"/>		
External Earth Loop Impedance: Circuit resistance: Insulation resistance:	R_1+R_2 <input style="width: 50%;" type="text"/> Ω or R_2 <input style="width: 50%;" type="text"/> Ω PH/PH <input style="width: 50%;" type="text"/> M Ω PH/N <input style="width: 50%;" type="text"/> M Ω PH/E <input style="width: 50%;" type="text"/> M Ω N/E <input style="width: 50%;" type="text"/> M Ω Confirmation of the adequacy of Earthing <input style="width: 50%;" type="text"/> Confirmation of the adequacy of equipotential bonding <input style="width: 50%;" type="text"/> Confirmation of the correct polarity <input style="width: 50%;" type="text"/> Maximum measured Earth loop impedance <input style="width: 50%;" type="text"/> Ω	
Agreed Limitations of the inspection and testing, if any		
DECLARATION		
I/We CERTIFY that the said works do not impair the safety of the existing installation, that the said works have been designed, constructed, inspected and tested in accordance with BS 7671:2008 amended on the date shown*, and that the said works, to the best of my/our knowledge and belief, at the time of my/our inspection, complied with BS 7671 except as detailed in the departures section of this certificate.		
Name: <input style="width: 90%;" type="text"/> Signature of test operative: <input style="width: 90%;" type="text"/> Position: <input style="width: 90%;" type="text"/> Date: <input style="width: 90%;" type="text"/>	For on Behalf of: <input style="width: 90%;" type="text"/> Address: <input style="width: 95%;" type="text"/> * <input style="width: 90%;" type="text"/>	
Insulation/Continuity Resistance Meter <input style="width: 50%;" type="text"/>	Earth Loop/PFC Meter <input style="width: 50%;" type="text"/>	Earth Electrode Resistance Meter <input style="width: 50%;" type="text"/> RCD Meter <input style="width: 50%;" type="text"/>

2.2.4. Propriety Test Certificate Example Infrastructure

HIGHWAY ELECTRICAL INSTALLATION CERTIFICATE		BESM/						
Issued in accordance with <i>British Standard 7671-Requirements for Electrical installation</i>								
DETAILS OF THE CLIENT								
Client Name: <input style="width: 90%;" type="text"/>	Employer: <input style="width: 90%;" type="text"/>							
Address: <input style="width: 95%;" type="text"/>								
Postcode: <input style="width: 30%;" type="text"/>	Telephone: <input style="width: 40%;" type="text"/>							
LOCATION OF WORKS								
DETAILS OF THE WORKS								
Extent of the installation work covered by this certificate:	<input style="width: 98%;" type="text"/>	Installation Type New: <input checked="" type="checkbox"/> <input style="width: 40px;" type="text"/> Additional: <input style="width: 40px;" type="text"/> Alteration: <input style="width: 40px;" type="text"/>						
DESIGN								
I, being the person responsible for the design of the electrical installation (as indicated by my signature below), particulars of which are described above, having having exercised reasonable skill and care when carrying out the design hereby certify that the design work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671: <input style="width: 100px;" type="text"/> (date), except for the departures, if any, detailed as follows: Details of departures from BS 7671, as amended (Regs. 120.3): <input style="width: 980px; height: 15px;" type="text"/>								
Signature/Representative*: <input style="width: 150px;" type="text"/> Name/Local Authority*: <input style="width: 150px;" type="text"/> Date: <input style="width: 80px;" type="text"/> Designer/Local authority address: <input style="width: 980px; height: 20px;" type="text"/>								
CONSTRUCTION AND INSPECTION & TESTING								
I, being the person responsible for the construction and inspection & testing of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction and testing & inspection, hereby certify that the said work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671: <input style="width: 100px;" type="text"/> (date), except for the departures, if any, detailed as follows: Details of departures from BS 7671, as amended (Regs. 120.3): <input style="width: 980px; height: 15px;" type="text"/>								
Signature of test operative: <input style="width: 150px;" type="text"/> Name: <input style="width: 100px;" type="text"/> Date: <input style="width: 80px;" type="text"/> Signature of Q S: <input style="width: 150px;" type="text"/> Name: <input style="width: 100px;" type="text"/> Date: <input style="width: 80px;" type="text"/>								
SUPPLY CHARACTERISTICS AND EARTHING ARRANGEMENTS								
Earthing Arrangements TN-C-S <input style="width: 60px;" type="text"/> TN-S <input style="width: 60px;" type="text"/> TT <input style="width: 60px;" type="text"/> Other* <input style="width: 60px;" type="text"/>	Nature of Supply Parameters Nominal voltage at supply U/U_0 <input style="width: 40px;" type="text"/> * <input style="width: 20px;" type="text"/> E V Nominal frequency f <input style="width: 40px;" type="text"/> * <input style="width: 20px;" type="text"/> E Hz External loop impedance Z_e <input style="width: 40px;" type="text"/> * <input style="width: 20px;" type="text"/> E Ω Prospective fault current I_{pf} <input style="width: 40px;" type="text"/> * <input style="width: 20px;" type="text"/> E kA	Supply Protective Device Characteristics Type: <input style="width: 100px;" type="text"/> Nominal current rating: <input style="width: 60px;" type="text"/> A Number and Type of Live Conductors (AC) 1-phase, 2-wire <input style="width: 40px;" type="text"/> 3-phase, 3-wire <input style="width: 40px;" type="text"/> 1-phase, 3-wire <input style="width: 40px;" type="text"/> 3-phase, 4-wire <input style="width: 40px;" type="text"/>						
*Other source of supply to be detailed in attached schedules	* Place E for result by enquiry or M for result by measurement							
PARTICULARS OF INSTALLATIONS DETAILED IN THIS CERTIFICATE								
Means of Earthing Distributor's facility: <input style="width: 40px;" type="text"/> Installation earth electrode: <input style="width: 40px;" type="text"/>	Maximum Demand Maximum demand (load) <input style="width: 100px;" type="text"/> Amps per phase Details of Installation Earth Electrode (where applicable) <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Type</td> <td style="width: 33%;">Location</td> <td style="width: 33%;">Electrode resistance to earth</td> </tr> <tr> <td><input style="width: 80px;" type="text"/></td> <td><input style="width: 80px;" type="text"/></td> <td><input style="width: 80px;" type="text"/> Ω</td> </tr> </table>		Type	Location	Electrode resistance to earth	<input style="width: 80px;" type="text"/>	<input style="width: 80px;" type="text"/>	<input style="width: 80px;" type="text"/> Ω
Type	Location	Electrode resistance to earth						
<input style="width: 80px;" type="text"/>	<input style="width: 80px;" type="text"/>	<input style="width: 80px;" type="text"/> Ω						
Main Protective Conductors								
Earthing conductor: material: <input style="width: 80px;" type="text"/> csa: <input style="width: 40px;" type="text"/> mm ² continuity checked: <input style="width: 40px;" type="text"/> (Y/N) Main equipotential bonding conductor (s): material: <input style="width: 80px;" type="text"/> csa: <input style="width: 40px;" type="text"/> mm ² continuity checked: <input style="width: 40px;" type="text"/> (Y/N)								
Main Switch or Circuit-breaker								
BS, Type: <input style="width: 60px;" type="text"/> No. of poles: <input style="width: 40px;" type="text"/> Current rating: <input style="width: 40px;" type="text"/> A Location: <input style="width: 100px;" type="text"/> Fuse rating: <input style="width: 40px;" type="text"/> A	RCD details (where applicable)	Operating current $I_{\Delta n}$: <input style="width: 60px;" type="text"/> mA Operating time: <input style="width: 60px;" type="text"/> ms (at $I_{\Delta n}$)						
*Where the Installation has been carried out using Local Authority Specifications and the Designer is no longer available, the Engineer ordering the works is responsible for validating the design and should complete the Design Section.								

SCHEDULE OF TEST RESULTS

BESM/

Insert serial number of related certificate or report

Issued in accordance with *British Standard 7671-Requirements for Electrical installation*

SCHEDULE OF TEST RESULTS FOR FIXED FURNITURE

CIRCUIT DETAILS							TEST RESULTS										
Item Ref. No.	Furniture description and location	Overcurrent protective device			RCD	Wiring conductors		Continuity R1 + R2	Insulation resistance			Polarity correct	Earth fault loop impedance		PFC	RCD	
		BS (EN)	Type	Rating	Operating current, I _{yn}	live	cpc		P/N	P/E	N/E		Z _e	Z _s	kA	IDn	5xIDn
				A		mA	mm ²	mm ²	Ω	MΩ	MΩ		MΩ	Ω	Ω	Ω	
1																	
2																	
3																	
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REMARKS

TEST INSTRUMENT USED (SERIAL NO.)

Insulation/Continuity
Resistance Meter

Earth Loop/PFC
Meter

Earth Electrode
Resistance Meter

RCD Meter

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of

2.3. Standard Details

On separate Sheet