

BILL NO. 5.12

ELECTRICAL INSTALLATIONS

INCOMING SERVICES AND SWITCHGEAR

600/1000V XLPE/SWA/LSOH Copper

- | | | |
|---|--|-----|
| 1 | 300 mm2 4 Core cable laid underground. | Run |
|---|--|-----|

Low voltage (L.V.) cubicle switchboard complete with circuit breakers, ACBs, MCCBs, copper busbars earth fault and overcurrent relays, switches, relays, power factor correction capacitors, contactors, current transformers, meters, digital multi-meters and indicating instrument, castell key interlock, batteries and charger, electronic measuring instruments, automatic transfer switch complete with E&M interlock, fuses, fuse switches, tinned copper earth bar, rubber mats, facilities for CCMS interfacing, interconnecting wiring and all necessary accessories, fixings and fittings, all as described

- | | | |
|---|---|--------|
| 2 | L.V. Switchboard (Ref. *). | No. |
| 3 | Allow for one complete set of spare fuses for each rating of fuse switch as described. | 1 Item |
| 4 | Allow for purpose - made hydraulic operated handling device for handling all sizes of ACBs in switchboard as described. | 1 Item |
| 5 | Allow for carrying out conductor test on busbars rated 100A or above, as described. | 1 Item |
| 6 | Allow for any other items not included in the foregoing but shown on the Drawings and/or as described. | 1 Item |

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EMERGENCY GENERATING SETS

Diesel Generating Sets of minimum
prime power rating * kVA

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| 7 | Allow for diesel generating engine complete with alternator, electrical battery starting system, cooling system, lubricating oil system, exhaust system and ductwork and silencers, all necessary equipment, fittings and accessories. | 1 Item |
| 8 | Allow for all pipework and accessories. | 1 Item |
| 9 | Allow for fuel supply system complete with * litre daily service fuel tank and supporting frame, fuel transfer pumping system, oil drip trays, oil resistant flexible hose, fuel oil transfer pump, diesel fuel level switches, quick closing mechanism, painting, all necessary pipeworks, valves, fittings and accessories. | 1 Item |
| 10 | Allow for topping up of all fuel tanks with fuel upon satisfactory completion of tests. | 1 Item |
| 11 | Allow for lifting hoist and trolley. | 1 Item |
| 12 | Allow for acoustic treatment installation to the whole diesel generating sets installation, generator room and fuel tank room. | 1 Item |
| 13 | Allow for electrical installation complete with all cabling works including sensor cables, conduits, trunking and earthing system. | 1 Item |

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|----|---|--------|
| 14 | Allow for control cubicle including lockable enclosure, contactors, switch fuses, relays, switchgear, wiring, control equipment, rubber mat and accessories, clean contacts for alarms to be connected for remote indication. | 1 Item |
| | | |
| 15 | Allow for interfacing with central control and monitoring system (CCMS), complete with interfacing panels, contactors, relays, microswitches, transducers, transformers, signal and control cables, conduits and all necessary fittings, connection to direct digital control system, CCMS or direct digital controllers (DDC). | 1 Item |

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MAIN AND SUB-MAIN DISTRIBUTION

Busbar trunkings and fittings
complete with copper conductors,
supports, hangers, all-insulated
totally enclosed type, not less than
IP54 of IEC 60529

16 600A TPN busbar trunking. Run

17 2000A TPN busbar trunking. Run

600/1000V XLPE/SWA/PVC Copper cables

18 25 mm²; 4 Core cables fixed above ground. Run

19 50 mm²; 4 Core cables fixed above ground. Run

20 95 mm²; 4 Core cables fixed above ground. Run

Termination glands

21 25 mm²; 4 Core cables. No.

22 50 mm²; 4 Core cables. No.

23 95 mm²; 4 Core cables. No.

600/1000V FR/XLPE/SWA/LSOH copper
cables to BS 6387 Cat. CWZ

24 16 mm²; 4 Core cables fixed above ground. Run

25 25 mm²; 4 Core cables fixed above ground. Run

26 50 mm²; 4 Core cables fixed above ground. Run

27 70 mm²; 4 Core cables fixed above ground. Run

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Termination glands

28	16 mm2; 4 Core cables.	No.
29	25 mm2; 4 Core cables.	No.
30	50 mm2; 4 Core cables.	No.
31	70 mm2; 4 Core cables.	No.

600/1000V PVC insulated copper
cables to BS 6004

32	25 mm2; 1 Core cables fixed above ground.	Run
33	70 mm2; 1 Core cables fixed above ground.	Run

Air break switchgears to B.S.
EN60947-2

AI switches to MCB boards

34	40A TPN AI switch.	No.
35	63A TPN AI switch.	No.

AI switches to MCCB boards

36	100A TPN AI switch.	No.
37	160A TPN AI switch.	No.
38	200A TPN AI switch.	No.

Isolating switches to busbar

39	200A TPN isolating switch.	No.
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Main switches to MCB boards

40	32A SPN main switch.	No.
41	40A SPN main switch.	No.
42	32A TPN main switch.	No.

Busbar chambers complying with IEC 60439-1 and IEC 60439-2, complete with totally enclosed type sheet steel enclosure, 4 bars, internal cables and busbar connections to associated control gears and switchgears, all as described

43	400A TPN Busbar chamber.	No.
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Miniature circuit breaker (MCB) distribution boards to IEC 60439-3 complete with sheet steel metal enclosure, busbars, ferrules and incoming switch-disconnector (MCBs and AI switches measured separately)

44	12 Way 40A SPN MCB distribution board (ref. * , *).	No.
45	12 Way 63A SPN MCB distribution board (ref. * , *).	No.
46	6 Way 100A TPN MCB distribution board (ref. * , *).	No.
47	8 Way 100A TPN MCB distribution board (ref. * , *).	No.
48	10 Way 100A TPN MCB distribution board (ref. * , *).	No.
49	12 Way 100A TPN MCB distribution board (ref. * , *).	No.

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Moulded case circuit breaker (MCCB)
distribution boards to IEC 60439-1
and IEC 60439-3 complete with sheet
steel metal enclosure, busbars and
integral main isolating switches
(MCCBs and AI switches measured
separately)

50	4 Way 100A TPN MCCB distribution board (ref. * , *).	No.
51	4 Way 200A TPN MCCB distribution board (ref. * , *).	No.
52	8 Way 300A TPN MCCB distribution board (ref. * , *).	No.
53	12 Way 400A TPN MCCB distribution board (ref. * , *).	No.

Miniature circuit breakers (MCBs) to
IEC 60898-1, rated instantaneous
tripping current Type B, fixed in
distribution boards

54	10A SPN MCB.	No.
55	16A SPN MCB.	No.
56	20A SPN MCB.	No.
57	32A SPN MCB.	No.
58	10A TPN MCB.	No.
59	16A TPN MCB.	No.
60	20A TPN MCB.	No.
61	32A TPN MCB.	No.

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Miniature circuit breakers (MCBs) to IEC 60898-1; rated instantaneous tripping current Type B, equipped with integral earth leakage protection of 30 mA sensitivity, fixed in distribution boards

62	10A SPN MCB.	No.
63	20A SPN MCB.	No.
64	40A SPN MCB.	No.
65	10A TPN MCB.	No.
66	20A TPN MCB.	No.
67	40A TPN MCB.	No.

Moulded case circuit breakers (MCCBs) to IEC 60898-1, rated instantaneous tripping current Type B, fixed in distribution boards

68	32A SPN MCCB.	No.
69	40A SPN MCCB.	No.
70	63A SPN MCCB.	No.
71	32A TPN MCCB.	No.
72	40A TPN MCCB.	No.
73	63A TPN MCCB.	No.
74	100A TPN MCCB.	No.

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GENERAL LIGHTING

Fluorescent light fittings complete with lamps or tubes, control gears, transformers, ballasts, starters and reflectors including connections to cables and conduits system, earthing and bonding, lamp holders, suspension rods hangers and fixings and all necessary fittings and accessories, all as described

75	1 No. x 14W 600 mm Batten type T5 fluorescent tubes (ref. *).	No.
76	2 No. x 14W 600 mm Batten type T5 fluorescent tubes (ref. *).	No.
77	1 No. x 28W 1200 mm Batten type T5 fluorescent tubes (ref. *).	No.
78	2 No. x 28W 1200 mm Batten type T5 fluorescent tubes complete with dimming ballast (ref. *).	No.
79	1 No. x 18W Recessed mounted vertical downlight to IP44 complete with die-cast aluminium body, polycarbonate diffuser, aluminium reflector (ref. *).	No.
80	1 No. x 70W High pressure sodium wall mounted bulkhead to IP65 complete with die-cast aluminium body, polycarbonate diffuser, aluminium reflector (ref. *).	No.
81	2 No. x 14W 600 x 600 mm energy saving recessed modular light fittings (ref. *).	No.

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Accessories of approved type
including back boxes, cover plate
and plugs, all as described

82 10A SP 1-way lighting switch. No.

83 10A SP 2-way lighting switch. No.

Final circuits comprising PVC copper
cables, drawing into and including
conduits and fittings and/or
flexible conduits and fittings and
any cable installing facilities,
with earthing, all as described

From distribution board (ref. * ,
*), 1 core cables, 1.5 mm2 to

84 Lighting. No.

85 10A SP 1-way lighting switch. No.

86 10A SP 2-way lighting switch. No.

Landscape light fittings complete
with lamps or tubes, all control
gear, transformers, lamp holders,
ballasts, starters, reflectors, and
including construction of concrete
foundations, excavation,
backfilling, lamp poles, connector
and services boxes, connections to
cables and conduits system, earthing
and bonding, brackets, hanging
brackets, arms, paint finishes and
all necessary fittings and
accessories, all as described

87 130 mm Diameter x 470 mm high 120W
planter upright with earth spike to
IP55 (ref. *). No.

88 1 No. x 18W 900 mm Wall mounted
waterproof fluorescent tubes to IP65
with polycarbonate body and high
impact resistant acrylic diffuser
(ref. *). No.

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|----|--|-----|
| 89 | 1 No. x 28W 1200 mm Wall mounted waterproof fluorescent tubes to IP65 with polycarbonate body and high impact resistant acrylic diffuser (ref. *). | No. |
| 90 | 1 No. x 26W Recessed wall mounted waterproof fluorescent lamps to IP65 with polycarbonate body and high impact resistant acrylic diffuser (ref. *). | No. |
| 91 | 110 x 110 mm In-ground LED up light with stainless steel body to IP68. | No. |
| 92 | 2 x 100W 6 m High pole mounted luminaire with twin arms complete with die cast aluminium and stainless steel housing, safety glass, reflector, 6 m high galvanised mild steel lamp pole and footing. | No. |

Accessories of approved type including back boxes, cover plate and plugs, all as described

- | | | |
|----|---|-----|
| 93 | 10A SP 1-way weatherproof (IP65) lighting switch. | No. |
|----|---|-----|

Final circuits comprising 600/1000V XLPE/SWA/PVC copper cables, drawing into underground cable ducts for landscape lighting (underground cable ducts measured separately) or any cable installing facilities, with earthing, all as described

From distribution board (ref. *, *, *), 2 core XLPE/SWA/PVC cables, 16

- | | | |
|----|---|-----|
| 94 | Lighting. | No. |
| 95 | 10A SP 1-way weatherproof (IP65) lighting switch. | No. |

SMALL POWER INSTALLATION

Accessories of approved type
including back boxes, cover plate
and plugs, all as described

96	13A Single switched socket outlet.	No.
97	13A Single switched socket outlet with pilot light.	No.
98	13A Single switched socket outlet with pilot light and metal clad front plate.	No.
99	13A Twin switched socket outlet with metal clad front plate.	No.
100	13A Twin switched socket outlet with pilot light of flameproof type.	No.
101	13A Fused connection unit.	No.
102	13A Fused connection unit with switch and flex outlet.	No.
103	20A DP isolating switch.	No.
104	32A DP isolating switch.	No.
105	32A Waterproof type TPN isolating switch.	No.

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Final circuits comprising PVC copper cables, drawing into and including conduits and fittings and any cable installing facilities, with earthing, all as described

From distribution board (ref. *),
1 core cables, 2.5 mm2 to

106	13A Single switched socket outlet.	No.
107	13A Single switched socket outlet with pilot light.	No.
108	13A Single switched socket outlet with pilot light and metal clad front plate.	No.
109	13A Twin switched socket outlet with metal clad front plate.	No.
110	13A Twin switched socket outlet with pilot light of flameproof type.	No.

From distribution board (ref. *),
1 core cables, 4 mm2 to

111	13A Fused connection unit.	No.
112	13A Fused connection unit with switch and flex outlet.	No.
113	20A DP isolating switch.	No.
114	32A DP isolating switch.	No.

From distribution board (ref. *),
1 core cables, 6 mm2 to

115	32A Waterproof type TPN isolating switch.	No.
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TRUNKING, LADDER AND TRAY

Galvanised steel cable trunkings and fittings to IEC 61084-1 including removable covers, fittings, fixings and supports, all as described

116	50 x 50 mm Trunking.	Run
117	75 x 75 mm Trunking.	Run
118	100 x 100 mm Trunking.	Run
119	150 x 150 mm Trunking.	Run
120	100 x 50 mm Trunking in 2 compartments.	Run
121	150 x 100 mm Trunking in 2 compartments.	Run

Galvanised steel underfloor trunkings and fittings including access cover flushed with finished floor level, fittings and fixings, all as described

122	300 x 30 mm Trunking in 3 compartments.	Run
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Extra over trunkings for the following fittings

123	300 x 300 mm Galvanised steel service box complete with 3 No. socket outlet (measured separately) and blank plate for 1 No. computer network outlet.	No.
124	300 x 300 mm Galvanised steel junction box.	No.

Galvanised steel perforated trays and fittings to BS 1449 and ISO 1460, all as described

125	75 mm Wide cable tray.	Run
126	100 mm Wide cable tray.	Run
127	200 mm Wide cable tray.	Run

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UNINTERRUPTIBLE POWER SUPPLY SYSTEM

Uninterruptible Power Supply (UPS)
System complete with associated
equipment, inverter, rectifier,
batteries, battery chargers, by-pass
transfer switches, visual alarms,
control panels and control circuits,
all necessary accessories, all as
described

- | | | |
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| 128 | 50 kVA UPS system with battery capacity sufficient to maintain 3 hours back up time. | No. |
| 129 | 120 kVA UPS system with battery capacity sufficient to maintain 15 minutes back up time. | No. |

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LIGHTNING PROTECTION

Air termination copper rods
including all brackets, clamps and

130 16 mm Diameter * mm high copper No.

Tinned copper tapes supported at
approved spacing including jointing
and fixings

131 25 x 3 mm. Run

Earth pits

132 300 x 300 x 450 mm Deep earth pit No.
including all necessary excavation,
backfilling, disposal, reinforced
concrete, rendering, covers and
frames, bedding, haunching and other
accessories as described.

Earth electrodes

133 Earth rod electrodes complete with No.
mild steel inner core with a bonded
hard drawn copper sleeve, hardened
steel point penetrating ends,
driving into soil, earth within 300
x 300 mm earth pits; connected to *
x * earth tapes to achieve earth
impedance.

Bonds

134 Connecting lightning protection No.
system to other metal work complete
with 25 x 3 mm soft annealed copper
strips.

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EARTHING AND BONDING

Equipotential bonding to all exposed and extraneous conductive parts of non electric services complete with all components, clamps and accessories, complying with the current edition of the IEE wiring regulations, all as described

135	Allow for main equipotential bonding all extraneous conductive parts including main water and gas pipe, other services pipes and risers and exposed metallic parts.	1	Item
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136	Allow for supplementary equipotential bonding all accessible conductive parts in bathroom and all other rooms and area.	1	Item
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Tinned copper tapes supported at approved spacing including jointing and fixings

137	25 x 3 mm Tape.	Run
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138	25 x 6 mm Tape.	Run
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450/750V PVC insulated copper cables

139	1.5 mm ² Single core cables fixed above ground.	Run
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140	2.5 mm ² Single core cables fixed above ground.	Run
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Earth terminals

141	Tinned solid copper earth terminal including connections of all earth tapes.	Run
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Earth pits

142	300 x 300 x 450 mm Deep earth pit including all necessary excavation, backfilling, disposal, reinforced concrete, rendering, covers and frames, bedding, haunching and other accessories as described.	No.
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Earth electrodes

143	Earth rod electrodes complete with mild steel inner core with a bonded hard drawn copper sleeve, hardened steel point penetrating ends, driving into soil, earth within 300 x 300 mm earth pits, connected to * x * mm earth tapes to achieve earth impedance.	No.
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ELECTRICAL SUNDRIES

The following items are in respect
of the whole Electrical Installation

144	Allow for providing all facilities and supports for incoming cables and equipment supplied and installed by Supply Company, all as described.	1	Item
145	Allow for marking the positions of holes, mortices, chases and the like in the structure.	1	Item
146	Allow for inspection, testing and commissioning of the complete Electrical Installations all as described.	1	Item
147	Allow for inspection, attendance, operation and maintenance of the complete Electrical Installation during the Defects Liability Period, all as described.	1	Item
148	Allow for providing all necessary power and water, diesel and fuels in connection with inspection, testing, setting to work, commissioning, and maintenance.	1	Item
149	Allow for providing installation drawings including detailed design, working and builder's work drawings, all as described.	1	Item
150	Allow for providing as-built drawings, all as described.	1	Item
151	Allow for providing Operation and Maintenance (O&M) manuals and user manuals, all as described.	1	Item
152	Allow for providing training and tuition to employer's staff, all as described.	1	Item

153	Allow for providing sample boards, all as described.	1	Item
154	Allow for providing mock-ups and prototypes, all as described.	1	Item
155	Allow for supplying and fixing non fire rated sleeves and the like and fixing fire rated sleeves and the like provided by Nominated Sub- Contractors.	1	Item
156	Allow for providing spares and tools, all as described.	1	Item
157	Allow for disconnecting, setting aside and refixing for the convenience of other trades.	1	Item

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