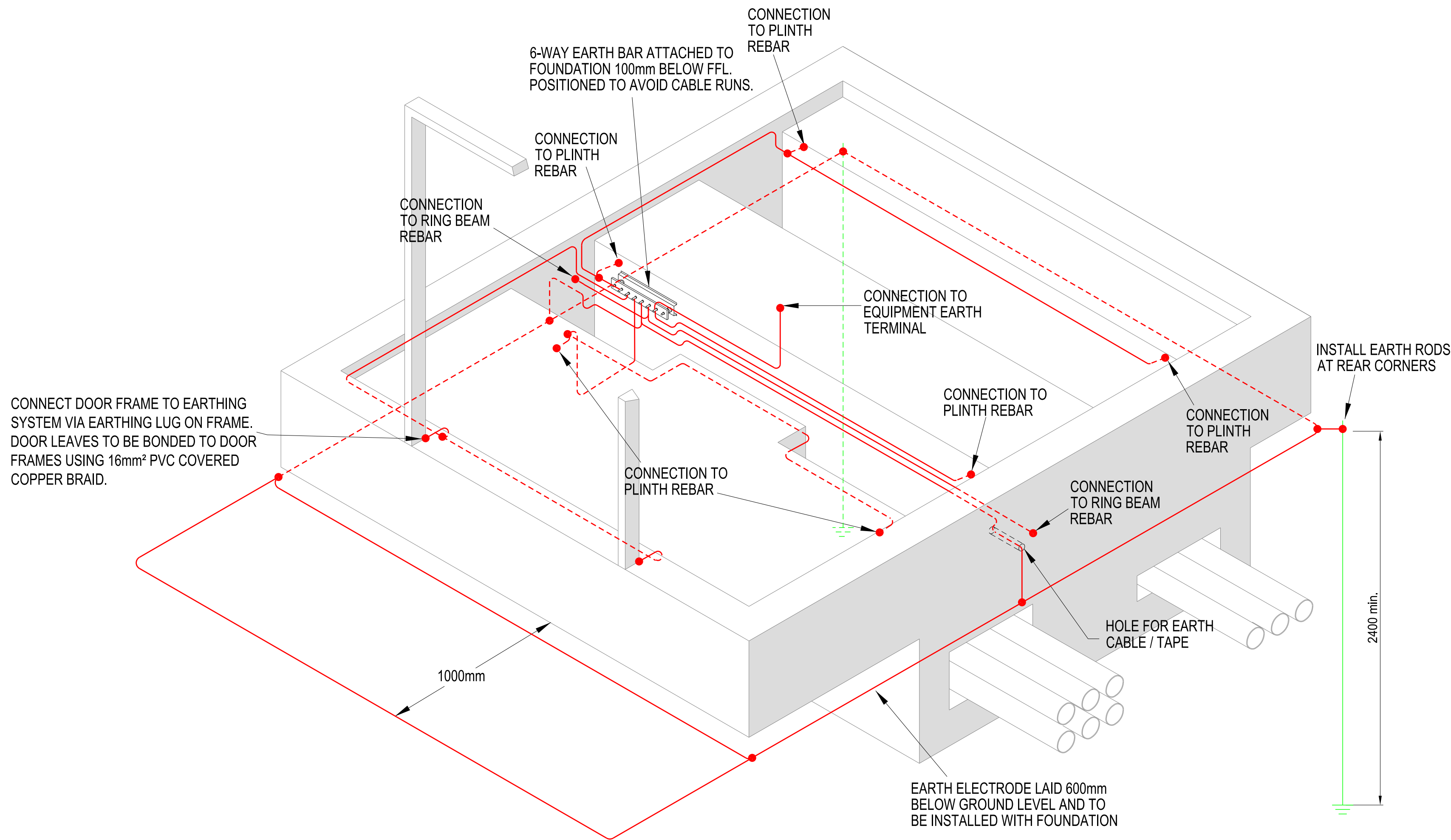




GENERAL NOTES

- THIS DRAWING SHALL NOT BE SCALED AND NO VARIATION TO THE STATED DIMENSIONS OR MATERIALS SPECIFIED SHALL BE PERMITTED WITHOUT PRIOR WRITTEN CONSENT FROM UK POWER NETWORKS.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- THE EARTHING SYSTEM SHALL BE PROVIDED BY THE DEVELOPER/CONTRACTOR UNLESS STATED OTHERWISE BY UK POWER NETWORKS.
- WHEREVER POSSIBLE THE EARTHING SYSTEM SHOULD BE INSTALLED IN ASSOCIATION WITH THE GROUND WORKS TO ENSURE THAT EARTH ELECTRODES ARE CORRECTLY POSITIONED PRIOR TO PLACEMENT OF CONCRETE.

REBAR/MESH REINFORCEMENT

- THE CONNECTION TO THE REINFORCEMENT WITHIN THE PLINTH SHALL USE EXOTHERMIC WELDING OR SUITABLE CLAMPS.
- ALL CONNECTIONS TO THE REINFORCEMENT SHALL USE A MINIMUM OF 70mm² STRANDED HARD DRAWN COPPER CABLE OR 25mm x 3mm COPPER TAPE.

EARTH CONDUCTOR, ELECTRODE & RODS

- THE EARTH RODS SHALL BE COPPER CLAD WITH APPROPRIATE FITTINGS, DRIVEN TO A MINIMUM DEPTH OF 2.4m.
- ALL EARTH ELECTRODE CONDUCTOR AND ELECTRODE SHALL BE AS FOLLOWS:
 - FOR EARTH FAULT LEVELS UP TO 8kA USE 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 3mm COPPER TAPE.
 - FOR EARTH FAULT LEVELS UP TO 12kA USE 120mm² OR 2 x 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 4mm COPPER TAPE.
 - FOR EARTH FAULT LEVELS UP TO 15kA USE 2 x 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 6mm COPPER TAPE.

EARTH RESISTANCE

- THE MAXIMUM RESISTANCE OF THE STANDALONE EARTHING SYSTEM SHALL BE SPECIFIED BY THE UK POWER NETWORKS DESIGNER.
- WHERE THE EARTHING SYSTEM IS INSTALLED BY A DEVELOPER OR CONTRACTOR CERTIFICATION CONFIRMING THE RESISTANCE OF THE STANDALONE EARTHING SYSTEM SHALL BE PROVIDED TO UK POWER NETWORKS PRIOR TO EQUIPMENT INSTALLATION.

BONDING

- NOT ALL EQUIPMENT BONDING IS SHOWN ON THE DRAWING. ALL EQUIPMENT SHALL BE BONDED IN ACCORDANCE WITH ECS 06-0023.

OTHER

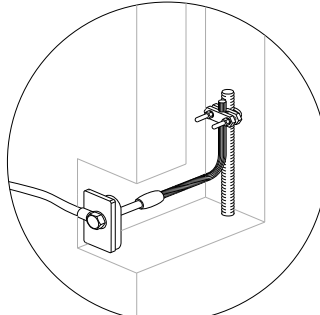
- A 6-WAY EARTH BAR SHALL BE PROVIDED IN THE POSITION SHOWN ATTACHED TO THE PLINTH AROUND 100mm BELOW FFL.
- THE EARTHING SYSTEM IS INSTALLED FOR UK POWER NETWORKS' SOLE USE AND SHALL NOT BE INTERCONNECTED WITH ANOTHER EARTHING SYSTEM OR USED FOR ANY OTHER PURPOSE WITHOUT PERMISSION FROM UK POWER NETWORKS.

FURTHER INFORMATION

- FOR FURTHER DETAILS ON THE CONSTRUCTION OF THIS EARTHING SYSTEM INCLUDING MATERIALS, CONNECTIONS, LABELLING ETC. REFER TO ECS 06-0023.
- FOR INFORMATION ON SECONDARY SUBSTATION EARTHING DESIGN REFER TO EDS 06-0014.

NOTE: THIS DRAWING ONLY SHOWS THE EARTHING ASSOCIATED WITH THE GROUND WORKS. ADDITIONAL EARTHING MAY BE REQUIRED TO ACHIEVE THE EARTH RESISTANCE VALUE AND TO ENSURE THE SUBSTATION IS SAFE. REFER TO THE RELEVANT EARTHING STANDARD FOR THE COMPLETE EARTHING AND BONDING REQUIREMENTS.

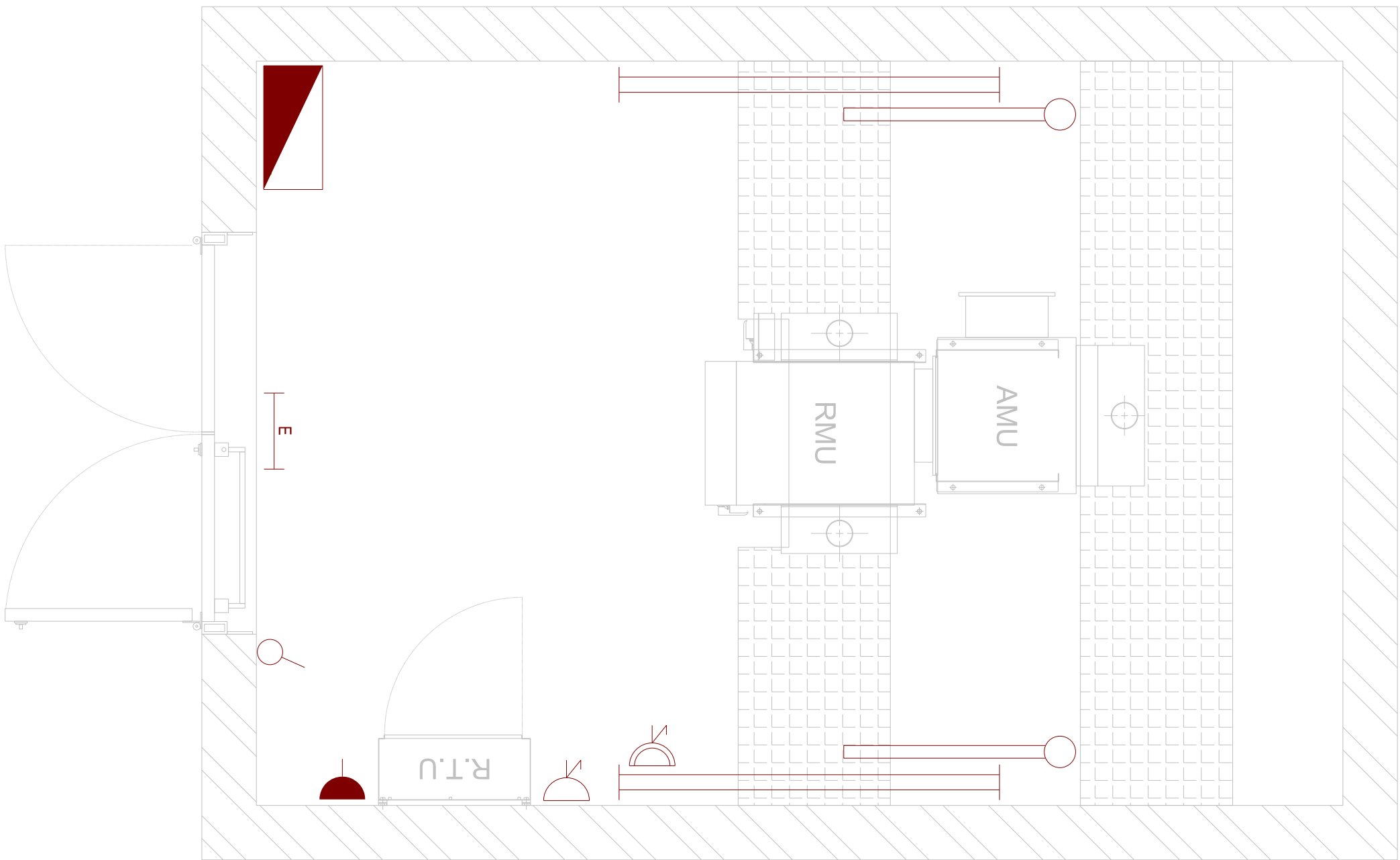
**REBAR/EARTH CONNECTION METHOD
DETAIL**



EARTH POINT CONNECTED TO REBAR OR REINFORCEMENT MESH WITH CLAMPS OR EXOTHERMIC WELDING.

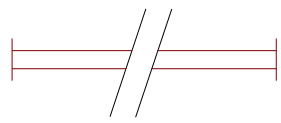
EARTHING KEY	
	EARTH ROD
	EARTH ELECTRODE
	CONNECTION

A	26-10-18	Original	UA	RDH
Version	Date	Description	UA	UKPN
			Checked	Dm.
			Approved	Designed
				
TITLE FREESTANDING BRICK-BUILT SUBSTATION FOR A SINGLE METERING RING MAIN UNIT EARTHING LAYOUT				
SCALE NTS		@A1	APPROVED	Version
DRAWING NO.		EDS 07-3102.11 Sheet 2 of 3		
SITE		SECONDARY SITES		



KEY:

(SEE NOTES FOR EQUIPMENT DETAILS)



TWIN FLUORESCENT LUMINAIRE



EMERGENCY SELF CONTAINED LUMINAIRE



13A UNSWITCHED FUSED SPUR FOR RTU



13A SWITCHED SINGLE SOCKET LABELLED FOR TEST EQUIPMENT



13A SWITCHED DOUBLE SOCKET



LIGHT SWITCH



CONSUMER UNIT



DOUBLE STACKED TUBULAR HEATERS

GENERAL NOTES

- THE LIGHTING AND POWER REQUIREMENTS ARE SUMMARISED BELOW. REFER TO EDS 07-1119 FOR FURTHER DETAILS.
- ALL WORK AND TESTING SHALL BE CARRIED OUT BY SUITABLY COMPETENT OPERATIVES IN ACCORDANCE WITH BS 7671.
- ALL ACCESSORIES AND ACCESSORY MOUNTING BOXES OR ENCLOSURES SHALL BE IP56 SURFACE MOUNTED FROM THE MK MASTERSEAL RANGE OR EQUIVALENT.

POWER SUPPLY OPTIONS

- MINIMUM 4MM² SWA FROM THE LV CABINET/BOARD 32A AUXILIARY SUPPLY TERMINALS OR 35MM² SERVICE FROM LV PILLAR OR LV DISTRIBUTION NETWORK. ALL SUPPLIES SHALL BE TERMINATED IN A 100A CUT-OUT FUSED AT 30A.

DISTRIBUTION BOARD

- THE DISTRIBUTION BOARD SHALL BE AN IP56 TYPE WITH A MINIMUM OF 5 WAYS AND INCLUDE:
 - A 100A/125A DOUBLE-POLE (PHASE AND NEUTRAL) DISCONNECTOR WITH 15KA BREAKING CAPACITY (TO BS EN 60947).
 - RCBOs (TO BS EN 61009-1) AND MCBs (TO BS EN 60898-2) WITH 15KA BREAKING CAPACITY.
 - 16/20A RCBO FOR THE 13A SOCKET OUTLET CIRCUIT.
 - 16A MCB FOR THE TEST EQUIPMENT 13A SOCKET OUTLET.
 - 16/20A RCBO TYPE C FOR THE HEATING CIRCUIT.
 - 6/10A MCB FOR THE LIGHTING CIRCUIT.
 - 6A MCB FOR EACH RTU OR PLTU (IF INSTALLED).
 - A SPARE WAY COMPLETE WITH BLANKING PLATE FOR FUTURE USE.
- THE DISTRIBUTION BOARD SHALL BE MOUNTED AT A HEIGHT OF 1350MM TO 1450MM ABOVE FINISHED FLOOR LEVEL.

INTERNAL LIGHTING

- THE SUBSTATION SHALL HAVE A MINIMUM LUMINANCE OF 300 LUX IN ACCORDANCE WITH HSE HSG38 PROVIDED BY A MINIMUM OF TWO LIGHT FITTINGS ON OPPOSITE SIDES OF THE SUBSTATION.
- THE LIGHT FITTINGS SHALL BE POSITIONED TO AVOID SHADOWS WHEN EQUIPMENT DOORS ARE OPEN.
- ALL LIGHT FITTINGS SHALL BE MOUNTED AT A MAXIMUM HEIGHT OF 2200MM ABOVE FINISHED FLOOR LEVEL AND BE POSITIONED TO AID FUTURE MAINTENANCE. LIGHT FITTINGS SHALL NOT BE INSTALLED ABOVE AN LV BOARD.
- GENERAL PURPOSE LIGHT FITTINGS SHALL BE OF THE FLUORESCENT IMPACT AND CORROSION RESISTANT TYPE, CORROSION RESISTANT WITH A POLYCARBONATE PRISMATIC DIFFUSER (TO BS EN 60598-1) AND SHALL HAVE A MINIMUM DEGREE OF PROTECTION OF IP56. THE PREFERRED SIZE IS A 1500MM TWIN LAMP FITTING.
- LIGHT FITTINGS SHALL BE FITTED WITH 35W OR 49W T5 OR T16 LINEAR FLUORESCENT TUBES OF THE HIGH FREQUENCY ENERGY EFFICIENT TYPE (TO BS EN 60081) OR EQUIVALENT LED. ALL LAMPS SHALL HAVE CAPS OF THE 'BI' PIN TYPE AND A MINIMUM COLOUR TEMPERATURE OF 3500K (A WHITE APPEARANCE).
- LIGHT FITTINGS SHOULD BE CONNECTED VIA A PLUG IN ROSE (OR SIMILAR) TO AID FUTURE MAINTENANCE. A PROTECTIVE CONDUCTOR SHALL BE CONNECTED TO THE EARTH TERMINAL OF EACH FITTING.
- A SURFACE MOUNTED LIGHT SWITCH WITH NEON INDICATOR SHALL BE POSITIONED ADJACENT TO THE SUBSTATION DOOR. SUBSTATIONS WITH MULTIPLE POINTS OF ACCESS SHALL HAVE A LIGHT SWITCH ADJACENT TO EACH DOOR AND SHALL BE WIRED WITH 2-WAY LIGHTING.
- ALL LIGHT SWITCHES SHALL BE MOUNTED AT 1400MM ABOVE FINISHED FLOOR LEVEL.

EMERGENCY LIGHTING

- AN EMERGENCY LIGHT (TO BS EN 1838 AND BS 5266) SHALL BE PROVIDED AT EACH EXIT DOOR. AN ADDITIONAL EMERGENCY LIGHT SHALL BE INSTALLED WHERE THERE IS AN OPEN LV BOARD.
- EMERGENCY LIGHTS SHALL HAVE A MINIMUM LUMINANCE OF 1 LUX AND SHALL BE THE INTEGRAL, SELF-CONTAINED TYPE (TO BS EN 60598-2-22) INCORPORATING A FLUORESCENT LAMP (OR LED EQUIVALENT) AND A POLYCARBONATE DIFFUSER. THE RATED DURATION OF EMERGENCY LIGHTS SHALL BE 3 HOURS.
- ABOVE DOOR EMERGENCY LIGHTS SHALL INCLUDE AN EXIT LEGEND PLATE.
- LIGHT FITTINGS SHALL BE IP65 HEAVY DUTY 28W TC-T (OR EQUIVALENT LED) BULKHEAD TYPE CONSTRUCTED IN POLYCARBONATE WITH AN IMPACT RESISTANT POLYCARBONATE COVER, SEALED TO THE BODY WITH A SILICON RUBBER GASKET AND STAINLESS STEEL CAPTIVE FIXING SCREWS.
- ALL EXTERNAL LIGHTING SHALL BE CONTROLLED BY PHOTOELECTRIC CONTROL UNITS (TO BS 5972) AND PIR MOVEMENT DETECTORS.

POWER

- A MINIMUM OF TWO DOUBLE 13A SOCKET OUTLETS (TO BS 1363) SHALL BE INSTALLED ON OPPOSITE SIDES OF THE SUBSTATION.
- AN ADDITIONAL SINGLE 13A SOCKET OUTLET (TO BS 1363) SHALL BE INSTALLED, DESIGNATED AND LABELLED AS A TEST EQUIPMENT SOCKET AND SUPPLIED VIA A SEPARATE MCB.
- ANY RTU/PLTU SHALL BE SUPPLIED BY AN UNSWITCHED FUSE CONNECTION UNIT (TO BS 1363) FUSED AT 5A AND INSTALLED ADJACENT TO THE EQUIPMENT.
- RADIAL CIRCUITS SHALL BE USED FOR ALL POWER CIRCUITS.
- ALL SMALL POWER ACCESSORIES SHOULD BE MOUNTED AT 1000MM ABOVE FINISHED FLOOR LEVEL.

HEATING

- TUBULAR HEATERS (COMPLYING WITH BS EN 60335-2-30 AND BS EN 442-1) WITH WIRE GUARDS SHALL BE INSTALLED WITH THE CAPABILITY OF MAINTAINING AN INTERNAL TEMPERATURE OF 21°C. TYPICALLY 4x6 DOUBLE STACKED 915MM 135W HEATERS FULFIL THIS REQUIREMENT.
- HEATERS SHALL BE CONTROLLED VIA AN INTEGRAL THERMOSTAT SET AT 15°C AND LOCKED OFF AGAINST TAMPERING. AN OVERRIDE SWITCH WITH A FOUR-HOUR TIMER SHALL BE PROVIDED TO ALLOW THE AMBIENT TEMPERATURE TO BE INCREASED TO 21°C DURING OCCUPATION.
- EACH HEATERS SHALL USE A SEPARATE CIRCUIT AND SHALL BE SUPPLIED VIA AN UNSWITCHED FUSE CONNECTION UNIT FUSED AT 13A.
- HEATERS SHALL BE MOUNTED APPROX. 400MM ABOVE FINISHED FLOOR LEVEL.
- SEPARATE THERMOSTATS SHALL BE MOUNTED 1400MM ABOVE FINISHED FLOOR LEVEL.

CABLING

- ALL CABLES SHALL BE 6491B L50H TO BS EN 50525-3-41 AND SHALL COMPLY WITH BASEC. ALL INSULATION SHALL USE PHASE OR NEUTRAL COLOURS THROUGHOUT THE LENGTH OF THE CONDUCTOR IN ACCORDANCE WITH BS 7671. NOTE: THE USE OF COLOURED SLEEVES TO MARK CONDUCTORS IS NOT ACCEPTABLE.
- ALL CABLES SHALL USE STRANDED COPPER CONDUCTORS WITH THE FOLLOWING MINIMUM CROSS SECTIONAL AREA:
 - CUT-OUT UNIT TAILS 25MM².
 - LIGHTING 1.5MM².
 - SMALL POWER, INCLUDING HEATERS, 4.0MM².
- ALL CABLES, EXCEPT ARMoured CABLES AND CUT-OUT TAILS, SHALL BE ENCLOSED IN PLASTIC CONDUIT OR TRUNKING, THE TYPES AND SIZES SHALL BE SUITABLE FOR THE OPERATING CONDITIONS.
- ALL CABLES SHALL BE INSTALLED WITHOUT JOINTS OTHER THAN AT EQUIPMENT AND TERMINAL FITTINGS.

CONDUIT, TRUNKING AND TRAYS

- ALL CABLING SHALL BE INSTALLED IN MINIMUM 20MM CONDUIT SIZED IN ACCORDANCE BS 7671.
- ALL CONDUIT, BOXES AND FITTINGS SHALL BE HIGH IMPACT, NON-FLAME PROPAGATING, SELF-EXTINGUISHING, HEAVY-DUTY PVC CONDUIT (TO BS EN 61386-1). DIMENSIONS SHALL COMPLY WITH BS EN 60423.
- THERE SHALL BE SUFFICIENT JUNCTION BOXES, DRAW-IN BOXES AND INSPECTION FITTINGS INSTALLED TO ALLOW CABLES TO BE INSPECTED, WITHDRAWN AND REPLACED IF NECESSARY. THE COMPLETE INSTALLATION SHALL BE ARRANGED USING A LOOP-IN TYPE SYSTEM WITH JOINTS BEING CARRIED OUT AT SWITCHES, ISOLATORS OR APPLIANCE FITTINGS.
- ALL ADAPTABLE BOXES AND ACCESSORIES SHALL MATCH THE CONDUIT AND SHALL BE FITTED WITH EARTHING TERMINALS.
- JOINTS BETWEEN CONDUITS MAY BE PUSH-FIT, COMPRESSION, MECHANICAL LOCKING OR SOCKET-END SEALED WITH PVC ADHESIVE. WHERE A WEATHERPROOF OR WATERTIGHT CONNECTION IS REQUIRED PUSH-FIT ARRANGEMENT ALONE IS NOT ACCEPTABLE.
- ALL CONDUIT SHALL BE SECURED USING MATCHING DISTANCE SADDLES SPACED AT A MAXIMUM DISTANCE OF 750MM AND 200MM FROM ANY BEND, JOINT OR ACCESSORY. ALL BOXES AND ACCESSORIES SHALL BE SECURED INDEPENDENTLY.
- REFER TO EDS 07-0119 FOR TRUNKING AND CABLE TRAY REQUIREMENTS.

LABELLING

- ALL LABELLING SHALL COMPLY WITH BS 7671.
- ALL DISTRIBUTION BOARD WAYS SHALL BE PERMANENTLY LABELLED TO IDENTIFY CIRCUIT FUNCTION, CABLE SIZE AND PROTECTIVE DEVICE RATING.

HOT SITES

- ALL SOCKETS SHALL BE DISCONNECTED OR REMOVED.
- ALL LIGHTING AND RTU SUPPLIES FROM AUXILIARY TERMINALS SHALL BE VIA AN ISOLATION TRANSFORMER.
- REFER TO ECS 06-0023 FOR FURTHER INFORMATION.

TESTING AND CERTIFICATION

- UPON COMPLETION OF THE WORKS, THE INSTALLATION SHALL BE TESTED IN ACCORDANCE WITH BS 7671. AN ELECTRICAL INSTALLATION CERTIFICATE TOGETHER WITH A SCHEDULE OF TEST RESULTS AS DETAILED IN BS 7671 SHALL BE FORWARDED TO UK POWER NETWORKS.

A	26-10-18	Original	UA	RDH
Version	Date	Description	Checked	Drn.
			Approved	Designed
				
TITLE FREESTANDING BRICK-BUILT SUBSTATION FOR A SINGLE METERING RING MAIN UNIT SMALL POWER & LIGHTING				
SCALE	NTS	@A1	APPROVED	Version
DRAWING NO.		EDS 07-3102.11		A
SITE		SECONDARY SITES		