

**Specification for the installation of a Solar
Photovoltaic System**

at

**Armthorpe Community Centre
Welfare Park
Church Street
Armthorpe
Doncaster
DN3 3AG**

SECTION 1

STANDARD SPECIFICATION FOR ELECTRICAL SERVICES

TECHNICAL CLAUSES

ARMTHORPE PARISH COUNCIL

SECTION 1 - STANDARD SPECIFICATION FOR ELECTRICAL SERVICES TECHNICAL CLAUSES

1. Scope

The clauses in this section of the Specification deal with the general standards of materials and workmanship and approved methods in connection with the Electrical Installation work. The contractor shall carry out the works detailed in Section 2 of the Specification using the materials and methods described herein:-

2. Standard of Workmanship

The work shall be carried out using the best current practices in order to produce a first class installation to the satisfaction of the Council. The work shall, at all times, be adequately and effectively supervised and at no time shall the ratio of unskilled/skilled operatives exceed that given by the National Agreement for the Electrical Contracting Industry. All operatives taking part in the installation of services as described in this specification shall possess an Electrotechnical Certification Scheme (ECS) card or a Joint Industry Board (JIB) card. Either card may be requested for inspection by the C.A. or his representative.

3. Regulations and Standards

The whole of the installation shall be strictly in accordance with the following, unless otherwise specified herein:-

- (a) The Requirements for Electrical Installations (18th edition with amendments) issued by the Institution of Electrical Councils, Savoy Place, London WC2, hereinafter referred to as the I.E.E. Regulations.
- (b) The Requirements of the Health and Safety Executive.
- (c) The Regulations and Conditions of Supply of the appropriate Electricity Supply Authority.
- (d) The general requirements of the Fire Insurance Companies.

Should any conflict arise between any of the above regulations, then pending the decision of the Council, the more stringent regulations shall apply.

All materials used shall comply with relevant British Standard Specifications.

4. Access to Site

Access to site is by road only and all goods delivered shall be clearly marked and addressed to the Contractor, who shall ensure that the necessary arrangements have been made for off-loading and storing.

5. Visits to Site

The Contractor shall visit the site prior to submitting his tender to acquaint himself fully with the extent and nature of the work and failure to do so shall not form part of any claim for extra work. The Contractor at the time of tendering shall be deemed to have examined fully the Specification, and other documents attached and to have made the necessary examinations of the site.

6. Position of Equipment

The routes of cables and positions of luminaires, socket outlets, ancillary services, etc., as shown on the drawings, shall be assumed to be correct for the purpose of tendering. The exact positions of electrical apparatus shall be agreed on site with the Council before they are fixed.

The actual positions may be varied within reason at no extra charge, provided that instructions are given before installation.

Contact drawings shall not be scaled for the purpose of determining exact locations of equipment etc.

7. Underground Services

All underground services shall be laid with due regard to existing services, drains and culverts. These works shall include the responsibility for establishing and checking the exact position of existing services.

Cables shall be laid at least one metre from any existing underground service, crossovers excepted. Where this is not practicable, the Council's ruling shall be obtained before proceeding.

Where the Electrical Contractor is not the Main Contractor, the Main Contractor will be responsible for the excavating of cable trenches covering the base of the trench with a bed of sand and after the cable has been installed by the Electrical Contractor, covering the cable with sand, backfilling of the trench to within 300 mm at ground level, laying the cable warning tape, backfilling and making good. The Contractor shall also refer to the 'Installation of Mains Cables' Clause.

8. Clearance with Other Services

Electrical services shall be kept at least 150 mm clear of water, steam, condensation and other mechanical services.

9. Services in Ducts

Conduits shall not be installed in heating ducts without specific approval of the Council and in such cases, approved heat resisting cables shall be used for the complete circuit. The routes of services in ducts or ceiling voids shall be discussed with the Council before being installed.

10. Record Drawings

These works shall include for the furnishing of the following 'As fitted' drawings:-

1. Mains distribution diagrams including the position, number of ways, rating, type and phase of all items of switchgear and details of all cables.
2. Sub-circuit schedule, showing duty, location and nature of each way in all distribution boards.
3. Wiring diagrams of fire alarms, connections to boiler house plant etc., for heating and ventilation controls.
4. Plans showing the mains distribution routes, fire alarms, lighting installations, socket outlets, external cable routes, etc., 'as fitted'.
5. A typewritten list in duplicate indicating the size, manufacturer and type number of the luminaires in each room. The schedule must also indicate the reference number of spare glassware.

A print of each of the proposed record drawings shall be submitted to the Council for checking and approval immediately the contract is completed.

After such approval has been obtained, the Contractor shall provide a full set of 'as fitted' prints and manufacturers' information all contained within a plastic wallet for inclusion in the Health and Safety file.

11. Labels and Identification

Every item of equipment shall have ivory labels to describe the function of the equipment or unit in accordance with the details given on the record drawings. Letters shall be 10mm minimum. All labels shall be fixed to the respective item using self tapping screws or nuts and bolts. Labels shall not be fixed using adhesive only.

12. Circuit Lists

A typewritten schedule, laminated or suitably protected in a plastic wallet or frame, shall be clipped inside every distribution board, giving details of circuit number, fuse or MCB rating, and points supplied. The schedule shall be typewritten on quality card and inserted in a plastic sleeve and securely fixed to the inside of the door.

13. Phase Marking

Wherever possible, appropriately coloured conductors shall be used to indicate the phase connected. In all other cases, each conductor in all apparatus, switch and distribution gear shall be plainly marked by terminal sleeves in hard, coloured PVC or rubber to indicate the phase to which it is connected.

The interior of all apparatus etc. shall have the phases marked by the fixing of coloured plastic discs or counters by brass screws commencing with the brown phase at the left or the top, as appropriate.

14. Quietness in Operation

All equipment shall be quiet in operation and all fixings and equipment shall be entirely free from drumming and rattle. All supports shall be fixed to avoid transmission of vibration or noise to the structure, trunking and conduit. Any noise considered excessive by the Council shall be traced and remedied without charge.

15. Earthing and Bonding

Where appropriate, the Contractor shall provide an earth bar mounted adjacent to the main distribution board for all bonding connections, which shall be clearly labelled.

The consumer's earthing terminal shall be bonded to the metalwork of the gas and/or water service. This bonding connection shall be made by means of copper conductors of cross-sectional area equivalent to that laid down in the IEE Regulations. Connections to the pipes of other services shall be made by means of clamps complying with BS 951. The bonding connection shall be made as close as possible to the point of entry of the gas or water service into the building. Where doubt or difficulty arises the Council's decision shall be sought.

An efficient circuit protective conductor shall be provided throughout every part of every circuit of the installation. The size of the circuit protective conductor shall be at least in accordance with the tables included in the IEE Wiring Regulations, but where the protective conductor comprises a cable not forming part of a composite cable, no conductor smaller than 1.5 sq. mm shall be used. Such cables shall have copper conductors with yellow-striped green insulation, of the same type as specified for the sub-circuit.

Where a circuit protective conductor is used at the termination of a mineral insulated copper sheathed cable, its cross-sectional area shall be not less than one half of the largest current carrying conductor in the cable and shall be not smaller than 4sq. mm.

The earthing terminal of every socket outlet and metal enclosure box shall be connected to the circuit protective conductor. Where the circuit protective conductor is formed by metal conduit, trunking or duct, the earthing terminal shall be connected by means of a green and yellow PVC insulated copper conductor of at least 1.5 sq. mm to an earthing terminal incorporated in the associated box or enclosure. A further loop of green and yellow cable shall be connected to the metal trunking using a brass bolt, nuts and shake proof washers.

An earthing terminal shall be provided for every lighting point and connected to the circuit protective conductor.

An earthing terminal shall be provided at every lighting switch position.

The circuit protective conductor shall be effectually bonded to extraneous fixed metalwork which might otherwise come into fortuitous contact with earth metalwork of the installation or apparatus unless effectual physical segregation can be ensured. Extraneous fixed metalwork in any room, which contains a socket outlet, shall in any event be effectually bonded to the circuit protective conductor.

All radiators and exposed metal pipes shall be bonded to the circuit protective conductor, but where metal to metal joints exist and form a continuous electrical

circuit of negligible impedance, one bonding connection may suffice for a group of radiators or pipework. However, in these circumstances, at least one such bonding connection shall be made, on each floor level of the building and at least one connection shall be made for every 250 sq. m of floor area served by the radiators and pipes.

Bonding connections to extraneous metalwork shall be made as unobtrusively as possible, connections to pipework being made in service ducts or voids when practicable. Such bonding connections shall not be made where pipes are buried and to do so would render the connection inaccessible. Bonding connections confined within service ducts or voids shall be made using yellow striped green PVC insulated conductors or copper strips of appropriate size as already specified for circuit protective conductors.

Wherever it is necessary for bonding connections to be made outside of service ducts or voids, the following methods shall be adopted.

Where the installation comprises insulated cables in conduit, bonding connections shall be made to extraneous metalwork where necessary by extending the conduit system to a convenient point adjacent to the metalwork and terminating the conduit with a circular BS through box containing an earthing terminal. A yellow striped green PVC insulated circuit protective conductor shall be taken from this point, through an end spout using a stuffing gland and bonded to the metalwork.

Where the installation comprises mineral insulated metal sheathed cables, bonding connections shall be made to extraneous metalwork where necessary by installing a single core MIMS cable of the type specified for the circuit wiring and run in the manner specified, terminating in a circular BS box with an earthing terminal at a convenient point adjacent to the metalwork.

A yellow striped green PVC insulated circuit protective conductor shall be taken from this point, through an end spout using a stuffing gland and bonded to the metalwork.

Where the installation comprises insulated and sheathed cables, bonding connections shall be made to extraneous metalwork where necessary by means of green insulated and sheathed single core cables of the same type specified for the circuit wiring and installed in the manner specified for these cables, from the nearest convenient earthing terminal on the system. Where the Specification calls for insulated and sheathed cables to be protected by conduits, this shall apply also to such bonding connections.

Excessive drilling of earth tapes or other operations which reduce the effective cross-sectional area of the tape will not be permitted.

The ends of every circuit protective conductor, whether stranded or solid, shall be connected by an approved mechanical clamp using a correctly sized lug.

All connections shall be accessible and made secure by high tensile brass screws. The electrical resistance of the circuit protective system must be such that satisfactory results can be obtained when carrying out the earth fault loop impedance test but, in any event, the resistance of the circuit protective system, when measured from the earthing point to any other position on the circuit protective system of the completed installation, shall not exceed 1 ohm.

Where the circuit protective conductor is formed by metal conduit, trunking, ducts, or metal sheaths of cables, all joints shall be mechanically sound and electrically continuous. For any part of any circuit the resistance of the circuit protective path so formed shall be not more than twice that of the largest current carrying conductor for that part of the circuit.

16. Conduits

Conduit shall be heavy gauged steel welded and manufactured to BS 31-1940, Class B. Minimum size of conduit shall be 20 mm. Conduits shall be smooth inside and out and free from imperfections. Conduits installed in Boiler Houses, Laundries, Kitchens, cast in concrete, outside buildings and other damp positions shall be heavy gauge welded Class 3 galvanised. Galvanised boxes, saddles, fitments and accessories shall also be used. For all other work, black enamelled conduit shall be used unless otherwise specified.

All bends shall be formed cold on site on a bending machine, and without alteration to the conduit section. **Elbows, tees or manufactured bends shall not be used.** The conduit shall be threaded to the required length by means of good quality dies and held securely in an efficient vice for this operation. The conduit shall be well reamed, all burrs and surplus oil shall be removed. All vice marks and other defacements of finish shall be well painted with a good quality rust inhibiting paint immediately after erection.

For conduit boxes, couplers and all items of equipment with threaded entries, the conduit shall be tightly screwed into the item so that the conduit ends butt, or the conduit butts onto the shoulder provided, on no account shall the conduit protrude into such items as threaded switch boxes.

For entry into trunking and sheet metal boxes etc., the method shall be by coupling and male hexagonal brass bush. The connection shall be well painted inside and out by means of a good quality rust-inhibiting paint immediately after the conduit entry has been made. Conduit unions shall be used in preference to running threads. Running threads shall only be used with the Council's permission. All running threads shall be secured by a locknut and painted after erection to prevent rusting.

When the conduit is to be concealed within plaster or run in a floor screed, etc., it shall be securely fixed to prevent any movement. All surface work, work in ducts or ceiling voids, etc., shall be secured by means of heavy distance saddles secured by screws and rawlplugs. The spacing of fixings shall not exceed:-

Conduit Size	Vertical Spacing	Horizontal Spacing
20 mm and 25 mm	1.6 metres	1.3 metres
32 mm x 1½"	1.75 metres	1.3 metres
2"	2.0 metres	1.6 metres

Galvanised conduits shall be secured by brass or galvanised screws.

Where conduit is installed supplying equipment remote from a wall it shall be securely fixed to suitable 'unistrut' sections, which shall be securely fixed to both ceiling and floor. The exact arrangement shall be agreed with the Council or Clerk of Works on site before the work proceeds.

All conduits shall be installed so as to give a neat appearance and all drops to switch boxes, etc., shall be truly vertical. Switch boxes shall be well secured by two screws screwed into rawl plugs.

Draw in boxes, etc., shall generally be at lighting points, etc., and the maximum distance between boxes shall be two right angle bends or 10 m of straight conduit.

The conduits shall be completely assembled, fixed and swabbed out before wiring is commenced. Care shall be taken to prevent plaster and other debris from entering the conduit. For a flush installation, all boxes shall be flush with ceiling or plaster level and, in the case of suspended ceilings, extension rings shall be used to ensure that no gap exists between conduit box and fitments.

All conduit boxes onto which luminaires are to be affixed shall be capable of withstanding a dead weight of 20 kg and no weight shall be taken by the ceiling, except where stated elsewhere in this Specification.

The whole system shall be electrically and mechanically continuous and a test for earth continuity shall be carried out prior to concealment.

The number of cables installed in any conduit shall not exceed those permitted in the appropriate tables of the IEE Regulations, and cables shall be capable of easy withdrawal without any dismantling of the conduit.

For multi-storey buildings, the conduits to socket outlets, etc., shall be run in the ceiling void of the floor below, rising to the outlets concerned. If the ground floor of any building has a solid concrete floor, conduits shall not be run in the screed, rising to outlets etc., unless specifically instructed later in this Specification. In these circumstances the conduits shall be run in the ceiling void of the room concerned, dropping to the various outlets, etc.

If for any other reason the Contractor wishes to run conduits in the floor screed, he shall obtain written permission from the Council. All conduits in floor screeds shall be galvanised and the conduits shall be swabbed out after erection. Measures shall be taken to prevent the ingress of debris.

Where due to type of construction, it is necessary to cast conduits into concrete to serve lighting points, etc., then conduits shall be galvanised, generally back outlet boxes shall be used and the conduit installed in such a manner as to be self draining.

Where conduits are taken through walls and/or floors, the hole shall be made good with incombustible material.

Where conduits are installed in floors having a hot poured mastic finish, no cables shall be installed prior to completion of the floor screed.

17. Conduit Boxes

Standard circular conduit boxes shall be used at all lighting points and drawing in points. These shall be malleable cast iron to BS 31-1940 complete with heavy

quality lids and brass screws where necessary. Lids shall overlap the box where flush fixed.

18. Flexible Conduit

Flexible conduit (e.g. anaconda) shall be used for connections to all motors and other items of equipment, which may experience movement or vibration. This shall be PVC sheathed, KOPEX type or approved equivalent manufactured in accordance with BS 731 and terminated in the proper adaptors.

An internal circuit protective conductor shall be installed of minimum size, 2.5 sq. mm to earth the item of equipment to the main conduit system. The circuit protective conductor shall be green and yellow.

19. Trunking

Trunking shall be of the make, size and type specified in the Schedule of Equipment and Materials. This shall be well secured at intervals not exceeding 1.3 m and free from any sharp edges or projections. Manufacturer's bends, tees and other fittings shall be used and no attempt shall be made to make these on site from lengths of trunking.

Retaining clips shall be fitted to all trunking when the lid is not at the top and cable support pins shall be fitted to all vertical runs at distances not exceeding 1.3m. Where run through a floor, fire barriers shall be fitted. Fire barriers shall also be fitted when the trunking passes through an area enclosed by fire doors, or structural fire barriers.

Where conduit is installed supplying equipment remote from a wall it shall be securely fixed to suitable 'unistrut' sections, which shall be securely fixed to both ceiling and floor. The exact arrangement shall be agreed with the Council or Clerk of Works on site before the work proceeds.

The trunking shall be electrically, and mechanically continuous and copper links shall be used at each junction for the purpose of earthing. All joints and other defacements of finish shall be well painted in an approved colour.

Trunking shall be installed so that the numbers of cables contained therein do not occupy more than 40% of the free space area.

20. Cables in Conduit and Trunking

Cables shall be BASEC approved and shall be delivered to site on reels with seals and labels intact and shall be one manufacturer throughout the installation. Minimum conductor size shall be 1.5sq. mm.

They shall be drawn into conduits direct from the reels and any cable, which has become kinked, twisted or damaged in any way, shall be rejected.

The installation shall be wired directly between all points and no intermediate connections shall be permitted. The termination made shall be suitable for the type of terminal provided, and where necessary, crimped terminations shall be used.

Cables shall be coloured in accordance with IEE Regulations.

Extra low voltage and communication cables shall not be run in the same trunking or conduit as mains voltage cables. Cables shall not pass through luminaires unless they are heat resisting to BS 6007.

The number of cables per conduit shall not exceed the number stated in the IEE Tables.

21. Flexible Cables

Flexible cables shall be BASEC approved and manufactured in accordance with BS 6004 for normal use and BS 6007 for use in higher temperature conditions. They shall be of the correct rating and type for the purpose for which they are used. Minimum size of conductor shall be 0.75 sq. mm and where multicore cables are used the cable shall be terminated so that no strain is placed on the earth conductor.

Cables to all tungsten luminaires shall terminate directly into the luminaire, the cables within the luminaire being protected by suitable heat resistant sleeve.

Where luminaires are supported by a flexible cable, the mechanical load on the cables shall not exceed that given in the IEE Regulations.

The cores of every flexible cable shall be coloured in accordance with the IET Regulations.

22. M.I.M.S. Cables

Tradesmen installing M.I.M.S. cables shall be fully conversant and highly skilled in this type of work.

M.I.M.S. cables shall be manufactured to BS 6207, BASEC approved and unless stated to the contrary elsewhere they shall be 1000-volt rating, copper sheath and cores. Minimum size of cable shall be 1.0 sq. mm and all the cable on one contract shall be supplied by one manufacturer.

Cables shall terminate in cold screw on pot seals complete with earth tail and universal run type glands with cores sleeved with polychloroprene, PVC or silicon rubber. Sleeving shall be anchored into the pot seal and identified by coloured tapes and sleeves.

Cables shall terminate at a definite point and intermediate connections will not be permitted. For all points such as luminaires, etc., the cable shall terminate in a standard conduit box well supported as detailed in Clause 216 Paragraph 10.

Adaptable boxes shall not be used unless specified elsewhere in this specification. Galvanised boxes shall be used in damp situations.

All cables shall be neatly installed and shall be clipped by means of copper saddles (or aluminium for aluminium cables) secured by two brass screws screwed into rawplugs. Multiple saddles shall be used for up to four cables and for more than four cables. The cables may be run on galvanised cable tray or wire basket and secured by brass screws and nuts. Alternatively, with the approval of the Council or Clerk of Works cables may be secured by means of suitable plastic straps. Where bare

copper cables are used the cable tray shall be rigid PVC. Spacing of saddles shall not exceed 400 mm for cables up to 4.0 sq. mm and 450 mm for larger sizes. Drops to switches, socket outlets, etc., shall be truly vertical and cables run in false roofs, voids, etc., shall be run either parallel to or at right angles to the nearest wall and may be supported at regular intervals by securely fixed loops of 'all-round' band, PVC covered.

Cables shall be protected from mechanical damage to a height of 1200 mm where rising through floors. Cables shall not be run in floor screed.

The Contractor shall install these cables in accordance with the maker's recommendations and using the specialised tools available. The cable shall be tested as soon as installed and again at the end of the Contract and any cable having an insulation reading other than infinity registered on a 500 volt insulation tester shall be rejected.

When a cable is required to enter a motor, or any item of equipment subject to vibration, a single loop 150 mm coil shall be formed prior to entry in order to absorb such vibration.

Cable run in the ground and in damp situations shall be PVC served. They shall be affixed with PVC served saddles and secured by round head sheradised screws. All PVC served cables shall have PVC shrouds at all terminations. These shall be fitted prior to the gland during the making off procedure.

When unserved cables are run below plaster level they shall be given two coats of Shellac varnish before clipping back to wall surface.

Where a cable is terminated by a pot seal only, it must be via an approved box having an integral earth clamp to ensure earth continuity.

23. Soft Skinned Metal Sheathed Fire Performance Cable

These cables shall meet the requirements of all relevant sections of BS 5839 and shall be BASEC approved and unless stated to the contrary elsewhere they shall be 500 volt rating (min), aluminium sheath and copper cores. Minimum size of cable shall be 1.5 sq. mm and all the cable on one contract shall be supplied by one manufacturer.

Only Fire Performance cable having LSOH sheathing and coloured red such as Pirelli FP200 Gold, Prysmian FP200 Gold or their approved equivalent shall be used.

Installation to be installed in strict accordance with manufacturers instructions generally following the practices of M.I.M.S cable installation.

Support Clips – to be heat resisting type and spaced at the recommended intervals.
Terminations – to be via a waterproof gland, as manufactured by the cable supplier.

Special care to be taken stripping back the "metal" sheath to avoid cutting Insulation.

Where recommended by the cable manufacturer purpose made "distance collars" / ferrules should be fitted on the ends of all cables.

All fire alarm cables are to be segregated from the cables, conduit and trunking of all other services along all cable routes.

Each loop should not exceed 1Km using 1.5mm cable.

24. Installation of Mains Cable

This section covers the installation of cables described in the following 2No. Clauses.

Cables shall be delivered to site on manufacturer's drums and installed along the routes shown on the drawing and/or as detailed elsewhere in this Specification. Intermediate joints shall not be permitted unless the Council gives his approval in writing.

Where cables are run on the surface of walls or in service ducts, they shall either be secured by heavy quality galvanised spacer bar saddles secured by screws screwed into rawlplugs, secured by Unistrut cleats or similar. Small cables shall be secured at intervals not exceeding 600 mm, or run in cable tray, as described elsewhere in this specification. For larger cables the following table shall be used:-

Cable size sq. mm	70	120	150	240	300
Maximum space of saddles metres	0.75	1.0	1.35	1.5	1.75

The cables shall be so installed that the radius of bends is not less than that permitted in IEE Regulations and no strain is placed on to end connections. Where cables are required to span an open space they shall be supported by cable tray.

Where run in the ground, the trench shall be 600 mm deep, cables laid on a 75 mm bed of sand with 75 mm sand cover. The trench shall be backfilled to within 300 mm ground level and a PVC marking tape laid along the entire cable route. Backfilling shall then be completed.

When the work is carried out as a sub-contract to a Main Contractor, the excavating, backfilling and supply of such shall be carried out by the Main Contractor unless specifically mentioned to the contrary. The Council shall be notified before backfilling commences.

Cables shall be drawn into an approved duct, where crossing road(s), and entering building(s), and shall be sealed after the installation of the cable.

Where run in the ground, cables shall be indicated where buried by concrete markers laid level with the finished ground surface. The markers shall be spaced at intervals of 50m on straight runs and shall be installed at all 'tees', 'through joints' and sudden changes of direction.

Where changes of direction occur the marker should be fitted with arrows to denote same. Markers shall be 225mm x 225mm x 50mm fitted with lead inserts indicating voltage, direction and type. In unmade ground, markers shall be suitable concrete posts standing 300 mm above ground and complete with the relevant information. A marker shall be positioned where the cable enters or leaves the building.

The Contractor shall provide sufficient rollers for the easy handling of the cable, which should run out from the underside of the drum to prevent excessive bending of

the cable.

25. XLPE, SWA, LSF Cables

XLPE, SWA and LSF served cables shall be BASEC approved and in accordance with BS 6724, shall be 1000 volt grade and of one manufacturer for any one contract. They shall terminate in suitable compression glands, which provide an anchorage and a cross joint bonding of the armouring. Intermediate joints will not be permitted.

Where a separate CPC conductor is specified it shall be installed alongside the cable and secured to it by means of plastic straps at suitable intervals.

These cables shall not be installed when temperatures fall below 0°C. Single-core cables armoured with steel wire or tape shall not be used.

When solid aluminium conductors are specified, these shall be terminated as detailed in the following Clause.

26. PVC Insulated Armoured and PVC Sheathed Aluminium Cables

Cables shall be BASEC approved and manufactured in accordance with BS.6346 and shall be of the 1000-volt grade, supplied by one manufacturer.

The cable shall be delivered to site together with the test certificate.

Current carrying conductors of the cable shall be manufactured from fully annealed aluminium PVC insulated and bedded. The total resistivity of the aluminium armour shall be equal or less than that of one of the cores.

The cable shall have an overall sheath of PVC compound.

Aluminium cables shall not be handled below a temperature of 0°C. The cable shall not be bent to a radius less than twelve times its overall diameter.

Jointing lugs and sleeves of aluminium cables shall be of the compression type. A manufacturer's approved compression tool shall be used and specially shaped tubular aluminium sleeves shall be employed for termination of phase and neutral conductors. The compression tool shall be equipped with correct shaped dies for indent of conductors of all sizes and shall operate at adequate pressure to administer the correct grade of joint.

All joint boxes shall be of the cast iron type. After jointing, joint boxes shall be filled with bitumen filling compound. Pouring temperature shall not exceed 140°C.

Cables shall be terminated in suitable glands. Since the cable armour is used for earth bond and armour protection, the gland shall be provided with tapered cone in order to clamp the armour and provide a low impedance bond.

27. Cable Tray

Cable trays shall be perforated, not less than 20 SWG up to 100mm, 18 SWG up to 150mm and 16 SWG up to 300mm and shall be galvanised.

They shall be of adequate width to take all the cables in one flat layer and allow 33% spare area for the installation of future cables. Manufacturer's bends, angles, etc., shall be used to give gradual change of direction and so create no strain on the cable. Cables shall be fixed with slips, screws and nuts as previously detailed.

The tray shall be securely fixed to the fabric by specially made supports and masonry bolts so that cable weight may be carried without deflection. All brackets, etc., shall be well painted with zinc rich paint and the whole installed to give a neat appearance. Cables shall be well dressed and the tray shall be spaced 25 mm from the building fabric.

Where wire basket is installed, subject to the approval of the Council or Clerk of Works, it shall have the same support fixings as stated above and be linked by the manufacturers recommended propriety fittings.

28. PVC Insulated and Sheathed Cables

PVC insulated and sheathed cables shall be BASEC approved and in accordance with BS 6004 and incorporate an earth continuity conductor.

Where run in timber floors or roof voids, they shall be run either along the timber joists or at right angles to them. Cables run above suspended ceilings and in roof voids may be supported by 150mm diameter loops of PVC covered all round band securely fixed at 500mm intervals. When run in intermediate floors they shall be threaded through 25mm holes, drilled centrally to a depth of joists where run at right angles to the joist and clipped at regular intervals. All drops to switches etc. shall be truly vertical and when concealed by plaster they shall be protected by PVC oval conduit. Metal or plastic sheathing will not be accepted. All cables shall be fixed by nylon cable cleats and for surface work these shall be not more than 225mm apart.

The sheaths of all cables shall enter the terminating boxes, which shall be well bushed. The earth conductor shall terminate in the earth terminal provided in every accessory. Bare earth continuity conductors shall be fitted with yellow striped green PVC sleeving.

In situations where cables incorporating a metallised melinex screen are specified, the method shall be the same as for standard PVC insulated and sheathed cables. The melinex shall be cut back along with the sheath and not wrapped round the earth conductor. Sufficient screen properties are obtained by random contact with the bare earth wire.

29. Switchboard Panels and Fuse boards

Switchboards shall be 500-volt rating, totally enclosed, and comply with BS 162, BS 5419 BS 5486 and BS 3871. They shall be in accordance with instructions given elsewhere in this specification and on the drawing.

When this specification permits the Contractor to manufacture his own switchboard, all items shall be securely mounted on a robust angle iron or unistrut framework, or other alternative method approved by the Council or Clerk of Works, the frame being cleaned and given two coats of corrosion preventative paint of approved colour before switchgear is bolted to it.

The bus bar shall run the full length of the panel, with all switch fuses, breakers etc., bolted to the bus bar chamber through paxoline insulating barriers. Switch fuses shall be connected to the bus bar by means of copper conductors.

The switchboards shall be securely bolted to the walls and/or floor as detailed elsewhere and earth continuity shall be affected by means of 25 mm x 3 mm copper strip, bonding all items to the incoming main.

Where fuse switches, breakers, etc., have stud type outgoing terminals, the Contractor shall sweat to the outgoing cables suitable lugs, or if aluminium cables are specified compression type materials.

Outgoing cables shall not pass through the bus bar chamber. Distribution boards shall be manufactured in accordance with BS 5486 and BS 3871.

Distribution boards shall be securely bolted to the building fabric at a height of 2.0 m to the bottom of the boards unless otherwise stated, the neutral bar in T.P. & N. boards shall have as many ways as the total number of fuse ways, i.e. three times the ways per phase.

All switch fuses shall contain HRC fuses. No fuse exceeding 15 amperes shall be re-wirable. A set of spare HRC fuses shall be supplied and handed to the Council for all circuits.

30. Terminations in Sheet Metal Accessory Boxes

When conduit and/or MICC cables terminate in accessory boxes, trunking, adaptable boxes, or any item not having a thread to receive the conduit/MICC cable, the following procedure shall be adopted:-

1. If the Contractor makes the hole into which the termination enters, then he shall use a suitable sized hole cutter to form a hole that is not oversized.
2. The paint shall be removed from round the hole to ensure a good earth continuity.
3. The conduit/MICC shall be connected by means of a coupling and male bush.
4. As soon as the connection is made the junction shall be well painted inside and out with rust inhibiting paint, of the same colour as the conduit.

31. Socket Outlets

Unless otherwise indicated elsewhere in this specification, socket outlets shall be of 13 ampere rating to BS 1363 with overlapping cover plate for flush mounting finished to match the plates of lighting switches specified elsewhere.

Socket outlets shall be circuited as detailed on the drawings, but where no specific circuiting is shown then one of the following ways shall be adopted.

- (i) By means of a ring circuit using cables having conductors of 2.5 sq. mm.
- (ii) By means of looping two outlets together using cables having conductors of 4

sq. mm connected to a 32-ampere way.

The earth terminal of all socket outlets shall be connected to the main earth system by means of a conductor in accordance with IEE regulations. Earth tails are to be provided in each socket box.

32. Connection Units

Connection units shall comprise a D.P. switch and removable fuse cartridge to BS 1363/1362 with overlapping cover plate finished to match other accessories. The fuse in each connection unit shall have the correct rating for the apparatus to which it is connected.

33. Contactors

All contactors referred to or specified or indicated elsewhere shall be of the 500 volt rating with D.C. operating coils. They must be quiet in operation and the Council reserves the right to reject noisy contactors. Contactor enclosures shall be gasketed and sealed to prevent the ingress of dust and damp.

34. Lighting Switches

Switches shall be rocker-operated grid switches, all insulated, unless otherwise specified elsewhere.

Switches controlling lighting circuits shall be single pole, 15 ampere.

In no case shall a connected load exceeding 10 amperes be controlled by a 15 ampere switch.

Switches connected to different phases of the supply shall not be installed in the same box or within two metres of each other except where otherwise indicated. Under these conditions, switches shall be installed and labelled 400 volts by a permanent label.

Each switch which is fitted out of sight of the luminaire it controls shall be identified by engraving the switch plate in an approved manner. The engraving of the plates shall be filled red enamel.

35. Lighting Sub-Circuits

No cable smaller than 1.5 sq. mm shall be used for any lighting circuit.

Each sub-circuit shall be protected at the sub-distribution board and, unless otherwise indicated, must not have more than ten lighting points connected to it.

The lighting installation shall be carried out using the 'loop in' principle, no joints being allowed and all connections being made at the appropriate terminals of the accessories. Final connection to each lighting point shall be made by one of the following methods.

- Terminating directly into the luminaire, with cables being protected where necessary by heat resistant sleeving.

- Via plug in ceiling roses and flexible cables.
- Via propriety junction boxes.

The exact method will be described elsewhere in this specification.

36. Lamps, Tungsten Filament

These works shall include for the supply and fixing of all tungsten lamps indicated on the drawings or schedules.

Within the general range and excepting special applications, lamps up to and including 150 watts shall have bayonet caps and all lamps above 150 watts shall have E.S. or G.E.S. caps.

37. Lamps, Fluorescent

These works shall include for the supply and installation of all fluorescent lamps indicated on the drawings or schedules.

All tubes must be quiet in operation.

Fluorescent lamp control gear shall be provided with power factor correction and radio interference suppressor.

The colour of the fluorescent tubes shall be counter checked with the Council before the Contractor orders same.

The Contractor shall ensure that all luminaires used in connection with a dimming device shall be fitted with the correct type of tube and control gear as recommended by the dimmer manufacturer.

38. Luminaires

The Contractor shall include for the supply, connection, erection, complete with all necessary suspensions, accessories, lamp holder and lamps of all luminaires indicated on the schedule or the drawings.

All luminaires shall have the metalwork effectively earthed.

All luminaires shall be in a clean and brand new condition at the time of handover of the Contract.

The method of suspension of all luminaires shall be electrically and mechanically sound and as detailed elsewhere in this specification.

The Contractor must satisfy himself as to the method of fixing all luminaires and the nature of the work involved, and make due allowance for this work in his tender. If it is permissible to use a suspended ceiling for fixings, then this will be stated elsewhere in this specification. Otherwise the Contractor shall assume that the luminaires should be fixed completely separately to the ceiling.

The electrical Contractor shall be responsible for informing the General Contractor of the positions where additional timber supports are required for the fixing of luminaires and other such ceiling mounted points.

All luminaires are to be fixed by an appropriate fixing method such as to timber noggings installed at fitting centres or by means of plywood inserts supported by T sections of suspended ceilings or by specified suspension kits detailed elsewhere within this specification.

Where luminaires are fixed to suspended ceilings wiring may terminate at either plug-in ceiling roses or approved multi-point units subject to the approval of the Council or Clerk of Works. Final connections to luminaries shall be made by flexible PVC/PVC cables.

Where possible, cables shall enter fluorescent fittings close to the connection terminals to avoid passing alongside control gear.

The number and type of fittings to be supplied and installed in this contract are detailed on the drawing and in the Schedule. Care is to be taken to ensure an orderly appearance. Positions shown on the plans are approximate only and subject to confirmation as work proceeds.

It shall be verified that the catalogue numbers quoted in the Schedule include all parts necessary to constitute the complete luminaires and where items such as lampholder, brackets, non-standard suspensions, etc., are not included in the catalogue, allowance must be made for their provision.

Where wiring is run through the spines of fluorescent fittings for in line mounting, it shall be heat resistant flexible cable, having a maximum working temperature range up to 115°C.

Lamps and fluorescent tubes, of the power stated in the Schedule rated at 230 volts shall be supplied and fixed to all points on completion of this contract. All fluorescent fittings are to be provided with white tubes, unless stated to the contrary.

39. System of Wiring (where applicable)

A limited amount of clipping of cables may be required where the cables are installed in the voids above suspended ceilings. The purpose of the clipping is mainly to protect cables from possible damage, which could be caused through contact with hot water pipes or contact with the sharp edges of other metalwork present in the voids. There is no intention that the cables should be supported at close intervals along their length, as with surface installations. Where it is practicable, cables should be bunched with the object of avoiding an untidy tangle of single individual cables with random directions. The bunched cables are to be supported at intervals in PVC stirrups or 'all in one' band, used to form a 150-dia. loop, each loop containing not more than twelve cable cores and fixed at a maximum distance of 500 mm apart. Further loops should be installed directly above every cable drop for lighting fittings and switches etc. Separate loops shall be installed to contain and support extra low voltage and communication cables.

Where accessories are positioned on fair-faced brickwork walls and the other side of the wall is either plastered or falls within a store or cupboard, the conduits are to pass down the reversed side of the wall, under the plaster where possible and pass through the wall to the accessory. Wiring is to be concealed wherever possible.

Where Electrical services cross a subsidence or movement joint in the building fabric, the Contractor shall include for a flexible service across the joint.

40. Loose Material

Items of loose materials shall be supplied by the Contractor at the end of the contract.

These items shall be handed to the Council, duly advised and a signature obtained for their receipt.

SECTION 2

DESCRIPTION OF WORKS

ARMTHORPE PARISH COUNCIL

SECTION 2 – DESCRIPTION OF WORKS

Specification for the Design, Supply & Installation of a Photovoltaic Panel Installation at Armthorpe Community Centre.

1. Description of Works

The contractor shall allow for the design, supply installation, connection, testing and commissioning of a, Photovoltaic Panel System, to Armthorpe Community Centre.

All works shall be carried-out in compliance with:

- Counciling Recommendation G59 (current edition) – Recommendations for the connection of generating plant to the distribution systems of licensed distribution network operators.
- BS 7671 (current edition) - Requirements for electrical installations (all parts – but in particular, Part 7-712 Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems).
- BS EN 62446 (current edition) - Grid connected photovoltaic systems - Minimum requirements for system documentation, commissioning tests and inspection.
- A system of photovoltaic cells shall be supplied and installed by a Microgeneration Certification Scheme (MCS) registered specialist.
- Only MCS registered products shall be installed, no alternatives will be allowed.
- Electricity Safety, Quality and Continuity Regulations

2. Project Location & Site Plan

Project name

Armthorpe Community Centre Solar Panel Project

Project Location

Armthorpe Community Centre, Welfare Park, Church Street, Armthorpe, Doncaster, DN3 3AG.

Project Owner

Armthorpe Parish Council

3. Proposed Site Plan



4. Scope of Work

The successful contractor will be required to:

- Design, supply, and install a solar PV system with a minimum solar array of 50,000 kWh.
- Conduct site assessment and structural integrity checks to ensure suitability.
- Provide all necessary permits, approvals, and regulatory compliance for installation.
- Supply high-efficiency solar panels, inverters, mounting structures, and other essential components.
- Install a monitoring system for real-time energy tracking and efficiency analysis.
- Ensure grid connectivity and compliance with relevant electricity supply regulations.
- Conduct testing, commissioning, and user training on system operation and maintenance.

- Provide a comprehensive maintenance plan, including warranty and after-sales support.

5. Technical Requirements

The solar panel system must:

- Meet a minimum solar array of 50,000 kWh.
- Utilize Tier-1 solar PV modules with high efficiency.
- Include MPPT inverters for optimized energy conversion.
- Be compatible with battery storage systems (optional).
- Have a minimum warranty of 10 years for panels and 5 years for inverters.
- Comply with BS EN 62196, IEC 61439-7, IEC 61851, and other relevant standards.

6. Eligibility Criteria

Bidders must:

- Be registered and certified solar PV installers.
- Have a proven track record in commercial solar installations.
- Provide evidence of previous similar projects.
- Demonstrate technical expertise and financial stability.
- Provide a detailed project timeline and implementation plan.

7. Tender Submission Requirements

Interested bidders must submit:

- A technical proposal, including system specifications and layout designs.
- A financial proposal, including all costs (materials, labour, permits).
- A project schedule, detailing key milestones.
- Warranty and after-sales service commitments.
- Proof of certification, accreditation, and insurance.

8. Evaluation Criteria

Tenders will be evaluated based on:

- Technical compliance with the project requirements.
- Cost-effectiveness and financial feasibility.
- Experience and expertise in solar PV installations.
- Project timeline and implementation strategy.
- Warranty and maintenance support.

9. Deadline for Submission

All proposals must be submitted by **8th July 2025 at 4pm** to **clerk@armthorpeparishcouncil.co.uk**. Late submissions will not be considered.

10. Contact for Further Information

For enquiries regarding this tender, please contact:

Sarah Youngman, Armthorpe Parish Council, Armthorpe Community Centre, Welfare Park, Church Street, Armthorpe, Doncaster, DN3 3AG, 01302 830543, clerk@armthorpeparishcouncil.co.uk.

11. General

The contractor must ensure the whole installation is designed and installed to the highest standard, with anti-vandal design and equipment.

- All cables must be XLPE/steel wire armoured type, installed out of reach of the public, or LSOH cables, fully contained within galvanised steel conduit and / or underground ducting,
- All Inverter units must be either sited within a suitable protective housing/building or protected by heavy duty galvanised steel cages, in-line with the manufacturer's recommendations.
- All battery storage units must be either sited within a suitable protective housing/building or protected by heavy duty galvanised steel cages, in-line with the manufacturer's recommendations.
- All luminaires are to be minimum impact rating of IK10

12. Scope of Works

The contractor must include for the following items in their tender submission.

The contractors design proposal, including:

- PV system design
- Supply, install, commission and test the PV array and canopy.

13. Project Schedule

At the tender stage, the contractor is to provide a programme of delivery for:

- The full design
- Consultation Period
- Site Set up.
- Enabling works
- Project Commencement

- Project completion

14. Standards and Supplier Responsibilities

PV System Standards

- The installer will be a registered MCS contractor or equivalent, such that the installation will qualify for SEG payments.
- Respond in a timely manner to Council enquiries.
- Undertake pre-installation site surveys and identify any property issues associated with the installation (including but not limited to structural and electrical issues). In this respect, the Supplier will carry out any liaison with the relevant Council contact before conducting site assessments.
- Be responsible for the design of the system.
- Support Council in seeking permissions to proceed.
- Provide output calculation for the proposed system evidenced by near and far shading analysis, calculation to MCS Performance Evaluation Method, and presented with supporting rationale.
- Engage with the local Planning Authority on behalf of the Council, to secure Planning Permission
- Provide a project delivery plan covering all H & S matters.
- Supply and install systems ordered by the Council.
- Liaise with the Council regarding the Goods and/or Services to be delivered.
- Be responsible for the safe provision, erection and dismantling of scaffolding, where applicable.
- Be responsible for protection of the work area as necessary.
- Be responsible for the disposal of waste and any associated costs.
- Complete the installation to meet current electrical wiring regulations and all manufacturers installation guides including all necessary earth bonding and lightning strike protection.
- Complete all administration and registration required for system installation in a timely fashion, including but not limited to the application for incentive tariffs that may be applicable.
- Provide copies of all of the above correspondence to the Council
- Commission and test the completed system.

- Provide any extra monitoring, maintenance and training options to the Council, where not already included.

15. Handover and commissioning

The Supplier will provide an electronic file containing (but not limited to):

- Manufacturer datasheets for all equipment including PV modules, inverters, mounting systems, monitoring systems.
- Warranty documentation including all contact details.
- Technical drawings for solar panels, foundations, ducting / cable runs etc.
- Structural calculations for structures including static and dynamic load calculations.
- SLDs for electrical works including PV string layouts.
- DNO / Grid permissions.
- Planning Approval.
- Building Control approval.
- O & M Manual including Preventative maintenance plan.
- Output calculation including shading analysis.
- Such documentation as required for installation to qualify for SEG payments.

16. Health and Safety

The Contractor must ensure that all works to this Project are carried out in compliance with ALL the relevant sections of the HEALTH AND SAFETY AT WORK ACT 1974 and with the requirements of the latest edition of the following:

- The Construction (Design and Management) Regulations
- The Electricity Supply Regulations
- The Construction (Lifting Operations) Act
- The Construction (General Provisions) Act
- The Construction (Health and Welfare) Act
- The Construction (Working Phases) Act
- The Factories Act

- The Gas safety (Installation and Use) Regulations
- The Control of Asbestos at Work Regulations 2002 including Regulation 4 and 20

SECTION 3

TESTING AND COMMISSIONING

ARMTHORPE PARISH COUNCIL

SECTION 3 – TESTING AND COMMISSIONING

1. Introduction

The Contractor shall carry out tests for earth loop impedance, mechanical and electrical continuity and insulation resistance on the completed installation in accordance with the current edition of the I.E.T. Regulations.

2. Commissioning

At the end of the contract the Contractor shall satisfy himself that the installation is 100% complete, that all labels and distribution board circuit schedules are fitted etc. He shall ensure that all manufacturer's information is available and that all equipment functions as intended and that keys are ready to hand over. He shall then notify the Architect, in writing, that the installation is complete and shall demonstrate to the Architect that this is so. No installation will be taken over that is not complete in every respect.

3. Test and Test Instruments

The Contractor shall provide all labour and instruments to carry out the necessary tests. The accuracy of the tests shall be demonstrated to the satisfaction of the Architect with seven days notice being given. He shall satisfy himself that the installation is in a fit state for the tests to be made.

On completion of the installation, a Completion and Inspection Certificate as detailed in the I.E.T. Regulations shall be completed by the Contractor and forwarded to the C.A., together with two copies of the detailed test records for all the circuits.

The resistance value of the earth electrodes shall also be submitted to the Project Council.

SECTION 4

SCHEDULE OF MATERIALS AND EQUIPMENT

ARMTHORPE PARISH COUNCIL

SECTION 4 – SCHEDULE OF MATERIALS AND EQUIPMENT

All items listed in this schedule shall be supplied and installed by the Contractor. Where more than one accessory or piece of equipment is required, the Contractor shall obtain the information of the correct quantities from the drawings, specification or schedule, prior to submitting his tender.

Where a quotation from a supplier is referred to in this specification, the quantities, specification and general details of the quotation shall be checked by the Contractor prior to submitting his tender, to ensure that it complies fully with the tender specification and drawings.

The tender is to be based on the materials and equipment listed in this specification.

The Contractor may submit for consideration, alternative makes of material and equipment to those specified but, where this is done, it shall be on the express understanding that the alternative shall be declared at the time of tendering and the effect on the cost of the tender stated.

The alternatives suggested shall comply with the relevant British Standards, latest edition, and shall be guaranteed to be equivalent in standard and operation to those specified. The alternative offered shall not be used without approval of the Council, in writing, and until such time as the contract sum has been adjusted.

Upon being notified that his tender has been accepted, the Contractor shall immediately check the delivery period quoted for all items of material listed in this schedule. He will then be required to place his order for such materials at an appropriate time to ensure delivery of materials without hindrance to the progress of the works and to bring to the notice of the Council any long delivery periods quoted which may cause delay in completion.

In cases where delay is liable to be caused through long delivery, alternatives will be allowed, but approval must be obtained, in writing, from the Council to the use of such alternatives.

Where delay is caused through inability to obtain a specified material or piece of equipment and this inability is attributable to neglect on the part of the Contractor in placing his order, the Council reserves the right to alter or modify the specification so that an alternative material or piece of equipment, method of fixing or means of installation shall be substituted for that originally specified without any extra cost being allowed to the contract. The decision of the Council in this matter shall be final and all correspondence between supplier and Contractor shall be made available for the Council's inspection to enable him to determine the responsibility for delay.

SCHEDULE OF MATERIALS AND EQUIPMENT

DESCRIPTION	MANUFACTURER	REFERENCE
PV Panels	To be confirmed at design stage	
Inverters	To be confirmed at design stage	
Switchgear	To be confirmed at design stage	
Cables	LSOH	BASEC Approved

SECTION 5

SUMMARY OF TENDER

ARMTHORPE PARISH COUNCIL

SECTION 6 – ELECTRICAL SUMMARY OF TENDER

Armthorpe Community Centre Solar Panels

Item	Description	Price (£)
1	Supply and Installation of a roof-mounted photovoltaic system, including all panels, links, mounting frames, brackets, and associated equipment.	£
2	Supply and Installation of all inverters, monitoring equipment and all associated wiring and connection.	£
3	Provide grid connectivity in compliance with relevant electricity supply regulations	£
4	Provision of all necessary permits, approvals, and regulatory compliance for the installation.	£
5	Provision of scaffolding and access equipment	£
6	Testing and commissioning	£
7	Provision of 'As Fitted' drawings and maintenance manuals	£
8	Any work not included in the above items but necessary to comply fully with the specification and drawings, and to provide a <u>fully operational</u> PV system	£
	Total Price	£