Scheme Specification

Solar Panel Installations To Suit Various House Types

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This document has been prepared by Trevor Hopkins Associates Ltd. with relevant sections and information provided by suppliers, consultants, and manufacturers.

Change Log

Revision	Change
A	First Release
B	Updated information following updated MIS3002 Version 6.0

NOTE:

The scheme must comply with all recommendations made and specifications stated unless granted specific written disposition by the Employer or their Appointed Agent. If no details are provided it is the Contractor's responsibility to investigate, design and specify the relevant elements.

This document shall be read in conjunction with the schedule of Employers Requirements and Conditions of Contract. All pricing documents shall be returned with a completed installation Summary Form.

Whilst this document captures the main requirements and specifications it is an overview and does not purport to detail every finite detail of the works.

All proprietary products must carry relevant certification for their intended use.

The contractor is responsible for all requirements under the CDM regulations and a full designer's risk assessment will be required prior to completion of the detailed design process.

The contractor is reminded to report any discrepancies to the Employer's Agent and seek clarification where necessary.

Where standards and regulations are quoted, it must be noted that these are only correct at time of writing this document. It is the contractor's responsibility to ensure compliance with all standards and requirements at the time of installation, as relevant.

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SECTION 1: SCOPE

The purpose of this document is to provide specifications and workmanship clauses for retrofitting Solar Photovoltaic panels at various properties within the Barcud housing stock. It accounts for different panel types, site limitations, associated hardware requirements and different property configurations.

This document covers all on-roof installations up to 3.68kWp which is the maximum capacity for G98 (install and notify) installations. In-roof installations or those on roofs below 25 degrees and above 55 degrees are subject to alternative requirements. This document does not cover distributed systems and those intended for HMOs. All photovoltaic systems within this document are intended to provide a solar connection to individual dwellings.

This document covers the installation of solar PV panels with grid connected inverters only. Systems involving electric vehicle charging points and solar batteries are covered by separate requirements.

The installation of solar panels will undertake the following sequence

1. Site assessment and Survey
2. Plan the works (System Design)
3. Obtain approvals
4. Site preparation
5. installation
6. Commissioning
7. Handover

SECTION 2: SYSTEM OVERVIEW

The following gives an overview of the systems to be installed and their general limitations and expectations.

Responsibilities

The contractor will be responsible for the following tasks

1. Assess roof suitability for solar installation: Orientation; area; ascertain structural integrity and condition to meet new loading
2. Locate services
3. Identify site constraints and mitigate
4. Assess electrical system suitability
5. Complete Tender form listing key installation information
6. Provide and remove scaffolding
7. Install solar panels on a proprietary rail system
8. Install inverter in a position to be agreed with the employer's agent
9. Install electrical interconnections
10. Notify DNO (G98 notice)
11. Commission, test and certify the installation. Register all devices for warranties
12. Set up monitoring smartphone app with tenant and Employer's designated representative
13. Provide documentation package including warranty information to Employer

Performance indicators

Solar PV panels and associated inverter should be suitable for generating 3.3 to 3.6kWp. Specific performance degradation limits are listed in this document.

All components must be supplied with a manufacturer's warranty of at least 15 years.

Limitations

Systems must be installed on a southerly aspect roof where practicable. Where roofs cannot support the installation due to structural or size limitations, notify the employer before proceeding. Where the dwelling is an apartment within a building or there are multiple dwellings under the same roof slope, clarify roof/shared ownership with Employer before proceeding. Where the electrical system is deemed unsuitable for installation without further upgrades, notify the employer.

Qualifications

The company providing the installation must carry a valid Trustmark and be MCS certified. Scaffolding must only be installed by a suitably qualified subcontractor. All site operatives must carry valid CSCS cards.

SECTION 3: SITE ASSESSMENT AND SURVEY

3.01: Site Preparation.

Roof slopes should be clean of debris, and vegetation prior to the commencements of works.

3.02: Site Survey

The site must be prepared and surveyed prior to designing the system

- The existing electrical system within the dwelling must be assessed
- Assess the roof slope for suitability
- Impact on protected species
- Locate all incoming services affected by the works
- Site constraints must be established
- Appropriate components must be selected to suit prevailing dwelling geometry or construction
- The roof area must be measured to determine available areas for installation
- Identify factors that may influence the effectiveness of the installation

3.03: Assess electrical system

The existing installation within the dwelling must be assessed by an NICEIC certified electrician.

3.04: Assess roof slope

The roof coverings need to be identified to select the appropriate bracket design and standoff. The roof structure will dictate which bracketry is utilised. Roofs with purlins and rafter may need different bracketry to modern roof trusses. The spacings of structural timbers will dictate bracket spacings.

Roofs must be assessed for structural integrity and suitability for the designated Solar PV installation.

3.05: Protected species

Many species of plants and animals in England are protected. This protection often applies to the habitats supporting features they live in. What you can and cannot do by law varies from species to species.

Local planning authorities (LPAs) should use this guide to assess whether a planning application would harm or disturb a protected species. It will help you decide if you can give planning permission.

This is Natural Resources Wales's 'standing advice'. This is general advice that Natural Resources Wales, as a statutory consultee, gives to LPAs. It:

- avoids the need to consult on every planning application
- helps you make planning decisions on development proposals

You must consult Natural Resources Wales if a development proposal:

- might affect a site of special scientific interest (SSSI)
- needs an environmental impact assessment
- needs an appropriate assessment under the Habitats Regulations

Natural Resources Wales may:

- object to a planning application if it's likely to harm a protected species on a SSSI
- give you advice about a protected species affected by a development proposal or on a specific issue that is not covered by this guidance

You should get advice from a qualified ecologist to help you reach a decision if you need it.

You can find one using either the:

Chartered Institute of Ecology and Environment Management (CIEEM) directory

Environmental Data Services directory

There are separate guides for:

developers to prepare a development proposal to avoid harm or disturbance to protected species

the effect of nationally significant infrastructure projects on protected species

habitats and species of principal importance in England (Section 41 list)

The National Planning Policy Framework sets out the 'mitigation hierarchy'. This requires developers to avoid significant adverse impacts on protected species. If this is not possible, developers should propose mitigation measures. As a last resort, where developers cannot avoid or mitigate adverse impacts, they must compensate for them.

Further guidance is set out in the natural environment planning practice guidance.

BATS

Bats are a rare and declining group of species. Hence, all British species of bat are fully protected by the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats &c.) Regulations 1994 making it an offence to intentionally or recklessly kill or injure or disturb these species whilst in a place of shelter or protection. Failure to comply with this may result in prosecution and anyone found guilty of an offence is liable to a fine or to imprisonment, or both.

Bats frequently live in buildings and may be harmed by development. A thorough visual check by a licensed batworker must be completed to look for evidence of the presence of bats must be carried out BEFORE the works commence.

A bat roost is defined in the legislation as "any structure or place which a bat uses for shelter or protection". Roosts are protected whether or not bats are present at the time. If a development activity is likely to result in the disturbance or killing of a bat, damage to its habitat or any of the other activities listed above, then a licence will usually be required.

Bat surveys begin with an initial site assessment of the buildings to be affected. The survey involves an inspection for signs of bats. Should evidence of bats be found or areas suited to roosting bats identified it may be necessary to complete further evening emergence surveys. Bat activity surveys allow for identification of roost access points, number of bats present and species of bat using a roost. An initial daytime assessment can be completed at any time of year. Activity surveys can only be undertaken in the active season which runs from April to October.

3.06: Incoming services

Incoming Services will be overhead or underground. All overground services should be identified and protected as relevant. Typically, overhead lines are electrical, telephony or specialist communication or alert systems.

Overhead Electric

The law says that any work near electric overhead power lines must be carefully planned and carried out to avoid danger from accidental contact or close proximity to the lines.

The precautions necessary will depend on the nature of the work at the site and will be required even when work near the line is of short duration.

Safety can be achieved by a combination of measures:

Planning and preparation

Eliminating the danger

Controlling the access

Controlling the work

What you need to know

Contact with live overhead lines kills people and causes serious injuries every year.

Work involving long or high plant or equipment eg excavators, MEWPs, scaffold poles, tipper vehicles and cranes, presents a particularly high risk.

Remember:

- contact with a power line is not necessary for danger. Close approach to live conductors may allow a 'flashover';
- contact can be lethal with voltages as low as 230V;
- do not mistake overhead power lines on wooden poles for telephone wires; and
- electric current can flow through wood or plastic (if damp or dirty) and cause fatal shocks.

Planning and preparation

The first step is to find out whether there is any overhead power line within or immediately adjoining the work area, or across any route to it.

Information may be available from the local electricity supplier. If any such lines are found, you should assume that they are live unless proved otherwise by their owners.

If there are any electric lines over the work area, near the site boundaries, or over access roads to the work area, consult the owners of the lines so that the proposed plan of work can be discussed.

Allow sufficient time for lines to be diverted or made dead, or for other precautions to be taken as described below.

Eliminating the danger

Try to eliminate the danger by:

Avoidance – find out if the work has to be carried out under or near overhead lines. It may be possible to avoid it altogether;

Diversion – divert all overhead lines clear of the work area; or

Isolation – make lines dead while the work is in progress.

In some cases it may be necessary to use a suitable combination of these measures, particularly where overhead lines pass over permanent work areas.

If the danger cannot be eliminated, you must manage the risk by controlling access to, and work beneath, overhead power lines.

Controlling the access

Where there is no scheduled work or passage of plant under the lines, barriers can prevent close approach. However, where plant will pass beneath the lines, defined passageways should be made.

The danger area should be made as small as possible by restricting the width of the passageway to the minimum needed for the safe crossing of plant. It is safest if the passageway crosses the route of the line at right angles.

Controlling the work

If work beneath live overhead lines cannot be avoided, barriers, goal posts and warning notices should be provided.

The following precautions may also be needed to manage the risk:

Clearance – the safe clearance required beneath the overhead lines should be ascertained from the owner of the line;

Exclusion – plant, equipment or hand tools that could reach beyond the safe clearance limit should not be taken under the line;

Modifications – plant such as cranes and excavators should be modified by the addition of suitable physical restraints so that it cannot reach beyond the safe clearance limit;

Additions – cranes with telescopic or fly jibs may need additional restraining devices to prevent alteration in length of jib or angle of fly jib; and

Supervision – access for plant and materials and the working of plant should be under the direct supervision of a suitable person appointed to ensure that safety precautions are observed.

Other Overhead lines

Non-electrical power lines should be protected during the works. Their presence may compromise access and should be worked around by the installing contractors. Any damage must be immediately rectified by the appropriate specialist. BT Openreach should be contacted to resolve telephony disruptions and any other data connections must involve the Employer as they may be providing specialist communications for care or alert systems.

3.07: Site constraints

Assess each site individually for accessibility and other factors which may compromise the installation.

3.08: Resident Considerations

The system designer, installer and their nominated representatives must approach the employer to establish if there are any resident limitations which will influence the installations. Examples include:

- mobility and access issues
- requirement for uninterrupted electrical supply due to medical equipment
- limitations to working days or times
- security concerns
- mental health issues of the requirement to have nominees present

Note: all Contractors are required to read, understand and agree to follow the Barcud Codes of Conduct relating to their interactions with Residents and other stakeholders. This documentation is provided separately.

3.09: Environmental Compromises

The installer should plan the system around the presence of trees or adjacent structures which may compromise the performance of the system. Where there is a risk that the system may become compromised in the future such as the result of tree growth, the employer will need to be consulted to assess if a long-term management plan is required or even practicable.

SECTION 4: SYSTEM DESIGN

4.01: Solar Panels

Monocrystalline Solar Panels

Monocrystalline panels are made from a single pure silicon crystal, giving them a uniform dark colour and rounded edges. They are the most efficient type, typically around 21% efficiency, and are ideal for installations with limited roof space. They are durable, long-lasting, and aesthetically appealing, but they are also the most expensive due to the energy-intensive manufacturing process. These must be specified for all installations.

Polycrystalline Solar Panels

Polycrystalline panels are made from multiple silicon crystals melted together, resulting in a blue hue with visible grain boundaries. They are less efficient than monocrystalline panels, averaging around 14–15% efficiency, but are more cost-effective. These panels are suitable for homeowners with ample roof space who want a lower upfront cost. These panels must NOT BE INSTALLED in any Barcud properties unless otherwise approved.

Solar capacity

Solar capacity will be minimum 3.3kW. Where roof slopes do not permit this on an optimal roof location, this should be discussed with the Employer. Note that buildings of multiple occupancy, may not have sufficient roof area to meet the minimum power requirements.

Solar capacity will be no greater than 3.68kW

4.02: Battery Systems

Battery systems are not to be installed during routing Solar Panel retrofit works. Where Barcud require Battery installations to be installed these will be covered under separate arrangements and subject to the guidance of British Standard PAS 63100:2024.

4.03: Mounting Hardware

Generally

All mounting should be manufactured in Stainless Steel or aluminium for all installations due to the high exposure nature of the target properties.

Rails

Rails should be installed to suit the panel layout without excess where practicable. The rails system should only be used with compatible hardware as confirmed by the supplier. Mixing systems is not permitted. Where multiple lengths of rail are required, always use proprietary jointing insets between lengths. As a guide rails should be installed within 350mm of the bottom and tops of panels.

Brackets for Pitched roofs

Brackets should be selected to suit the roof covering. Taller brackets are required for thicker roof coverings. All brackets should be installed with spacers where applicable to ensure surrounding slates are not damaged during installation and use due to bracket flexing. The brackets should be installed directly to rafters using stainless steel screws ensuring at least 50mm engagement in the underlying timber. Once the position of rafters has been determined on the roof, slates should be removed and trimmed as neatly as possibly to ensure a neat and reliable installation. Renusol 420184 brackets should be used on all roofs with plain tiles and slates. These are high load brackets suitable for rafter installation. Sufficient number of brackets should be utilised for every rail. As a guide, this should be the number of panels in a run plus one i.e. 4 panels will require 5+ brackets per rail.

Flashings

All brackets should be installed with proprietary bracket flashings such as Genius Speed Flashings. Insect foam fillers and lids must always be installed.

Bird Mesh

The perimeters of all gaps between panels and roof surface shall be fitted with a tight fitting bird mesh. This mesh should be trimmed to suit the gap so it fits neatly and completely fills the gap.

Others

For roof slopes below 25 degrees and above 55 degrees, alternative systems should be employed. In-roof, wall-mounted and ground-mounted systems are outside the scope of this document.

4.04: Minimum Technical Information

As a minimum, the following technical information shall be communicated in writing to the customer at or before the point that the contract is awarded:

a) The result of the performance estimate calculated in accordance with section

b) Manufacturer's datasheet for the proposed solar modules

c) Manufacturer's datasheet for the proposed inverter

d) Manufacturer's datasheet for the Module Level Power Electronics Device, if applicable

e) Manufacturer's datasheet for the proposed EESS, if applicable

f) A drawing with the proposed module layout

g) The Sunpath diagram used to calculate SF (where SF<1.0 and the MCS methodology is used)

h) Any other requirements stipulated by RECC (if applicable)

SECTION 5: CONSENTS & NOTIFICATIONS

5.01: Prior Approvals.

Several approvals may be required prior to installation of solar panels. The contractor is responsible for obtaining all consents requiring prior approval. All consent must be in place prior to commencement on site.

Planning

In most cases, Solar Panels are considered permitted development but this does not apply to all properties, especially, but not exclusively, those in conservation areas, national parks or listed properties. The local authority should be consulted to ascertain whether planning consent or conservation area consent is required for all panel installations.

Generally, panels must not:

- be installed above the ridge line.
- Must not project more than 200mm above the plane of the roofslope.

Building Regulations

Building regulations will apply to the installation under the following sections:

- Structural Safety (Part A): The roof must be able to support the added weight of the solar panels and mounts without compromising the building's integrity.
- Fire Safety (Part B): Panels must use approved materials and provide adequate ventilation to prevent overheating.
- Conservation of Fuel and Power (Part L): Systems must be wired efficiently.
- Electrical Safety (Part P): The wiring, inverters, and connection to the home's mains must be installed safely to reduce fire and shock risks.

Generally, installers that are MCS certified, do not need to submit a Building Regulations Application, however, all installers should check with their local Building Control that this protocol is valid.

Ecological Licenses

Where the license is affected by the presence of protected species a license may be required from Natural Resources Wales.

Other Consents

Where properties are leased or in shared ownership, consent will be required from the leaseholder and all relevant stakeholders.

5.02: Notifications

G98 applications

Micro generation (G98) is a simple connection procedure for fully type tested installations under 16A per phase. Installations take place on a fit and notify basis.

The generation installation must meet the following criteria to qualify within the G98 guidelines:

- The rated output must be under 16A per phase for connection at low voltage
- Grid Interface Protection must be installed to local standards and functionally tested
- The system will shut down during a power outage
- An isolation switch is installed, capable of isolating all phases, and lockable in the "Off" position
- A circuit diagram is displayed on-site

It is installed by an installer who has not commissioned any other generation within the local geographic region within the last 28 days or plans to install more within this region in the next 28 days

You must notify the of the generation installation within 28 days of commissioning.

G98 Form A for installations of generation / storage at **multiple premises**

G98 Form B for installations of generation / storage at a **single premise**

If you require more information, please see the applicable summary guide. You can submit your forms by email or post. Make sure to include any supporting documentation.

Email: nged.newsupplies@nationalgrid.co.uk

Post: National Grid Electricity Distribution, Records Team, 6th Floor, Toll End Road, Tipton, DY4 0HH

G99 applications

These cover installations over 3.68kWp which require prior approval from the DNO. These fall outside the scope of this document.

SECTION 6: INSTALLATION

6.01: Setting Out

All installations must be planned to take into account roof orientation and optimal position dictated by latitude. This is typically around 40 degrees for housing owned and operated by Barcud. There panels are fixed to roof slopes they will generally be roof mounted parallel to the roof slope. For roof slopes below 25 degrees and above 55 degrees, alternative systems should be investigated. Generally, panels are installed on a south facing roof-slope but where dwelling orientation does not permit, they should be installed on a southerly aspect. Roof mounted obstacles such as projecting dormers, sky lights and chimney will impact the layout and should be planned around.

Panels must be installed with at least 400mm from roof edges in all directions. This minimum distance applies to rooflights, dormers, valleys and chimneys to allow access for maintenance

Panel support rails must be positioned within 350mm of panel edges unless otherwise recommended by the panel manufacturer.

6.02: Site limitations

Panel installations are severely compromised by shadowing caused by trees or other permanent structures. External hardware must be installed in a way that does not impede access or accessibility for maintenance.

6.03: Electrical Work

The peak power of the system and its connection type will dictate the configuration of the system to be installed. Installation will include all wiring, interconnections, inverter and isolators.

Where installations are to be completed on older dwellings, there is a likelihood that non-combustible consumer units are not installed. The option to instal metal consumer units should be given to the employer where they are not already fitted, for consideration.

6.04: Commissioning

The system will undergo commissioning and post-installation testing by the installer. Part of the commissioning will include a comprehensive explanation of the system to the resident and the relevant housing officer or designated employer's representative. The tenant will be guided on all infographics and assistance will be provided to install smartphone apps where available. Where systems are connected to landlords supply only, the employer's representative must be guided through the system and any monitoring software usage.

6.05: MCS

MCS is the UK's quality mark for renewable energy technologies like solar panels and heat pumps. They set the standards to expect from an MCS certified installer and the products they use, highlighting quality, competency and compliance.

MCS certification is also a requirement for accessing many UK government incentives and ensures that the renewable installation is installed to industry-recognised MCS Standards.

Solar Photovoltaic systems should only be installed and certified by MCS certified contractors working to the latest published MIS3002 standards.

It is a scheme requirement for MCS Contractors to own at least one copy of the following documents in each office or regional office undertaking design and commissioning work:

- BS 7671:2018 Requirements for Electrical Installations (IET Wiring Regulations Eighteenth Edition). Available from British Standards Institution (BSI): www.bsi-global.com or The Institution of Engineering and Technology (IET): www.theiet.org/publications/
- IET Code of Practice for Grid Connected Solar Photovoltaic Systems (IET publication ISBN 978-1-84919-721-2 Paperback, 978-1-84919-722-9 Electronic)
- Engineering Recommendation G99 Issue 1 – Amendment 1 published May 2018 - 'Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019'
- Engineering Recommendation G98 Issue 1 – Amendment 1 published May 2018 - 'Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019'
- Engineering Recommendation G100 Issue 1 – Amendment 2 May 2018 - 'Technical Requirements for Customer Export Limiting Schemes' • MCS 001 - MCS - Contractors certification scheme document.

It is not a scheme requirement for MCS Contractors to own, or have immediate access to, the following documents unless this MIS standard does not adequately cover off the aspects required.

- MGD 003: Determining the Electrical Self-Consumption of Domestic Solar Photovoltaic (PV) Installations with and without Electrical Energy Storage
- MGD 005: Solar PV Shade Evaluation Procedure
- BRE Digest 489 Wind loads on roof-based photovoltaic systems.
- BRE Digest 495 Mechanical installation of roof-mounted photovoltaic systems.
- BS EN 50549-1:2019 Requirements for generating plants to be connected in parallel with distribution networks. Connection to a LV distribution network. Generating plants up to and including Type B
- BS EN 1991-1-1:2002 Eurocode 1. Actions on structures. General Actions. Densities, self-weight, imposed loads for buildings.
- BS EN 13374:2013+A1 Temporary edge protection systems. Product specification. Test methods.
- BS EN 62446-1:2016+A1:2018 Photovoltaic (PV) systems. Requirements for testing, documentation and maintenance. Grid connected systems. Documentation, commissioning tests and inspection.
- BS EN 10088-1:2005 Stainless steels. List of stainless steels.
- BS EN 12975-2:2006 Thermal solar systems and components – Solar collectors – Part 2 Test methods.
- BS EN ISO 14713-1:2017 Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel structures. General principles of design and corrosion resistance.
- ETSI TS 103 645 Cyber Security for Consumer Internet of Things.
- Ofgem: Guidance for generators: Co-location of electricity storage facilities with renewable generation supported under the Renewables Obligation or Feed-in Tariff schemes (version 2).
- MIS 3012 – MCS – The Battery Standard
- IET Code of Practice for Electrical Energy Storage Systems (IET publication ISBN 978-1-78561-278-7 Paperback, 978-1-78561-279-4 Electronic)
- Single Ply Roofing Association "Site pull-out test protocol for flat roofs" (S15-19).

All system components must be fitted in struct accordance with manufacturers written instructions and product guidance in terms of physical and electrical installation and environmental protection.

All equipment should be installed in accordance with its manufacturer's instructions. Where the manufacturer's instructions conflict with the requirements of MIS3002 then the requirements of MIS3002 take precedence unless it can be proven that system performance, safety and durability are no worse than if the requirements are followed.

6.06: Distribution Network Operator (DNO)

Applications can be discussed with the DNO. Where G98 installations are a 'fit and notify' installation, G99 installations require prior approval before works commence. Two network operators cover Wales: SP Energy Networks in the North and National Grid in the South. Refer to 'https://www.energynetworks.org/customers/find-my-network-operator' for coverage.

6.07: Fire Detection

The fire detection system within the property is to be upgraded to include a multi sensor where the inverter and solar battery are located within a dwelling. Where dwellings are not already fitted with interlinked smoke and heat detectors, the whole house system is to be upgraded.

6.08: Installation period

The installation is to be completed, tested and commissioned within 21 days of erection of scaffolding unless otherwise agreed by the Employer. Where the employer may wish to secure scaffolding on the property for a longer period to conduct roof maintenance works, this will be discussed and negotiated on a case by case basis.

6.09: Commissioning

The solar PV system shall be commissioned according to a documented procedure to ensure that the system is safe, has been installed in accordance with the requirements of MIS3002 and the manufacturers' requirements, and is operating correctly in accordance with the system design. The system shall be inspected and tested in accordance with Section 16 of the Code of Practice except 16.4.

6.10: Documentation and Handover

MCS Contractors shall collate a comprehensive document pack which, as a minimum, includes:

- Copies of all forms and checklists used to commission the system
- The maintenance requirements and maintenance services available (see clause 7)
- Manufacturer user manuals and warranty details.
- Any documentation or checklists required for any incentive schemes
- Any additional information as detailed in Section 17 of the Code of Practice

At the point at which the solar PV system is handed over to the client, the documentation as detailed in 6.2.1 shall be provided and explained along with a document signed by the MCS Contractor containing at least the following:

- A declaration, signed by the MCS Contractor's on-site representative, confirming that the installation meets the requirements of this Standard
- Client name and address
- Site address (if different)
- MCS Contractor's name, address, contact details etc.
- List of the key components installed
- The estimation of system performance calculated according to Section 4
- Recommended interval for the first periodic inspection
- MCS contact details (helpline telephone number and email address)

No later than 10 working days after commissioning, the installation shall be registered by the MCS Contractor on the MCS Installation Database (MID) and an MCS Certificate generated.

The MCS Certificate shall be sent to the customer with instruction to include it within the handover pack.

The generation of the certificate shall be undertaken in full compliance with the terms and conditions of use of the MID1 and the registration of the system on the MID shall be undertaken only after the system has been fully installed and commissioned and not before.

6.11: Maintenance

A maintenance schedule including the checks to be undertaken and their frequency is given in MIS3002 Appendix F according to building type/occupancy. The maintenance checks suggested along with their frequency are advisory only and include:

- Customer checks (visual only)
- An intermediate maintenance visit by an MCS Contractor
- A full maintenance visit with more involved tests requiring specialist equipment, again by an MCS Contractor.

Note: The actual checks required, and how frequent, will be dependent upon system size, the use/occupancy of the building, and ease of roof access along with specific requirements of the customer and any other stakeholders such as insurers. As a minimum, handover documents shall include the checks customers should carry out themselves, the recommended frequency of those checks, and what to do if any issues are identified.

6.12: Registrations

G98 applications to the DNO are to be completed within 48 hours of system commissioning.

Inverter product registrations to activate guarantees and warranties are to be completed within 48 hours of commissioning

MCS Commissioning certification is to be issued to the Employer within 14 days of commissioning.

SECTION 7: SITE SAFETY

7.01: Construction (Design And Management) Regulations 2015

CDM 2015 makes a distinction between commercial clients and domestic clients. Client duties apply in full to commercial clients (for domestic clients the duties normally pass to other dutyholders).

A commercial client is any individual or organisation that carries out a construction project as part of a business.

Commercial clients have a crucial influence over how projects are run, including the management of health and safety risks. Whatever the project size, the commercial client has contractual control, appoints designers and contractors, and determines the money, time and other resources for the project.

For all projects, commercial clients must:

1. make suitable arrangements for managing their project, enabling those carrying it out to manage health and safety risks in a proportionate way. These arrangements include:
   - appointing the contractors and designers to the project (including the principal designer and principal contractor on projects involving more than one contractor) while making sure they have the skills, knowledge, experience and organisational capability
   - allowing sufficient time and resources for each stage of the project
   - making sure that any principal designer and principal contractor appointed carry out their duties in managing the project
   - making sure suitable welfare facilities are provided for the duration of the construction work
2. maintain and review the management arrangements for the duration of the project
3. provide pre-construction information to every designer and contractor either bidding for the work or already appointed to the project
4. ensure that the principal contractor or contractor (for single contractor projects) prepares a construction phase plan before that phase begins
5. ensure that the principal designer prepares a health and safety file for the project and that it is revised as necessary and made available to anyone who needs it for subsequent work at the site

For notifiable projects (where planned construction work will last longer than 30 working days and involves more than 20 workers at any one time; or where the work exceeds 500 individual worker days), commercial clients must:

- notify HSE in writing with details of the project
- ensure a copy of the notification is displayed in the construction site office

Refer to www.hse.gov.uk for detailed responsibilities

7.02: Health & Safety

Contractor is to manage the project adhering to the following examples of potential risk:

Falls from height

- Make sure ladders are in good condition, at a 1:4 angle and tied or footed.
- Prevent people and materials falling from roofs, gable ends, working platforms and open edges using guardrails, midrails and toeboards.
- Ensure fragile roof surfaces are covered
- Secure working platforms with guard rails to be used on or below the roof.

Exposure to building dusts

- Prevent dust by using wet cutting and vacuum extraction on tools; use a vacuum cleaner rather than sweeping; use a suitable, well fitting mask.

Electricity

- Turn the electricity supply and other services off before drilling into walls.
- Do not use excavators or power tools near suspected buried services.

Generally

- Protect members of the public, the client, and others.

Secure the site

- Provide nets to scaffolds and use rubbish chutes as required.

Residents

- The building will remain in constant use by residents and visitors throughout the works. Robust procedures and operations must be in place to ensure the safety of all site attendees throughout the works. This will apply 24 hours a day, 7 days a week so it is imperative that the site is left in a safe condition at the end of each working day and members of the public are kept safe during each working day. This may require temporary diversions to be in place and all members of the public and the employer must be made aware of any changes to arrangements and procedures in advance so that residents can be kept updated. Ladders must be plated and locked when left unattended to prevent unauthorised access.

7.03: Work At Height Regulations 2005

The Regulations apply to all work at height where there is risk of a fall that is liable to cause personal injury. They place duties on employers, the self-employed and any person who controls the work of others (such as facilities managers or building owners who may contract others to work at height).

Those with duties under the Regulations must ensure that:

- all work at height is properly planned and organised
- those involved in work at height are competent
- the risks from work at height are assessed, and appropriate work equipment is selected and used
- the risks of working on or near fragile surfaces are properly managed
- the equipment used for work at height is properly inspected and maintained

For managing work at height and selecting the most appropriate equipment, dutyholders must:

- avoid work at height where possible, for example doing the work from ground level using extending equipment
- use work equipment or other measures to prevent falls, where work at height cannot be avoided, for example cherry pickers or scaffolding
- use work equipment or other measures to minimise the distance and consequences of potential falls, where the risk cannot be eliminated, for example nets or bean bags

For more information, see: The Work at Height Regulations 2005 or A Brief Guide to the Work at Height Regulations.

The law requires that when you work at height, you also plan for emergencies and rescue. These arrangements should not rely on the fire brigade as this may result in a delay which may be critical.

SECTION 8: ELECTRICAL & FIRE

8.01: Installation Generally

Install, test and commission the electrical work in accordance with BS 7671 (The IEE Wiring Regulations) and requirements of the Electricity supply company ensuring compliance with design and performance requirements, to provide a safe, well insulated, earth protected system capable of supplying the anticipated maximum demand. Installation work to be carried out by qualified electricians fully conversant with BS 7671 (The IEE Wiring Regulations). All installers to carry a current and valid MCS Certificate issued by one of the following organisations to cover the entire installation from the Solar Panels to the existing home electrical network:

- Certsure LLP t/a NICEIC
- Napit Certification Ltd
- Simply Certification
- The IAA (Installation Assurance Authority)
- Amtivo Group t/a British Assessment Bureau

8.02: Cable Routes

Cable routes should be straight, vertical or horizontal and parallel. Positioned at least 150 mm clear of other services. Cables running parallel and adjacent to heating pipes to be located below the pipes. Concealed horizontal runs in walls, if unavoidable, to be located within 150 mm of ceiling or between 150 and 300 mm of floor. Concealed cable runs to wall switches and outlets to be vertically in line with the accessory.

8.03: Installing Cables Generally

Install cables neatly and securely, adequately protected against accidental damage, adverse environmental conditions, mechanical stress and deleterious substances. Install cables without joints other than at equipment and terminal fittings. Do not run cables in spaces where they will be surrounded or covered by insulation. Where this is not practical, size cables accordingly.

8.04: Inspection And Testing

To BS 7671 (The IEE Wiring Regulations: Part 7). Give not less than 24 hours notice before commencing tests. In addition to items required to be inspected or tested, ensure that labels and signs required by the Regulations are securely fixed in the correct locations. After satisfactory completion of tests submit two copies of inspection and completion certificates to the Employer.

8.05: Fire Detection

The fire detection system within the property is to be upgraded to include a multi sensor where the inverter are located within a dwelling. Where dwellings are not already fitted with interlinked smoke and heat detectors, the whole house system is to be upgraded.

SECTION 9: OTHERS

9.01: Site exploration

The Main Contractor shall make local enquiries, visit the site and carry out his own investigations into existing services and other factors affecting the proposed works including access to the site. No claims for failure to make search enquiries will be considered.

9.02: Existing Services

Protect and secure the safety (and temporary diversion if necessary) of:

- Live services known at the time of tender.
- Other services, (unknown of or unlocated at the time of tender) from the time of their location.

9.03: Protecting the Works from Inclement Weather

The Main Contractor shall protect the works from inclement weather.

9.04: Scaffold

It is a requirement of the Work at Height Regulations 2005 that unless a scaffold is assembled to a generally recognised standard configuration, eg NASC Technical Guidance TG20 for tube and fitting scaffolds or similar guidance from manufacturers of system scaffolds, the scaffold should be designed by bespoke calculation, by a competent person, to ensure it will have adequate strength, rigidity and stability while it is erected, used and dismantled.

At the start of the planning process, the user should supply relevant information to the scaffold contractor to ensure an accurate and proper design process is followed. Typically this information should include:

- site location
- period of time the scaffold is required to be in place
- intended use
- height and length and any critical dimensions which may affect the scaffold
- number of boarded lifts
- maximum working loads to be imposed and maximum number of people using the scaffold at any one time
- type of access onto the scaffold eg staircase, ladder bay, external ladders
- whether there is a requirement for sheeting, netting or brickguards
- any specific requirements or provisions eg pedestrian walkway, restriction on tie locations, inclusion/provision for mechanical handling plant eg hoist)
- nature of the ground conditions or supporting structure
- information on the structure/building the scaffold will be erected against together with any relevant dimensions and drawings
- any restrictions that may affect the erection, alteration or dismantling process

Prior to installation, the scaffold contractor or scaffold designer can then provide relevant information about the scaffold. This should include:

- type of scaffold required (tube & fitting or system)
- maximum bay lengths
- maximum lift heights

- platform boarding arrangement (ie 5 + 2) and the number of boarded lifts that can be used at any one time
- safe working load / load class
- maximum leg loads
- maximum tie spacing both horizontal and vertical and tie duty
- details of additional elements such as beamed bridges, fans, loading bays etc, which may be a standard configuration (see note 1 ref TG20:13) or specifically designed
- information can be included in relevant drawings if appropriate
- any other information relevant to the design, installation or use of the scaffold
- reference number, date etc. to enable recording, referencing and checking
- All scaffolding must be erected, dismantled and altered in a safe manner. This is achieved by following the guidance provided by the NASC in document SG4 'Preventing falls in scaffolding' for tube and fitting scaffolds or by following similar guidance provided by the manufacturers of system scaffolding.

For scaffolds that fall outside the scope of a generally recognised standard configuration the design must be such that safe erection and dismantling techniques can also be employed throughout the duration of the works. To ensure stability for more complex scaffolds, drawings should be produced and, where necessary, these may need to be supplemented with specific instructions. Any proposed modification or alteration that takes a scaffold outside the scope of a generally recognised standard configuration should be designed by a competent person and proven by calculation.

All employees should be competent for the type of scaffolding work they are undertaking and should have received appropriate training relevant to the type and complexity of scaffolding they are working on.

Employers must provide appropriate levels of supervision taking into account the complexity of the work and the levels of training and competence of the scaffolders involved.

As a minimum requirement, every scaffold gang should contain a competent scaffolder who has received training for the type and complexity of the scaffold to be erected, altered or dismantled.
Trainee scaffolders should always work under the direct supervision of a trained and competent scaffolder. Operatives are classed as 'trainees' until they have completed the approved training and assessment required to be deemed competent.

Erection, alteration and dismantling of all scaffolding structures (basic or complex) should be done under the direct supervision of a competent person. For complex structures this would usually be an 'Advanced Scaffolder' or an individual who has received training in a specific type of system scaffold for the complexity of the configuration involved.

Scaffolding operatives should be up to date with the latest changes to safety guidance and good working practices within the scaffolding industry. Giving operatives job specific pre-start briefings and regular toolbox talks is a good way of keeping them informed.

Guidance on the relevant expertise of Scaffolders and Advanced scaffolders including details of which structures they are deemed competent to erect can be obtained from the Construction Industry Scaffolders Record Scheme (CISRS) website

It is the scaffold users / hirers responsibility to ensure that all scaffolding has been inspected as follows:

- following installation / before first use
- at an interval of no more than every 7 days thereafter
- following any circumstances liable to jeopardise the safety of the installation eg high winds.

All scaffolding inspection should be carried out by a competent person whose combination of knowledge, training and experience is appropriate for the type and complexity of the scaffold. Competence may have been assessed under the CISRS or an individual may have received training in inspecting a specific type of system scaffold from a manufacturer/supplier.

A non-scaffolder who has attended a scaffold inspection course (eg a site manager) could be deemed competent to inspect a basic scaffold structure.

The scaffold inspection report should note any defects or matters that could give rise to a risk to health and safety and any corrective actions taken, even when those actions are taken promptly, as this assists with the identification of any recurring problem.

9.05: Health & Safety

The accuracy and sufficiency of this information is not guaranteed by the Employer or the Employer's representative. The Contractor is to ascertain if any additional information is required to ensure the safety of all persons and the Works.

Common hazards: Not listed. Control by good management and site practice.

Site staff: Draw to the attention of all personnel working on the site the nature of any possible contamination and the need to take appropriate precautionary measures.

COSHH: The Contractor shall at his own expense observe and comply with Control of Substances Hazardous to Health & Regulation 1998 and all other acts of Parliament, instruments, rules, orders, regulations, bylaws and any other updates and amendments thereof

The Contractor shall take all reasonable precautions for safeguarding their employees and other persons and property affected by both execution of the contract

The Main Contractor shall provide temporary fencing, hoardings, planked footways, guard rails, gantries and the like, as may be necessary for the proper execution of the work and for meeting the requirements of the local, highway and other authorities.

The Main Contractor will be responsible for meeting current Welfare Regulations for all employees and sub-contractors during the works including provision of toilet facilities.

Comply with the recommendations of BS 5228-1, in particular clause 7.3, to minimize noise levels during the execution of the Works.

Protect the site, the Works and the general environment including the atmosphere, land, streams and waterways against pollution. If pollution occurs inform immediately, including to the appropriate Authorities and provide relevant information.

Prevent nuisance from smoke, dust, rubbish, vermin and other causes.

Prevent personal injury or death, and damage to the Works or other property from fire. Comply with Joint Code of Practice 'Fire Prevention on Construction

The Main Contractor is to manage the project adhering to the following examples of potential risks

Falls from height

Make sure ladders are in good condition, at a 1:4 angle and tied or footed.

Prevent people and materials falling from roofs, gable ends, working platforms and open edges using guardrails, midrails and toeboards.

Make sure fragile roof surfaces are covered, or secure working platforms with guard rails are used on or below the roof.

Exposure to building dusts

Prevent dust by using wet cutting and vacuum extraction on tools; use a vacuum cleaner rather than sweeping; use a suitable, well fitting mask.

Electricity

Turn the electricity supply and other services off before drilling into walls.

Do not use excavators or power tools near suspected buried services.

Generally

Protect members of the public, the client, and others.

Secure the site

Net scaffolds and use rubbish chutes.

Visitors

Limit access to the works to all but essential personnel. Meetings are to be conducted away from construction risks and hazards. Visitors must sign in and out of the site and wear the appropriate level of PPE required as relevant. It should be noted that some works may need to be halted and made safe prior to certain site visitation.

Waste

General: Minimize production of waste and prevent accumulations. Keep the site and works clean and tidy. This includes rubbish, debris, spoil, surplus material, containers and packaging.

Collect and store waste in suitable containers. Remove frequently and dispose off site in a safe and competent manner:

- Non-hazardous material: In a manner approved by the Waste Regulation Authority.
- Hazardous material: As directed by the Waste Regulation Authority and in accordance with relevant regulations.

Sort and dispose of recyclable material at a Materials Recycling Facility approved by the Waste Regulation Authority.

Remove rubbish, dirt and residues from all voids and cavities in the construction before closing in.

Personal Protective Equipment

General: Provide for the sole use of those acting on behalf of the Employer, in sizes to be specified:

- Safety helmets to BS EN 397, neither damaged nor time expired. Number required: 2.
- High visibility waistcoats to BS EN ISO 20471 Class 2. Number required: 2.
- Safety boots with steel insole and toecap to BS EN ISO 20345. Pairs required: 2.
- Disposable respirators to BS EN 149.FFP1S.
- Eye protection to BS EN 166.
- Ear protection - muffs to BS EN 352-1, plugs to BS EN 352-2
- Hand protection - to BS EN 388, 407, 420 or 511 as appropriate.

9.06: Protections

Protect Existing Services

Confirmation: Notify all service authorities, statutory undertakers and/ or adjacent owners of proposed works not less than one week before commencing site operations.

Identification: Before starting work, check and mark positions of utilities/ services. Where positions are not shown on drawings obtain relevant details from service authorities, statutory undertakers or other owners. Subject to fees.

Work adjacent to services

- Comply with service authority's/ statutory undertaker's recommendations.

- Adequately protect, and prevent damage to services: Do not interfere with their operation without consent of service authorities/ statutory undertakers or other owners.

Identifying services

- Overhead: Use headroom markers.

Damage to services

If any results from execution of the Works:

- Immediately give notice and notify appropriate service authority/ statutory undertaker.
- Make arrangements for the work to be made good without delay to the satisfaction of service authority/ statutory undertaker or other owner as appropriate.
- Any measures taken to deal with an emergency will not affect the extent of the Contractor's liability.

Protect Roads And Footpaths

Duty: Maintain roads and footpaths within and adjacent to the site and keep clear of mud and debris.

Damage caused by site traffic or otherwise consequent upon the Works: Make good to the satisfaction of the Employer, Local Authority or other owners.

Protect Existing Work

Protection: Prevent damage to existing work, structures or other property during the course of the work.

Removal: Minimum amount necessary.

Replacement work: To match existing.

Protect Building Interiors

Protection: Prevent damage from exposure to the environment, including weather, flora, fauna, and other causes of material degradation during the course of the work.

Protect Existing Furniture, Fittings And Equipment

Protection: Prevent damage or move as necessary to enable the Works to be executed. Reinstate in original positions.

Protect Adjoining Property

Permission: Obtain as necessary from owners if requiring to erect scaffolding on or otherwise use adjoining property.

Adjoining Property Restrictions

Precautions:

- Prevent trespass of workpeople and take precautions to prevent damage to adjoining property.
- Pay all charges.
- Remove and make good on completion or when directed.
- Works that require access onto adjoining land may be subject to The Access to Neighbouring Land Act 1992

Damage: Bear cost of repairing damage arising from execution of the works.

Protect Existing Structures

Duty: Check proposed methods of work for effects on adjacent structures inside and outside the site boundary.

Protect Materials For Recycling/ Reuse

Duty: Sort and prevent damage to stated products or materials, clean off bedding and jointing materials and other contaminants.

Storage: Stack neatly and protect until required by the Employer or for use in the Works as instructed

9.07: Principal Designer/Contractor

A principal designer can be an organisation or individual who is appointed by the client (commercial or domestic) to take the lead in planning, managing, monitoring and coordinating health and safety during the pre-construction phase (design and planning stage) of a project involving, or likely to involve, more than one contractor.

A principal designer is the designer (as defined in the Regulations) with control over the pre-construction phase who has the relevant skills, knowledge and experience and where they are an organisation, the organisational capability to carry out all the functions of the role. However, they do not have to carry out actual design work on the project.

A principal designer has an important role in influencing how the risks to health and safety should be managed and incorporated into the wider management of a project. Design decisions taken during the pre-construction phase can have a significant effect on whether a project is delivered in a way that secures health and safety. The principal designer's role involves close cooperation with the client and the principal contractor, and coordinating the work of others in the project team to ensure that significant and foreseeable risks are managed throughout the design process.

A principal designer must be appointed in writing by the client where a project involves, or is likely to involve, more than one contractor.

The principal designer should be appointed by the client as early as possible in the design process, and where practicable, at the concept stage of the project.

The duration of a principal designer's appointment should take into account any design work which may continue into the construction phase or any issues that may arise during construction involving the need to make suitable modifications to the designs. A principal designer should be in place for as long as there is a need for their role to be performed, but where their appointment finishes before the end of the project, they should fully brief the principal contractor on matters arising from designs relevant to any subsequent construction work, and also pass the health and safety file on to them.

A principal designer must be a designer as defined, and must be able to demonstrate they have the health and safety skills, knowledge and experience (SKE), and where they are an organisation, the organisational capability, to carry out the work they are being appointed for. The level of SKE should be proportionate to the complexity of the project and the range and nature of the risks involved. This will involve having:

- the technical knowledge of the construction industry relevant to the project
- the ability to understand, manage and coordinate the pre-construction phase (including ensuring that significant and foreseeable risks are managed through the design process) and any design work carried out after construction begins

A principal contractor is the contractor with control over the construction phase of a project involving more than one contractor. They are appointed in writing by the client (commercial or domestic) to plan, manage, monitor and coordinate health and safety during this phase.

A principal contractor, in close cooperation with the client and the principal designer, has an important role in influencing how the risks to health and safety are managed during construction work. This includes ensuring standards are understood and followed.

A principal contractor must be appointed in writing by the client where a project involves more than one contractor.

The principal contractor should be appointed by the client as early in the project as possible and before the construction phase begins. This is so that the principal contractor can:

- allow time to plan the work of the construction phase and, in liaison with the principal

designer and others involved in the project, identify any risks to health and safety and the control measures which need to be put in place

- record details of any planning in a construction phase (PDF) plan
- work with the client for the duration of their appointment

liaise with the principal designer for the remainder of their appointment for the purposes of planning, managing, monitoring and coordinating the pre-construction phase

The effort devoted to planning should be proportionate to the complexity of the project and the level of risks involved.

A principal contractor must be able to demonstrate that they have the skills, knowledge, experience (SKE) and, where an organisation, the organisational capability to carry out the work they are being appointed for. The level of SKE should be proportionate to the scale and complexity of the project and the nature of the risks to health and safety.

Skills and Competence

The Contractor shall make every site operative under his direct (indirect) employment working on this project aware of the standard of workmanship he is expected to attain.

Where and to the extent of materials, products and workmanships are not fully specified they shall be installed:

- In accordance with the manufacturer's instructions and good building practice (including the relevant provision of current British Standard documents).
- Suitable for the purpose of the works stated in or to be reasonably inferred following contract documents

When the site manager has satisfied himself that a completed operation is of the required standard he should notify the Employer.

The contractor shall not leave it to the Employer to detect faults and provide snagging lists and shall himself plan his own inspection arrangements in order to reduce the risk of costly remedial works, which he would have had to carry out to comply with his obligations.

Operatives: Appropriately skilled and experienced for the type and quality of work.

Quality Of Products

Generally: New

Supply of each product: From the same source or manufacturer.

Whole quantity of each product required to complete the Works: Consistent kind, size, quality and overall appearance.

Tolerances: Where critical, measure a sufficient quantity to determine compliance.

Deterioration: Prevent. Order in suitable quantities to a programme and use in appropriate sequence.

Quality Of Execution

Generally: Fix, apply, install or lay products securely, accurately, plumb, neatly and in alignment.

Dimensions: Check on-site dimensions.

Finished work: Without defects, e.g. not damaged, disfigured, dirty, faulty, or out of tolerance.

Location and fixing of products: Adjust joints open to view so they are even and regular.

Related Work

Details: Provide all trades with necessary details of related types of work. Before starting each new type or section of work ensure previous related work is:

- Appropriately complete.
- In accordance with the project documents.

- To a suitable standard.
- In a suitable condition to receive the new work.

Preparatory work: Ensure all necessary preparatory work has been carried out.

Manufacturer's Recommendations/ Instructions

General: Comply with manufacturer's printed recommendations and instructions current on the date of installation.

Changes to recommendations or instructions: Submit details.

Ancillary products and accessories: Use those supplied or recommended by main product manufacturer.

Agreement certified products: Comply with limitations, recommendations and requirements of relevant valid certificates.

Compliance

Compliance with proprietary specifications: Retain on site evidence that the proprietary product specified has been supplied.

Compliance with performance specifications: Submit evidence of compliance, including test reports indicating:

- Properties tested.
- Pass/ fail criteria.
- Test methods and procedures.
- Test results.
- Identity of testing agency.
- Test dates and times.
- Identities of witnesses.
- Analysis of results.

Documentation

Hand over to the Employer at Practical Completion. These shall be typewritten, A4 bound with each page enclosed in a durable cover. The following information must be included:

- Record Drawings
- Test and Completion Certificates
- Maintenance Instructions
- Manufacturers’ Directory & Colour Product literature
- Full Description of works
- Commissioning Certificates

SECTION 10: BARCUD SOLAR PANEL INSTALLATION FORM

(To be completed by Tendering Contractor)

Property Number/Name	
Street	
Town	
County	
Postcode	
Existing Roof Material	
Existing Roof Structure	
Roof assessed to be suitable?	
Contractor's Name	
MCS Certification Number	
IEEE Certificate Number	
Fire alarm System Assessor	
Panel Manufacturer	
Panel Model and Capacity	
No of Panels to be Fitted	
Panel performance guarantee 10 year Output Rating % 25 year Output Rating %	10y_____% 25y_____%

Configuration (e.g 2 x 8)	
Orientation of Roof Where Panels are to be Installed	
Rail Manufacturer and Material	
Bracket Type and Material	
Inverter make	
Inverter Model and Rating	
Inverter Location	
Inverter Guarantee Period	