

# GREEN HOME FESTIVAL

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# POWERING THE MODERN HOME: THE ELECTRICAL PERSPECTIVE

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 **SELECT**





## WHO ARE **SELECT** ?

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- **1900** founded in Edinburgh
- **1,250** member firms
- **15,00** electricians
- **3,500** apprentices and adult trainees
- **£1 billion** member turnover

# CLIMATE CHANGE ACT 2008 & CO2 EMISSIONS



**2019**

UK Climate Change Act is amended with new targets...



**100%**

...with the original 80% reduction now 'net zero'...



**2050**

...to be achieved by the middle of this century...



**2045**

...but here in Scotland, the target is five years earlier



# CLIMATE CHANGE ACT 2008 & CO2 EMISSIONS



- The way we power and heat our homes has evolved throughout the years.
- This type of power and heat generation won't be permitted in Scotland in 2045
- Use alternatives to harness renewable energy sources and power our homes



# GENERATION AND STORAGE



**SOLAR**



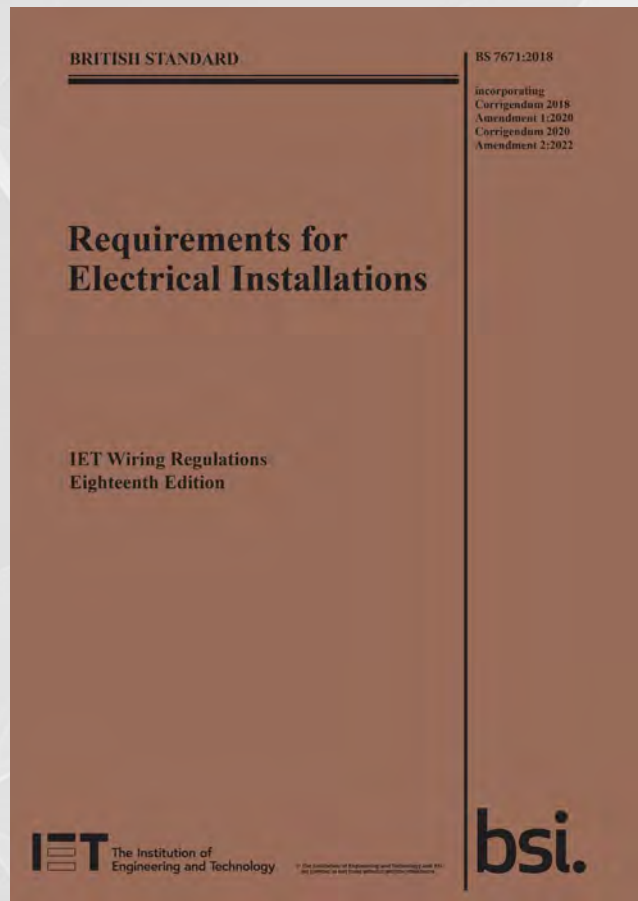
**WIND**



**HYDRO**



**ENERGY STORAGE**



- The current edition of the IET wiring regulations is called **BS 7671:2018+A2:2022**
- Applies to the design, installation and verification of electrical installations
- New Part 8 and chapter on **Prosumer's Electrical Installations**



## PART 8: FUNCTIONAL REQUIREMENTS

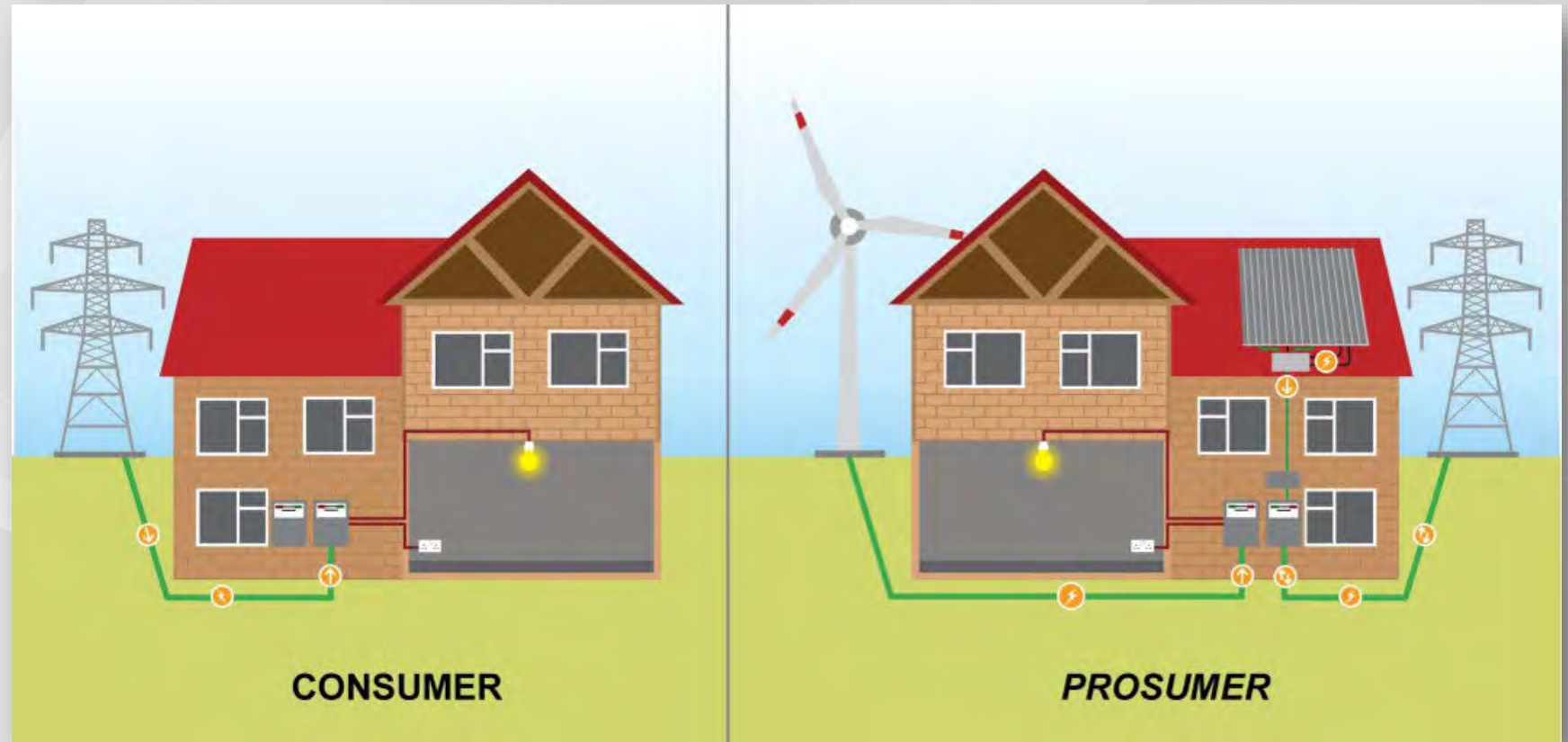
- This is an entirely new part in BS 7671 which contains only one chapter

## CHAPTER 82: PROSUMER'S LOW VOLTAGE ELECTRICAL INSTALLATIONS

- Historically, utility companies have managed the public transmission and distribution network from the point of view of having central production adapted to demand variation.
- The objective of this chapter is to provide requirements, such that, low-voltage electrical installations are compatible with the current and future ways to deliver safely the electrical energy to current-using equipment either from the public network or from other local sources.

## WHAT IS A PROSUMER?

An Entity or party which can be both a producer **and** a consumer of electrical energy



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# PROSUMER METHODS

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## SOLAR PV

- Installing a solar PV system can be beneficial
- Use the electricity you produce to power your home
- Excess electricity that is not used can be sold and fed back to the network or stored for later use



# HOW TO GENERATE ELECTRICITY AND BECOME A PROSUMER



**WIND GENERATION**



**HYDRO GENERATION**



## DO YOU HAVE AN ELECTRIC VEHICLE AND CHARGE POINT?

- The point where an electric vehicle is connected to the fixed installation, i.e. electrically
- Any unused electricity can be fed from the vehicle back into the property for you to use





# HEATING YOUR HOME: AIR SOURCE HEAT PUMPS

- An air source heat pump (ASHP) is a low-carbon way of heating a home, absorbing latent heat from the outside and using it to increase the temperature inside.
- ASHPs look similar to air-conditioning units. Their size depends on how much heat they'll need to generate for a home – the more heat, the bigger the heat pump.
- There are two main types of ASHPs: **air-to-water** and **air-to-air**. They work in different ways and are compatible with different types of heating systems.



# WHAT TO DO WITH UNUSED GENERATED ELECTRICITY

- Electrical energy storage systems (EESS) will play a major part in the drive towards net zero
- Will help you reduce the amount of energy you use from the grid
- With unit costs at an all-time high, will also help with cost savings
- Works great in conjunction with solar PV as the excess power generated can be stored

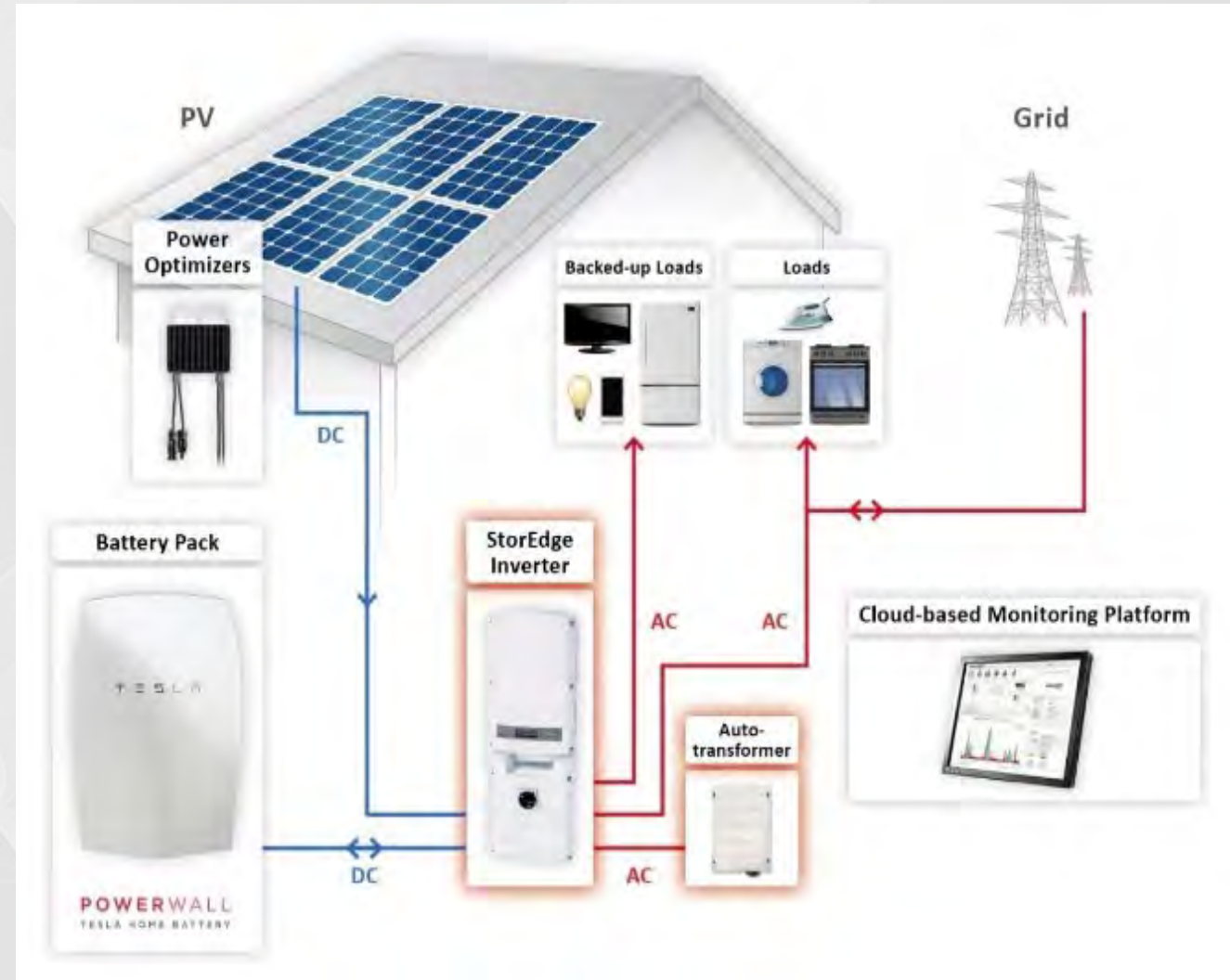




## ELECTRICAL ENERGY MANAGEMENT SYSTEM

BS 7671 Regulation 825.1:

“An EEMS shall monitor and control the operation of all power supplies, the load of the storage units and the operation of loads.”



# OPERATING MODES

## CONNECTED MODE

Where a prosumer's installation is connected to the grid, can be **direct feeding**, i.e. importing **from** the grid, or **reverse feeding**, i.e. exporting **to** the grid

## ISLAND MODE

Normally connected to the grid but operating in a mode where some or all of the installation is isolated from the grid and is operating solely from a generated source or an EESS





# ISLAND MODE OPERATION

- Where circuits are operated independently of the grid supply, a few additional conditions must be planned and adhered to.
- Such circuits will need to be connected via an additional consumer unit/distribution board.
- In accordance with BS 7671, the EESS cannot rely on the distributors' earth connection during island mode operation.



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THE INSTALLATION

 **SELECT**

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## HOW SELECT CAN HELP

- SELECT members are assessed by a UKAS accredited inspection service
- This includes requirements for competent and qualified employees and compliance with relevant statutory and industry standards
- SELECT continues to push for regulation of the electrical industry and professional recognition for electricians
- SELECT provides training to members on various aspects of electrical requirements



## BENEFITS OF USING A SELECT MEMBER

- Nearest contractor can be located via SELECT website
- Annually inspected
- Insured
- Training
- Complaints procedure
- Technical advice
- Industry-recognised trade association, with more than 120 years of experience





# DNO NOTIFICATION AND APPROVAL

**EVCP & HP Connections Form v3.4**

**Cover Page**

Completing this form accurately will help DNOs process your application as quickly as possible. Please read the following information thoroughly before starting to ensure you have all information required to complete the relevant sections.

<b>What is eligible</b>	This form is for Electric Vehicle Charge Points (EVCP) or Heat Pumps (HP) being installed in a premises with an existing Distribution Network Operator (DNO) electricity connection. This form may also be used for the installation of Vehicle-to-Grid Electric Vehicle Charge Points (V2G EVCP) where the total aggregated capacity of generation/battery storage equipment in a premises is 17kW (single phase) or 50kW (3-phase) or less. To apply for a new connection to the network, please contact your relevant DNO.
<b>When to complete</b>	This form should always be reviewed prior to installing any new EVCP or HP to determine whether the installation requires an application or whether it is eligible for the notification process.
<b>When to submit</b>	If the installation meets all the notification criteria (Section B) the DNO must be notified within 28 days of installing the new equipment. If all the criteria in Section B cannot be met, you should submit an application to the DNO using this form before connecting the new equipment to ensure that the DNO can maintain safe and effective operation of the electricity network.
<b>What to submit</b>	Depending on the nature of the new equipment, the DNO may require additional information. For multiple pieces of equipment (including multiple pieces of equipment under one controller) or multiple premises, please use the <a href="#">multiple installations spreadsheet</a> , also available on the ENA website.
<b>Finding your DNO</b>	For help identifying your DNO and their contact details please visit the ENA website. Grid: Any reinforcement costs associated with this installation may be charged to the customer.

**Required Information**

To populate this form, you will need information about the following:

<b>Device to be installed</b>	Details of EVCPs or HPs to be installed are required. Where equipment is not registered in the relevant ENA database, additional information will be required (Section E). A link to the Heat Pump Database can be found on the <a href="#">Database page</a> on the ENA website. Type tested V2G EVCPs can be found in the <a href="#">ENA Type Test Verification Record Register</a> .
<b>Existing services at the premises</b>	Details of any existing EVCPs, electric heating, battery storage, generation (e.g. solar PV), storage or other large load drawing devices.
<b>Maximum demand (MD)</b>	A load survey is required to calculate the Maximum Demand. This should comprise the existing Maximum Demand of the whole premises and the new equipment to be installed as well as any import or load limiting devices. Further Guidance on such devices is available in the FAQ section of the Connecting to the network page on the ENA website. If the cut-out rating is unknown or uncertain, it can be established by asking the DNO. The supply capacity MUST be confirmed with the DNO where the MD is greater than the cut-out rating of where the new MD is >60A per phase (13.8kVA single phase) for residential / non-CT metered premises.
<b>Supply capacity / cut-out rating</b>	If the cut-out rating is unknown, a photograph can be provided to the DNO together with the application. Please note that you <b>MUST NOT</b> open the cut-out unless authorised to do so. Further Guidance on cut-out ratings is available on the ENA website.
<b>Adequacy of supply</b>	An adequacy of supply assessment is required prior to installing a EVCP or HP. The DNO must be contacted in advance of installation where there is an identified issue with adequacy or a safety concern with the premises existing DNO service equipment.

**Timelines**

Providing that this form is fully and correctly completed, the following timeframes are applicable:

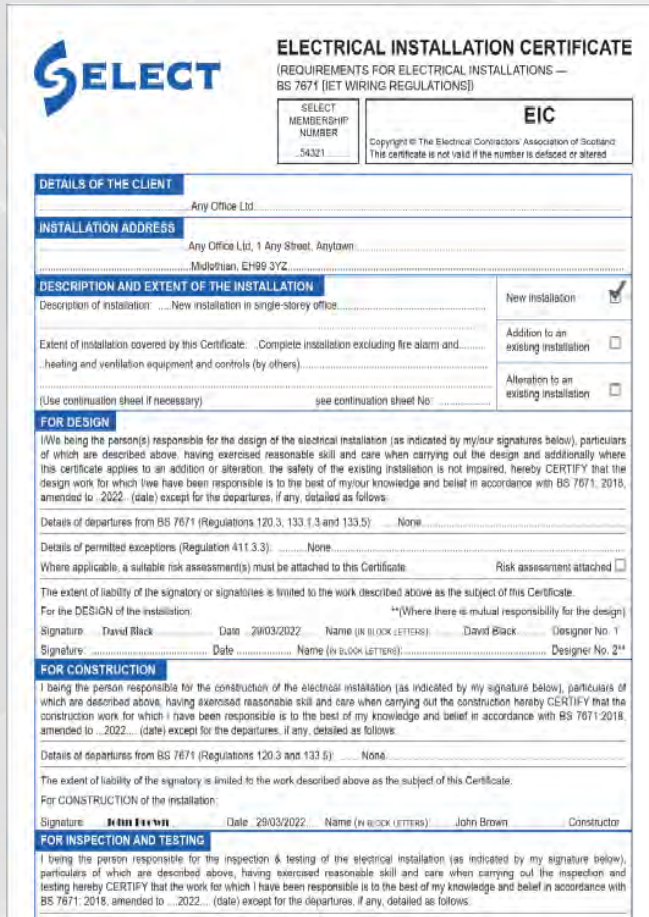
<b>Notification</b>	Provided the installation meets all the relevant notification criteria (i.e. all the applicable checkboxes in Section B that are relevant to the installation can be ticked) installers can connect the new EVCP or HP and notify the DNO using this form within 28 days of their installation.
<b>Application (MD &lt; 100A)</b>	The DNO should assess the supply capacity and confirm if the new equipment can be connected within 10 working days of receiving the completed form.

<https://www.enanetworks.org/registering-the-networks-connection-to-the-network>  
<https://www.enanetworks.org/info/faq/why-is-my-network-operator-fee>

## Additional Loads

- DNOs generally treat the connection of an EESS and solar PV in parallel with their network, much like a distributed generation system
- Installers of an EESS and Generation Systems must follow the same approach as the additional loading for gaining approval
- A good working knowledge of ENA Engineering Recommendations G98 and G99 will be required.
- **bit.ly/G98-ENA / bit.ly/G99-ENA**
- Feeding into the grid, MCS certification will be required.

# DOCUMENTATION



**SELECT** ELECTRICAL INSTALLATION CERTIFICATE  
(REQUIREMENTS FOR ELECTRICAL INSTALLATIONS — BS 7671 (IET WIRING REGULATIONS))

SELECT MEMBERSHIP NUMBER: .54321  
EIC  
Copyright © The Electrical Contractors' Association of Scotland  
This certificate is not valid if the number is defaced or altered

**DETAILS OF THE CLIENT**  
Any Office Ltd

**INSTALLATION ADDRESS**  
Any Office Ltd, 1 Any Street, Anytown  
Middletown, EH99 3YZ

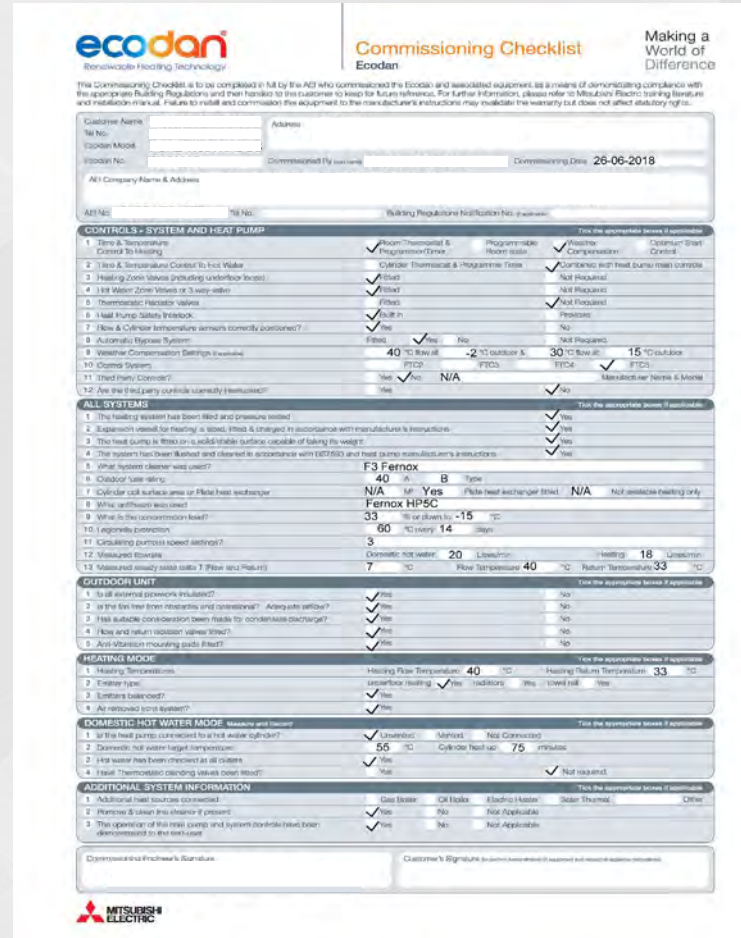
**DESCRIPTION AND EXTENT OF THE INSTALLATION**  
Description of installation: ... New installation in single-storey office  
New installation   
Extent of installation covered by this Certificate: ... Complete installation excluding fire alarm and heating and ventilation equipment and controls (by others)  
Addition to an existing installation   
Alteration to an existing installation   
(Use continuation sheet if necessary) see continuation sheet No: .....

**FOR DESIGN**  
I (We) being the person(s) responsible for the design of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design and additionally where this certificate applies to an addition or alteration, the safety of the existing installation is not impaired, hereby CERTIFY that the design work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671, 2018, amended to ...2022... (date) except for the departures, if any, detailed as follows:  
Details of departures from BS 7671 (Regulations 120.3, 133 (1.3 and 133.5)) ... None  
Details of permitted exceptions (Regulation 411.3.3) ... None  
Where applicable, a suitable risk assessment(s) must be attached to this Certificate Risk assessment attached   
The extent of liability of the signatory or signatories is limited to the work described above as the subject of this Certificate.  
For the DESIGN of the installation. <sup>\*\*</sup>(Where there is mutual responsibility for the design)  
Signature: David Black Date: 29/03/2022 Name (in BLOCK LETTERS): David Black Designer No. 1  
Signature: Date: Name (in BLOCK LETTERS): Designer No. 2<sup>\*\*</sup>

**FOR CONSTRUCTION**  
I being the person responsible for the construction of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction hereby CERTIFY that the construction work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to ...2022... (date) except for the departures, if any, detailed as follows:  
Details of departures from BS 7671 (Regulations 120.3 and 133.5)) ... None  
The extent of liability of the signatory is limited to the work described above as the subject of this Certificate.  
For CONSTRUCTION of the installation:  
Signature: John Brown Date: 29/03/2022 Name (in BLOCK LETTERS): John Brown Constructor

**FOR INSPECTION AND TESTING**  
I being the person responsible for the inspection & testing of the electrical installation (as indicated by my signature below), particulars of which are described above, having exercised reasonable skill and care when carrying out the inspection and testing hereby CERTIFY that the work for which I have been responsible is to the best of my knowledge and belief in accordance with BS 7671:2018, amended to ...2022... (date) except for the departures, if any, detailed as follows:

Electrical Installation Certificate



**ecodan** Commissioning Checklist Making a World of Difference  
ecodan  
Renewable Heating Technology

The Commissioning Checklist is to be completed in full by the ADI who commissioned the Ecodan and associated equipment, as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference. For further information, please refer to Mitsubishi Electric training literature and installation manual. Failure to install and commission the equipment to the manufacturer's instructions may invalidate the warranty (it does not affect statutory rights).

Customer Name: Address: Ecodan Model: Ecodan No: Commissioned by: Commissioning Date: 26-06-2018  
All Company Name & Address: ARI No: TR No: Building Regulations Notification No. (if applicable)

**CONTROLS - SYSTEM AND HEAT PUMP**  
1. Thermostat/Control to Heating: Room/Thermostat & Programmable Room/Zone ✓, Radiator/Room/Zone Control ✓  
2. Thermostat/Control to Hot Water: Cylinder/Thermostat & Programmable Time ✓, Combined with hot/cold water control ✓  
3. Heating Zone Valves (including underfloor heating): ✓, Not Required ✓  
4. Hot Water Zone Valves or 3-way valve: ✓, Not Required ✓  
5. Thermostatic Radiator Valves: ✓, Not Required ✓  
6. Hot Pump Safety Interlock: ✓, Not Required ✓  
7. Flow & Off-flow temperature sensors correctly positioned? ✓, No ✓  
8. Automatic Bypass System: ✓, Not Required ✓  
9. Weather Compensation Settings (if available): 40 °C flow all FPC, -2 °C outdoor FPC, 30 °C flow all FPC, 15 °C outdoor FPC ✓  
10. Control System: ✓, Not Required ✓  
11. Third party control? ✓, Not Required ✓  
12. Are the third party controls correctly installed? ✓, Not Required ✓

**ALL SYSTEMS**  
1. The heating system has been filled and pressure tested ✓  
2. Equipment used for filling is clean, fitted & changed in accordance with manufacturer's instructions ✓  
3. The feed pump is fitted on a suitable surface capable of taking its weight ✓  
4. The system has been flushed and cleared in accordance with BS 7671 and heat pump manufacturer's instructions ✓  
5. What system cleaner was used? F3 Fernox  
6. Outdoor unit rating: 40 kW B Type  
7. Outdoor unit surface area or plate heat exchanger: N/A or Yes (plate heat exchanger fitted) N/A Not suitable heating only  
8. What antifreeze was used? Fernox HPSC  
9. What is the concentration level? 33 % or down to -15 °C  
10. Logically detection: 60 °C every 14 days  
11. Circulating pumps speed settings? Domestic hot water: 20 Litres/min Heating: 18 Litres/min  
12. Visually checked: 7 °C Flow (and Return) Flow Temperature: 40 °C Return Temperature: 33 °C


**OUTDOOR UNIT**  
1. Is all external pipework insulated? ✓/Yes ✓/No ✓  
2. Is the hot line from radiators and convectors? Adequate venting? ✓/Yes ✓/No ✓  
3. Has suitable condensation been made to condensation discharge? ✓/Yes ✓/No ✓  
4. Flow and return isolation valves fitted? ✓/Yes ✓/No ✓  
5. Anti-vibration mounting pads fitted? ✓/Yes ✓/No ✓

**HEATING MODE**  
1. Heating temperature: Heating Flow Temperature: 40 °C Heating Return Temperature: 33 °C  
2. Emiser type: ✓/Yes ✓/No ✓  
3. Emiser balanced? ✓/Yes ✓/No ✓  
4. Air removed from system? ✓/Yes ✓/No ✓

**DOMESTIC HOT WATER MODE**  
1. If the hot water pump connected to a hot water cylinder? ✓/Unvented ✓/Unvented ✓/Not Connected ✓  
2. Domestic hot water target temperature: 55 °C ✓/Cylinder heat up: 75 minutes ✓  
3. Hot water has been checked at all outlets: ✓/Yes ✓/No ✓  
4. Final Thermostatic mixing valve open fitted? ✓/Yes ✓/No ✓

**ADDITIONAL SYSTEM INFORMATION**  
1. Additional heat sources connected? Gas Boiler ✓/Oil Boiler ✓/Electric Heater ✓/Solar Thermal ✓/Other ✓  
2. Radiators & clean this cleaner if present: ✓/Yes ✓/No ✓/Not Applicable ✓  
3. The operation of the main pump and system controls have been demonstrated to the customer: ✓/Yes ✓/No ✓/Not Applicable ✓

Operator's Signature: Date: Customer's Signature: (to be completed by customer at end of commissioning)



Commissioning Certificate





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## ANY QUESTIONS?

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