

PAS 2030:2012

Improving the energy efficiency of existing buildings

Specification for installation process, process management and service provision



Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2012. Published by BSI Standards Limited 2012.

ISBN 978 0 580 75722 8

ICS 91.120.10, 91.140.10

No copying without BSI permission except as permitted by copyright law.

Publication history

First edition February 2012

Amendments issued since publication

Date	Text affected

Contents

	Page
Foreword	iii
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Installation process	4
4.1 Method statement	4
4.2 Energy efficiency measure design specification	4
4.3 Installation location information	4
4.4 Installation methods	5
4.5 Installation equipment and tools	5
4.6 Checking, handling and storage	5
4.7 Provision of installation instructions to operatives	5
4.8 Intermediate inspections	6
4.9 People	6
4.10 Engagement of subcontract installers	6
4.11 Commissioning	7
4.12 Handover	7
4.13 Installation control	7
4.14 Installation documents and record keeping	7
5 Installation process management	8
5.1 Operation and process oversight	8
5.2 Pre-installation survey	8
5.3 Action in respect of intermediate inspection	8
5.4 Installation process change	8
5.5 Process continuity plan	9
5.6 Process control	9
5.7 Internal audit and corrective action	9
5.8 Installation process records	9
5.9 Business and financial probity	9
6 Service provision	10
6.1 Complaints procedure	10
6.2 Interaction with customers	10
7 Claims of conformity	10
7.1 General claims requirement	10
7.2 Declarations of conformity	10
8 Documents essential to the application of the Annexes of this PAS	11
8.1 Use of the identified documents	11
8.2 British Standards	11
8.3 Institution of Gas Engineer and Managers – Standards	12
8.4 Energy Networks Association Engineering Recommendations	12
8.5 UKLPG	12
8.6 Department of Communities and Local Government	12
8.7 Common Minimum Technical Competence Annexes	13



Annexes

Annex A (normative) Condensing boilers, natural gas-fired and liquefied petroleum gas-fired (domestic and non-domestic)	14
Annex B (normative) Condensing boilers, oil-fired (domestic and non-domestic)	19
Annex C (normative) Heating controls	25
Annex D (normative) Under-floor heating	29
Annex E (normative) Flue-gas recovery devices	34
Annex F (normative) Gas-fired warm-air heating systems (domestic and non-domestic)	38
Annex G (normative) Electric storage heaters (domestic and non-domestic)	43
Annex H (normative) Cavity wall insulation	46
Annex I (normative) Loft insulation	51
Annex J (normative) Pitched roof insulation	56
Annex K (normative) Flat roof insulation	61
Annex L (normative) Internal wall insulation	66
Annex M (normative) External wall insulation	71
Annex N (normative) Hybrid wall insulation	76
Annex O (normative) Draught proofing	82
Annex P (normative) Floor insulation	87
Annex Q (normative) Heating system insulation (pipes and cylinders)	92
Annex R (normative) Energy efficient glazing and doors	97
Annex S (normative) Lighting fittings	103
Annex T (normative) Lighting controls (non-domestic)	107
Annex U (normative) Ground and air source heat pumps	111
Annex V (normative) Solar thermal	117
Annex W (normative) Solar PV	124
Annex X (normative) Biomass boilers	130
Annex Y (normative) Micro-combined heat and power (CHP)	136
Annex Z (normative) Micro- and small-scale wind turbine systems	142
Annex AA (informative) Installation project information collation form	147

List of figures

Figure 1 – Green Deal overview	vi
--------------------------------------	----

List of tables

Table A.1 – Measure-specific requirements for gas-fired condensing boilers	15
Table B.1 – Measure-specific requirements for oil-fired condensing boilers	20
Table C.1 – Measure-specific requirements for heating controls	26
Table D.1 – Measure-specific requirements for under-floor heating	30
Table E.1 – Measure-specific requirements for flue-gas recovery devices	35
Table F.1 – Measure-specific requirements for gas-fired warm-air heating systems (domestic and non-domestic)	39
Table G.1 – Measure-specific requirements for electric storage heaters (domestic and non-domestic)	44
Table H.1 – Measure-specific requirements for cavity wall insulation	47
Table I.1 – Measure-specific requirements for loft insulation	52
Table J.1 – Measure-specific requirements for pitched roof insulation	57
Table K.1 – Measure-specific requirements for flat roof insulation	62
Table L.1 – Measure-specific requirements for internal wall insulation	67
Table M.1 – Measure-specific requirements for external wall insulation	72
Table N.1 – Measure-specific requirements for hybrid wall insulation	77
Table O.1 – Measure-specific requirements for draught proofing	83
Table P.1 – Measure-specific requirements for floor insulation	88
Table Q.1 – Measure-specific requirements for heating system insulation (pipes and cylinders) ..	93
Table R.1 – Measure-specific requirements for energy efficient glazing and doors	98
Table S.1 – Measure-specific requirements for lighting fittings	104
Table T.1 – Measure-specific requirements for lighting controls (non-domestic)	108
Table U.1 – Measure-specific requirements for ground and air source heat pumps	112
Table V.1 – Measure-specific requirements for solar thermal	118
Table W.1 – Measure-specific requirements for solar PV systems	125
Table X.1 – Measure-specific requirements for biomass boilers	131
Table Y.1 – Measure-specific requirements for micro-CHP equipment	137
Table Z.1 – Measure-specific requirements for micro- and small-scale wind turbine systems	143

Foreword

The development of this Publicly Available Specification (PAS) has been facilitated by BSI Standards Limited and published under licence from The British Standards Institution. It came into effect on 7th February 2012 to specify requirements for the installation of energy efficiency measures (EEM) using products and systems approved for use in the installation of EEM measures recognized in the UK Government's Standard Assessment Procedure (SAP) in relation to the Green Deal and the Green Deal Code of Practice, in existing buildings. This will be particularly but not exclusively where such installation is undertaken within the remit of the United Kingdom Green Deal Financing Mechanism.

The development of this PAS was sponsored by the Department for Energy and Climate Change (DECC).

Acknowledgement is given to Mr Tom Lock of the Energy Saving Trust Limited who, as Technical Author for PAS 2030, has made significant contribution to its timely completion.

Recognition is also given to the following organizations that, through their nominees to the Steering Group, assisted with the development of this specification through direct technical input and through the provision of liaison with other bodies not directly represented on the group:

- Association of British Certification Bodies
- British Board of Agrément
- British Electrotechnical and Allied Manufacturers Association
- British Gas
- British Standards Institution Consumer & Public Interest Network
- Chartered Institution of Building Services Engineers
- Construction Products Association
- CITB-ConstructionSkills
- Department of Communities and Local Government
- Energy Retailers Association
- Federation of Master Builders
- Glass and Glazing Federation
- Insulated Render and Cladding Association
- Kingfisher plc
- National Insulation Association
- Royal Institute of British Architects
- United Kingdom Accreditation Service
- University College London.

Comments from other parties were also sought by BSI, particularly through the Expert Review and Public Comment process, which took place during October 2011. The expert contributions from all the organizations and individuals consulted in the development this PAS are gratefully acknowledged.



Publishing information

The British Standards Institution retains ownership and copyright of this PAS. BSI Standards Limited as the publisher of the PAS reserves the right to withdraw or amend this document on receipt of authoritative advice that it is appropriate to do so. Once published, this PAS will be reviewed at intervals not exceeding two years, and any amendments arising from the review will be published as an amended Publicly Available Specification and publicized in *Update Standards*.

Use of this document

It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to a competent person or persons for whose use it has been produced.

This PAS is not to be regarded as a British Standard, European Standard or International Standard. In the event that this PAS is put forward to form the basis of a full British Standard, European Standard or International Standard, it will be withdrawn.

Presentational conventions

The provisions of this PAS are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall". Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material, e.g. Notes, are presented in italic type, and do not constitute a normative element.

Contractual and legal considerations

Attention is drawn to the fact that the Green Deal Code of Practice requires installers of energy efficiency measures installed under the Green Deal Financing Mechanism to be certified as conforming to this PAS.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Attention is drawn to the principle, applicable in British Standards generally, that they do not require actions that are the subject of legal requirement. Therefore, this PAS does not include, for example, requirement to observe Health and Safety, Building Regulations, Gas Safety Regulations, Water Regulations, etc. with which it is assumed users of this PAS will be in compliance.

Compliance with this PAS does not in itself confer immunity from legal obligations.



Introduction

This PAS provides a specification for the installation of energy efficiency measures (EEM) in existing buildings. The PAS achieves this by focusing particularly on the necessary installation processes for the measures, the management of the process that guides their installation and the quality of the service provided to the customer before, during and after the installation. This PAS has been designed to establish a robust, uniformly applicable specification that will assist installers that comply with its requirements in full to demonstrate that their installation processes are capable of providing installation of energy efficiency improvement measures to specification and in accordance with the customer's expectations.

This PAS has been produced to work alongside, but not exclusively in connection with, the Green Deal Financing Mechanism. The Green Deal is the Coalition Government's flagship policy for improving the energy efficiency of buildings in Great Britain. It is a market framework based on a key principle that some energy efficiency related changes to properties pay for themselves, in effect, through the resulting savings on fuel bills.

The Green Deal creates a financing mechanism that will allow a range of energy efficiency measures to be installed in both dwellings and non-dwellings at no upfront cost. DECC will be using this PAS:

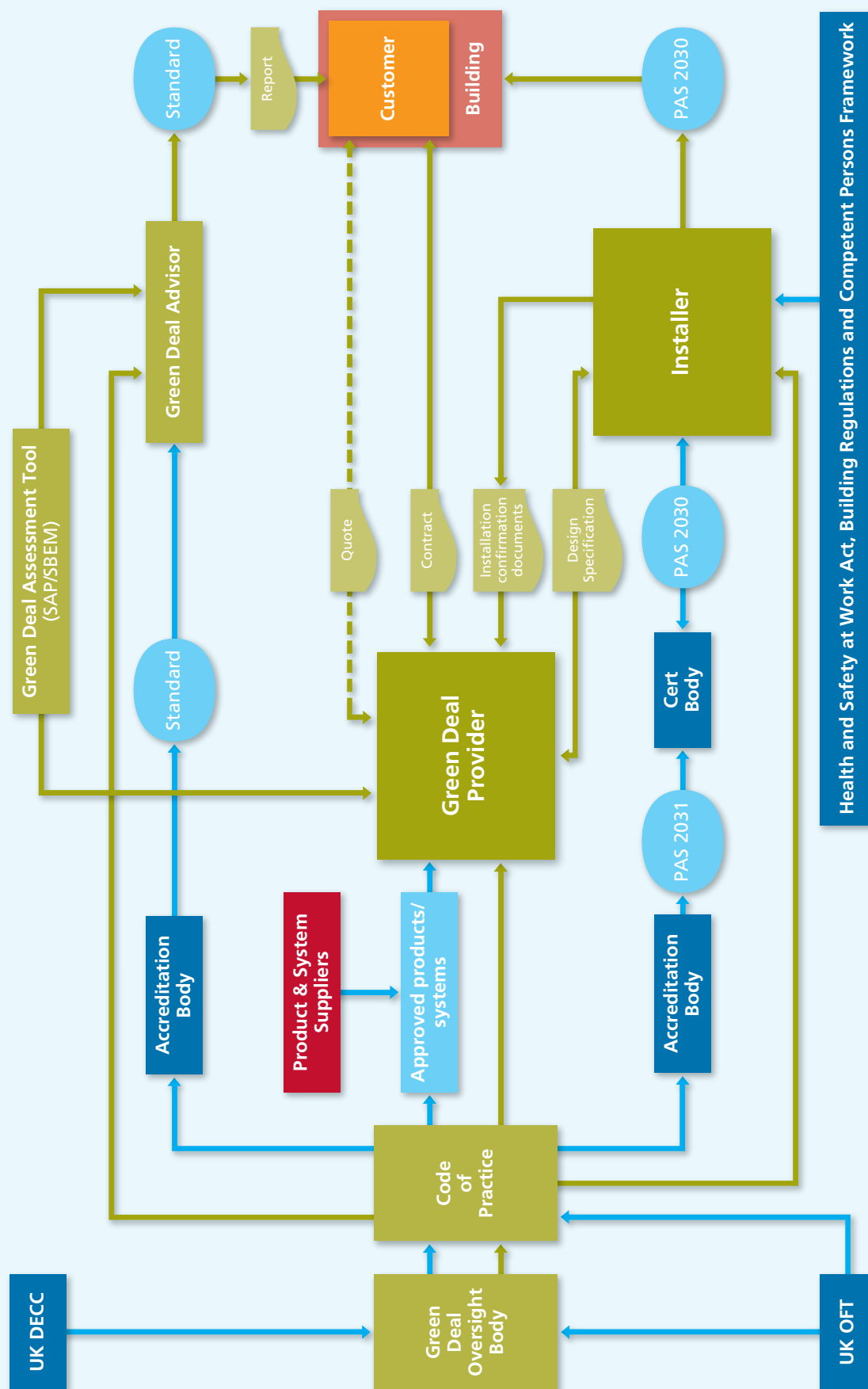
- to set the requirements for the installation of the measure(s) under the Green Deal and in accordance with the requirements of the Green Deal Code of Practice; and
- as a good practice benchmark for installations carried out on their flagship policy.

This PAS is primarily intended for the installer of energy efficiency measures, but other parties may also find it useful (e.g. Green Deal Providers).

At the time of first publication for PAS 2030, the list of EEM permitted under the Green Deal numbered 26 and each of these is provided for in a measure-specific Annex to this PAS. For any given installation, the installer is therefore required to meet all the requirements of Clauses 1 to 8 of PAS 2030 together with those set out in the Annex relevant to the measure to be installed. It is anticipated that the list of permitted measures will change over time and therefore a procedure has been agreed that will facilitate the periodic amendment of the PAS to accommodate amendments, additions and deletions to the list.



Figure 1 – Green Deal overview – Key stakeholder relationships



1 Scope

This Publicly Available Specification (PAS) sets out requirements for the installation of energy efficiency measures (EEM) in existing buildings used for both dwelling and non-dwelling purposes, including those that facilitate the generation of energy for use and/or sale. It is intended for use by any entity undertaking the installation of any products and/or systems designed to improve the energy efficiency of existing buildings but particularly where those products and systems are to be installed within the remit of the United Kingdom Green Deal Financing Mechanism. For those installations funded under the Green Deal this PAS should be read in conjunction with the relevant sections of the Green Deal Code of Practice.

This PAS includes requirements in respect of installation processes, process management and service provision and includes criteria relating to installation methods, equipment, tools, product or system and material suitability, the commissioning of installed measures and the training, skills and competence of the people undertaking such installation.

This PAS is constituted of core requirements to be met by any entity claiming conformance to it, supplemented by Annexes setting out additional requirements for each measure type. This PAS requires claims of conformance to be in respect of the core requirements and all Annexes relevant to the installation to be undertaken by the claiming entity.

Annexes A to Z provide specific requirements relating to particular energy efficiency improvement measures for application by installers undertaking installation of those measures. These Annexes also include requirements in respect of the provision of information to customers.

This PAS does not include requirements for the technical specification of the energy efficiency measures to be installed.

This PAS does not include requirements relating to the certification of PAS 2030 compliance by independent third parties which subject is covered by PAS 2031:2012, developed in conjunction with this PAS.

2 Normative references

Green Deal Code of Practice

NOTE: The application of this PAS requires users to select measure-specific Annexes that are relevant to the measure to be installed from the range of Annexes provided. Because of this all other normative references are Annex specific. Clause 8 lists all documents that are considered indispensable for the application of particular Annexes.

3 Terms and definitions

The following terms and definitions are considered indispensable to the understanding and application of this PAS.

3.1 approved (EEM) register

EEM products and systems recognized for the installation of EEM measures in the conditions in relation to products, as set out in the Green Deal Code of Practice

3.2 competence

having the necessary technical knowledge, skill and experience for the nature of the installation process undertaken

3.3 competence currency

period for which competence is to be considered as adequate without further training and/or knowledge acquisition

3.4 competence ratio

number of operatives below the required threshold and/or specialist competence level permitted to work on an EEM installation of a particular type relative to the number of operatives who meet the required threshold and/or specialist competence level working on the same installation

3.5 commissioning

activities that ensure that the installed measure operates within the boundaries and conditions of the design specification

3.6 customer

property owner, landlord and/or tenant of a building at which energy efficiency measures are being installed

NOTE: Attention is drawn to the fact that in this PAS, the term customer refers to the recipient of an energy efficiency measure installation project. For an installation under the Green Deal that customer will have a direct business relationship with a Green Deal Provider (GDP) and not with the installer undertaking the placement of measures in the building of which they are owner, landlord or tenant. In this context, the installer is acting as an agent of the relevant GDP. The Customer could be referred to as the occupier in other Green Deal-related documents.

3.7 (EEM) product

item from the approved (EEM) register that is not made available as an (EEM) system

3.8 (EEM) specifier

entity providing EEM design and/or specification services to customers in relation to products/systems identified on the approved (EEM) register

3.9 (EEM) system

combination of particular products, installation equipment and materials, installation method and performance objectives included on the approved (EEM) register

3.10 energy efficiency measure (EEM)

planned work undertaken to improve the energy performance of a building by saving or generating energy

3.11 Green Deal Provider (GDP)

entity fulfilling the role of EEM specifier for products/systems from the approved register for installations financed under the Green Deal

NOTE 1: The Green Deal Provider will also have responsibilities relating to the financing of the EEM to be installed.

NOTE 2: PAS 2030 refers throughout to "EEM specifier" as the entity providing EEM design and/or specification services to customers. For installations carried out under the Green Deal, the term Green Deal Provider is to be substituted wherever EEM specifier appears.

3.12 installer

entity undertaking the physical placement of an energy efficiency measure(s) in an existing building

3.13 installation

location, placement and/or fixing of an energy efficiency measure in, or connected to, an existing building excluding any related work to enable the installation of the measure

3.14 operative

person employed by the installer, either directly or under a subcontract arrangement, to undertake installation tasks on an energy efficiency measure in accordance with the relevant method statement and the related requirements of this PAS

NOTE: Individuals employed to provide labouring, carrying or loading/unloading capability do not constitute operatives in the terms of this PAS.

3.15 pre-installation survey

inspection and assessment undertaken by, or on behalf of, the installer prior to commencement of installation, to confirm that the design specification provided by the EEM specifier can be fulfilled at the location specified and that the proposed installation will not result in non-compliance with statutory requirements and/or industry best practice.

NOTE: The application of this survey to particular measures is addressed through the pre-installation requirements and the surveyor competence requirements in the measure-specific Annexes.

3.16 supervision

provision of operational oversight by an operative who meets the required threshold and/or specialist competence level required for the installation of a particular EEM type and is authorized by the installer to do so



4 Installation process

4.1 Method statement

Unless otherwise made available by the EEM specifier, the installer shall define and record in a method statement the **installation process** for each energy efficiency measure to be installed under the scope of this PAS, before commencement of its installation. The method statement shall include the elements listed in a) through l) of this Clause as specified in their respective Clauses in this PAS:

- a) the EEM design specification obtained from the EEM specifier, including the products/systems specified for that installation (4.2) and identification and incorporation of the relevant measure-specific installation Annex(es) from this PAS;
- b) the required location-specific information (4.3);
NOTE: For installations carried out under the Green Deal, this will be obtained from the GDP.
- c) the method(s) for installing the product(s)/system(s) specified, including all constituent tasks and the identification of any relevant standards and specifications (4.4);
- d) the tools and equipment required for the installation, including any requirement for calibration (4.5);
- e) product/system-related checking, handling and storage instructions (4.6);
- f) provision of installation instructions to operatives (4.7);
- g) requirement for intermediate inspection (4.8);
- h) the training and competence required of operatives by the installer and the arrangements to be made for their supervision to ensure installation of the measure(s) in compliance with this PAS and its relevant Annexes (4.9);
- i) details of the sequence of tasks and identification of those undertaking each task (including the engagement of subcontractors) (4.10);
- j) detail of any "commissioning" action required on the part of the installer (4.11);
- k) the information to be delivered to the customer at the time responsibility for the installed measure is handed over (4.12);
- l) procedures for installation control (4.13).

This method statement shall include reference to any other measures already installed or to be installed at the same location that may have an impact on the installation or operation of the product(s) or system and the arrangements to be made for their co-operation (4.3a).

4.2 Energy efficiency measure design specification

4.2.1 Obtaining a copy of the design specification

The installer shall not commence any installation without first having obtained a location-specific design specification for each measure to be installed, from the EEM specifier. For Green Deal-related installations, the design specification shall be obtained from the GDP authorizing that installation.

NOTE: Installers may have an input to the design process, but this is outside the scope of this PAS.

4.2.2 Identification of the relevant measure-specific Annexes

The installer shall identify the measure-specific Annex(es) of this PAS relevant to the design specification for each installation to be undertaken and make provision in the method statement to implement the requirements set out in those Annexes.

4.3 Installation location information

When not already provided, the installer shall obtain the information listed in a) to g) of this Clause to enable the effective installation of the measure(s) at the specified location and to the required standard:

- a) details of, and provision for, interrelationship between measures and measure installation in respect of: (1) mutual efficiency and effectiveness of measures, and (2) working procedures and timing;
- b) installation instructions and requirements to be applied including those for any required interrelationship between measures;
- c) customer requirements and expectations to be met by the installer, including, for example timing, access to the premises, storage of materials and tools and use of toilets and other facilities;
- d) confirmation that all necessary permissions have been obtained and any constraints made known;
NOTE: This should include information in respect of historic or listed properties covered by the Town and Country Planning Act 1990; the Listed Buildings and Conservation Areas Act 1990 or the Ancient Monuments and Archaeological Areas Act 1979.
- e) information that is to be provided by the installer to the customer;
- f) confirmation that the necessary guarantees and warranties are in place;

- g) detail of the terms and conditions included in guarantees and warranties, including any specific installation requirements or limitations that may affect their validity.

The installer shall not commence the installation until the information in a) to g) has been obtained. For installations under the Green Deal this information shall be requested from the GDP or written confirmation obtained from the relevant GDP that particular items of information are not necessary, e.g. in respect of specific customer requirements.

4.4 Installation methods

The method(s) for the installation of the EEM(s) shall originate from the product/system specification sheets or other such guidelines and information provided by the product or system manufacturer, supplier or EEM specifier for this purpose. Preference shall be given to material provided by the manufacturer or set out in the relevant Annex in this PAS.

Where an installation method is not provided with the product or system, the installer shall, prior to commencing the installation, contact the manufacturer, supplier or EEM specifier, as applicable, to obtain the required information.

In the event that installation methods cannot be obtained, commencement of the installation shall be deferred until the required alternative or customised method has been agreed and issued to the installer by the EEM specifier.

4.5 Installation equipment and tools

4.5.1 Availability

Equipment appropriate to the installation process to be undertaken shall be available to operatives at the time of installation.

NOTE: Attention is drawn to the existence of health and safety at work legislation in relation to the provision and use of tools and equipment.

4.5.2 Suitability and capability

The selection and use of equipment and tools shall be defined and relevant to the installation process being undertaken, as provided for in the methods obtained under 4.4.

4.5.3 Calibration

4.5.3.1 Equipment requiring calibration shall be calibrated in accordance with the manufacturer's instruction or verified at intervals determined by the installer prior to use. The interval between such

calibrations shall not exceed that recommended by the equipment manufacturer. Where equipment requiring calibration is hired, copies of calibration certificates shall be obtained and retained as a record.

4.5.3.2 Calibration and verification records for equipment, gauges, measuring and test equipment shall include:

- a) equipment identification, including the measurement reference standard against which the equipment is calibrated;
- b) any out-of-specification readings when equipment is submitted for calibration;
- c) a statement of conformity to specification after each calibration or verification.

4.5.3.3 In the event that the installer has reason to believe that a calibrated item may be out of calibration (e.g. the item has been dropped or mistreated), the installer shall have in place instruction that operatives cease using the item immediately and arrangement for its recalibration or replacement at the earliest practicable time. The installer shall record the date and time of all instances where recalibration or replacement is required during an installation, and take action to confirm any measurements that may have been made while the item was out of calibration.

4.5.4 Equipment and tool maintenance

4.5.4.1 Equipment required to carry out the installation processes shall be identified and resources provided for equipment and tool maintenance.

4.5.4.2 All equipment and tools used for installation work shall be maintained in a fit-for-purpose and safe condition.

4.6 Checking, handling and storage

The installer shall operate a procedure to ensure that they are aware of any particular handling instructions and storage conditions for the measure(s)/products or systems that they are installing under the scope of this PAS and that those requirements are effectively implemented.

4.7 Provision of installation instructions to operatives

The installer shall make available to the operative(s) for every installation undertaken the necessary product/system specifications, work instructions, installation methods and relevant standards, repair requirements and location-specific information to enable the installation to be completed to the specification provided by the EEM specifier.

Location-specific information shall include at least the following:

- a) installation times agreed by the customer and any commitments made;
- b) known special needs/expectations in respect of the customer;
- c) notification of any interrelationship between measures and measure installation at the same location, particularly in respect of the mutual efficiency and effectiveness of measures, working procedures and timing.

NOTE: For measures to be installed under the Green Deal, it is expected that much of the above information will have been made available by the GDP (4.3).

4.8 Intermediate inspections

The installer shall include in the method statement the necessary facility to accommodate any intermediate inspections required by external parties.

4.9 People

4.9.1 Selection, training and work assignment

The installer shall establish and operate procedures to:

- a) determine the skills and competence levels required by operatives to undertake the required installation tasks;
- b) recruit and retain a sufficient number of operatives possessing the required skills at the required level of competence, or capable of acquiring those attributes with appropriate training, as specified in the relevant measure-specific Annex;
- c) provide or arrange access to any training required;
- d) assign operatives to installation projects commensurate with the levels of skill and competence specified in the relevant measure-specific Annex and maintain a record of the operatives assigned to and working on each project;
- e) ensure that operatives undertaking installation tasks are informed of and understand the importance of their installation activities and how they contribute to the achievement of the efficiencies specified;
- f) assess the effectiveness of procedures operated under a), b), c), d) and e);
- g) maintain records of current capability, training, competence and identified route to competence for each operative.

NOTE: Attention is drawn to the requirements relating to the employment and registration of competent operatives in the Green Deal Code of Practice and to the fact that these will need to be taken into account in any certification assessment that may be undertaken in respect of the application of PAS 2030.

4.9.2 Installation supervision

The installer shall assess the respective skills and competence of operatives assigned to the installation tasks required for each installation and provide a level of supervision in accordance with the competence ratio provided in the relevant measure-specific Annex of this PAS. Supervision shall include monitoring and inspecting operatives on site to ensure that they routinely comply with the requirements of PAS 2030 and that measures are installed at the designated location, in accordance with the design specification of the EEM specifier.

4.10 Engagement of subcontract installers

The installer shall ensure that arrangements to subcontract any part of an installation to another installer include requirements that the subcontractor complies with all requirements of this PAS that are relevant to the installation-related tasks to be undertaken. The installer shall retain responsibility for compliance with all requirements of this PAS for all work that is carried out under a subcontract.



4.11 Commissioning

Where otherwise not covered by a measure-specific requirement, it shall be the responsibility of the installer to ensure the installed measure(s) is commissioned, in accordance with the manufacturer's instructions and the design specification and in conformance with any relevant statutory regulations. Record shall be made of commissioning action undertaken, including any performance measurement results, and for installations under the Green Deal copy made available to the GDP.

4.12 Handover

When the measure is fully installed and commissioned, and with any operationally material defects corrected, the installer shall undertake a handover procedure with the customer as follows:

Where the installation is being funded under the Green Deal, the installer shall obtain instructions for the handover process from the GDP and undertake the handover accordingly.

Where the installation is outside the remit of the Green Deal Financing Mechanism, the installer shall prepare and work to a handover procedure including, but not limited to, the provision of information on:

- a) the safe operation of the installed measure, which could include operable components (e.g. windows, including any restrictor hardware), electrical equipment, mechanical equipment and associated control devices (e.g. boilers and heating controls). Where practicable, this shall include both demonstration and a visual check that the person receiving the instruction is able to operate components and controls;
- b) the care of the installed measure to avoid detrimental effects (e.g. avoidance of penetrating air barriers by inserting fixings into internally insulated walls, regular cleaning and replacement of air filters in mechanical ventilation systems);
- c) the regular maintenance of the installation to ensure that it operates safely, efficiently and effectively. Such maintenance shall be in accordance with the requirements of any guarantees or warranties provided by the manufacturer and/or the EEM specifier;
- d) the efficient operation of the installation to facilitate the delivery of the expected reduction in energy use.

Prior to conducting the handover process the installer shall ensure that the operatives undertaking the handover are competent to do so and have access to adequate knowledge on the measures involved in the installation together with the behaviour required for their safe, efficient and effective operation and maintenance. Information provided in the handover process shall be clear, structured, relevant and appropriate.

Where the handover is to be undertaken by the GDP, the installer shall supply such information and guidance as may be requested in advance of the handover and shall make arrangements to provide handover support as required. In advance of the handover the installer shall agree with the GDP the information and guidance to be provided to the customer. In advance of the handover, the installer shall agree with the GDP the information and guidance to be left with the customer, including documentation relating to any defects liability periods.

The handover process shall where practicable, involve a physical viewing of the installed measure and an explanation of its function and operation, including where appropriate demonstrations of the operation of components, devices and controls. The use of any user guides, maintenance manuals and other documents necessary for the safe, efficient and effective care, operation and maintenance of the installed measures, shall also be explained. All guides, manuals and other relevant documentation shall be provided to the customer(s) and/or located adjacent to the installed measures where appropriate and convenient to do so. The Installer shall retain or ensure access to copies of these documents and for installations under the Green Deal, supply copies to the GDP if requested to do so.

4.13 Installation control

The installer shall have in place and operate a documented installation control procedure appropriate for validating that the installations undertaken conform to the EEM specifier's specification and/or the relevant installation methods. Record of the installation control outcomes for each installation undertaken shall be made and signed off by a person authorized to do so on behalf of the installer.

4.14 Installation documents and record keeping

The installer shall have in place and operate a documented procedure to demonstrate that the information contained in the method statement (4.1) for each installation is available to, and has been used by, the operatives undertaking that installation.

Records relating to the use of work instructions, relevant installation methods and constituent tasks shall include the nature and timing of any changes to installation related activities that may be authorized (5.4).

5 Installation process management

5.1 Operation and process oversight

The installer shall have in place, and operate, procedures designed to ensure that installation processes are undertaken and completed so as to meet the design specification issued by the EEM specifier to the satisfaction of the customer and in accordance with the requirements of this PAS.

5.2 Pre-installation survey

5.2.1 Undertaking the survey

The installer shall undertake a pre-installation survey at the designated location on the basis of the installation method statement prepared under 4.1, using a competent surveyor as defined in the relevant measure-specific Annex of this PAS.

The survey shall be undertaken at a level of detail sufficient to confirm that the specified EEM can be safely and effectively installed at the designated location and shall include any specific pre-installation survey requirements from the relevant measure-specific Annex of this PAS.

Before conclusion of the pre-installation survey, the installer shall confirm with the customer that:

- the nature and extent of the specified installation is known to the customer and is in line with that customer's expectations
- the arrangements made for site access and installation materials storage are adequate and appropriate for the installation to be undertaken.

Record of the survey and its findings, including these customer-related issues, shall be made by the surveyor and retained by the installer, with copy being made available to the GDP when required.

NOTE 1: *The pre-installation survey could be included as a first stage of an installation visit provided provision is made for actual installation not to proceed until any identified problems have been resolved.*

NOTE 2: *Attention is drawn to the Building Regulations requirements in England and Wales or the Building (Scotland) Regulations, which establish regulatory requirements with which the installer will be expected to comply.*

5.2.2 Safety alarms

Where carbon monoxide (CO) or other safety alarm(s) have already been installed at the designated location, the surveyor shall ascertain whether or not they are operational and report the outcome in the survey record. Where the EEM to be installed requires the installation of safety monitoring as part of the specification the surveyor shall assess whether or not any pre-existing alarms will be sufficient for the new installation.

5.2.3 Presence of protected species

In the event that species (e.g. bats, birds, butterflies, dormice) or plants that could be subject to special protection are found to be present at the designated location, the surveyor shall include report of that presence in the survey record and make the presence known to the GDP and installer.

5.2.4 Action in response to survey findings

In the event that the survey findings reveal potential installation problems, the installer shall notify the EEM specifier and any relevant statutory authorities, and work with the EEM specifier as necessary to develop a mutually agreed solution. Installation shall not commence until such solution has been agreed. The installer shall always obtain the written agreement of the EEM specifier to any introduction of changes to the defined installation process.

5.3 Action in respect of intermediate inspection

Where an intermediate inspection (4.8) is required by particular measures as part of the overall installation process, the installer shall establish and operate procedures to ensure that work that might impede subsequent inspection cannot continue until the intermediate inspection has been completed and clearance to continue issued.

5.4 Installation process change

5.4.1 Introduction of new or modified method statement and/or installation methods

Any variation to the method statement and/or installation methods shall be defined, documented and agreed with the EEM specifier before proceeding.

5.4.2 Compatibility of installation process change

Any change to an installation process shall be accompanied by a review of related tasks and methods to ensure compatibility with the installation of other measures being installed at the same premises.

5.4.3 Internal feedback

All internally generated feedback from operatives on the installation process, positive or negative, shall be documented and acknowledged prior to being investigated and corrected where judged beneficial. Any decision not to take corrective action in relation to negative feedback shall be documented, including the reasons for reaching the decision.

5.5 Process continuity plan

When not otherwise arranged by the EEM specifier, the installer shall have in place arrangements that, in the event of an unforeseen circumstance that prevents the installer completing an installation, all installation processes then in progress or otherwise outstanding can be transferred to another installer and completed in accordance with the relevant design specification and in accordance with this PAS.

NOTE: For installations carried out under the Green Deal, the Code of Practice requires that, in the above circumstances, responsibility for completion of the installation reverts to the relevant GDP.

5.6 Process control

The installer shall have in place a documented installation process control procedure capable of demonstrating that the requirements of this PAS have been met for each installation undertaken, including the completion of the installation control procedure (4.13). Record of the application of the installation process control procedure shall be maintained for each installation and signed off by a competent person authorized to do so on behalf of the installer.

5.7 Internal audit and corrective action

5.7.1 Procedure

A procedure for internal auditing of installation processes by the installer shall be established, implemented and documented to ensure that over the course of a 12-month period each type of installation process undertaken is audited at least once to check conformity to the requirements of this PAS. Record of such audit and any resulting actions shall be made and retained.

NOTE: It is recommended that installers carrying out large numbers of installations of the same type consider undertaking audits more frequently on a percentage basis, in preference to the maximum interval specified above.

5.7.2 Investigation

The cause and consequences of issues raised during internal audit (5.7.1) shall be identified, systematically examined and the findings documented.

5.7.3 Corrective action

Corrective action shall include rectification of the particular occurrence identified under 5.7.2 and initiation of measures to prevent recurrence.

5.7.4 Verification of corrective action

The effectiveness of corrective actions undertaken (5.7.3) shall be assessed by the installer and outcomes documented.

5.8 Installation process records

The installer shall establish and maintain records containing at least the information identified in a) through j) of this Clause, in relation to each installation undertaken. Installation process records shall be retained for a minimum of six years and for installations under the Green Deal shall be made available to the relevant GDP when requested.

- a) location of the installation;
- b) type of measure(s) installed;
- c) dates of installation commencement, completion and commissioning;
- d) identification of specific products/systems installed;
- e) details of any problems encountered, corrections agreed and remedial work undertaken;
- f) name(s) of operatives undertaking the installation and their competence level;
- g) results of performance testing carried out;
- h) commissioning records;
- i) relevant installation certificates;
- j) confirmation that the installation process has been undertaken in accordance with this PAS shall be prepared for each installation and signed off by a competent person authorized to do so on behalf of the installer.

NOTE: In addition to the sign-off procedures required under 5.6 and 5.8, the GDP may be required or may choose to undertake a separate validation and sign-off process.

5.9 Business and financial probity

The installer shall have adequate arrangements to cover liabilities arising from its operations and/or activities undertaken under the scope of this PAS and have the financial stability and business resources likely to sustain the operation of an EEM installation service.

6 Service provision

6.1 Complaints procedure

The installer shall have in place and operate a documented complaints procedure appropriate for:

- a) receiving, recording, acknowledging and resolving all complaints from customers. For installations under the Green Deal, the procedure shall include the procedure for transferring the complaint to the relevant GDP. For complaints about the installation, this procedure shall include taking steps to confirm that the complaint has been addressed by the GDP and the issue resolved;
- b) receiving, recording and addressing complaint from a GDP. The record shall include actions taken to resolve issues that have been the subject of complaint and of the outcome, including evidence that the GDP making the complaint is satisfied with the outcome.

6.2 Interaction with customers

The installer shall have in place and operate a procedure to instruct each operative likely to have direct contact with customers, as to how to act in response to an approach from customers especially, but not exclusively, in respect of:

- a) pre-notified customer requirements and expectations particularly issues of work timing and access;
- b) agreed customer service requirements;
- c) customer questions or requests for information;
- d) customer request for additional measure-related work extending beyond the installation process definition;
- e) customer complaint or other customer feedback in respect some aspect of the installation or installation process;
- f) meeting the installers general responsibility for observing the customer service principles and requirements set out in the Green Deal Code of Practice for GDPs.

7 Claims of conformity

7.1 General claims requirement

Installation processes for which conformity with this specification is claimed shall be demonstrated by the inclusion of the following information in associated documentation, including any documentation issued to the customer:

- a) number and date of this Publicly Available Specification;
- b) identification of the installed measure(s) and the relevant measure-specific Annex(es) of PAS 2030;
- c) postal address of the building in which the measure was installed;
- d) date of handover of the installed measure(s);
- e) name or trademark of the installer.

7.2 Declarations of conformity

Declaration of conformity to this PAS shall be expressed in the form:

The installation of [energy efficiency measure] at [location of installation] and handed over on [date of handover] has been undertaken by [name of installer] using an installation process complying with PAS 2030:2012, including Annex(es) [insert references to relevant measure-specific Annex(es)].

NOTE: The inclusion of reference to PAS 2030:2012 in relation to a particular installed measure represents the installer's declaration that the installation process used meets the requirements of this PAS. The accuracy of the claim is solely the claimant's responsibility and is not to be confused with third-party certification of conformity.

8 Documents essential to the application of the Annexes of this PAS

8.1 Use of the identified documents

The documents listed in 8.2 to 8.7 are cited in one or more of the measure-specific Annexes of this PAS and shall be used as required in the application of any Annex in which they are cited. For dated references, only the edition cited shall apply. For undated references, the latest edition of the referenced document (including any amendments) shall apply.

8.2 British Standards

BS 5410-1:1997, *Code of practice for oil firing – Part 1: Installations up to 45 kW output capacity for space heating and hot water supply purposes.*

BS 5410-2:1978, *Code of practice for oil firing – Part 2: Installations of 45 kW and above output capacity for space heating, hot water and steam supply service.*

BS 5440-1:2008, *Flueing and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd, 3rd family gases) – Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys.*

BS 5440-2:2009, *Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances.*

BS 5482-1, *Code of practice for domestic butane and propane gas burning installations – Part 1: Permanent dwellings.*

BS 5864:2010, *Installation and maintenance of gas-fired ducted air heaters of rated heat input not exceeding 70 kW net (2nd and 3rd family gases). Specification.*

BS 6644:2011, *Specification for installation of gas-fired boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases).*

BS 6798:2009, *Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net.*

BS 6891:2005+A2:2008, *Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas). Specification.*

BS 7593:2006, *Code of practice for treatment of water in domestic hot water central heating systems.*

BS 7671: *Requirements for electrical installations. IET Wiring Regulations.*

BS 8213-4, *Windows, doors and rooflights – Part 4: Code of practice for the survey and installation of windows and external doorsets.*



BS 8660-1:2011, *Gas-fired micro-cogeneration appliances of rated thermal input not exceeding 70 kW net – Part 1: Specification for selection, installation, inspection, commissioning, servicing and maintenance of Stirling engine micro-cogeneration appliances.*

BS EN 1264-4:2009, *Water based surface embedded heating and cooling systems – Part 4: Installation.*

BS EN 14336:2004, including Corrigendum January 2009 *Heating systems in buildings – Installation and commissioning of water based systems*

BS EN 62446:2009, *Grid connected photovoltaic systems. Minimum requirements for system documentation, commissioning tests and inspection.*

8.3 Institution of Gas Engineer and Managers – Standards

(available from www.igem.org.uk/technical-standards/standards/)

IGEM UP/1, 1A & 1B, *Strength testing, tightness testing and direct purging each standard covers industrial commercial and domestic testing and purging requirements.*

IGEM/UP/2, Edition 2, *Installation of pipework on industrial and commercial premises.*

IGEM/UP/7, Edition 2, *Gas installations in timber-framed and light steel buildings.*

IGEM UP/10, Edition 3, *Installation of flued gas appliances in industrial and commercial premises incorporating specific requirements for appliances fired by bio-fuels.*

8.4 Energy Networks Association Engineering Recommendations

(available from www.energynetworks.org/electricity/engineering/distributed-generation.html)

G59/2, *Distributed Generation Connection Guide – A guide for connecting generation that falls under G59/2 to the distribution network.*

G83/1-1, *Stage 1: Distributed Generation Connection Guide – A guide for connecting generation that falls under G83/1-1 STAGE 1 to the distribution network.*

G83/1-1, *Stage 2: Distributed Generation Connection Guide – A Guide for connecting generation that falls under G83/1-1 STAGE 2 to the distribution network.*

Recommendations for the Connection of Small-scale Embedded Generators (up to 16 A per phase) in Parallel with Public Low-voltage Distribution Networks

8.5 UKLPG

(available from www.uklpg.org/shop/codes-of-practice/)

Code of Practice 22, *Design installation and testing of LPG Piping Systems.*

8.6 Department of Communities and Local Government

Non-Domestic Building Services Compliance Guide (available from www.planningportal.gov.uk/uploads/br/non-domestic_building_compliance_guide_2010)

Domestic Building Services Compliance Guide (available from www.planningportal.gov.uk/uploads/br/domestic_building_compliance_guide_2010.pdf)

8.7 Common Minimum Technical Competence Annexes

(CMTC Annexes 2-19 may be downloaded free of charge from: www.summitskills.org.uk/public/cms/File/Certification/Complete%20CMTC%20Document%20A%20Dec%2011%20v2%200.pdf)

CMTC Annex 2A – Common Process for HW, CW and ‘Wet’ Heating Systems (Domestic)

CMTC Annex 2B – Common Processes for HW, CW and ‘Wet’ Heating Systems (Non-domestic)

CMTC Annex 2C – Common Processes (Compressed Gas Welded Pipework)

CMTC Annex 2D – Common Processes (Manual Arc Welded Pipework)

CMTC Annex 4A – Oil Appliance Installation (Domestic)

CMTC Annex 4B – Oil Appliance Installation (Non-domestic)

CMTC Annex 4C – Oil Storage and Tank Systems

CMTC Annex 6 – Backflow Prevention

CMTC Annex 9A – Hot Water Systems (Domestic)

CMTC Annex 9B – Unvented Hot Water Storage Systems

CMTC Annex 9C – Hot Water Systems (Non-domestic)

CMTC Annex 9D – Solar Thermal Hot Water

CMTC Annex 10A – ‘Wet’ Heating Systems (Domestic)

CMTC Annex 10B – Underfloor Heating

CMTC Annex 10C – ‘Wet’ Central Heating systems (Non-domestic)

CMTC Annex 10D – Warm Air Heating (Domestic)

CMTC Annex 10E – Warm Air Heating (Non-Domestic)

CMTC Annex 11 – Heat Pump

CMTC Annex 12 – Micro-Combined Heat and Power Appliance Installation

CMTC Annex 13A – Energy Efficiency (Domestic)

CMTC Annex 13B – Energy Efficiency (Non-domestic)

CMTC Annex 15A – Domestic Ventilation Systems Installation

CMTC Annex 15B – Mechanical Ventilation Systems Installation

CMTC Annex 15C – Air Handling Unit (Non-domestic)

CMTC Annex 15D – Plastic Ductwork Systems

CMTC Annex 15E – Fire-rated Ductwork Systems

CMTC Annex 18 – Solar Photovoltaic Systems Installation

CMTC Annex 19 – Wind Turbine Systems Installation

The following annexes are available from <http://www.cskills.org/aboutus/newsandevents/campaigns/cutthecarbon/index.aspx>

CMTC Annex CWI 1 – Determine the Suitability of the Building for Cavity Wall Insulation

CMTC Annex CWI 2 – Install Cavity Wall Insulation

CMTC Annex DP 1 – Determine the Suitability of a Building for Draught Proofing Work

CMTC Annex DP 2 – Install Draught Proofing to Doors, Windows and Access Hatches

CMTC Annex EWI 1 – Determine the Suitability of the Building for External Wall Insulation

CMTC Annex EWI 2 – Install External Wall Insulation

CMTC Annex EWI 3 – Apply Surface Finishes to External Wall Insulation

CMTC Annex HSI 1 – Determine the Suitability of a Building for Heating System Pipework and Cylinder Insulation

CMTC Annex HSI 2 – Install Insulation to Heating System Pipes and Cylinders

CMTC Annex INS 1 – Determine the Suitability of a Building for Roof, Loft or Floor Insulation Work

CMTC Annex INS 2 – Install Insulation to Framed Sections of Buildings

CMTC Annex IWI 1 – Determine the Suitability of a Building for Internal Wall Insulation Work

CMTC Annex LFT 1 – Install Loft Insulation

Annex A (normative)

Condensing boilers, natural gas-fired and liquefied petroleum gas-fired (domestic and non-domestic)

A.1 Additional installation requirements

When installing a gas-fired condensing boiler, in addition to meeting the core requirements set out in Clauses 4 to 7 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in Section A.1 of Table A.1.

A.2 Pre-installation survey requirements

Prior to commencing the physical installation of the gas-fired condensing boiler on site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section A.2 of Table A.1

A.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of a gas-fired condensing boiler, the installer shall employ or contract only a surveyor meeting the competence requirements of Section A.3 of Table A.1.

A.4 Operative competence

When installing a gas-fired condensing boiler, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section A.4 of Table A.1), at the competency ratio specified in Section A.6 of Table A.1.

A.5 Provision of information in respect of gas-fired condensing boilers

At the time of handover of a gas-fired condensing boiler to the customer, the installer shall ensure that the information identified at Section A.7 of Table A.1 is provided to the customer as part of the handover process required in 4.12.

Table A.1 – Measure-specific requirements for gas-fired condensing boilers

Measure	Condensing Boilers, Natural Gas-fired and Liquefied Petroleum Gas-fired (Domestic and Non-domestic)
Product Category	Natural Gas-fired and Liquefied Petroleum Gas-fired Condensing Boilers
A.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. Where relevant to the type of installation being undertaken, the requirements or guidance given in: a) BS 6798:2009, <i>Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net</i>; b) BS 6644:2011, <i>Specification for installation of gas-fired boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases)</i>; c) BS 6891:2005+A2:2008, <i>Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas). Specification</i>; d) BS 5440-1: 2008, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys</i>. e) BS 5440-2: 2009, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances</i>; f) BS 7593:2006, <i>Code of practice for treatment of water in domestic hot water central heating systems</i>. g) IGEM/UP/2, Edition 2, <i>Installation of pipework on industrial and commercial premises</i>. h) UKLPG, <i>Code of practice 22, LPG Piping System design and installation</i>; i) BS 5482-1, <i>Code of practice for domestic butane and propane gas burning installations – Part 1: Permanent dwellings</i>. j) IGEM UP/10, Edition 3, <i>Installation of flued gas appliances in industrial and commercial premises incorporating specific requirements for appliances fired by bio-fuels</i>; k) IGEM UP/1, 1A & 1B, <i>Strength testing, tightness testing and direct purging each standard covers industrial commercial and domestic testing and purging requirements</i>; l) Both the domestic and non-domestic Building Services Compliance Guides (published by DCLG). NOTES: Attention is drawn to the need, where relevant, for all gas-fired condensing boiler installation work to comply with: a) the current Gas Safety (Installation and Use) Regulations that apply in the UK country or locality in which the installation is being carried out. The Gas Safety (Installation and Use) Regulations have requirements relating to both technical gas safety standards and qualification and supervision of persons carrying out gas work; b) the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation, hot water safety, combustion appliances, conservation of fuel and power and electrical safety. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Regulation 7: Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-Domestic Technical Handbook; c) the current Water Supply (Water Fittings) Regulations or Water Byelaws that apply in the UK country in which the installation is being carried out; d) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671).

Table A.1 – continued

A.2 Pre-installation survey requirements	As a minimum, the pre-installation survey shall investigate and determine if: • the condition of the building fabric is satisfactory in relation to the proposed work; • the installation work will result in non-compliance with the building regulations in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; heat-producing appliances; conservation of fuel and power; • the installation work will result in non-compliance with relevant gas safety regulations; • the proposed installation will be compliant with any requirements stated by the boiler manufacturer; • the proposed installation may or will result in a plume nuisance situation; • any special condensate disposal arrangements are required; • the building is located in a hard water area (above 200 ppm); • water conditioning arrangements are required in relation to the water hardness; • relevant checks have been undertaken to determine if asbestos containing materials are present.	
A.3 Surveyor competence requirements	Competence required	Route(s) to competence
	As defined under Section A.4 of Table A.1.	As defined under Section A.4 of Table A.1.
A.4 Operative threshold competence requirements	Competence required	Route(s) to competence
	Where applicable to the scope of work undertaken the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic) 2B – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Non-domestic) 2C – Minimum Competency for Common Processes (Compressed Gas Welded Pipework Installation) 2D – Minimum Competency for Common Processes (Manual Arc Welded Pipework Installation) 6A – Backflow Prevention (Plumbing and Heating Systems) 9A – Hot Water System Installation (Domestic) 9B – Hot Water System Installation (Unvented) 9C – Hot Water System Installation (Non-domestic) 10A – ‘Wet’ Central Heating Systems Installation (Domestic) 10B – ‘Wet’ Central Heating Systems Installation (Under-floor) 10C – ‘Wet’ Central Heating Systems Installation (Non-domestic) 13A – Energy Efficiency for Domestic Heating and Hot Water 13B – Energy Efficiency for Non-domestic Heating and Hot Water	England and Wales 1) Achievement of the relevant QCF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).

Table A.1 – continued

Common Minimum Technical Competences Annexes 2A, 2B, 2C, 2D, 6A, 9A, 9B, 9C, 10A, 10B, 10C, 13A and 13B have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES1, <i>Apply health and safety legislation and working practices;</i> • SUMMES7, <i>Prepare to carry out work;</i> • SUMMES10, <i>Install plumbing systems, equipment and components;</i> • SUMMES21, <i>Install industrial and commercial H&V systems, equipment and components;</i> • SUMMES25, <i>Inspect and test mechanical systems, equipment and components;</i> • SUMMES27, <i>Commission mechanical systems;</i> • SUMMES30, <i>Prepare resources for pipe jointing activities.</i> In addition, all gas-fired condensing boiler electrical work must be undertaken by operatives who meet the competence requirements as stated in the <i>IET Electrotechnical Assessment Specification for use by Certification and Registration Bodies</i> (March 2010) as applicable to the scope of work being undertaken. The IET Electrotechnical Assessment Specification assessment specification is wholly based upon and requires alignment to the SummitSkills National Occupational Standards for Electrotechnical Services – Building and Structures (SUMETS1- SUMETS8). • SUMETS1, <i>Apply Health and Safety Legislation and Working Practices.</i> • SUMETS2, <i>Apply Environmental Legislation, Working Practices and Principles (Electrotechnical Services).</i> • SUMETS3, <i>Maintain Effective Working Relationships.</i> • SUMETS4, <i>Provide Relevant People with Technical and Functional Information.</i> • SUMETS5, <i>Oversee the Work Environment.</i> • SUMETS6, <i>Organise the Working Environment.</i> • SUMETS7, <i>Prepare to Carry out Work.</i> • SUMETS8, <i>Identify Systems, Equipment and Components.</i> NOTE: As stated under Section A.1 of Table A.1, the Gas Safety (Installation and Use) Regulations have requirements relating to qualification and supervision of persons carrying out gas work. These requirements are not repeated here; however, installers are reminded of the legal obligation to meet the requirements.	2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Registration with the approved gas safety scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS Accredited Certification Body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for use by Certification and Registration Bodies</i> (March 2010). Scotland 1) A current SNIJB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter grade or be eligible to hold such a card and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification and for electrical installation activities must hold or be eligible to hold a current SJIB approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).
--	--

Table A.1 – continued

Operative specialist competence requirements	Competence required	Route(s) to competence
	Competence as specified for threshold operatives with no additional requirements.	Not applicable.
A.5 Current competency	Currency of competency in accordance with Sections A.3 and A.4 in Table A.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on site. Where safety- or technical-critical revisions are made to the competency requirements in Sections A.3 and A.4 in Table A.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE 1: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i> <i>NOTE 2: The currency of competency requirements stated above relate only to the competence requirements stated within this Annex and do not relate to or replace the qualification and supervision requirements stated within the Gas Safety (Installation and Use) Regulations.</i>	
A.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: - range, scale, geographical spread and complexity of the work being undertaken; - supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.	
A.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information - Product manufacturer installation and servicing instructions. - Product manufacturer user manuals/guides. - Product warranty information and guarantees. - Benchmark commissioning certificate of other commissioning certificate that meets the requirements of the Building Regulations. - System cleaning and water treatment record (if not included in the commissioning certificate). - Installer details (if not included in the commissioning certificate) e.g. mechanical, electrical. - Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). - A copy of any electrical inspection and testing certificates that have completed to meet the requirements of Building Regulations and/or the current version of BS7671 (IET Wiring Regulations). Verbal information and/or demonstration - An explanation of the purpose and relevance of the written information provided. - An explanation of what controls/components should not be adjusted by the system user. - Demonstration of: - how to set user controls for maximum efficiency; - any safety checks that the system user should undertake; - what to do in the case of an emergency or perceived emergency.	

Annex B (normative)

Condensing boilers, oil-fired (domestic and non-domestic)

B.1 Additional installation requirements

When installing oil-fired condensing boilers, in addition to meeting the core requirements set out in Clauses 4 to 7 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in Section B.1 of Table B.1.

B.2 Pre-installation requirements

Prior to commencing the physical installation of the oil-fired condensing boiler on site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section B.2 of Table B.1.

B.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of oil-fired condensing boilers, the installer shall employ or contract only a surveyor meeting the competence requirements of Section B.3 of Table B.1.

B.4 Operative competence

When installing oil-fired condensing boilers, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section B.4 of Table B.1), at the competency ratio specified in Section B.6 of Table B.1.

B.5 Provision of information in respect of oil-fired condensing boilers

At the time of handover of the oil-fired condensing boiler to the customer, the installer shall ensure that the information identified at Section B.7 of Table B.1 is provided to the customer as part of the handover process required in 4.12.

Table B.1 – Measure-specific requirements for oil-fired condensing boilers

Measure	Condensing Boilers, Oil-fired (Domestic and Non-domestic)	
Product category	Oil-fired Condensing Boilers	
B.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. Where relevant to the type of installation being undertaken, the requirements or guidance given in: a) BS 5410-1:1997, <i>Code of practice for oil firing – Part 1: Installations up to 45 kW output capacity for space heating and hot water supply purposes</i>; b) BS 5410-2:1978, <i>Code of practice for oil firing – Part 2: Installations of 45 kW and above output capacity for space heating, hot water and steam supply service</i>; c) BS 7593:2006, <i>Code of practice for treatment of water in domestic hot water central heating systems</i>. NOTE: Attention is drawn to the need, where relevant, for all oil-firing condensing boiler installation work to comply with: a) the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation; hot water safety; combustion appliances; conservation of fuel; and power and electrical safety. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Regulation 7: Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-domestic Technical Handbook; b) the current Water Supply (Water Fittings) Regulations or Water Byelaws that apply in the UK country in which the installation is being carried out; c) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671).	
B.2 Pre-installation requirements	As a minimum, the pre-installation survey shall investigate and determine if: • the condition of the building fabric is satisfactory in relation to the proposed work; • the installation work will result in non-compliance with the building regulations in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; heat-producing appliances; conservation of fuel and power; • the installation work will result in non-compliance with relevant gas safety regulations; • the proposed installation will be compliant with any requirements stated by the boiler manufacturer; • the actual or proposed fuel storage arrangements are compliant with regulatory requirements/recognised industry standards; • the proposed installation may or will result in a plume nuisance situation; • any special condensate disposal arrangements are required; • the building is located in a hard water area (above 200 ppm); • water conditioning arrangements are required in relation to the water hardness; • relevant checks have been undertaken to determine if asbestos containing materials are present.	
B.3 Surveyor competence requirements	Competence required	Route(s) to competence
	As defined under Section B.4 of Table B.1.	As defined under Section B.4 of Table B.1.

Table B.1 – continued

B.4 Operative threshold competence requirements	Competence required	Route(s) to competence
	Where applicable to the scope of work undertake the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic); 2B – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Non-Domestic); 2C – Minimum Competency for Common Processes (Compressed Gas Welded Pipework Installation); 2D – Minimum Competency for Common Processes (Manual Arc Welded Pipework Installation); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 9B – Hot Water System Installation (Unvented); 9C – Hot Water System Installation (Non-domestic); 10A – ‘Wet’ Central Heating Systems Installation (Domestic); 10B – ‘Wet’ Central Heating Systems Installation (Under-floor); 10C – ‘Wet’ Central Heating Systems Installation (Non-domestic); 13A – Energy Efficiency for Domestic Heating and Hot Water; 13B – Energy Efficiency for Non-domestic Heating and Hot Water. Common Minimum Technical Competences Annexes 2A, 2B, 2C, 2D, 6A, 9A, 9B, 9C, 10A, 10B, 10C, 13A and 13B have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES1, <i>Apply health and safety legislation and working practices</i>; • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES21, <i>Install industrial and commercial H&V systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i> SUMMES27 <i>Commission mechanical systems</i>; • SUMMES30, <i>Prepare resources for pipe jointing activities</i>.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). Scotland 1) A current SNIJIB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter grade or be eligible to hold such a card and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification and for electrical installation activities must hold or be eligible to hold a current SJIB-approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)).

Table B.1 – continued

	In additional, all oil-firing condensing boiler electrical work must be undertaken by operatives who meet the competence requirements as stated in the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010) as applicable to the scope of work being undertaken. The IET Electrotechnical Assessment Specification assessment specification is wholly based upon and requires alignment to the SummitSkills National Occupational Standards for Electrotechnical Services – Building and Structures (SUMETS1 to SUMETS8). • SUMETS1, <i>Apply Health and Safety Legislation and Working Practices.</i> • SUMETS2, <i>Apply Environmental Legislation, Working Practices and Principles (Electrotechnical Services).</i> • SUMETS3, <i>Maintain Effective Working Relationships.</i> • SUMETS4, <i>Provide Relevant People with Technical and Functional Information.</i> • SUMETS5, <i>Oversee the Work Environment.</i> • SUMETS6, <i>Organise the Working Environment.</i> • SUMETS7, <i>Prepare to Carry out Work.</i> • SUMETS8, <i>Identify Systems, Equipment and Components.</i>	2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).
--	--	---

Table B.1 – continued

Operative specialist competence requirements	Competence required	Route(s) to competence
	In addition to the above threshold competence, specialist operative competence based on the following is required: Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 4A – Oil-fired Combustion Appliance Installation (Domestic); 4B – Oil-fired Combustion Appliance Installation (Non-domestic); 4C – Oil Storage Tank and Associated Pipework Installation. Common Minimum Technical Competences Annexes 4A, 4B and 4C have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES1, <i>Apply health and safety legislation and working practices</i>; • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES8, <i>Identify systems, equipment and components</i>; • SUMMES9, <i>Install domestic heating systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>; • SUMMES27, <i>Commission mechanical systems</i>.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column. 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work. Scotland 1) A current SNIJB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter grade or be eligible to hold such a card and Must hold the following qualifications: OFTEC105E, OFTEC600A, and either: OFTEC101 or OFTEC102, hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification and for electrical installation activities must hold or be eligible to hold a current SJIB-approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).

Table B.1 – continued

B.5 Current competency	Currency of competency in accordance with Sections B.3 and B.4 in Table B.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on site. Where safety- or technical-critical revisions are made to the competency requirements in Sections B.3 and B.4 in Table B.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE 1: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i> <i>NOTE 2: The Common Minimum Technical Competency Annexes 4A, 4B and 4C require renewal of qualifications/certifications at five-yearly intervals.</i>
B.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: a) range, scale, geographical spread and complexity of the work being undertaken; b) supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.
B.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information • Product manufacturer's installation and servicing instructions. • Product manufacturer's user manuals/guides. • Product warranty information and guarantees. • Commissioning certificate that meets the requirements of the Building Regulations. • System cleaning and water treatment record (if not included in the commissioning certificate). • Installer details (if not included in the commissioning certificate): • mechanical; • electrical. • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • A copy of any electrical inspection and testing certificates that have been completed to meet the requirements of Building Regulations and/or the current version of BS 7671 (IET Wiring Regulations). Verbal information and/or demonstration • An explanation of the purpose and relevance of the written information provided. • An explanation of what controls/components should not be adjusted by the system user. • Demonstration of: • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; • what to do in the case of an emergency or perceived emergency.

Annex C (normative)

Heating controls

C.1 Additional installation requirements

When installing heating controls, in addition to meeting the core requirements set out in Clauses 4 to 7 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in Section C.1 of Table C.1.

C.2 Pre-installation survey requirements

Prior to commencing the physical installation of the heating controls on-site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section C.2 of Table C.1

C.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of heating controls, the installer shall employ or contract only a surveyor meeting the competence requirements of Section C.3 of Table C.1.

C.4 Operative competence

When installing heating controls, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section C.4 of Table C.1), at the competency ratio specified in Section C.6 of Table C.1.

C.5 Provision of information in respect of heating controls

At the time of handover of heating controls to the customer, the installer shall ensure that the information identified at Section C.7 of Table C.1 is provided to the customer as part of the handover process required in 4.12.

Table C.1 – Measure-specific requirements for heating controls

Measure	Heating Controls	
Product category	Thermostatic Radiator Valves (TRVs), Programmers, Room Thermostats, Cylinder Thermostats	
C.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. NOTE: Attention is drawn to the need, where relevant, for all heating controls installation work to comply with: a) the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation; hot water safety; combustion appliances; conservation of fuel; and power and electrical safety. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Regulation 7: Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-domestic Technical Handbook; b) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671).	
C.2 Pre-installation survey requirements	As a minimum the pre-installation survey shall investigate and determine if the: - proposed controls arrangement is compatible with the existing heating system installation; - installation work will result in non-compliance with the building regulations in relation to conservation of fuel and power; - proposed installation will be compliant with any requirements stated by the heating controls product manufacturer; - relevant checks have been undertaken to determine if asbestos containing materials are present.	
C.3 Surveyor competence requirements	Competence required	Route(s) to competence
	As defined under Section C.4 of Table C.1.	As defined under Section C.4 of Table C.1.
C.4 Operative, threshold competence requirements	Competence required	Route(s) to competence
	Where applicable to the scope of work undertake the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and 'Wet' Heating Systems Installation Work (Domestic); 2B – Minimum Competency for Hot Water, Cold Water and 'Wet' Heating Systems Installation Work (Non-domestic); 2C – Minimum Competency for Common Processes (Compressed Gas Welded Pipework Installation); 2D – Minimum Competency for Common Processes (Manual Arc Welded Pipework Installation); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 9B – Hot Water System Installation (Unvented); 9C – Hot Water System Installation (Non-domestic); 10A – 'Wet' Central Heating Systems Installation (Domestic); 10B – 'Wet' Central Heating Systems Installation (under-floor);	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex.

Table C.1 – continued

	10C – ‘Wet’ Central Heating Systems Installation (Non-domestic); 13A – Energy Efficiency for Domestic Heating and Hot Water; 13B – Energy Efficiency for Non-domestic Heating and Hot Water. Common Minimum Technical Competences Annexes 2A,2B, 2C, 2D, 6A, 9A, 9B, 9C, 10A, 10B, 10C, 13A and 13B have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES1, <i>Apply health and safety legislation and working practices;</i> • SUMMES7, <i>Prepare to carry out work;</i> • SUMMES10, <i>Install plumbing systems, equipment and components;</i> • SUMMES21, <i>Install industrial and commercial H&V systems, equipment and components;</i> • SUMMES25, <i>Inspect and test mechanical systems, equipment and components;</i> • SUMMES27, <i>Commission mechanical systems;</i> • SUMMES30, <i>Prepare resources for pipe jointing activities.</i> In addition, all heating controls installation electrical work must be undertaken by operatives who meet the competence requirements as stated in the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010) as applicable to the scope of work being undertaken. The IET Electrotechnical Assessment Specification assessment specification is wholly based upon and requires alignment to the SummitSkills National Occupational Standards for Electrotechnical Services – Building and Structures (SUMETS1 to SUMETS8). • SUMETS1, <i>Apply Health and Safety Legislation and Working Practices.</i> • SUMETS2, <i>Apply Environmental Legislation, Working Practices and Principles (Electrotechnical Services).</i> • SUMETS3, <i>Maintain Effective Working Relationships.</i> • SUMETS4, <i>Provide Relevant People with Technical and Functional Information.</i> • SUMETS5, <i>Oversee the Work Environment.</i> • SUMETS6, <i>Organise the Working Environment.</i> • SUMETS7, <i>Prepare to Carry out Work.</i> • SUMETS8, <i>Identify Systems, Equipment and Components.</i>	4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). Scotland 1) For mechanical installation activities a current SNIJB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter grade or be eligible to hold such a card and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification and for electrical installation activities must hold or be eligible to hold a current SJIB-approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).
--	--	---

Table C.1 – continued

Operative, specialist competence requirements	Competence required	Route(s) to competence
	Competence as specified for threshold operatives with no additional requirements.	Not applicable.
C.5 Current competency	Currency of competency in accordance with Sections C.3 and C.4 in Table C.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on site. Where safety- or technical-critical revisions are made to the competency requirements in Sections C.3 and C.4 in Table C.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i>	
C.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: - range, scale, geographical spread and complexity of the work being undertaken; - supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.	
C.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information - Product manufacturer installation and servicing instructions. - Product manufacturer user manuals/guides. - Product warranty information and guarantees. - Installer details: - mechanical; - electrical. - Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). - A copy of any electrical inspection and testing certificates that have completed to meet the requirements of Building Regulations and/or the current version of BS 7671 (IET Wiring Regulations). Verbal information and/or demonstration - An explanation of the purpose and relevance of the written information provided. - An explanation of what controls/components should not be adjusted by the system user. - Demonstration of: - how to set user controls for maximum efficiency; - any safety checks that the system user should undertake.	

Annex D (normative)

Under-floor heating

D.1 Additional installation requirements

When installing under-floor heating, in addition to meeting the core requirements set out in Clauses 4 to 7, of this PAS the installer shall also work to any standards, specifications, instructions or guidance identified in Section D.1 of Table D.1.

D.2 Pre-installation survey requirements

Prior to commencing the physical installation of the under-floor heating on site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section D.2 of Table D.1.

D.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of under-floor heating, the installer shall employ or contract only a surveyor meeting the competence requirements of Section D.3 of Table D.1.

D.4 Operative competence

When installing under-floor heating, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section D.4 of Table D.1), at the competency ratio specified in Section D.6 of Table D.1.

D.5 Provision of information in respect of under-floor heating

At the time of handover of under-floor heating, the installer shall ensure that the information identified at Section D.7 of Table D.1 is provided to the customer as part of the handover process required in 4.12.

Table D.1 – Measure-specific requirements for under-floor heating

Measure	Under-floor Heating	
Product category	Under-floor Heating (wet systems)	
D.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. The requirements stated in BS EN 1264-4:2009, <i>Water based surface embedded heating and cooling systems – Part 4: Installation</i>. NOTE: Attention is drawn to the need, where relevant, for all under-floor heating system work to comply with: a) the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation; sanitation; hot water safety; water efficiency; conservation of fuel; and power and electrical safety. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Regulation 7: Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-domestic Technical Handbook; b) the current Water Supply (Water Fittings) Regulations or Water Byelaws that apply in the UK country in which the installation is being carried out. In particular, compliance in relation to the following aspects is highlighted: prevention of contamination of the wholesome water supply, energy conservation, safe operation, testing and commissioning; c) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671).	
D.2 Pre-installation survey requirements	As a minimum the pre-installation survey shall investigate and determine if the: • structural pre-condition requirements to enable the installation to proceed have been met; • pipe circuit lengths are broadly appropriate in relation to room area and pipe spacing; • the under-floor heating layout design has taken account of the location of all fixtures to avoid overheating issues; • proposed location of the under-floor heating manifold(s) is appropriate; • installation work will result in non-compliance with the building regulations in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; conservation of fuel and power; • proposed installation will be compliant with any requirements stated by the under-floor heating product manufacturer; • relevant checks have been undertaken to determine if asbestos-containing materials are present.	
D.3 Surveyor competence requirements	Competence required	Route(s) to competence
	As defined under Section D.4 of Table D.1.	As defined under Section D.4 of Table D.1.

Table D.1 – continued

D.4 Operative threshold competence requirements	Competence required	Route(s) to competence
	Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic); 2B – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Non-domestic). Common Minimum Technical Competence Annex 2A and 2B have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards: • SUMMES1, <i>Apply health and safety legislation and working practices</i>; • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES21, <i>Install industrial and commercial H&V systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>. In addition, all under-floor heating installation electrical work must be undertaken by operatives who meet the competence requirements as stated in the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010) as applicable to the scope of work being undertaken. The IET Electrotechnical Assessment Specification assessment specification is wholly based upon and requires alignment to the SummitSkills National Occupational Standards for Electrotechnical Services – Building and Structures (SUMETS1 to SUMETS8). • SUMETS1, <i>Apply Health and Safety Legislation and Working Practices</i>. • SUMETS2, <i>Apply Environmental Legislation, Working Practices and Principles (Electrotechnical Services)</i>. • SUMETS3, <i>Maintain Effective Working Relationships</i>. • SUMETS4, <i>Provide Relevant People with Technical and Functional Information</i>. • SUMETS5, <i>Oversee the Work Environment</i>. • SUMETS6, <i>Organise the Working Environment</i>. • SUMETS7, <i>Prepare to Carry out Work</i>. • SUMETS8, <i>Identify Systems, Equipment and Components</i>.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). Scotland 1) For mechanical installation activities a current SNIJB Registration card at Plumber, Advanced or Technician Plumber grade and hold a current Water Byelaws/Regulations qualification and for electrical installation activities must hold or be eligible to hold a current SJIB-approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).

Table D.1 – continued

Operative specialist competence requirements	Competence required	Route(s) to competence
	In addition to the above threshold competence, specialist operative competence based on the following is required: The competence requirements defined in Common Minimum Technical Competence Annex 10B – Minimum Competency for ‘Wet’ Central Heating Systems Installation Work (Under-floor Heating). Common Minimum Technical Competence Annex 10B derived from, and is cross-referenced to, the following SummitSkills National Occupational Standards: • SUMMES7 (M7), <i>Prepare to carry out work;</i> • SUMMES8 (M8), <i>Identify systems, equipment and components;</i> • SUMMES9 (M9), <i>Install domestic heating systems, equipment and components;</i> • SUMMES25 (M25), <i>Inspect and test mechanical systems, equipment and components;</i> • SUMMES27 (M27), <i>Commission mechanical systems.</i>	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column. 2) Completion of other training and certification that has been aligned with the competences referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annex referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work. Scotland 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column. 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annex referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work.
D.5 Current competency	Currency of competency in accordance with Sections D.3 and D.4 in Table D.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on site. Where safety- or technical-critical revisions are made to the competency requirements in Sections D.3 and D.4 in Table D.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i>	

Table D.1 – continued

D.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: a) range, scale, geographical spread and complexity of the work being undertaken; <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> b) supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.
D.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information • Product manufacturer's user manuals/guides and guarantee documents. • Testing and commissioning certificates. • Water treatment records. • Electrical certification, if relevant. • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • Installer details: • mechanical; • electrical. Diagrammatic information • Hydraulic schematic. • Wiring schematic. Verbal information/demonstration • Setting of controls. • Awareness of the effect that changing to a different type of floor covering may have on system output. • Awareness of which system components should only be adjusted by a competent engineer.

Annex E (normative)

Flue-gas recovery devices

E.1 Additional installation requirements

When installing flue-gas recovery devices, in addition to meeting the core requirements set out in Clauses 4 to 7 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in Section E.1 of Table E.1.

E.2 Pre-installation survey requirements

Prior to commencing the physical installation of the gas-fired condensing boiler on site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section E.2 of Table E.1.

E.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of flue-gas recovery devices, the installer shall employ or contract only a surveyor meeting the competence requirements of Section E.3 of Table E.1.

E.4 Operative competence

When installing flue-gas recovery devices, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section E.4 of Table E.1), at the competency ratio specified in Section E.6 of Table E.1.

E.5 Provision of information in respect of flue-gas recovery devices

At the time of handover of the flue-gas recovery device to the customer, the installer shall ensure that the information identified at Section E.7 of Table E.1 is provided to the customer as part of the handover process required in 4.12.

Table E.1 – Measure-specific requirements for flue-gas recovery devices

Measure	Flue-gas Recovery Devices	
Product category	Flue-gas Heat Recovery Devices for use with gas-fired condensing boilers (domestic scale)	
E.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. Where relevant to the type of installation being undertaken, the requirements or guidance given in: • BS 5440-1:2008, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd,3rd family gases) – Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys;</i> • BS 5440-2:2009, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd,3rd family gases) – Part 2: Specification for the installation and maintenance of ventilation for gas appliances.</i> NOTE: Attention is drawn to the need, where relevant, for all flue-gas recovery device installation work to comply with: a) <i>the current Gas Safety (Installation and Use) Regulations that apply in the UK country or locality in which the installation is being carried out. The Gas Safety (Installation and Use) Regulations have requirements relating to both technical gas safety standards and qualification and supervision of persons carrying out gas work and work on gas appliances;</i> b) <i>the current Building Regulations that apply in the UK country in which the installation is being carried out. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Regulation 7: Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-domestic Technical Handbook;</i> c) <i>the current Water Supply (Water Fittings) Regulations or Water Byelaws that apply in the UK country in which the installation is being carried out;</i> d) <i>the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671).</i>	
E.2 Pre-installation survey requirements	As a minimum the pre-installation survey shall investigate and determine if the: • condition of the building fabric is satisfactory in relation to the proposed work; • installation work will result in non-compliance with the Building Regulations in relation to workmanship; materials; structural stability; fire safety; heat-producing appliances; • proposed installation will be compliant with any requirements stated by the flue-recovery devices product manufacturer; • relevant checks have been undertaken to determine if asbestos-containing materials are present.	
E.3 Surveyor competence requirements	Competence required	Route(s) to competence
	As defined under Section E.4 of Table E.1.	As defined under Section E.4 of Table E.1.

Table E.1 – continued

E.4	Operative threshold competence requirements	Competence required	Route(s) to competence
		Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and 'Wet' Heating Systems Installation Work (Domestic); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 9B – Hot Water System Installation (Unvented). Common Minimum Technical Competences Annexes 2A, 6A, 9A and 9B have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES1, <i>Apply health and safety legislation and working practices</i>; • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES21, <i>Install industrial and commercial H&V systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>; • SUMMES27, <i>Commission mechanical systems</i>. NOTE: As stated under Section E.1 of Table E.1, the Gas Safety (Installation and Use) Regulations have requirements relating to qualification and supervision of persons carrying out gas work and work on gas appliances. These requirements are not repeated here; however, installers are reminded of the legal obligation to meet the requirements.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column. 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work. Scotland 1) A current SNIJB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter grade or be eligible to hold such a card and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification. 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work.
	Operative specialist competence requirements	Competence required	Route(s) to competence
		Competence as specified for threshold operatives with no additional requirements.	Not applicable.

Table E.1 – continued

E.5 Current competency	Currency of competency in accordance with Sections E.3 and E.4 of Table E.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on-site. Where safety critical or technical critical revisions are made to the competency requirements in Sections E.3 and E.4 of Table E.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE 1: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i> <i>NOTE 2: The currency of competency requirements stated above relate only to the competence requirements stated within this Annex and do not relate to, or replace, the qualification and supervision requirements stated within Gas Safety (Installation and Use) Regulations.</i>
E.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: a) range, scale, geographical spread and complexity of the work being undertaken; b) supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.
E.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information • Product manufacturer's installation and servicing instructions. • Product warranty information and guarantees. • Benchmark commissioning certificate of other commissioning certificate that meets the requirements of the Building Regulations. • Installer details: • mechanical; • electrical. Verbal information and/or demonstration • An explanation of the purpose and relevance of the written information provided.

Annex F (normative)

Gas-fired warm-air heating systems (domestic and non-domestic)

F.1 Additional installation requirements

When installing gas-fired warm-air heating systems (domestic and non-domestic), in addition to meeting the core requirements set out in Clauses 4 to 7 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in Section F.1 of Table F.1.

F.2 Pre-installation survey requirements

Prior to commencing the physical installation of the gas-fired warm-air heating systems (domestic and non-domestic) on site, the installer shall undertake a pre-installation survey in accordance, as a minimum, with the requirements set out in Section F.2 of Table F.1

F.3 Surveyor competence

When undertaking a pre-installation survey in respect of the installation of gas-fired warm-air heating systems (domestic and non-domestic), the installer shall employ or contract only a surveyor meeting the competence requirements of Section F.3 of Table F.1.

F.4 Operative competence

When installing gas-fired warm-air heating systems (domestic and non-domestic), the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (Section F.4 of Table F.1), at the competency ratio specified in Section F.6 of Table F.1.

F.5 Provision of information in respect of gas-fired warm-air heating systems

At the time of handover of the gas-fired warm-air heating system (domestic and non-domestic), the installer shall ensure that the information identified at Section F.7 of Table F.1 is provided to the customer as part of the handover process required in 4.12.

Table F.1 – Measure-specific requirements for gas-fired warm-air heating systems (domestic and non-domestic)

Measure	Gas-fired Warm-air Heating Systems (Domestic and Non-domestic)
Product category	Gas-fired Warm-air Heating Systems
F.1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 7)	The requirements or guidance given in product manufacturer's instructions. Where relevant to the type of installation being undertaken, the requirements or guidance given in: a) BS 5864:2010, <i>Installation and maintenance of gas-fired ducted air heaters of rated heat input not exceeding 70 kW net (2nd and 3rd family gases). Specification</i>; b) BS 6891:2005+A2:2008, <i>Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas). Specification</i>; c) BS 5440-1: 2008, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 1: Specification for installation of gas appliances to chimneys and for maintenance of chimneys</i>; d) BS 5440-2: 2009, <i>Flueing and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases) – Part 2: Specification for the installation and maintenance of ventilation provision for gas appliances</i>; e) IGEM/UP/2, Edition 2, <i>Installation of pipework on industrial and commercial premises</i>; f) IGEM/UP/7, Edition 2, <i>Gas installations in timber-framed and light steel buildings</i>; g) UKLPG, <i>Code of Practice 22, LPG Piping System Design and Installation</i>; h) IGEM UP/1 , 1A & 1B, <i>Strength testing, tightness testing and direct purging each standard covers industrial commercial and domestic testing and purging requirements</i>; i) Both the domestic and non-domestic Building Services Compliance Guides (published by DCLG). NOTE: Attention is drawn to the need, where relevant, for all gas-fired warm air heating system installation work to comply with: a) the current Gas Safety (Installation and Use) Regulations that apply in the UK country or locality in which the installation is being carried out. The Gas Safety (Installation and Use) Regulations have requirements relating to both technical gas safety standards and qualification and supervision of persons carrying out gas work and work on gas appliances; b) the current Building Regulations that apply in the UK country in which the installation is being carried out. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P and Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook and Non-Domestic Technical Handbook; c) the current Water Supply (Water Fittings) Regulations or Water Byelaws that apply in the UK country in which the installation is being carried out; d) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671)

Table F.1 – continued

F.2 Pre-installation survey requirements	As a minimum the pre-installation survey shall investigate and determine if the: • the condition of the building fabric is satisfactory in relation to the proposed work; • the installation work will result in non-compliance with the building regulations in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; heat-producing appliances; conservation of fuel and power; • the installation work will result in non-compliance with relevant gas safety regulations; • the proposed installation will be compliant with any requirements stated by the gas-fired warm-air heating systems product manufacturer; • the proposed installation may or will result in a plume nuisance situation; • any special condensate disposal arrangements are required; • relevant checks have been undertaken to determine if asbestos-containing materials are present.				
F.3 Surveyor competence requirements	<table> <tr> <th data-bbox="571 507 1288 555">Competence required</th><th data-bbox="1288 507 2011 555">Route(s) to competence</th></tr> <tr> <td data-bbox="571 555 1288 603">As defined under Section F.4 of Table F.1.</td><td data-bbox="1288 555 2011 603">As defined under Section F.4 of Table F.1.</td></tr> </table>	Competence required	Route(s) to competence	As defined under Section F.4 of Table F.1.	As defined under Section F.4 of Table F.1.
Competence required	Route(s) to competence				
As defined under Section F.4 of Table F.1.	As defined under Section F.4 of Table F.1.				
F.3 Operative threshold competence requirements	<table> <tr> <th data-bbox="571 603 1288 659">Competence required</th><th data-bbox="1288 603 2011 659">Route(s) to competence</th></tr> <tr> <td data-bbox="571 659 1288 1343"> Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 10D – Warm Air Heating Systems Installation (Domestic); 10E – Warm Air Heating System Installation (Non-domestic). Common Minimum Technical Competences Annexes 2A, 6A, 9A, 10D and 10E have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES8 (M8), <i>Identify systems, equipment and components</i>; • SUMMES9, <i>Install domestic heating systems, equipment and components</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>. </td><td data-bbox="1288 659 2011 1343"> England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). </td></tr> </table>	Competence required	Route(s) to competence	Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 10D – Warm Air Heating Systems Installation (Domestic); 10E – Warm Air Heating System Installation (Non-domestic). Common Minimum Technical Competences Annexes 2A, 6A, 9A, 10D and 10E have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES8 (M8), <i>Identify systems, equipment and components</i>; • SUMMES9, <i>Install domestic heating systems, equipment and components</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).
Competence required	Route(s) to competence				
Where applicable to the scope of work undertaken, the competences in the following Common Minimum Technical Competence Annexes are required: 2A – Minimum Competency for Hot Water, Cold Water and ‘Wet’ Heating Systems Installation Work (Domestic); 6A – Backflow Prevention (Plumbing and Heating Systems); 9A – Hot Water System Installation (Domestic); 10D – Warm Air Heating Systems Installation (Domestic); 10E – Warm Air Heating System Installation (Non-domestic). Common Minimum Technical Competences Annexes 2A, 6A, 9A, 10D and 10E have been derived from, and are cross-referenced to, the following SummitSkills National Occupational Standards for Mechanical Engineering Services: • SUMMES7, <i>Prepare to carry out work</i>; • SUMMES8 (M8), <i>Identify systems, equipment and components</i>; • SUMMES9, <i>Install domestic heating systems, equipment and components</i>; • SUMMES10, <i>Install plumbing systems, equipment and components</i>; • SUMMES25, <i>Inspect and test mechanical systems, equipment and components</i>.	England and Wales 1) Achievement of the relevant QCF/SCQF qualifications/qualification units defined in the Common Minimum Technical Competence Annexes referred to in the adjacent column and where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Member of a Building Regulations Competent Person Scheme for the type of work included under the scope of this Annex. 4) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).				

Table F.1 – continued

	In additional, all gas-fired warm-air heating systems electrical work must be undertaken by operatives who meet the competence requirements as stated in the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010) as applicable to the scope of work being undertaken. The IET Electrotechnical Assessment Specification assessment specification is wholly based upon and requires alignment to the SummitSkills National Occupational Standards for Electrotechnical Services – Building and Structures (SUMETS1 to SUMETS8). • SUMETS1, <i>Apply Health and Safety Legislation and Working Practices.</i> • SUMETS2, <i>Apply Environmental Legislation, Working Practices and Principles (Electrotechnical Services).</i> • SUMETS3, <i>Maintain Effective Working Relationships.</i> • SUMETS4, <i>Provide Relevant People with Technical and Functional Information.</i> • SUMETS5, <i>Oversee the Work Environment.</i> • SUMETS6, <i>Organise the Working Environment.</i> • SUMETS7, <i>Prepare to Carry out Work.</i> • SUMETS8, <i>Identify Systems, Equipment and Components.</i> NOTE: As stated under Section F.1 of Table F.1, the <i>Gas Safety (Installation and Use) Regulations</i> have requirements relating to qualification and supervision of persons carrying out gas work. These requirements are not repeated here; however, installers are reminded of the legal obligation to meet the requirements.	Scotland 1) For installations up to 70kW heat input a current SNIJIB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter or be eligible to hold such a card or SVQ Level 3 Heating and Ventilating Industrial and Commercial Installation (SQA G9X8 23) and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification. For installations over 70kW heat input, a current SNIJIB Registration card at Plumber, Advanced or Technician Plumber or Gasfitter, Advanced or Technician Gasfitter or be eligible to hold such a card or SVQ Level 3 Heating and Ventilating Industrial and Commercial Installation (SQA G9X8 23) and hold a current Water Byelaws/Regulations qualification, and, where relevant, unvented qualification, and for electrical installation activities must hold or be eligible to hold a current SJIB/JIB-approved electrician grade card or where the scope of the work is domestic scale only hold SQA Unit 6 (F9H7 04 Carry Out Work on Electrical Systems for the Control (and supply) of Mechanical Services (Limited Scope)). 2) Completion of other training and certification that has been aligned with the competencies referred to in the adjacent column and accepted by the oversight body. 3) Demonstrable knowledge in relation to the competence specified in the Common Minimum Technical Competence Annexes referred to in the adjacent column gained through industry experience and verified by a UKAS accredited certification body through a structured interview and on-site inspection of work and, where applicable, as defined within the <i>IET Electrotechnical Assessment Specification for Use by Certification and Registration Bodies</i> (March 2010).
Operative specialist competence requirements	Competence required	Route(s) to competence
	Competence as specified for threshold operatives with no additional requirements.	Not applicable.

Table F.1 – continued

F.5 Current competency	Currency of competency in accordance with Sections F.3 and F.4 of Table F.1 shall be reconfirmed at 12-monthly intervals. Reconfirmation of competence shall be through both examination of personnel records and inspection of work carried out on site. Where safety- or technical-critical revisions are made to the competency requirements in Sections F.3 and F.4 of Table F.1, including any revisions to the cross-referenced documents, installers shall meet the requirements of the revisions within the time period stated at the time the revisions are introduced. <i>NOTE 1: The time period for meeting the requirements of the revisions should be set in consultation with the UKAS accredited certification body(ies) and take account of the nature and level of risk associated with the reason(s) for the revisions.</i> <i>NOTE 2: The currency of competency requirements stated above relate only to the competence requirements stated within this Annex and do not relate to or replace the qualification and supervision requirements stated within Gas Safety (Installation and Use) Regulations.</i>
F.6 Competence ratio	The installer shall employ or subcontract at least one operative that meets the specialist operative competence requirements in full. The competence ratio shall be determined by the installer in relation to the: a) range, scale, geographical spread and complexity of the work being undertaken; b) supervision experience of the individual that meets the specialist operative competence requirements and the experience of the individuals being supervised. <i>NOTE: Where a specialist operative is new to the role, it may be appropriate for a lower competency ratio to be applied.</i> The individual(s) that meets the specialist operative competence requirements shall inspect and confirm compliance of all work undertaken.
F.7 Measure-specific information to be handed over to the customer in addition to 4.12	Written information • Product manufacturer's installation and servicing instructions. • Product manufacturer's user manuals/guides. • Product warranty information and guarantees. • Commissioning certificate that meets the requirements of the Building Regulations. • Installer details (if not included in the commissioning certificate): • mechanical; • electrical. • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • A copy of any electrical inspection and testing certificates that have completed to meet the requirements of Building Regulations and/or the current version of BS 7671 (IET Wiring Regulations). Verbal information and/or demonstration • An explanation of the purpose and relevance of the written information provided. • An explanation of what controls/components should not be adjusted by the system user. • Demonstration of: • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; • what to do in the case of an emergency or perceived emergency.