

PAS 2030:2019

Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes

in correct as of 19/11/2019



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Foreword

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The PAS process enables a Specification to be rapidly developed in order to fulfil an immediate need in industry. A PAS can be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

Supersession

Together with PAS 2035:2019, this PAS supersedes PAS 2030:2017, which will be withdrawn on 31 January 2021.

Relationship with other publications

PAS 2030 is intended to be read, and used, in conjunction with PAS 2035.

Information about this document

This is a full revision of PAS 2030, which continues to provide a specification for the installation of energy efficiency measures in existing dwellings but has been amended to align with the parallel introduction of PAS 2035 *Retrofitting Dwellings for Improved Energy Efficiency: Specification and Guidance*, which is applicable only to dwellings. As a result, this PAS is no longer applicable to non-dwellings.

PAS 2030 is published with the expectation that installers intending to claim compliance with it, will commence adoption of its provisions immediately following publication with a view to fully meeting its requirements and claiming compliance with PAS 2030:2019 and therefore also PAS 2035:2019, by 31 January 2021. During this period, PAS 2030:2017 will remain available for use where required but will be withdrawn on 31 January 2021.

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is put forward to form the basis of a full British Standard, European Standard or International Standard, it will be withdrawn.

BSI permits the reproduction of Figure A.1. This reproduction is only permitted where it is necessary during the decision-making process for retrofit designs during each application of the PAS. A larger version of Figure A.1 is available.

BSI permits the reproduction of the form in Annex G to assist installers in meeting the record keeping requirements of this PAS.

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

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

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

Introduction

This revision of PAS 2030 continues to provide a specification for the installation of energy efficiency measures (EEM) in existing dwellings but has been modified in response to market changes that have altered the context in which it is applied and to align with the parallel introduction of PAS 2035 *Retrofitting Dwellings for Improved Energy Efficiency: Specification and Guidance*, which is applicable only to dwellings. As a result, this PAS is no longer applicable to buildings used for purposes other than dwellings.

Although this PAS was originally developed with support for the United Kingdom Green Deal Financing Mechanism as a primary objective, it has always been appropriate for application in respect of any EEM installation, irrespective of how that installation is to be funded.

In this edition, the independence of the PAS has been further clarified with the removal of all references to specific funding schemes of any type and reliance on the generally accepted use of UKAS accredited certification bodies to provide compliance assessment where this is required. **Figure 1** provides a graphic overview of the principal elements of the system and their various relationships.

The most significant areas of change to PAS 2030 are:

- Removal of guidance about the scope and content of designs for EEMs, which has been moved to PAS 2035;
- Removal of guidance about the interactions between EEMs (except for the *Measures Interaction Matrix*), which has been moved to PAS 2035;
- Removal of guidance about assessment and upgrading of existing ventilation systems, which has been moved to PAS 2035; and
- For demonstration of competence, requirement for the use of regulated and industry agreed vocational qualifications or apprenticeships, personal certificates of competence relevant to the EEM to be installed or for electrical work, compliance with the EAS to replace the reliance on Minimum Technical Competencies that was applicable in earlier editions.

Attention is drawn to the fact that this PAS does not set out a specification for the design of EEM or for the assessment of dwellings undertaken to inform such designs – those topics are covered by PAS 2035. It does however set out critical aspects of retrofit design (the retrofit design) that Retrofit Installers should expect to find addressed in the designs they work to and without which they should not commence installation.

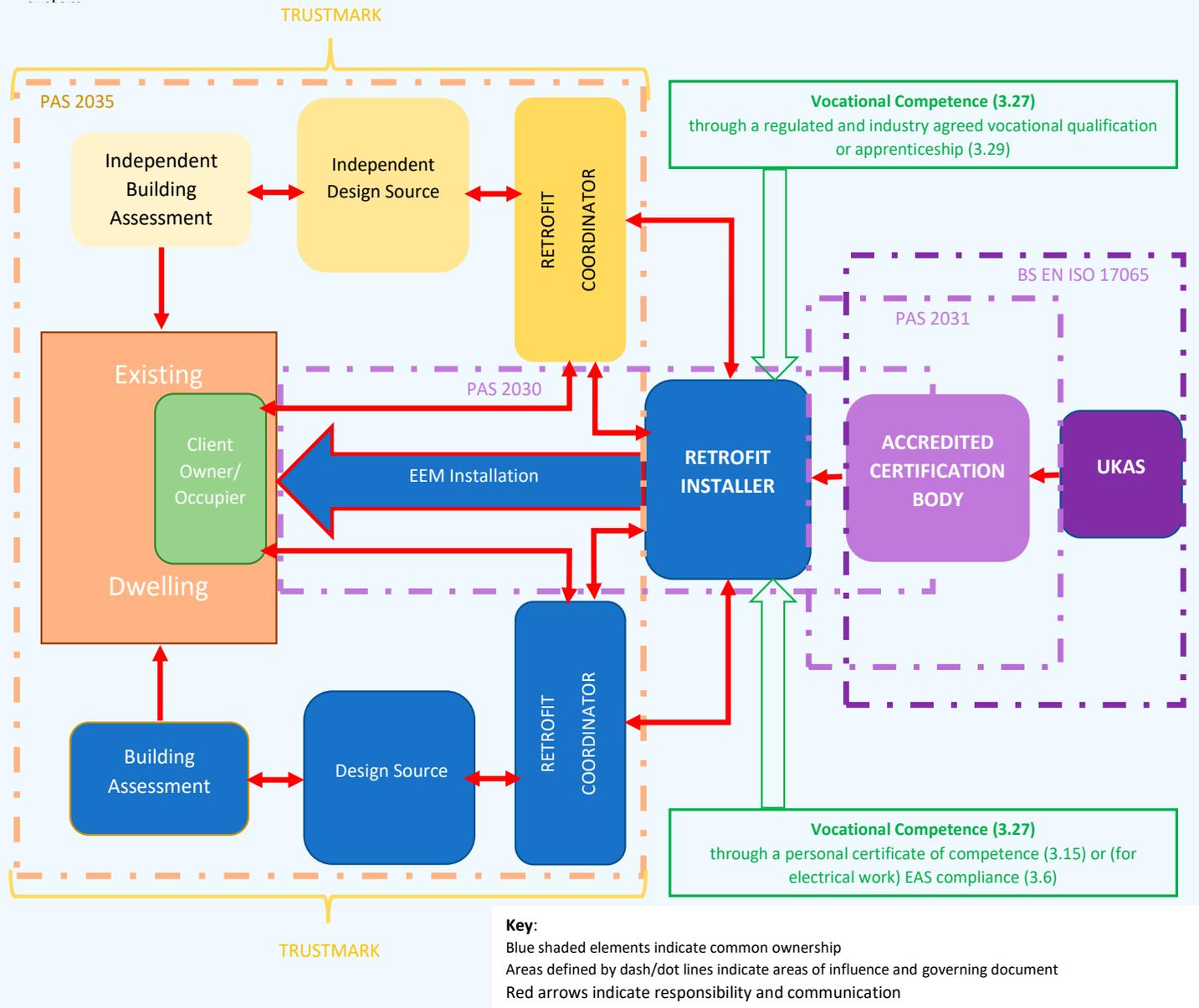
The primary objective for the PAS remains the provision of a robust, uniformly applicable EEM installation process that will assist Installers that comply with its requirements in full to demonstrate that their installation processes are capable of providing installation to specification and in accordance with the Client's expectations.

Each of the energy efficiency measures covered by this PAS is provided for in a measure-specific Annex. Compliance with this PAS requires that for each installation, the installer has to meet all the requirements of Clauses 1 to 9 of PAS 2030 together with those set out in the Annex relevant to each measure to be installed.

This edition of PAS 2030 includes changes to the list of included measures with one new measure-specific annex setting out requirements for the insulation of residential park homes, and removal of Annexes C1, C9 and D3 and of non-domestic measures from other annexes. It is anticipated that the list of included measures will further change over time and therefore future editions of this PAS should be anticipated.

Figure 1 – EEM installation and validation system – Overview, indicating the relevant specifications and their areas of application

PAS 2040 Figure 1. Primary elements of the EEM retrofit system



1 Scope

This PAS specifies requirements for the installation of Energy Efficiency Measures (EEM) in existing dwellings (not new build) and no longer covers buildings used for non-dwelling purposes. It is intended for use by any entity undertaking the installation of any products and/or systems designed to improve the energy efficiency of such dwellings in accordance with PAS 2035.

As with previous editions, 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 vocational qualification of the people undertaking such installation. The PAS includes information provided to assist Installers to fulfil their responsibility to ensure the effective co-functioning of EEM installed in the same dwelling.

This PAS consists of core requirements to be met by any entity claiming compliance with it, and normative measure-specific Annexes setting out supplementary requirements for each included measure type.

Claims of compliance with this PAS will be in respect of the processes and procedures employed and their application in the installation of EEM in any given dwelling. Such claims do not reflect the quality or performance of the retrofit design, which will be the subject of claims of compliance with PAS 2035.

This PAS requires claims of compliance to be in respect of the core requirements and all Annexes relevant to the installation undertaken by the claiming entity. The entity is also required to identify whether the claim is on the basis of self-assessment, other party assessment or independent third-party validation and to differentiate between installation undertaken on the basis of an installer provided retrofit design and that undertaken in accordance with a retrofit design provided by an independent third party.

Annex A provides detail of the PAS 2030 measure-specific Annex structure and its relationship to the list of specified measures and includes information to assist Installers to fulfil their responsibility for ensuring the correct functional relationship between EEM installed in the same dwelling.

Annexes B, C and D provide specific requirements relating to particular energy efficiency measures for application by Installers undertaking installation of those measures. These Annexes also include additional requirements in respect of the provision of information to clients.

Annex E identifies the points of substantive change between PAS 2030:2017 and PAS 2030:2019.

Annex F sets out guidance on the use and application of PAS 2030:2019

Annex G provides an example installation project information collation form that can be copied and used by Installers to assist demonstration of their compliance with this PAS

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, developed in conjunction with this PAS.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 normative references are Annex-specific. Clause 10 lists all documents that are considered indispensable for the application of particular Annexes.

Standards publications

ISO IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*

BS 5250, *Code of practice for the control of condensation in buildings*

BS 7913, *Guide to the conservation of historic buildings*

BS 3632, *Residential park homes — Specification*

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

BS 8213-4, *Code of practice for the survey and installation of windows and external door sets*

BS 6262 2, *Glazing for buildings — Part 2: Code of practice for energy light and sound*

BS 6262 3, *Glazing for buildings — Part 3: Code of practice for fire security and wind loading*

BS 6262 4, *Glazing for buildings — Part 4: Code of practice for safety related to human impact*

BS 6262 6, *Glazing for buildings — Part 6: Code of practice for special applications*

BS 6262 7, *Glazing for buildings — Part 7: Code of practice for the provision of information*

BS 8000-7, *Workmanship on building sites — Part 7: code of practice for glazing*

BS EN 13120, *Internal blinds — Performance requirements including safety*

BS EN 13561, *External blinds — Performance requirements including safety*

BS EN 13659, *Shutters — Performance requirements including safety*

BS 6644, *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 6891, *Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas) — Specification*

BS 5440-1, *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*

BS 5440-2, *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 7593, *Code of practice for treatment of water in domestic hot water central heating systems*

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

BS 5410-1, *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, *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 7593, *Code of practice for treatment of water in domestic hot water central heating systems*

BS 7671, *Requirements for Electrical Installations — IET Wiring Regulations*

BS EN 378-1, *Refrigerating systems and heat pumps — Safety and environmental requirements — Basic requirements, definitions, classification and selection criteria*

BS EN 378-3, *Refrigerating systems and heat pumps — Safety and environmental requirements — Installation location and personal protection*

BS EN 378-4, *Refrigerating systems and heat pumps — Safety and environmental requirements — Operation, maintenance, repair and recovery*

BS EN 14336, *Heating systems in buildings — Installation and commissioning of water based heating systems*

BS EN 16484-1 *Building automation and control systems (BACS) — Project specification and implementation*

BS EN 806-1, *Specifications for installations inside buildings conveying water for human consumption — General*

BS EN 806-4, *Specifications for installations inside buildings conveying water for human consumption — Installation*

BS EN 806-5, *Specifications for installations inside buildings conveying water for human consumption — Operation and maintenance*

BS 8558, *Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings*

BS 5970, *Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C*

BS 5864, *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 6891, *Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas) — Specification*

Other publications

[N1] SWIGA. *External Wall Insulation Specification for Weathering and Thermal Bridge Control*. Available at <https://www.swiga.co.uk/news/new-external-wall-insulation-industry-documents> [viewed May 2019].

[N2] MINISTRY OF HOUSING, COMMUNITIES AND LOCAL GOVERNMENT. *Approved Documents A-P*, London: 2010. Available at <https://www.gov.uk/government/collections/approved-documents> [viewed May 2019].

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[N11] UKLPG, *Code of practice 22: Design, installation and testing of LPG Piping systems*. August 2011.

[N12] THE INSTITUTION OF GAS ENGINEERS AND MANAGERS. *IGEM UP/1, 1A & 1B, Strength testing, tightness testing and direct purging each standard covers industrial commercial and domestic testing and purging requirements*, Loughborough: 2005.

[N13] MINISTRY OF HOUSING, COMMUNITIES AND LOCAL GOVERNMENT. *The Domestic Building Services Compliance Guide*, London: 2018.

[N14] HEALTH AND SAFETY EXECUTIVE. *Gas Safety (Installation and Use) Regulations 1998*. London: 2018.

[N15] THE STATIONERY OFFICE. *Water Supply (Water Fittings) Regulations*. Great Britain: 1999.

[N16] EUROPEAN PARLIAMENT. (EU) No 517/2014, *F-gas regulations*. 2014. Available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.150.01.0195.01.ENG [viewed May 2019].

[N17] YOUNG. Y., SHIRET. A., HAYTON. J. AND GRIFFITHS. W., *Design of low temperature domestic heating systems – A guide for system designers and installers*. BRE Trust. Hertfordshire: 2013.

[N18] THE INSTITUTION OF GAS ENGINEERS AND MANAGERS. *IGEM/UP/7, Edition 2, Gas installations in timber-framed and light steel buildings*. Loughborough: 2006.

[N19] THE STATIONERY OFFICE. *Electricity at Work Regulations 1989*. HMSO, London: 1989.

3 Terms and definitions

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

3.1 client

property owner, householder, landlord and/or tenant of a dwelling that is subject to retrofit, sometimes also including the funding body

NOTE In this PAS, the term Client refers to the recipient of a domestic retrofit project.

3.2 commissioning

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

3.3 dwelling

self-contained unit of accommodation such as a house or flat or park home used by one household as a home

3.4 (EEM) product

item intended for installation in existing dwellings for the purpose of enhancing the energy efficiency of those buildings, that is not made available as an (EEM) system

3.5 proprietary (EEM) system

combination of particular products and materials together with any related installation method, equipment requirements and performance objectives, placed on the market exclusively by a specific supplier, for installation in existing dwellings for the purpose of enhancing the energy efficiency of those dwellings

3.6 EAS compliance

holding a certificate of compliance with the EAS for the category of work relevant to the EEM to be installed, issued by a Certification Body accredited by UKAS against the requirements of ISO IEC 17065, or being registered as an Approved Certifier of Construction as defined in EAS Appendix 7 (Particular requirements for Scottish Building Standards)

NOTE EAS is Electrotechnical Assessment Specification for use by Certification and Registration Bodies.

3.7 energy efficiency measure (EEM)

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

3.8 installation

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

3.9 (installation) location

dwelling or group of dwellings that are the subject of EEM installation(s) under the supervision of a single, designated, competent person

3.10 (installation) method

the sequence of actions to be undertaken in installing one or more EEM products or systems in accordance with their particular specification, in a safe manner at a particular dwelling

3.11 (installation) method statement

precise description of the installation method

NOTE An installation method statement can be a single document prepared specifically for this purpose or could consist of a collection of documents, in the sequence of required application, contributing to the complete definition of the intended method.

3.12 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

NOTE 1 There are two categories of operative permitted under the provisions of this PAS, those who can demonstrate vocational competence (3.26) and those who are acquiring vocational competence (3.27).

NOTE 2 Individuals employed to provide labouring, carrying or loading/unloading capability do not constitute operatives in the terms of this PAS.

3.13 operative (experienced)

operative who has been installing EEM relevant to the occupation in which they operate, prior to the requirements for a vocational qualification included in this PAS for new entrants

NOTE This term is not used in this PAS other than as part of the definition of personal certificate of competence (3.15).

3.14 operative (new entrant)

operative who is new to installing an EEM and who can therefore only demonstrate vocational competence by (acquiring) vocational competence (see 3.26)

3.15 personal certificate of competence

certificate, issued by a certification body accredited by UKAS against the requirements of ISO IEC 17024, to an experienced operative who meets the certification scheme's competence criteria or as a means of on-going assessment for ensuring continued competence of an individual following the award of a vocational qualification

NOTE 1 See 3.13 for definition of experienced operative

NOTE 2 Certificates of competence may not be issued to new entrants (3.14) other than as a means of on-going assessment of individual competence following the award of a vocational qualification.

NOTE 3 The period for re-confirming competence following a vocational qualification should be set by the industry sector.

3.16 pre-installation building inspection

inspection of an installation location (3.9) undertaken by or on behalf of the EEM installer prior to commencement of installation, to confirm that the retrofit design provided is complete, complies with this PAS, can be fulfilled at the location specified and that the proposed installation will not result in noncompliance with statutory requirements and/or generally accepted industry good practice

NOTE The application of this inspection to particular measures is addressed through the pre-installation building inspection requirements and the inspector competence requirements in the relevant measure-specific Annex.

3.17 Recognition of Prior Experience and Learning (RPEL)

process by which prior experience and learning is assessed against relevant criteria to provide evidence for credit towards a vocational qualification

3.18 Register of Regulated Qualifications (RRQ)

register of nationally regulated qualifications maintained by:

- in England, the Office of the Qualifications Examinations Regulators;
- in Northern Ireland, the Council for Curriculum, Examinations and Assessment;
- In Scotland, the Scottish Qualification Authority;
- In Wales, Qualifications in Wales

NOTE For information, visit: <https://register.ofqual.gov.uk/>

3.19 retrofit assessment

survey, inspection and assessment of a dwelling to collate information for a retrofit design

3.20 Retrofit Assessor

person qualified to carry out a retrofit assessment

3.21 Retrofit Coordinator

person qualified as a specialist retrofit project manager, taking overall responsibility for overseeing the assessment of dwellings, the identification, specification and evaluation of energy efficiency measures for installation at a given dwelling as a single project, and their subsequent monitoring and evaluation

3.22 retrofit design

package of information prepared by a Retrofit Designer that determines the unique combination of EEM systems, products, materials and their inter-relationship, to be installed in a particular dwelling in order to achieve specified energy efficiency and other outcomes for that dwelling

3.23 Retrofit Designer

person qualified to prepare a retrofit design, in accordance with PAS 2035

3.24 (Retrofit) Installer

person or organisation undertaking the physical placement of an energy efficiency measure(s) in an existing dwelling

3.25 supervision

provision of operational oversight by an operative who meets the threshold and/or specialist competence or vocational qualification level required for the installation of an EEM type in the type of building being improved and is appointed by the Retrofit Installer to do so

3.26 vocational competence

holding a regulated and industry agreed, vocational qualification or apprenticeship, or a personal certificate of competence relevant to the EEM to be installed, or for electrical work compliance with the EAS, all of which include assessment of ability to deliver required outcomes through the practical application of acquired knowledge and skills in a workplace environment

3.27 (acquiring) vocational competence

process of becoming vocationally competent through participation in a structured training and/or assessment programme

3.28 vocational competence ratio

quantitative relationship between the number of operatives working on any particular retrofit project with vocational competence and the number of operatives engaged on the same project who are acquiring vocational competence

3.29 vocational qualification

recognition of knowledge, understanding and skills relevant to a particular occupation or employment and to the EEM) to be installed, necessary to deliver required outcomes safely through the practical application of that acquired knowledge and skills in a workplace environment as defined by the demands and outcome of a regulated, industry agreed, approved course or apprenticeship included in the RRQ

3.30 vocational qualification currency

period for which vocational competence will be considered adequate without further training or knowledge acquisition specified in respect of the particular vocational qualification(s), personal certification scheme(s) or EAS compliance, relied upon for the demonstration of vocational competence

4 Retrofit project management

Prior to commencement of installation the Retrofit Installer shall confirm that a Retrofit Coordinator has been appointed in accordance with the requirements of PAS 2035, and make the Retrofit Coordinator's identity and role responsibilities known to all personnel working on or in connection with the project. The Retrofit Installer shall also make provision for the Retrofit Coordinator to have access to work in progress (including pre-installation inspection, installation, testing, commissioning and handover), for the purpose of inspecting progress and quality.

5 The retrofit design

5.1 Installer responsibility to be in possession of a retrofit design

For each planned installation of EEM, the Retrofit Installer shall obtain a location-specific retrofit design complying with PAS 2035 for the complete package of measures to be installed as part of that project, at that location. The Installer shall not commence installation until the relevant design has been obtained and validated.

***NOTE** The Retrofit Installer is entitled to rely on a claim of compliance of the retrofit design with PAS 2035 provided by the Retrofit Coordinator unless she/he becomes aware of evidence to the contrary.*

5.2 Validation of the retrofit design

5.2.1 General requirement

Before incorporating the retrofit design into the installation method statement and commencing installation, the Retrofit Installer shall satisfy himself/herself that the retrofit design is complete and suitable for the dwelling(s) for which it has been prepared by means of the pre-installation building inspection (see 7.2) and through application of 5.2.2 to 5.2.5.

If the retrofit design provided is found to be deficient or is considered unsuitable for the dwelling(s) in which installation is to be undertaken, then clarification, further information or a revised retrofit design shall be obtained from the Retrofit Coordinator and installation shall not proceed until both the Installer and the Retrofit Coordinator are satisfied that the design is complete and suitable for the dwelling(s). However, final responsibility for the suitability of the design remains with the Retrofit Coordinator.

***NOTE** Throughout this PAS, the primary relationship between design and installation is assumed to be between the roles of Retrofit Coordinator and Retrofit Installer. The Retrofit Coordinator may however designate members of his or her team e.g. the Retrofit Designer, to undertake communication as appropriate to the topic to be communicated.*

5.2.2 Retrofit design documentation

The Retrofit Installer shall check that the retrofit design documents received from the Retrofit Coordinator include the items identified in this clause, where relevant to the EEM installation to be undertaken:

- identification of the address and precise location of the dwelling(s) in which the EEM(s) are to be installed;
- identification of any access constraints and access instructions provided by the Client or the occupants;
- a copy of the assessment report of the condition of the dwellings including identification of any repairs necessary before installation of EEMs;
- any assumptions on which the design is based, including assumptions that underpin the assessment of the dwelling(s);
- confirmation of the compliance of the design with the relevant standards;
- specifications of the materials, products and systems to be used, and of where and how they are to be installed, whether within the dwelling or on its exterior;
- construction details for all affected corners, junctions and edges of installed measures (whether prepared by the Retrofit Designer or obtained from a proprietary system designer, or clear identification of any standards details that are to be used, and where);
- installation instructions for all new systems and equipment;
- testing requirements, e.g. testing of new gas systems and electrical installations, thermography to confirm the integrity of the insulated envelope, fan pressurization testing to demonstrate compliance with any airtightness standard, etc.;
- commissioning requirements;
- handover requirements;
- maintenance instructions; and
- guarantee and warranty requirements.

Where any of these elements are missing from the design documentation the retrofit installer shall consult the Retrofit Coordinator about whether this was intended.

5.2.3 Scope, adequacy and suitability of the design

The Retrofit Installer shall check that the retrofit design includes, takes into account and makes provision for, the elements set out in this clause. Where any of these elements has not been included the Retrofit Installer shall consult the Retrofit Coordinator about whether this was intended:

- all interfaces between measures, both physical junctions and technical interactions as identified by the Measures Interaction Matrix (see Annex A of this PAS);
- improvement of the airtightness of the building envelope, i.e. reduction of wind-driven air infiltration and air leakage;
- management of moisture within the construction, and of the dynamic equilibrium between the internal and external relative humidity and the moisture content of construction materials, using vapour permeable materials as appropriate, such that moisture will not become trapped within any construction leading to risk of interstitial condensation and consequent damp and deterioration;

NOTE Retrofit Installers should be aware that retrofit designs for dwellings where condensation could be an issue will be likely to make reference to BS 5250 Code of practice for the control of condensation in buildings. Where required, dynamic modelling of moisture transfer should be carried out.

- minimizing thermal bridging at the corners, junctions and edges of installed measures, and at interfaces between them;
- eliminating thermal bypass, i.e. the uncontrolled penetration of cold external air to the warm side of any insulation layer;
- resilience against rainwater ingress (including ingress due to failure of any critical element or construction detail);
- provision of combustion air supplies for any open-flued combustion appliances located within the dwelling;
- mitigation of the risk of summer overheating;
- maintenance requirements to ensure the long-term integrity of the installation;
- protection of the dwelling against the risk of fire occasioned by the installation of EEM;
- resilience of installed EEM to flood risk.

5.2.4 Provision of adequate ventilation

For any retrofit design in which one or more EEM with the potential to reduce the level of background infiltration in habitable rooms is included (e.g. wall insulation, floor insulation, roof and loft insulation, draught stripping or replacement windows), the Retrofit Installer shall check that the retrofit design includes details of how adequate ventilation is to be maintained or provided to ensure good internal air quality and minimize surface and interstitial condensation risk. Where such detail is not included or is perceived as being inadequate, the Installer shall consult the Retrofit Coordinator about whether this was intended.

NOTE When checking the design, the Installer should also take account of any measure-specific ventilation related requirements in the applicable measure-specific annexes of this PAS.

5.2.5 Testing and commissioning

The Retrofit Installer shall check that the retrofit design includes instruction about how installed EEM are to be tested and commissioned, and that such instructions take account of any relevant manufacturer's instructions and/or measure-specific requirements in the relevant Annex in this PAS. Where such information has not been included the Retrofit Installer shall consult the Retrofit Coordinator about whether this was intended.

NOTE Where the retrofit design includes multiple EEMs that are required to be commissioned, PAS 2035 requires the retrofit design to specify that building services measures may be pre-commissioned individually but should be finally commissioned together at the same time, not separately.

6 Installation process

6.1 Installation method statement

6.1.1 Inclusion of relevant installation process(es)

Prior to commencement of any installation work the Retrofit Installer shall define and record in a location-specific installation method statement the complete installation process to be followed for each energy efficiency measure to be installed, under the scope of this PAS and in accordance with the retrofit design. The method statement shall include and take account of the elements specified in 6.1.2 to 6.1.6 of this PAS.

NOTE A generic method statement may be used, but if the installation method deviates from it in any way, then a location-specific method statement should be created either by editing the generic method statement or appending information to it to define the variation.

6.1.2 Reference to normatively referenced standards

In incorporating the retrofit design in the location-specific EEM installation method statement, the Retrofit Installer shall take account of all normatively referenced standards and any other relevant documents identified in this PAS, and where these are relevant to the installation to be undertaken shall be able to demonstrate how they have been incorporated in the installation method statement.

NOTE Should the Installer be aware of potentially relevant standards or other similar documents that have not been referenced in the retrofit design, it is recommended that the Installer draws these to the attention of the Retrofit Coordinator.

6.1.3 Identification of the relevant measure-specific annexes

The Retrofit Installer shall identify from the measure-specific Annex(es) included in this PAS (see A.1, Tables A.1 to A.3) the measures relevant to the retrofit design including any reference to EEM types, that could determine the scope of required competence for that installation. The Retrofit Installer shall make provision in the method statement for implementation of the requirements set out in the identified annexes.

6.1.4 Inclusion of relevant installation methods

The method statement shall include method(s) and sequences for the installation of the EEM(s) as specified in the retrofit design or originating from the product/system specification sheets, from system certification documents or other such information provided by the product or system manufacturer(s) or supplier(s).

6.1.5 Acquisition of missing method(s)

Where an installation method is not provided with a product or system, the installer shall, prior to commencing the installation, contact the manufacturer, supplier or Retrofit Coordinator, 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 customized method has been agreed with and issued to the installer by, the Retrofit Coordinator.

6.1.6 Provision for intermediate inspection

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

6.2 Installation equipment and tools

6.2.1 Availability

The Retrofit Installer shall determine and make available the equipment necessary for the installation process to be correctly undertaken, including any requirements/ instructions for selection and/or use of that equipment.

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.

6.2.2 Maintenance

The Retrofit Installer shall ensure that all equipment and tools used for installation work shall be maintained in a fit-for-purpose and safe condition, providing resources for this purpose as required.

6.2.3 Calibration

6.2.3.1 Equipment requiring calibration shall be calibrated in accordance with the manufacturer's instruction or verified at intervals determined by the Retrofit 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.

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

- equipment identification, including the measurement reference standard against which the equipment is calibrated;

- any out-of-specification readings when equipment is submitted for calibration; and
- a statement of conformity to specification after each calibration or verification.

6.2.3.3 In the event that the Retrofit 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 arrange 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.

6.3 Checking, handling and storage of materials and supplies

The Retrofit Installer shall operate a procedure to ensure that operatives are aware of any handling instructions and/or storage conditions for the products or systems that they are installing under the scope of this PAS, whether they are specified by the retrofit design, the manufacturer or the supplier, and that those instructions and conditions are followed.

6.4 Provision of installation instructions to operatives

The Retrofit 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 in accordance with the retrofit design.

Location-specific information shall include at least the following:

- briefing of operatives undertaking installation tasks about the importance of their installation activities and how they contribute to the achievement of the measure installation specified;
- installation times agreed by the Client and any commitments made;
- known special needs or expectations of the Client;
- notification of any inter-relationship between measures and measure installation at the same location, particularly in respect of the mutual efficiency and effectiveness of measures, working procedures and timing;
- any guidance or restrictions about weather conditions in which the specified EEMs may be installed.

6.5 People

6.5.1 Operative selection, training and work assignment

The Retrofit Installer shall establish and operate procedures to:

- determine the vocational competence required by operatives to undertake the required installation tasks, and by others engaged on the project (e.g. for enabling work);
- ensure the engagement of a sufficient number of vocationally competent operatives as specified in the relevant measure-specific Annex;
- undertake periodic assessment of the individual vocational competence (3.26) of its skilled workforce (direct or sub-contracted) to ensure that all individuals involved in skilled installation work are either vocationally competent or are acquiring vocational competence (3.27);
- ensure that all operatives have access to any training required to maintain their skills and knowledge, including any relevant system-specific training;
- provide and arrange access to training (including any relevant system-specific training) and assessment, for any operatives acquiring vocational competence whilst working under the supervision of a vocationally competent operative;
- provide and arrange for training of new entrant operatives (3.14) via a measure relevant vocational qualification, apprenticeship or EAS compliance route, and not rely on personal certificates of competence other than as a means of on-going assessment of individual competence following the award of a vocational qualification;
- assign operatives to installation projects commensurate with the vocational competence specified in the relevant measure-specific Annex and maintain a record of the operatives assigned to and working on each project;
- obtain and maintain evidence of the current capability, training, qualifications, competence and identified route to vocational competence for each operative;
- periodically assess the effectiveness of procedures operated under a), b), c), d), e), f), g) and h).

NOTE Attention is drawn to the fact that there may be requirements relating to the employment and registration of vocationally competent operatives engaged in EEM installations, under some funding schemes.

6.5.2 Briefing

Before any work to install EEMs begins, the Retrofit Installer shall consider the requirements for briefings (or ‘toolbox talks’) by the Retrofit Coordinator to explain the design intent and draw attention to key points including the intended installation sequence(s) where relevant. Briefings shall always be requested if:

- the PAS 2035 retrofit risk assessment has placed the project in the Path C risk category; or
- the retrofit design includes new or unusual materials, products or systems with which the Retrofit Installer(s) are not familiar; or
- the Retrofit Installers(s) have not installed the specified EEMs before; or
- the design is intended to achieve unusually challenging performance standards (e.g. with respect to air-tightness).

If a request for a briefing is refused, then the Retrofit Installer shall ask the Retrofit Coordinator to justify why a briefing need not or cannot be provided.

6.5.3 Installation supervision

6.5.3.1 The Retrofit Installer shall assess the respective vocational competence of operatives assigned to the installation tasks required for each installation and provide a level of supervision in accordance with the vocational competence and vocational competence ratio provided in the relevant measure-specific Annex of this PAS.

6.5.3.2 Supervision shall include monitoring and inspecting operatives and testing their work at the location of the work to ensure that:

- they comply with the requirements of this PAS and that measures are installed at the designated location in accordance with the retrofit design and to the satisfaction of the Client;
- no actions are taken during the installation that might be detrimental to the health or welfare of the occupants, the Installer’s operatives or other members of the public, or detrimental to the integrity of the dwelling, even if specified in the retrofit design (and instead to bring such issues to the attention of the Retrofit Coordinator and request appropriate amendments).

6.5.3.3 Supervision shall be continuous during working hours if:

- the PAS 2035 retrofit risk assessment carried out by the Retrofit Coordinator has placed the project in the Path C risk category; or
- the retrofit design includes new or unusual materials, products or systems with which the Installers are not

familiar; or

- the Retrofit Installers(s) have not installed the specified EEMs before; or
- the design is intended to achieve unusually challenging performance standards (e.g. with respect to air-tightness).

6.6 Subcontract Installers

Where the Retrofit Installer subcontracts any part of the installation to another installer, the Installer shall include the contractual requirement that the subcontract installer complies with all requirements of the retrofit design and of this PAS that are relevant to the installation related tasks to be undertaken and ensure that the subcontract installer has the necessary vocational competence for the installation tasks sub-contracted. The Retrofit Installer shall retain responsibility for compliance with the retrofit design and with this PAS for all work sub-contracted.

6.7 Testing

The Retrofit Installer shall arrange any testing of the improved dwelling (e.g. air-tightness testing) before, during and/or after installation of the EEMs, and of individual building systems (whether new or existing) to be carried out as specified by the retrofit design. The Installer shall supply copies of test results and certificates to the Retrofit Coordinator.

6.8 Commissioning

The Retrofit Installer shall be responsible for ensuring that:

- the installed EEMs are commissioned in accordance with the retrofit design; and
- a record is made of commissioning action undertaken, including any performance measurement results obtained; and
- commissioning certificates confirming satisfactory results are obtained or prepared as appropriate and copies are supplied to the Retrofit Coordinator.

6.9 Handover

6.9.1 Timing and extent of handover

When the EEMs are fully installed and commissioned and with any operationally material defects corrected, the Retrofit Installer shall undertake a handover procedure with the Client in accordance with the instructions provided in the retrofit design and

the relevant measure-specific Annex, including the handover of any documentation identified by them.

The handover process shall, where possible, involve physical inspection of the installed measures and an explanation of their 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, guarantee certificates and other relevant documentation shall be provided to the Client(s) via the Retrofit Coordinator and/or located adjacent to the installed measures where appropriate and convenient to do so. The Retrofit Installer shall retain and ensure access to copies of these documents for future reference.

The handover shall include a visual check that the person receiving the instruction is able to operate components and controls, and information about:

- the safe operation of the installed measure including 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;
- 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);
- the regular maintenance of the installation to ensure that it operates safely, efficiently and effectively, in accordance with the requirements of any guarantees or warranties provided by the manufacturer and/or the Retrofit Designer or the relevant measure specific Annex;
- the efficient operation of the installation to facilitate the delivery of the expected reduction in energy use.

6.9.2 Personnel undertaking the handover

Prior to the handover process the Retrofit Installer shall ensure that the operatives undertaking the handover are vocationally 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 to assist operatives in the handover process shall be clear, structured, relevant and appropriate.

6.10 Installation control

The Retrofit Installer shall have in place and operate a documented installation control procedure appropriate for validating that:

- the installations undertaken conform to the retrofit design and the location-specific method statement; and
- nothing has been done during the installation that could invalidate any manufacturer's or system supplier's guarantee or warranty.

Records of the installation control outcomes for each installation undertaken shall be made and signed by the supervisor appointed to that installation or other person authorized to do so on behalf of the Installer.

6.11 Installation documents and record keeping

The Retrofit Installer shall have in place and operate a documented procedure to demonstrate that the information contained in the location-specific method statement (6.1) for each installation is available to, and has been used by, the operatives undertaking that installation.

The Retrofit Installer shall keep photographic records of all installation work that is subsequently covered up by later work or by linings or finishes or was accessed via scaffolding or similar means such that it subsequently becomes inaccessible for inspection. Photographs shall be sufficiently numerous and detailed to demonstrate that the work has been completed in accordance with the retrofit design and the method statement. The date and location of each photograph shall be marked on the photograph automatically by the camera.

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.

7 Installation process management

7.1 Operation and process oversight

The Retrofit Installer shall have in place, and operate, procedures designed to ensure that pre-installation building inspection and installation processes in relation to the installation of EEM measures are undertaken and completed in accordance with the retrofit design, to the satisfaction of the Client(s) and in accordance with the requirements of this PAS, particularly in respect of:

- the measures installed;
- the use of specified installation methods;
- any required ventilation upgrade including where necessary the procurement and installation of any required ventilation upgrade from a ventilation specialist;
- avoidance of thermal bridging;
- testing;
- commissioning; and
- handover.

7.2 Pre-installation building inspection

7.2.1 Undertaking the inspection

The Retrofit Installer shall undertake a pre-installation inspection of the designated location on the basis of the installation method statement prepared under 6.1, using a vocationally competent person as defined in the relevant measure-specific Annex of this PAS.

The inspection 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 paying particular attention to potential moisture buildup as a result of the installation and taking into account the fire safety of the dwelling and the functionality and/or safety of installed services (gas, electricity, water, telecommunications, etc.); the inspection shall include any specific pre-installation inspection requirements from the relevant measure-specific Annex of this PAS.

7.2.2 Notification of pre-installation building inspection

The Retrofit Installer shall provide information as to the location and timing of forthcoming pre-installation building inspections to the Retrofit Coordinator and to any relevant certification body, and make arrangements

for the inspection to be assessed, upon request by that body if it wishes to do so.

7.2.3 Suitability and completeness of the installation method statement

The suitability and completeness of the installation method statement (6.1) shall be checked as part of the pre-installation building inspection. In the event that the method statement is found to be inadequate, the findings of the pre-installation inspection shall be used to inform the correction or further development of the method statement.

7.2.4 The suitability and completeness of the retrofit design

The suitability and completeness of the retrofit design (Clause 5) shall be reviewed as part of the pre-installation building inspection and action taken to bring to the attention of the Retrofit Coordinator:

- anything missing from the retrofit design that might reasonably be expected to be included (see Clause 5);
- anything that is contrary to the stated design assumptions (e.g. assumptions about areas that can only be examined after opening-up the construction); and
- any aspect of the design and specification that cannot be implemented, for whatever reason.

The Retrofit Installer shall request appropriate amendment of the retrofit design or the provision by the Retrofit Coordinator of written confirmation that installation can proceed without amendment.

7.2.5 Confirmation with the Client

Before conclusion of the pre-installation building inspection, the Retrofit Installer shall confirm with the Client that:

- the nature and extent of the specified installation is known to the Client and is in line with that Client's expectations;
- the arrangements made for site access and installation materials storage are adequate and appropriate for the installation to be undertaken; and
- the intended days and hours of working are acceptable.

7.2.6 Pre-installation building inspection records

Records of the pre-installation building inspection and its findings, including those relating to the suitability and completeness of the installation method statement, the retrofit design and any Client-related issues, shall be made by the inspector and retained by the Retrofit Installer, with a copy being made available to the Retrofit Coordinator and/or any relevant validation body, on request.

NOTE 1 *For loft insulation and draught-proofing measures only, the pre-installation building inspection 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 need to comply with applicable statutory requirements e.g. Building Regulations.*

NOTE 3 *Attention is drawn to the need for the pre-installation building inspection to note any potential risk in relation to the on-going performance of installed services so as to enable liaison with the retrofit designer and/or service providers where relevant.*

NOTE 4 *Retrofit Installers should encourage the persons appointed to undertake pre-installation inspections to familiarize themselves with the guidance provided in BS 7913 Guide to the conservation of historic buildings and BS 5250 Code of practice for the control of condensation in buildings.*

7.2.7 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 inspector shall include report of that presence in the inspection record and make the presence known to the Retrofit Installer and the Retrofit Coordinator.

7.2.8 Action in response to inspection findings

In the event that the pre-installation building inspection reveals potential installation problems, the Retrofit Installer shall notify the Retrofit Coordinator and any relevant statutory authorities, and work with the Retrofit Coordinator, as necessary, to develop a mutually agreed solution. Installation shall not commence until such a solution has been agreed by the Retrofit Coordinator and confirmed with the Client. The Retrofit Installer shall always obtain the written agreement of the Retrofit Coordinator to any introduction of changes to the defined installation process.

7.3 Action in respect of intermediate inspection

Where an intermediate inspection is required in respect of particular measures as part of the overall installation process, the Retrofit 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 has been given.

7.4 Installation change

7.4.1 Introduction of new or modified materials, products, construction details or processes

Any proposed variation to the retrofit design or location-specific method statement (including the substitution of alternative materials, products, construction details or processes) shall be defined, documented and submitted to the Retrofit Coordinator for approval. Installation work shall not proceed until such approval has been obtained.

7.4.2 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.

7.4.3 Internal feedback

The Retrofit Installer shall establish and operate a process to facilitate internal feedback on the installation process, whether positive or negative, from inspectors and installation operatives. Any feedback received 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 that decision.

7.5 Process continuity plan

When not otherwise arranged by the Retrofit Coordinator, the Retrofit Installer shall have in place and operate arrangements that, in the event of an unforeseen circumstance that prevents the Retrofit Installer completing an installation, all uncompleted installations can be transferred to another Retrofit Installer and completed in accordance with the retrofit design and in accordance with this PAS. Where the Retrofit Installer is providing sub-contracted services to a main contractor it shall be the responsibility of the main contractor to ensure there is a process continuity plan in place.

7.6 Process control

The Retrofit Installer shall have in place and operate 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. Records of the application of the installation process control procedure shall be maintained for each installation and signed by a competent person authorized to do so on behalf of the Installer.

7.7 Internal audit and corrective action

7.7.1 Procedure

The Retrofit Installer shall conduct a review of their operating system(s) at least once each year for each type of installation undertaken, to ensure conformity with the requirements of this PAS. Records of the review and any resulting actions taken to correct and prevent any future noncompliance shall be made and retained.

NOTE It is recommended that Retrofit 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.

7.7.2 Investigation

The cause and consequences of issues raised during internal audit (7.7.1) shall be identified, systematically examined and the findings documented.

7.7.3 Corrective action

Corrective action shall include rectification of the particular occurrences identified under 7.7.2 and initiation of measures to prevent recurrence.

7.7.4 Verification of corrective action

The effectiveness of corrective actions undertaken (7.7.3) shall be assessed by the Retrofit Installer and outcomes documented.

7.8 Installation process records

The Retrofit Installer shall establish and maintain records containing at least the information identified in a) through r) of this Clause, in relation to each installation undertaken for which compliance with this PAS is claimed. Installation process records shall be retained for six years or the term of any EEM guarantees (whichever is longer) and shall be made available to the Retrofit Installer's PAS 2030 certification body and to the Retrofit Coordinator, when requested:

- a) location of the installation;
- b) identification of the Retrofit Coordinator;
- c) identification of the Retrofit Designer;
- d) type of measure(s) installed;
- e) dates of installation commencement, completion, testing, commissioning and handover;
- f) identification of specific products/systems installed;
- g) the installation method statement including all related retrofit design documents;
- h) records of any assessments of exposure and wind load calculations;
- i) records of any pull-out tests carried out;
- j) details of any problems encountered, corrections agreed and remedial work undertaken;
- k) records of inclement weather and duration of delay or hold up experienced when installing EEM;
- l) name(s) of operatives undertaking the installation and their vocational competence levels;
- m) photographs as required by Clause 6.11;
- n) results of performance testing carried out;
- o) commissioning records;
- p) relevant installation certificates;
- q) confirmation that the installation process has been undertaken in accordance with this PAS signed off by a vocationally competent person, authorized to do so on behalf of the retrofit installer; and
- r) Confirmation of any claim of compliance with this PAS, issued to the Client or funding body.

7.9 Business and financial probity

7.9.1 Financial resource and insurance

The Retrofit Installer shall be able to demonstrate the financial stability and business resources likely to sustain the operation of an EEM installation service and shall have adequate arrangements, including insurance, to underwrite the liabilities arising from any claims resulting from deficiencies of product or system selection, design, detailing or installation, together with appropriate guarantees and warranties of the work, as required by the retrofit design or by any applicable quality assurance scheme, in respect of its operations and/or activities undertaken under the scope of this PAS.

7.9.2 Clarity of contractual liability

Where the Retrofit Installer is contracted to the Client on a 'design and build' basis, the roles of the Retrofit Designer and Retrofit Installer shall be sufficiently clearly defined and distinguished in the contract documentation to permit claims against either or both of them, as appropriate, in the event of a defective installation.

8 Service provision

8.1 Complaints procedure

The Retrofit Installer shall have in place and operate a documented complaints procedure appropriate for receiving, recording, acknowledging and resolving all complaints from clients.

8.2 Complaints records

The Retrofit Installer shall maintain records of all complaints and their resolution for six years or the duration of any EEM guarantees (whichever is longer) and shall make copies of such records available to the Retrofit Installer's PAS 2030 certification body or to the Retrofit Coordinator, when requested.

8.3 Interaction with clients

The Retrofit Installer shall have in place and operate a procedure to instruct each operative likely to have direct contact with clients or the occupants of the dwellings being improved, as to how to act in response to an approach from clients especially, but not exclusively, in respect of:

- vulnerable occupants (e.g. elderly or disabled persons or children);
- pre-notified Client requirements and expectations particularly issues of work timing and access;
- agreed Client service requirements;
- Client questions or requests for information;
- Client request for additional measure-related work extending beyond the installation process definition;
- Client complaint or other Client feedback in respect of some aspects of the installation or installation process.

9 Claims of compliance

9.1 Applicability of claims

Claims of compliance with this PAS shall be in respect of the processes and procedures employed and their application in the installation of EEM in any given dwelling. Such claims shall not be used to imply the quality or performance of the EEM installed, which will be the subject of claims of compliance with PAS 2035.

9.2 Requirement to claim

The installation of energy efficiency measures for which the processes, procedures and methods of application used are claimed to be in compliance with the requirements of this PAS shall be supported by a declaration of conformity to this PAS, expressed in the form provided in 9.3, as appropriate, issued to the Client and to the Retrofit Coordinator and where the claim is to 9.3.1, notified to the certification body providing evaluation services in respect of the installation.

9.3 Basis of claim

9.3.1 Independent third-party certification

Where compliance with PAS 2030 is confirmed by an independent third-party certification body:

- The installation of [energy efficiency measure(s)] at [location of installation] and handed over on [date of handover] has been undertaken by [name of Retrofit Installer] on the basis of a retrofit design claimed to comply with PAS 2035, using a process complying with PAS 2030, including Annex(es) [insert references to relevant measure-specific Annex(es)]. [Insert unambiguous identification of the certification body].

9.3.2 Other party confirmation

Where compliance with PAS 2030 is confirmed by an alternative method relying on parties other than those qualifying as an accredited independent third-party certification body:

- The installation of [energy efficiency measure(s)] at [location of installation] and handed over on [date of handover] has been undertaken by [name of Retrofit Installer] on the basis of a retrofit design claimed to comply with PAS 2035 using a process complying with PAS 2030, including Annex(es) [insert references to relevant measure-specific Annex(es)]. [Insert unambiguous identification of the confirmation body].

9.3.3 Retrofit Installer self-assessment

Where compliance with PAS 2030 is assessed by the Retrofit Installer:

- The installation of [energy efficiency measure(s)] at [location of installation] and handed over on [date of handover] has been undertaken by [name of Retrofit Installer] on the basis of a retrofit design claimed to comply with PAS 2035, using a process complying with PAS 2030, including Annex(es) [insert references to relevant measure-specific Annex(es)].

NOTE The inclusion of reference to PAS 2030 in relation to any particular installed measure or measures represents the Retrofit Installer's declaration that the 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.

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

10.1 Use of the identified documents

The documents listed in 10.2 to 10.9 are cited in the core text or 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 or edition-specific references, only the edition cited shall apply. For undated references or references that are not edition-specific, the latest edition of the referenced document (including any amendments) shall apply.

NOTE At the time of publication of the 2019 edition of PAS 2030, several of the standards listed in 10.2 have been updated from the versions applying in the 2017 edition. However, because the references to these documents in this PAS are undated those references remain unchanged. Attention is therefore drawn to the requirement to use the latest edition where references to documents are undated. To assist users of this PAS to identify the correct document, a list of the most recent editions of these standards is available from the PAS 2030 website.

10.2 Publicly Available Specification and British Standards

PAS 2035, *Retrofitting Dwellings for Improved Energy Efficiency – Specification and Guidance*

BS 5250, *Code of practice for the control of condensation in buildings*

BS 5410-1, *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, *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, *Flueing and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd, 3rd family gases) – Specification for installation of gas appliances to chimneys and for maintenance of chimneys*

BS 5440-2, *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, *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 5970, *Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C*

BS 6100-1, *Building and civil engineering – Vocabulary- Part 1 General terms*

BS 6262-2, *Glazing for buildings- Part 2: Code of practice for energy light and sound*

BS 6262-3, *Glazing for buildings- Part 3: Code of practice for fire security and wind loading*

BS 6262-4, *Glazing for buildings- Part 4: Code of practice for safety related to human impact*

BS 6262-6, *Glazing for buildings- Part 6: Code of practice for special applications*

BS 6262-7, *Glazing for buildings- Part 7: Code of practice for the provision of information*

BS 6644, *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, *Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net*

BS 6891, *Installation of low-pressure gas pipework of up to 35 mm (R1 1/4) on premises*

BS 7386, Draught-strips for the draught control of existing doors and windows in housing (including test methods)

BS 7593, Code of practice for treatment of water in domestic hot water central heating systems

BS 7619, Specification for extruded cellular unplasticized PVC (PVCU) profiles

BS 7671, Requirements for electrical installations — IET Wiring Regulations

BS 7880, Draught control of existing doors and windows in housing using draught strips

BS 7913, Guide to the conservation of historic buildings

BS 8000-0, Workmanship on building sites- Part 0: Introduction and general principles

BS 8558, Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages — Complimentary guidance to BS EN 806

BS 81234, Windows and doors — Code of practice for the survey and installation of windows and external door sets

BS 8660-1, 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 378-1, Refrigerating systems and heat pumps — Safety and environmental requirements — Basic requirements, definitions, classification and selection criteria

BS EN 378-3, Refrigerating systems and heat pumps — Safety and environmental requirements — Installation location and personal protection

BS EN 378-4, Refrigerating systems and heat pumps — Safety and environmental requirements — Operation, maintenance, repair and recovery

BS EN 806-1, Specifications for installations inside buildings conveying water for human consumption — General

BS EN 806-4, Specifications for installations inside buildings conveying water for human consumption — Installation

BS EN 806-5, Specifications for installations inside buildings conveying water for human consumption — Operation and maintenance

BS EN 1264-1, Water based surface embedded heating and cooling systems – Part 1: Definitions and symbols

BS EN 1264-2, Water based surface embedded heating and cooling systems – Part 2: Floor heating: Prove methods for the determination of the thermal output using calculation and test methods

BS EN 1264-3, Water based surface embedded heating and cooling systems – Part 3: Dimensioning

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

BS EN 1264-5, Water based surface embedded heating and cooling systems – Part 5: Heating and cooling surfaces embedded in floors — Determination of the thermal output

BS EN 1670, Building hardware – Corrosion resistance – Requirements and test methods

BS EN 12828, Heating systems in buildings — Design for water-based heating systems

BS EN 12831, Heating systems in buildings: Method for calculation of the design heat load

BS EN 13120, Internal blinds – Performance requirements including safety

BS EN 13561, External blinds and awnings – Performance requirements including safety

BS EN 13659, Shutters and external venetian blinds – Performance requirements including safety

BS EN 14336 (including Corrigendum January 2009), Heating systems in buildings – Installation and commissioning of water-based systems

BS EN 15316-4-8, Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Space heating generation systems, air heating and overhead radiant heating systems

BS EN 16484, Building automation and control systems (BACS) — Project specification and implementation

BS EN 16883, *Conservation of cultural heritage — Guidelines for improving the energy performance of historic buildings*

BS EN 62446-1, *Photovoltaic (PV) systems — Requirements for testing, documentation and maintenance — Grid connected systems — Documentation, commissioning tests and inspection*

BS EN ISO 11600, *Building construction — Jointing products- Classification and requirements for sealants*

10.3 Institution of Gas Engineer and Managers – Standards

(available from www.igem.org.uk/technicalstandards/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, *Installation of pipework on industrial and commercial premises*

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

10.4 Energy Networks Association Engineering Recommendations

(Available from www.energynetworks.org/electricity/engineering/distributedgeneration.html)

G59/3, *Distributed Generation Connection Guide – A guide for connecting generation that falls under G59/3 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*

G83/2-1, *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

10.5 UKLPG

(available from www.uklpg.org/shop/codesofpractice/)

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

10.6 Ministry of Housing, Communities and Local Government

Domestic Building Services Compliance Guide (available from www.planningportal.gov.uk/uploads/br/domestic_building_compliance_guide_2013.pdf)

10.7 Other insulation installation guidance references

10.7.1 External solid wall insulation

Specification for the installation of external wall insulation ensuring the safety and operation of fuel burning appliances, version 2

External Wall Insulation Specification for Weathering and Thermal Bridge Control

External Wall Insulation Pre-Installation Building Inspection Checklist

EWI Building Owner Maintenance Pack/Schedule

All available from the National Insulation Association (NIA), the Insulated Render and Cladding Association (INCA) or the Solid Wall Insulation Guarantee Agency (SWIGA)

10.7.2 Room in roof insulation (see B.12)

A Guide to Retrofit Room in Roof Insulation

Room in Roof Insulation pre-installation checklist

Both available from the National Insulation Association and Association for Technical Monitoring Agents

10.7.3 Loft insulation (see B.9)

General requirements and guidance for the installation of loft insulation
<http://www.glidevale.com/uploads/dab79298b0219093005220b716485704.pdf>

Annex A (normative)

Measure-specific Annex selection and co-installation requirements

A.1 Introduction

The clauses of this Annex provide:

- in **A.2** and **A.3**, information to facilitate the inclusion of measures specified in each retrofit design in the installation method statement (**6.1**);
- in **A.4**, information in respect of the potential for relationship between installed measures and between installed measures and the dwelling in which they are installed;
- in **A.5**, information to assist the avoidance of thermal bridging.

A.2 Energy efficiency measures and types arranged by measure category

Table A.1 – Category BFM (Building Fabric Measures)

Measure	Measure type	Measure reference	Current Annex
Cavity wall insulation including that installed in party walls	As measure	BFM.1	B1
Draught proofing	As measure	BFM.2	B2
Energy efficient glazing and doors including replacement insulating glass units (IGU)	As measure	BFM.3	B3
External wall insulation	1. Site rendered external wall insulation systems	BFM.4.1	B4
	2. Pre-finished external wall insulation systems	BFM.4.2	
Flat roof insulation	As measure	BFM.5	B5
Floor Insulation	As measure	BFM.6	B6
Hybrid wall insulation	As measure	BFM.7	B7
Internal wall insulation	As measure	BFM.8	B8
Loft insulation	1. Roll insulation	BFM.9.1	B9
	2. Blown insulation	BFM.9.2	
Pitched roof insulation	As measure	BFM.10	B10
Solar blind, shutters and shading devices (internal and external)	1. Mechanically operated devices	BFM.11.1	B11
	2. Electrically operated devices	BFM.11.2	
Room-in-roof insulation	As measure	BFM 12	B12
Park Homes insulation	As measure	BFM 13	B13

Table A.2 – Category BSM (Building Services Mechanical)

Measure	Measure type	Measure reference	Current Annex
Condensing boilers, natural gas-fired and liquefied petroleum gas-fired	As measure	BSM.1	C1
Condensing boilers, oil-fired	As measure	BSM.2	C2
Flue gas heat recovery devices	Devices for use with gas-fired condensing boilers (domestic scale)	BSM.3	C3
Heating system insulation	As measure	BSM.4	C4
Heating, hot water system, air conditioning or ventilation system controls and components	1. Heating and hot water system controls (domestic)	BSM.5.1	C5
	2. Air conditioning controls	BSM.5.2	
	3. Ventilation controls	BSM.5.3	
	4. Low energy circulator pumps	BSM.5.4	
	5. Low temperature radiators and fan convectors	BSM.5.5	
Hot water systems	Domestic hot water systems	BSM.6.1	C6
Mechanical ventilation with heat recovery	Domestic ventilation systems with heat recovery	BSM.7.1	C7
Under-floor heating	Hydraulic (wet) systems*	BSM.8	C8
Warm-air heating	1. Natural gas-fired and liquefied petroleum gas-fired warm air heating systems	BSM.9.1	C9
	2. Oil-fired warm air heating systems	BSM.9.2	
<i>NOTE Electric warm air heating systems are included under the measure electric storage heaters (see D.1).</i>			
Water efficient taps and showers	As measure	BSM.10	C10

Table A.3 – Category BSE (Building Services Electrical)

Measure	Measure type	Measure reference	New Annex
Electric storage heaters (including electric warm air heating units that incorporate heat storage)	1. Electric storage heaters	BSE.1.1	D1
	2. Electric storage heaters with warm air heat distribution	BSE.1.2	
Light fittings, lighting systems and lighting system controls	As measure	BSE.2	D2

A.3 Explanation of PAS 2030 measure-specific Annex referencing system

EEM included in PAS 2030 are organised in three groups, building fabric measures (BFM), building services mechanical (BSM and building services electrical (BSE). These groups are each presented in an Annex referenced as Annex B for BFM, Annex C for BSM and Annex D for BSE. Within these annexes, the related measures are each allocated a separate sub-Annex e.g. **B.1, B.2, B.3** etc. Referencing within each sub-Annex is provided for as follows:

Annex B (normative) BFM energy efficiency measures

B.1 Measure BFM.1 Cavity wall insulation including that installed in party walls

B, C, D There are three annexes each presenting a single category of energy efficiency measures (e.g. BFM, BSM, and BEM).

B.1, B.2, C.1, D.1 etc. – Measure specific sub-Annex reference, presented alongside title

B.1.1, B.1.2, B.1.3 etc. – Measure focussed requirements clauses within each sub-Annex B1.

Table B.1 – Table of required technical, competence and other requirements for sub-Annex B1

B1-I1, B1-I2, B1-I3 B1-I4 etc. – line references within the Table B.1.

A.4 Interactions between EEMs

A.4.1 Introduction

When EEMs are installed in any existing dwelling it is essential to take account of the fact that some measures can impact upon the performance of other measures or can themselves be impacted by those measures. There are also EEM that when installed in a dwelling without appropriate care can significantly impair the functionality of the dwelling.

For this reason, *PAS 2035 emphasizes the need for the Retrofit Designer to consider and make adequate provision for the interfaces between the EEMs in the retrofit design. PAS 2030 also imposes responsibilities on Retrofit Installers of EEMs to be alert to these potential issues and to closely follow the retrofit design. This extends to the requirement for Retrofit Installers to pay attention to such matters during the pre-installation building inspection and to refer to the Retrofit Coordinator any issues that they consider not to have been adequately provided for in the retrofit design.*

A.4.2 The measures interaction matrix

Figure A1 (which also appears in PAS 2035) provides information about the nature of relationships between co-installed EEMs, identifying measures that are independent and do not interact and measures that are not appropriate together and should not be combined; other intermediate relationships (e.g. when a construction detail is required for an interface) are also identified. PAS 2035 specifies that these relationships shall be taken into account by the Retrofit Designer when developing the retrofit design.

A.5 Avoidance of thermal bridging

As required in 5.2.1, Retrofit Installers shall satisfy themselves that the retrofit design provided by the Retrofit Designer includes construction details for eliminating thermal by-pass and minimizing thermal bridging at corners, junctions and edges of insulation layers either occurring as a consequence of geometry or resulting from discontinuity of the insulation or from insulation being thinner than in the adjacent area (e.g. around meter boxes, etc.).

NOTE *It is recommended that these construction details be based on accepted industry guidance or standards. e.g. External Wall Insulation Specification for Weathering and Thermal Bridge Control [N1] (see 10.7.1) Alternatively, temperature factors for construction details should be calculated in accordance with BRE Information Paper IP1106 Assessing the effects of thermal bridging at junctions and around openings (BRE 2006) [1]. Temperature Factors (f_{Rsi}) should be not less than 0.75.*

Where the retrofit design does not include construction details for eliminating thermal by-pass and minimizing thermal bridging the Retrofit Installer shall obtain confirmation from the Retrofit Coordinator that this was intentional.

NOTE *The Retrofit Coordinator should provide in writing valid reasons why no such detail is required; the cost of preparing or constructing such details is not a valid reason.*

Annex B (normative)

BFM energy efficiency measures

B.1 Measure BFM.1 Cavity wall insulation including that installed in party walls

B.1.1 Additional installation requirements

When installing cavity wall insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Retrofit Installer shall also work to any standards, specifications, instructions or guidance identified in B1-I1 of Table B.1.

B.1.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the cavity wall insulation at location, the Retrofit Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B1-I2 of Table B.1.

B.1.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of cavity wall insulation, the Retrofit Installer shall employ or contract only an inspector meeting the competence requirements of B1-I3 of Table B.1.

B.1.4 Operative competence

When installing cavity wall insulation, the Retrofit Installer shall employ or contract only operatives with the required level of qualification attained through one of the permitted routes (B1-I4 of Table B.1), with competence currency specified in B1-I5 of Table B.1 at the competency ratio specified in B1-I6 of Table B.1.

B.1.5 Provision of information in respect of cavity wall insulation

At the time of handover of the cavity wall insulation to the Client, the Retrofit Installer shall ensure that the information identified at B1-I7 of Table B.1 is provided to the Client as part of the handover process required in 6.9.

Table B.1 – Measure-specific requirements for cavity wall insulation (BFM.1)

Measure description	Cavity Wall Insulation including that installed in party walls
Measure type	As measure description (no sub-division)
B1-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of cavity wall insulation (CWI) products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design and incorporated in the installation method statement (6.1).</p> <p>The Installer responsibilities include preparation of the site and finishing work, incorporating:</p> <ul style="list-style-type: none"> • identification of essential ventilation openings that require sleeving or safeguarding before installation; • the position of all flues whether or not they are in service and measures that shall be taken to safeguard their proper functioning; and • ensuring that upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings and flues. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the Installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p>

Table B.1 – continued

	<p><i>NOTE 2 Attention is drawn to the need, where relevant, for all cavity wall insulation installation work to comply with 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: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p> <p><i>NOTE 3 Where the installation is to include party walls, and the Installer is not responsible for any necessary notices or agreements in respect of the work have been issued then the Installer should confirm with the Retrofit Designer that any necessary notice of work to be undertaken has been issued (e.g. any notice required under the Party Wall etc. Act [2]).</i></p> <p><i>NOTE 4 Additional assistance can be obtained from the NIA Building Fabric Assessment and Cavity Wall Insulation Remedial Work Scheme.</i></p>
<p>B1-I2 Pre-installation building inspection requirements</p>	<p>As a minimum the pre-installation building inspection shall:</p> <ul style="list-style-type: none"> • investigate and assess if the CWI installation work will: <ul style="list-style-type: none"> • result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; • result in unsafe operation of a combustion appliances; • compromise the functionality of existing ventilation ducts/systems; and • compromise the functionality and/or safety of existing services (gas, electric, water, telephone, etc.); • identify: <ul style="list-style-type: none"> • if the proposed installation would be non-compliant with any requirements stated by the supplier; • if the type and condition of the dwelling structure is suitable for the works to commence; • the extent of the cavity to be filled; • if the site layout or conditions will impair the execution of the works; and • if relevant checks have been undertaken to determine if asbestos containing materials are present; • be accompanied by evidence that the findings of the pre-installation building inspection have been independently checked by an appropriately qualified person (see B1-I3) prior to commencement of installation, with at least a randomly selected 1 in 10 of those checks (minimum of 1) including physical inspection of the dwelling by an appropriately qualified person; the appropriately qualified person shall: <ul style="list-style-type: none"> • be independent and not an employee of the inspector or of the Installer of the CWI, or a peer installer; and • not be paid by results nor remunerated only where an assessment is found to be valid; • ensure that each inspection checked includes a unique identifier and the names of the persons who completed the inspection and the check.

Table B.1 – continued

	Installation role	Evidence of vocational competence required
B1-I3	Building inspector	able to demonstrate vocational competence as defined in 3.26 of this PAS.
B1-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B1-I5	Competence currency	To be verified by the Retrofit Installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B1-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Retrofit Installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a higher competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B1-I7	Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Details of safe use and maintenance of the cavity wall insulation system, as specified by the supplier; • Any relevant product warranty information and guarantees; and • Building Regulations compliance certificate where appropriate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days).

B.2 Measure BFM.2 Draught proofing

B.2.1 Additional installation requirements

When installing draught proofing, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS the Installer shall also work to any standards, specifications, instructions or guidance identified in **B2-I1** of **Table B.2**.

B.2.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the draught proofing at location the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in **B2-I2** of **Table B.2**.

B.2.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of draught proofing, the Installer shall employ or contract only an inspector meeting the competence requirements of **B2-I3** of **Table B.2**.

B.2.4 Operative competence

When installing draught proofing, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (**B2-I4** of **Table B.2**), with competence currency specified in **B2-I5** of **Table B.2** at the competency ratio specified in **B2-I6** of **Table B.2**.

B.2.5 Provision of information in respect of draught proofing

At the time of handover of the draught proofing to the Client, the Installer shall ensure that the information identified at **B2-I7** of **Table B.2** is provided to the Client as part of the handover process required in **6.9**.

Table B.2 – Measure-specific requirements for draught proofing (BFM.2)

Measure description		Draught Proofing
Measure type		As measure (no sub-division)
B2-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of draught proofing products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, and incorporated in the installation method statement (6.1).</p> <p>The Installer responsibilities include preparation of the site and finishing work.</p> <p>When fitting draught-stripping products as a retrofit measure to hinged doors in wood, sliding windows in wood, hinged windows in wood and steel and domestic loft hatches, in houses that were not originally designed to incorporate draught-stripping, Installers shall use products meeting the requirements of BS 7386 working to the recommendations of BS 7880.</p> <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all draught proofing installation work to comply with 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: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>

Table B.2 – continued

B2-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the area and elements to be draught-proofed; • if relevant checks have been undertaken to determine if asbestos-containing materials are present; • if the condition of the elements to be draught-proofed is suitable for the works to commence in relation to: <ul style="list-style-type: none"> • timbers free from rot and/or infestation; • metal components being free from visible signs of corrosion; and • the surfaces that will receive draught-proofing materials being free from grease, etc.; • if the proposed installation would: <ul style="list-style-type: none"> • be non-compliant with any requirements stated by the Retrofit Designer; • compromise the functionality of existing ventilation systems in relation to air movement within the dwelling; and • result in unsafe operation of combustion appliances (combustion ventilation and or cooling ventilation); • if the site layout or conditions will impair the execution of the works in relation to appropriate access to the property and to the elements to be draught-proofed; and • If the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
	Installation role	Vocational competence required
B2-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B2-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B2-I5	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.2 – continued

<p>B2-16 Competence ratio</p>	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
<p>B2-17 Measure-specific information to be handed over to the Client in addition to 6.9</p>	<ul style="list-style-type: none"> • Any relevant product warranty information and guarantees.

B.3 Measure BFM.3 – Energy efficient glazing and doors including replacement Insulating Glass Units (IGU)

B.3.1 Additional installation requirements

When installing energy efficient glazing and doors, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B3-I1 of Table B.3.

B.3.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the energy efficient glazing and doors at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B3-I2 of Table B.3.

B.3.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of energy efficient glazing and doors, the Installer shall employ or contract only an inspector meeting the competence requirements of B3-I3 of Table B.3.

B.3.4 Operative competence

When installing energy efficient glazing and doors, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B3-I4 of Table B.3), with competence currency specified in B3-I5 of Table B.3 at the competency ratio specified in B3-I6 of Table B.3.

B.3.5 Provision of information in respect of energy efficient glazing and doors

At the time of handover of the energy efficient glazing and doors to the Client, the Installer shall ensure that the information identified at B3-I7 of Table B.3 is provided to the Client as part of the handover process required in 6.9.

Table B.3 – Measure-specific requirements for energy efficient glazing and doors (BFM.3)

Measure description		Energy Efficient Glazing and Doors including replacement insulating glass units (IGU)
Measure type		As measure description (no sub-division)
B3-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>Where relevant to the work to be undertaken, Installers shall take account of the guidance and information provided by:</p> <p>BS 8213-4, <i>Code of practice for the survey and installation of windows and external door sets</i> or <i>A good practice guide: Installation of replacement windows and doors</i>; and the guidance provided by GGF.</p> <p>BS 6262-2, <i>Glazing for buildings- Part 2: Code of practice for energy light and sound</i></p> <p>BS 6262-3, <i>Glazing for buildings- Part 3: Code of practice for fire security and wind loading</i></p> <p>BS 6262-4, <i>Glazing for buildings- Part 4: Code of practice for safety related to human impact</i></p> <p>BS 6262-6, <i>Glazing for buildings- Part 6: Code of practice for special applications</i></p> <p>BS 6262-7, <i>Glazing for buildings- Part 7: Code of practice for the provision of information</i></p> <p>BS 8000-7 <i>Workmanship on building sites- Part 7: code of practice for glazing</i></p> <p>NOTE 1 Attention is drawn to the need for all energy efficient glazing and doors work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation; conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</p> <p>NOTE 2 For IGU replacements only safety glazing requirements are applicable.</p>

Table B.3 – continued

B3-I2	Pre-installation building inspection requirements	<p>1) As a minimum the pre-installation building inspection shall include:</p> <ul style="list-style-type: none"> • review of contract; • measurement check, include fire egress*; • assessment of structure*; • check for asbestos*; • safety glazing requirements; • requirements relating to fire-resistant glazing; • ventilation requirements • check render and decorations condition* • user access requirements (e.g. disabled access); • specialist access equipment; and • explanation to existing owner. <p><i>NOTE Not applicable to IGU replacement.</i></p> <p>2) The pre-installation building inspection shall investigate and assess if the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship, materials, structural stability, fire safety, resistance to moisture.</p>
	Installation role	Vocational competence required
B3-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B3-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B3-I5	Competence currency	To be verified by the Installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.3 – continued

B3-16 Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative per team of four operatives. For each installation, the vocational competence ratio (see 3.28) over and above this minimum shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B3-17 Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days); • Relevant operating, maintenance, safety and security documentation relevant to the installation; and • Any relevant product warranty information and guarantees.

B.4 Measure BFM.4 – External wall insulation

B.4.1 Additional installation requirements

When installing external wall insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in **B4-I1** of **Table B.4**.

B.4.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the external wall insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in **B4-I2** of **Table B.4**.

B.4.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of external wall insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of **B4-I3** of **Table B.4**.

B.4.4 Operative competence

When installing external wall insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (**B4-I4** of **Table B.4**), with competence currency specified in **B4-I5** of **Table B.4**, at the competency ratio specified in **B4-I6** of **Table B.4**.

B.4.5 Provision of information in respect of external wall insulation

At the time of handover of the external wall insulation to the Client, the Installer shall ensure that the information identified at **B4-I7** of **Table B.4** is provided to the Client as part of the handover process required in **6.9**.

Table B.4 – Measure-specific requirements for external wall insulation (BFM.4)

Measure description		External Wall Insulation	
Measure type	BFM.4.1	Site rendered external wall insulation systems	
	BFM.4.2	Pre-finished external wall insulation systems	
B4-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>Because of the high risk of thermal by-pass rendering the insulation ineffective, external wall insulation shall not be installed on walls of cavity construction that have unfilled cavities or have had cavity wall insulation removed and not replaced, unless the cavities have been sealed in accordance with specifications and construction details provided by the Retrofit Designer (See PAS 2035 for further details).</p> <p>The Installer shall ensure that the methods used for the installation of external wall insulation (EWI) products or systems are as recommended by the system supplier and in accordance with the relevant retrofit design and incorporated in the installation method statement.</p> <p>In undertaking the installation, the Installer’s responsibilities shall include:</p> <p>a) Before installation starts, confirming that the retrofit design has made provision for ensuring that:</p> <ul style="list-style-type: none"> • the EWI system provided for installation is that recommended by the pre-design building survey and specified by the retrofit design; • wind loads have been calculated and taken into account in the fixing requirements; • all essential ventilation openings that require sleeving or safeguarding before installation are located and identified; • the position of all flues whether or not they are in service is determined and the measures that shall be taken to safeguard their proper functioning is determined; • any existing cables, pipework, ducting etc. that require it are removed or repositioned as/where necessary to accommodate the planned EWI system, with authorization from the relevant responsible body (where required) and undertaken by a person competent to undertake such work; 	

Table B.4 – continued

	<ul style="list-style-type: none"> • the existing ground levels, paths or decking adjacent to the dwelling are 150 mm below the level of the damp proof course; and • other areas of the dwelling and surrounding area that could be at risk during installation are adequately protected to ensure they are not damaged. <p>In the event that any of these aspects is not adequately covered, liaising with the Retrofit Designer to provide for their undertaking.</p> <p>b) During installation, ensuring that:</p> <ul style="list-style-type: none"> • all work is carried out in accordance with the site-specific retrofit design, drawings and method statement and that work is not permitted to progress unless copies of the site-specific specification documentation are accessible at location and all operatives are aware of the content and requirements relevant to their designated activities; • the system and all detailed interfaces with other parts of the dwelling or other planned EEMs to be undertaken in a manner and sequenced such, that all measures are fully effective, with optimized performance and junctions that are safe, durable and fully weatherproof for all expected exposure conditions. e.g. interface between EWI system and planned replacement windows; and • whether or not specifically required by the retrofit design, the items listed in i to viii below are given particular attention with regard to the efficacy and durability of the detail especially concerning the management and exclusion of moisture and/or the risk of surface/interstitial condensation or rising damp. Mastic sealants shall always be supported by a primary seal below, and all details shall be fully weatherproof: <ul style="list-style-type: none"> i. system base detail (including below dpc); ii. interfaces with roofs at eaves and verges (where metal or plastic cappings and trims shall not be used); iii. window/door reveals/heads; iv. system/cill interfaces (incl. overhang requirements/weepholes/thermal movement); v. surface fixtures (structurally sound); vi. penetrations through the system; vii. interfaces with roof soffits, flat roofs, conservatory roofs etc.; and viii. detailing and sealing around vents/flues, meters and other heating related structures/pipework. • all weather seals at the interface between EWI systems and other structures/finishes are installed with particular attention given to the soundness/cleanliness of contact surfaces, continuity and effectiveness around corners, bond to surfaces and the durability of the water seal; • all details are installed to minimize the risks of thermal bridging, removing/relocating/extending to allow continuity of insulation in all cases e.g. rooflines, meter boxes, pipework, flues, ducts; • photographic evidence of key stages of the installation is prepared and retained for the period of the guarantee, including close up photographs of representative examples of all moisture and thermally sensitive details;
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Table B.4 – continued

	<ul style="list-style-type: none"> • installations are undertaken in accordance with the specification for the installation of external wall insulation ensuring the safety and operation of fuel burning appliances, taking account of the recommendations provided in the document <i>External wall External Wall Insulation Specification for Weathering and Thermal Bridge Control</i> [N1] (see 10.7.1); • ventilation of the dwelling is assessed and if necessary upgraded in accordance with the retrofit design and with the requirements of PAS 2035; and • upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings and flues. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier is necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all external wall insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>
<p>B4-I2 Measure-specific pre-installation building inspection requirements supplementary to those in the core of this PAS (Clause 7.2)</p>	<p>1) In meeting the requirements specified in Clause 7.2 of this PAS, the designated competent person shall confirm that:</p> <ol style="list-style-type: none"> a) a full and detailed pre-design building assessment had been undertaken by a competent person (see B4-I3 of this Table), prior to the retrofit design being undertaken; and b) the retrofit design relevant to the installation under inspection has been produced in accordance with Clause 5 of this PAS taking full account of the findings and recommendations of the pre-design building assessment, including: <ul style="list-style-type: none"> • thermal performance calculations; • condensation risk analysis; • ventilation requirements and standard/bespoke drawing details; • the main components of the system including the fixing type/method, the insulation type and thickness, the joint details and specifications, the reinforcing coat and type of reinforcement and the finish;

Table B.4 – continued

- the proposed details for the main interfaces; (thermal bridging, meter boxes, reveals, roofline joists, party walls, base detail with particular reference to below dpc, base/floor details, seals at windows/doors, seals to penetrations, light fittings, sockets, fixing and sealing of surface mounted structures, interfaces with ceilings, interfaces with roof, junctions between the system and other finishes and/or other EEM) clearly demonstrate how the installation will avoid condensation risk particularly at moisture sensitive locations such as timber joist ends and within the wall structure (interstitial/surface condensation); and
 - the installation to the retrofit design is practical and achievable given the particular EWI system chosen for the project and the specific dwelling construction, site conditions and other EEMs planned for the property. (See also the Measures Interaction matrix Figure A.1).
- 2) As a minimum the pre-installation building inspection shall investigate and assess if the EWI installation work will:
- result in non-compliance with the Building Regulations, e.g. in relation to workmanship, materials, structural stability, fire safety;
 - provide resistance to moisture. Where possible, any areas of non-compliance shall be rectified by selection of another solution/detail, which shall be documented in the pre-installation building inspection and all contract documentation amended accordingly i.e. specification, drawings, method statement;
 - result in avoidable thermal bridging; where thermal bridging is avoidable by adaptation of the detail, such measures shall be taken and the contract documents amended to suit. Design details shall be such that they incorporate additional capacity, that for example, will provide water management within the system should surface or interstitial condensation occur;
 - result in unsafe operation of combustion appliances; unless an alternative safe detail can be found, EWI works shall not progress in the area causing the unsafe operation;
 - compromise the functionality of existing ventilation ducts/systems; unless an alternative safe detail can be found, EWI works shall not progress in the area causing the unsafe operation;
 - compromise the functionality and/or safety of existing services (gas, electric, water, telephone, etc.); unless an alternative safe detail can be found, EWI works shall not progress in the area causing the unsafe operation; and
 - result in the proposed installation being non-compliant with any requirements of the EEM supplier or of the retrofit design.
- 3) The pre-installation building inspection shall include confirmation that the condition of the substrate is suitable for the works to commence and where all or any of the substrate does not fulfil the requirements for installation, preparation of proposals for adaptations to be made or additional preparation undertaken that will be necessary in order that works can commence.
- 4) All instances of potential non-compliance identified in the pre-installation building inspection shall be documented and referred to the Retrofit Coordinator for resolution. Any design adjustments, special adaptations and/or additional preparation requirements shall be confirmed as acceptable in writing, by the system supplier and/or the Retrofit Coordinator.
- 5) The retrofit design documentation shall be amended to include any specified changes to the installation, the installation method statement modified accordingly and the pre-installation building inspection records updated to provide documentary evidence that the intended modified installation will address all the issues identified in the pre-installation building inspection and meets the requirements of all parties.

NOTE In undertaking pre-installation building inspections it is recommended that Installers consider using an industry recommended checklist e.g. the External Wall Insulation pre-installation building inspection checklist [N7] (see 10.7.1).

Table B.4 – continued

Installation role	Vocational competence required
B4-I3 Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B4-I4 Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B4-I5 Competence Currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B4-I6 Competence ratio	<p>For each installation task to be undertaken, the installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale, geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised; <p>but shall not be less than one carded operative per team of 4 (1 to 3), at the specified installation location at any time.</p> <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B4-I7 Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • As a minimum the user manual shall include details on fixing to the system, drilling or cutting the system, repairs to damaged areas, avoiding damage (e.g. ladders), cleaning recommendations, importance of weather seals, name/contact details of both the installer and system certificate holder, materials specification (name, colours etc.) and guidance on living in a highly insulated property, including the need for appropriate ventilation. The contents of the manual should be explained to the Client (not just left with them). • Where end-user maintenance is possible, details of how to undertake the maintenance including frequency and any product or tools that shall be used and where to obtain the required products and tools. • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • It should be explained to the Client that repairs should be carried out by a competent person, but that maintenance is their responsibility. • Any relevant product warranty information and guarantees.

B.5 Measure BFM.5 Flat roof insulation

B.5.1 Additional installation requirements

When installing flat roof insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B5-I1 of Table B.5.

B.5.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the flat roof insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B5-I2 of Table B.5.

B.5.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of flat roof insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of B5-I3 of Table B.5.

B.5.4 Operative competence

When installing flat roof insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B5-I4 of Table B.5), with competence currency specified in B5-I5 of Table B.5 at the competency ratio specified in B5-I6 of Table B.5.

B.5.5 Provision of information in respect of flat roof insulation

At the time of handover of the flat roof insulation to the Client, the Installer shall ensure that the information identified at B5-I7 of Table B.5 is provided to the Client as part of the handover process required in 6.9.

Table B.5 – Measure-specific requirements for flat roof insulation (BFM.5)

Measure description		Flat Roof Insulation
Measure type		As measure description (no sub-divisions)
B5-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10).	<p>The Installer shall ensure that the methods used for the installation of flat roof insulation products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, and incorporated in the installation method statement.</p> <p>The Installer’s responsibilities shall include preparation of the site and finishing work incorporating:</p> <ul style="list-style-type: none"> • identification of essential ventilation openings that require sleeving or safeguarding before installation; • the position of all flues whether or not they are in service and measures that shall be taken to safeguard their proper functioning and to prevent combustion of all newly installed adjacent materials; and • ensuring that upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings and flues. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier of the insulation and where applicable the waterproofing products may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all flat roof insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>

Table B.5 – continued

B5-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the area and elements to be insulated; • if relevant checks have been undertaken to determine if asbestos-containing materials are present; • if the condition of the roof is suitable for the works to commence in relation to: <ul style="list-style-type: none"> • existence of appropriate roof internal ventilation arrangements; • the roof build up being free from rodents/pests and protected species, e.g. bats; • timbers free from rot and/or infestation; • the condition of the ceiling (if applicable); • metal structural roof members being free from visible signs of corrosion; • electrical wiring is free from visible defects, e.g. damaged cables, trailing cables, exposed conductors; • no visible signs of water penetration; and • no visible signs of leakage from water system components, e.g. pipework. • if the proposed installation would: <ul style="list-style-type: none"> • be non-compliant with any requirements stated by the designer/ specifier; • compromise the functionality of existing air supply/extract ventilation ducts/systems; and • result in unsafe operation of a combustion appliances. • if the site layout or conditions will impair the execution of the works in relation to appropriate access to the property and to the elements to be insulated; • if the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
Installation role	Vocational competence required	
B5-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B5-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B5-I5	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.5 – continued

B5-16 Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B5-17 Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • any relevant product warranty information and guarantees.

B.6 Measure BFM.6 Floor insulation

B.6.1 Additional installation requirements

When installing floor insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in B6-I1 of Table B.6.

B.6.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the floor insulation at location, the installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B6-I2 of Table B.6.

B.6.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of floor insulation, the installer shall employ or contract only an inspector meeting the competence requirements of B6-I3 of Table B.6.

B.6.4 Operative competence

When installing floor insulation, the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B6-I4 of Table B.6), with competence currency specified in B6-I5 of Table B.6 at the competency ratio specified in B6-I6 of Table B.6.

B.6.5 Provision of information in respect of floor insulation

At the time of handover of the floor insulation to the Client, the installer shall ensure that the information identified at B6-I7 of Table B.6 is provided to the Client as part of the handover process required in 6.9.

Table B.6 – Measure-specific requirements for floor insulation (BFM.6)

Measure description	Floor Insulation
Measure type	As measure description (no sub-division)
B6-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of floor insulation products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, and incorporated in the installation method statement (5.1).</p> <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all floor insulation installation work to comply with 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: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England and Wales is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>

Table B.6 – continued

B6-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the area and elements to be insulated; • if relevant checks have been undertaken to determine if asbestos-containing materials are present; • if the condition of the floor structure and the sub- floor void is suitable for the works to commence in relation to: <ul style="list-style-type: none"> • existence of appropriate floor void ventilation arrangements; • the under-floor area being free from rodents/pests; • timbers free from rot and/or infestation; • metal structural floor support members being free from visible signs of corrosion; • electrical wiring is free from visible defects, e.g. damaged cables, trailing cables, exposed conductors; • no visible signs of water penetration or water accumulation in the under-floor area; and • no visible signs of leakage from water system components, e.g. pipework; • if the proposed installation would: <ul style="list-style-type: none"> • be non-compliant with any requirements stated by the designer/specifier; • compromise the functionality of existing air supply/extract ventilation ducts/systems; and • result in unsafe operation of a combustion appliances (floor vents, etc.); • if the site layout or conditions will impair the execution of the works in relation to: <ul style="list-style-type: none"> • appropriate access to the property and to the floor to be insulated; and • the room being free from stored items, floor coverings, etc.; • if the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
	Installation role	Vocational competence required
B6-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B6-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B6-I5	Competence currency	To be verified by the Installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.6 – continued

B6-16	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B6-17	Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • any relevant product warranty information and guarantees.

B.7 Measure BFM 7 Hybrid wall insulation

B.7.1 Additional installation requirements

When installing hybrid wall insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B7-I1 of Table B.7.

B.7.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the hybrid wall insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B7-I2 of Table B.7.

B.7.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of hybrid wall insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of B7-I3 of Table B.7.

B.7.4 Operative competence

When installing hybrid wall insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B7-I4 of Table B.7), with competence currency specified in B7-I5 of Table B.7 at the competency ratio specified in B7-I6 in Table B.7.

B.7.5 Provision of information in respect of hybrid wall insulation

At the time of handover of hybrid wall insulation to the Client, the Installer shall ensure that the information identified at B7-I7 of Table B.7 is provided to the Client as part of the handover process required in 6.9.

Table B.7 – Measure-specific requirements for hybrid wall insulation (BFM.7)

Measure description		Hybrid Wall Insulation
Measure type		As measure description (no sub-division)
B7-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of hybrid wall insulation (HWI) systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, and incorporated in the installation method statement (5.1). In undertaking the installation, the Installer's responsibilities shall include:</p> <p>a) before installation starts, confirming that the retrofit design has made provision for ensuring that:</p> <ul style="list-style-type: none"> • the HWI system provided for installation is that recommended in the pre-design building survey and specified by the retrofit design; • all essential ventilation openings that require sleeving or safeguarding before installation are located and identified; • the position of all flues whether or not they are in service is determined and the measures that shall be taken to safeguard their proper functioning is determined; • any existing cables, pipework, ducting etc. that require it are removed or repositioned as/where necessary to accommodate the planned EWI system, with authorization from the relevant responsible body (where required) and undertaken by a person competent to undertake such work; • other areas of the dwelling and surrounding area that could be at risk during installation are adequately protected to ensure they are not damaged; and • in the event that any of these aspects is not adequately covered, liaising with the Retrofit Coordinator to provide for their undertaking;

Table B.7 – continued

	<p>b) during installation, ensuring that:</p> <ul style="list-style-type: none"> • all work is carried out in accordance with the site specific retrofit design, drawings and method statement and that work is not permitted to progress unless copies of the site specific specification documentation are accessible at location and all operatives are aware of the content and requirements relevant to their designated activities; • the system and all detailed interfaces with other parts of the dwelling or other planned EEMs to be undertaken in a manner and sequenced such, that all measures are fully effective, with optimized performance and junctions that are safe, durable and fully weatherproof for all expected exposure conditions, e.g. interface between EWI/IWI system and planned replacement windows; • whether or not specifically required by the retrofit design, the items listed in I to IX below are given particular attention with regard to the efficacy and durability of the detail especially concerning the management and exclusion of moisture and/or the risk of surface/interstitial condensation or rising damp. Mastic sealants shall always be supported by a secondary seal and all details shall be fully weatherproof: <ul style="list-style-type: none"> i. system base detail (including below dpc); ii. window/door reveals/heads; iii. junctions of internal solid wall insulation with intermediate floors and suspended ground floors; iv. locations where the thickness of internal wall insulation is reduced; v. system/cill interfaces (incl. overhang requirements/weepholes/thermal movement); vi. surface fixtures (structurally sound); vii. penetrations through the system; viii. interfaces with roof soffits, flat roofs, conservatory roofs etc.; and ix. detailing and sealing around vents/flues, meters and other heating related structures/pipework. • all weatherseals at the interface between HWI systems and other structures/finishes are installed with particular attention given to the soundness/cleanliness of contact surfaces, continuity and effectiveness around corners, bond to surfaces and the durability of the water seal; • all details are installed to minimize thermal bridging, removing/relocating/extending to allow continuity of insulation in all cases where feasible e.g. rooflines, meter boxes, pipework, flues, ducts; • photographic evidence of key stages of the installation is prepared and retained, including close up photographs of representative examples of all moisture and thermally sensitive details; • all installations are in accordance with industry good practice. Where conflict with the requirements of this PAS exists, this PAS takes precedence; • ventilation of the dwelling is no worse following the installation of the measure than prior to the installation of the measure (This may require additional ventilation); and
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Table B.7 – continued

	<ul style="list-style-type: none"> upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings and flues. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all hybrid wall insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>
<p>B7-I2 Measure specific pre-installation building inspection requirements supplementary to those in the core of this PAS (Clause 7.2)</p>	<p>1) In meeting the requirements specified in Clause 7.2 of this PAS, the designated competent person shall confirm that:</p> <ol style="list-style-type: none"> a) a full and detailed pre-design building assessment had been undertaken by a competent person (see B7-I3 of this Table), prior to the retrofit design being undertaken; b) the retrofit design relevant to the installation under inspection has been produced in accordance with Clause 4 of this PAS taking full account of the findings and recommendations of the pre-design building assessment, including: <ul style="list-style-type: none"> thermal performance calculations; condensation risk analysis; ventilation requirements and standard/bespoke drawing details; the main components of the system including the fixing type/method, the insulation type and thickness, breather membrane vapour control layer, board type and jointing and the finish; the proposed details for the main interfaces; (thermal bridging, meter boxes, reveals, roofline joists, party walls, base detail with particular reference to below dpc, base/floor details, seals at windows/doors, seals to penetrations, light fittings, sockets, fixing and sealing of surface mounted structures, interfaces with suspended floors, intermediate floors and ceilings, interfaces with roof, junctions between the system and other finishes and/or other EEM) clearly demonstrate how the installation will avoid condensation risk particularly at moisture sensitive locations such as timber joist ends and within the wall structure (interstitial/surface condensation); and the installation to the retrofit design is practical and achievable given the particular HWI system chosen for the project and the specific dwelling construction, site conditions and other EEMs planned for the property. (See also Measures interaction matrix Figures A.1 and A.2).

Table B.7 – continued

	<p>2) As a minimum the pre-installation building inspection shall investigate and assess if the HWI installation work will:</p> <ul style="list-style-type: none"> • result in non-compliance with the Building Regulations, e.g. in relation to workmanship, materials, structural stability, fire safety; • provide resistance to moisture. Where possible, any areas of non-compliance shall be rectified by selection of another solution/detail, which shall be documented in the pre-installation building inspection and all contract documentation amended accordingly i.e. specification, drawings, method statement; • result in avoidable thermal bridging; where thermal bridging is avoidable by adaptation of the detail, such measures shall be taken and the contract documents amended to suit. Design details shall be such that they incorporate additional capacity, that for example, will provide water management within the system should surface or interstitial condensation occur; • result in unsafe operation of combustion appliances; unless an alternative safe detail can be found, HWI works shall not progress in the area causing the unsafe operation; • compromise the functionality of existing ventilation ducts/systems; unless an alternative safe detail can be found, HWI works shall not progress in the area causing the unsafe operation; • compromise the functionality and/or safety of existing services (gas, electric, water, telephone, etc.); unless an alternative safe detail can be found, HWI works shall not progress in the area causing the unsafe operation; and • result in the proposed installation being non-compliant with any requirements of the retrofit design. <p>3) The pre-installation building inspection shall include confirmation that the condition of the substrate is suitable for the works to commence and where all or any of the substrate does not fulfil the requirements for installation, preparation of proposals for adaptations to be made or additional preparation undertaken that will be necessary in order that works can commence.</p> <p>4) All instances of potential non-compliance identified in the pre-installation building inspection shall be documented and referred to the Retrofit Coordinator for resolution. Any design adjustments, special adaptations and/or additional preparation requirements shall be confirmed as acceptable in writing, by the system supplier and/or Retrofit Coordinator.</p> <p>5) The retrofit design documentation shall be amended to include any specified changes to the installation, the installation method statement modified accordingly and the pre-installation building inspection records updated to provide documentary evidence that the intended modified installation will address all the issues identified in the pre-installation building inspection and meets the requirements of all parties.</p> <p>The findings of the pre-installation building inspection shall be independently checked by an appropriately qualified person (see B17-I3) prior to commencement of installation, with at least a randomly selected 1 in 10 sample of those checks (minimum of 1) including physical inspection of the dwelling by an appropriately qualified person.</p>
Installation role	Vocational competence required
B7-I3 Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B7-I4 Operative (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
Operative (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B7-I5 Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.7 – continued

<p>B7-16 Competence ratio</p>	<p>For each installation task to be undertaken, the installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised; <p>but shall not be less than one carded operative per team of 4 (1 to 3), at the specified installation location at any time.</p> <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
<p>B7-17 Measure-specific information to be handed over to the Client in addition to 6.9</p>	<ul style="list-style-type: none"> • As a minimum the user manual shall include details on fixing to the system, drilling or cutting the system, repairs to damaged areas, avoiding damage (e.g. ladders), the importance of weather seals, how to hang items on IWI including restrictions on weights, breaking the vapour control layer and sealing, advice on fixing radiators, changes of electrical sockets, name/contact details of both the installer and system certificate holder, materials specification and guidance on living in a highly insulated property, including the need for appropriate ventilation. The contents of the manual should be explained to the Client (not just left with them); • Where end-user maintenance is possible, details of how to undertake the maintenance including frequency and any product or tools that shall be used and where to obtain the required products and tools; • Any relevant product warranty information and guarantees; • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days); • It should be explained to the Client that repairs should be carried out by a competent person, but that maintenance is their responsibility.

B.8 Measure BFM.8 Internal wall insulation

B.8.1 Additional installation requirements

When installing internal wall insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B8-I1 of Table B.8.

B.8.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the internal wall insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B8-I2 of Table B.8.

B.8.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of internal wall insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of B8-I3 of Table B.8.

B.8.4 Operative competence

When installing internal wall insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B8-I4 of Table B.8) with the competence currency specified in B8-I5 of Table B.8, at the competency ratio specified in B8-I6 of Table B.8.

B.8.5 Provision of information in respect of internal wall insulation

At the time of handover of the internal wall insulation to the Client, the Installer shall ensure that the information identified at B8-I7 of Table B.8 is provided to the Client as part of the handover process required in 6.9

Table B.8 – Measure-specific requirements for internal wall insulation (BFM.8)

Measure description		Internal Wall Insulation
Measure type		As measure description (no sub-division)
B8-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of internal wall insulation (IWI) systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design and incorporated in the installation method statement (5.1).</p> <p>In undertaking the installation, the Installers responsibilities shall include:</p> <p>a) before installation starts, confirming that the retrofit design has made provision for ensuring that:</p> <ul style="list-style-type: none"> • the IWI system provided for installation is that recommended in the pre-design building assessment and specified in the retrofit design; • all essential ventilation openings that require sleeving or safeguarding before installation are located and identified; • the position of all flues whether or not they are in service is determined and the measures that shall be taken to safeguard their proper functioning is determined; • any existing cables, pipework, ducting etc. that require it are removed or repositioned as/where necessary to accommodate the planned IWI system, with authorization from the relevant responsible body (where required) and undertaken by a person competent to undertake such work; • other areas of the dwelling and surrounding area that could be at risk during installation are adequately protected to ensure they are not damaged; <p>and in the event that any of these aspects is not adequately covered, liaising with the Retrofit Coordinator to provide for their undertaking.</p>

Table B.8 – continued

	<p>b) during installation, ensuring that:</p> <ul style="list-style-type: none"> • all work is carried out in accordance with the site specific retrofit design, drawings and method statement and that work is not permitted to progress unless copies of the site-specific specification documentation are accessible at location and all operatives are aware of the content and requirements relevant to their designated activities; • the system and all detailed interfaces with other parts of the dwelling or other planned EEMs to be undertaken in a manner and sequenced such, that all measures are fully effective, with optimized performance and junctions that are safe and durable for all expected conditions. Particular attention shall be given to the need to control moisture and prevent the risk of surface or interstitial condensation; • whether or not specifically required by the retrofit design, the items listed in i to viii below are given particular attention with regard to the efficacy and durability of the detail especially concerning the management and exclusion of moisture and/or the risk of surface/interstitial condensation or rising damp; <ul style="list-style-type: none"> i. system floor and ceiling details; ii. window/door reveals/heads; iii. junctions of internal solid wall insulation with intermediate floors and suspended ground floors; iv. locations where the thickness of internal wall insulation is reduced; v. system/cill interfaces; vi. surface fixtures (structurally sound); vii. penetrations through the system; viii. detailing and sealing around vents/flues, meters and other heating related structures/pipework; • all details are installed to minimize the risks of cold bridging, removing/relocating/extending to allow continuity of insulation in all cases where feasible e.g. pipework, flues, ducts, switches, sockets, radiators etc.; • photographic evidence of key stages of the installation is prepared and retained, including close up photographs of representative examples of all moisture and thermally sensitive details; • all installations are in accordance with industry best practice. Where conflict with the requirements of this PAS exists, this PAS takes precedence; • ventilation of the dwelling is no worse following the installation of the measure than prior to the installation of the measure (this may require additional ventilation see also A.5); and
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Table B.8 – continued

	<ul style="list-style-type: none"> • upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings and flues. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all internal wall insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook[N5] and Non-Domestic Technical Handbook [N6].</i></p>
<p>B8-I2 Measure-specific pre-installation building inspection requirements supplementary to those in the core of this PAS (Clause 7.2)</p>	<p>1) In meeting the requirements specified in Clause 7.2 of this PAS, the designated competent person shall confirm that:</p> <ol style="list-style-type: none"> a) a full and detailed pre-design building assessment had been undertaken by a competent person (see B7-I3 of this Table), prior to the retrofit design being undertaken; and b) the retrofit design relevant to the installation under inspection has been produced in accordance with Clause 4 of this PAS taking full account of the findings and recommendations of the pre-design building assessment, including: <ul style="list-style-type: none"> • thermal performance calculations, • condensation risk analysis; • ventilation requirements and standard/bespoke drawing details; • the main components of the system including the fixing type/method, the insulation type and thickness, the breather membrane, vapour control layer, board type and jointing, and the finish; • the proposed details for the main interfaces; (thermal bridging, meter boxes, reveals, roofline joists, party walls, base detail with particular reference to below dpc, base/floor details, seals at windows/doors, seals to penetrations, light fittings, sockets, fixing and sealing of surface mounted structures, interfaces with ceilings, interfaces with roof, junctions between the system and other finishes and/or other EEM) clearly demonstrate how the installation will avoid condensation risk particularly at moisture sensitive locations such as timber joist ends and within the wall structure (interstitial/surface condensation); and • the installation to the retrofit design is practical and achievable given the particular IWI system chosen for the project and the specific dwelling construction, site conditions and other EEMs planned for the property. (See also Measures Interaction Matrix Figure A.1).

Table B.8 – continued

	<p>2) As a minimum the pre-installation building inspection shall investigate and assess if the IWI installation work will:</p> <ul style="list-style-type: none"> • result in non-compliance with the Building Regulations, e.g. in relation to workmanship, materials, structural stability, fire safety; • provide resistance to moisture. Where possible, any areas of non-compliance shall be rectified by selection of another solution/detail, which shall be documented in the pre-installation building inspection and all contract documentation amended accordingly i.e. specification, drawings, method statement; • result in avoidable thermal bridging; where thermal bridging is avoidable by adaptation of the detail, such measures shall be taken and the contract documents amended to suit. Design details shall be such they incorporate additional capacity, that for example, will provide water management within the system should surface or interstitial condensation occur; • result in unsafe operation of combustion appliances; unless an alternative safe detail can be found, IWI works shall not progress in the area causing the unsafe operation; • compromise the functionality of existing ventilation ducts/systems; unless an alternative safe detail can be found, IWI works shall not progress in the area causing the unsafe operation; • compromise the functionality and/or safety of existing services (gas, electric, water, telephone, etc.); unless an alternative safe detail can be found, IWI works shall not progress in the area causing the unsafe operation; and • result in the proposed installation being non-compliant with any requirements of the EEM supplier or of the retrofit design. <p>3) The pre-installation building inspection shall include confirmation that the condition of the substrate is suitable for the works to commence and where all or any of the substrate does not fulfil the requirements for installation, preparation of proposals for adaptations to be made or additional preparation undertaken that will be necessary in order that works can commence.</p> <p>4) All instances of potential non-compliance identified in the pre-installation building inspection shall be documented and referred to the Retrofit Coordinator for resolution. Any design adjustments, special adaptations and/or additional preparation requirements shall be confirmed as acceptable in writing, by the system supplier and/or the Retrofit Coordinator.</p> <p>5) The retrofit design documentation shall be amended to include any specified changes to the installation, the installation method statement modified accordingly and the pre-installation building inspection records updated to provide documentary evidence that the intended modified installation will address all the issues identified in the pre-installation building inspection and meets the requirements of all parties.</p> <p>The findings of the pre-installation building inspection shall be independently checked by an appropriately qualified person (see B8-I3) prior to commencement of installation, with at least a randomly selected 1 in 10 sample of those checks (minimum of 1) including physical inspection of the dwelling by an appropriately qualified person.</p>
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Table B.8 – continued

Installation role	Vocational competence required
B8-13 Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B8-14 Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist) Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B8-15 Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B8-16 Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> range, scale geographical spread and complexity of the work being undertaken; supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p>but shall not be less than one carded operative per team of 4 (1 to 3), at the specified installation location at any time.</p> <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B8-17 Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> As a minimum the user manual shall include details on fixing to the system, drilling or cutting the system, repairs to damaged areas, avoiding damage (e.g. ladders), the importance of weather seals, how to hang items on IWI including restrictions on weights, breaking the vapour control layer and sealing, advice on fixing radiators, changes of electrical sockets, name/contact details of both the installer and system certificate holder, materials specification and guidance on living in a highly insulated property, including the need for appropriate ventilation. The contents of the manual should be explained to the Client (not just left with them). Where end-user maintenance is possible, details of how to undertake the maintenance including frequency and any product or tools that shall be used and where to obtain the required products and tools. Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). It shall be explained to the Client that repairs should be carried out by a competent person, but that maintenance is their responsibility. Any relevant product warranty information and guarantees.

B.9 Measure BFM.9 Loft insulation

B.9.1 Additional installation requirements

When installing loft insulation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B9-I1 of Table B.9.

B.9.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the loft insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B9-I2 of Table B.9.

B.9.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of loft insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of B9-I3 of Table B.9.

B.9.4 Operative competence

When installing loft insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B9-I4 of Table B.9), with competence currency specified in B9-I5 of Table B.9 at the competency ratio specified in B9-I6 of Table B.9.

B.9.5 Provision of information in respect of loft insulation

At the time of handover of the loft insulation to the Client, the Installer shall ensure that the information identified at B9-I7 of Table B.9 is provided to the Client as part of the handover process required in 6.9.

Table B.9 – Measure-specific requirements for loft insulation (BFM.9)

Measure description		Loft Insulation	
Measure type		BFM.9.1	Roll insulation
		BFM.9.2	Blown insulation
B9-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The installer shall ensure that the methods used for the installation of loft insulation products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design and incorporated in the installation method statement (5.1). Where relevant to the type of installation being undertaken, the requirements or guidance given in <i>General requirements and guidance for the installation of loft insulation</i> [N8] (see 10.7.3) shall also apply.</p> <p>The installer responsibilities include preparation of the site and finishing work, incorporating:</p> <ul style="list-style-type: none"> • identification of essential ventilation openings; • ensuring that upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings; • Identification of any electrical wiring that shall not be covered by insulation (because of the risk of overheating) and shall therefore be relocated above the insulation; and • Identification of any downlighters recessed into the ceiling that shall not be covered by insulation (because of the risk of overheating) and shall therefore be boxed to permit adequate surrounding ventilation. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p>	

Table B.9 – continued

		<p>NOTE 2 Attention is drawn to the need, where relevant, for all loft insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</p>
B9-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the area and elements to be insulated; • if relevant checks have been undertaken to determine if asbestos containing materials are present; • if the condition of the roof space is suitable for the works to commence in relation to: <ul style="list-style-type: none"> • existence of appropriate roof space ventilation arrangements; • the roof space being free from rodents/pests and protected species, e.g. bats; • timbers free from rot and/or infestation; • the condition of the ceiling; • metal structural roof members being free from visible signs of corrosion; • electrical wiring is free from visible defects, e.g. damaged cables, trailing cables, exposed conductors; • no visible signs of water penetration; and • no visible signs of leakage from water system components, e.g. pipework, cisterns, tanks, etc.; • if the proposed installation would: <ul style="list-style-type: none"> • be non-compliant with any requirements stated by the designer/specifier; • compromise the functionality of existing air supply/extract ventilation ducts/systems; and • result in unsafe operation of a combustion appliances. • if the site layout or conditions will impair the execution of the works in relation to: <ul style="list-style-type: none"> • appropriate access to the property and to the roof space; and • the roof space being free from stored items, boarding etc.; • if the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
	Installation role	Vocational competence required
B9-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.

Table B.9 – *continued*

B9-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B9-15	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B9-16	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives, carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B9-17	Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Building Regulations compliance certificate where appropriate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days); and • Any relevant product warranty information and guarantees.

B.10 Measure BFM.10 Pitched roof insulation

B.10.1 Additional installation requirements

When installing pitched roof insulation, in addition to meeting the core requirements set out in Clauses 4 to 10, of this PAS the Installer shall also work to any standards, specifications, instructions or guidance identified in B10-I1 of Table B.10.

B.10.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the pitched roof insulation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B10-I2 of Table B.10.

B.10.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of pitched roof insulation, the Installer shall employ or contract only an inspector meeting the competence requirements of B10-I3 of Table B.10.

B.10.4 Operative competence

When installing pitched roof insulation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B10I-4 of Table B.10), with competence currency specified in B10-I5 of Table B.10 at the competency ratio specified in B10-I6 of Table B.10.

B.10.5 Provision of information in respect of pitched roof insulation

At the time of handover of the pitched roof insulation to the Client, the Installer shall ensure that the information identified at B10-I7 of Table B.10 is provided to the Client as part of the handover process required in 6.9.

Table B.10 – Measure-specific requirements for pitched roof insulation (BFM.10)

Measure description	Pitched Roof Insulation
Measure type	As measure description (no sub-division)
B10-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of pitched roof insulation products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, and incorporated in the installation method statement (5.1).</p> <p>The Installer's responsibilities shall include preparation of the site and finishing work incorporating:</p> <ul style="list-style-type: none"> • identification of essential ventilation openings; and • ensuring that upon completion of the installation or at the end of each working day, if the installation takes longer than one day, the operatives investigate and confirm the proper functioning of all ventilation openings. <p><i>NOTE 1 The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p><i>NOTE 2 Attention is drawn to the need, where relevant, for all pitched roof insulation installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N2]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-domestic Technical Handbook [N6].</i></p> <p><i>NOTE 3 Where third-party accreditation exists to support it, non-vented roofs may be acceptable when using certain air and/or vapour permeable underlays.</i></p>

Table B.10 – *continued*

B10-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the area and elements to be insulated; • if relevant checks have been undertaken to determine if asbestos-containing materials are present; • if the condition of the roof space is suitable for the works to commence in relation to: <ul style="list-style-type: none"> • existence of appropriate roof space ventilation arrangements where required (Note 3 to B10I1); • the roof space being free from rodents/pests and protected species, e.g. bats; • timbers being free from rot and/or infestation; • metal structural roof members being free from visible signs of corrosion; • electrical wiring is free from visible defects, e.g. damaged cables, trailing cables, exposed conductors; • no visible signs of water penetration; and • no visible signs of leakage from water system components, e.g. pipework, cisterns, tanks, etc. • if the proposed installation would: <ul style="list-style-type: none"> • be non-compliant with any requirements stated by the designer/specifier; • compromise the functionality of existing air supply/extract ventilation ducts/systems; and • result in unsafe operation of a combustion appliances. • if the site layout or conditions will impair the execution of the works in relation to: <ul style="list-style-type: none"> • appropriate access to the property and to the roof space; and • the roof space being free from stored items, boarding, etc.; • If the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
	Installation role	Vocational competence required
B10-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B10-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	<p>Able to demonstrate vocational competence as defined in 3.26 of this PAS.</p> <p>For electrical installation work, vocational competence (3.26) through EAS compliance (3.6).</p>
B10-I5	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.10 – continued

B10-16 Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives, carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B10-17 Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days). • Any relevant product warranty information and guarantees.

B.11 Measure BFM.11: Solar Blinds, Shutters and Shading Devices (internal and external).

B.11.1 Additional installation requirements

When installing solar blinds, shutters or shading devices, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B11-I1 of Table B.11.

B.11.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the solar blinds, shutters or shading devices at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in B11-I2 of Table B.11.

B.11.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of solar blinds, shutters or shading devices, the Installer shall employ or contract only an inspector meeting the competence requirements of B11-I3 of Table B.11.

B.11.4 Operative competence

When installing solar blinds, shutters or shading devices, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B11-I.4 of Table B.11), with competence currency specified in B11-I5 of Table B.11 at the competency ratio specified in B11-I6 of Table B.11.

B.11.5 Provision of information in respect of solar blinds, shutters and shading devices

At the time of handover of solar blinds, shutters or shading devices to the Client, the Installer shall ensure that the information identified at B11-I7 of Table B.11 is provided to the Client as part of the handover process required in 6.9.

Table B.11 – Solar Blinds, Shutters and Shading Devices (BFM.11)

Measure description		Solar Blinds, Shutters and Shading Devices (Internal and External)
Measure type		BFM11.1 Solar Blinds, Shutters and Shading Devices for internal or external use, mechanical or manually operated
		BFM11.2 Solar Blinds, Shutters and Shading Devices for internal or external use, electrically operated
B11-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of solar blinds, shutters or shading devices products or systems are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design and incorporated in the installation method statement (5.1).</p> <p>a) BS EN 13120: <i>Internal blinds – Performance requirements including safety</i>;</p> <p>b) BS EN 13561: <i>External blinds – Performance requirements including safety</i>; and</p> <p>c) BS EN 13659: <i>Shutters – Performance requirements including safety</i>.</p> <p>NOTE 1 Attention is drawn to the need, where relevant, for all electrically operated solar blind, shutter and shading devices installation work to comply with the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].</p> <p>NOTE 2 Attention is drawn to the need, where relevant, for all solar blind, shutter and shading devices installation work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; and conservation of fuel and power and electrical safety. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</p>

Table B.11 – *continued*

B11-I2	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and determine if:</p> <ul style="list-style-type: none"> • the condition of the building fabric is satisfactory in relation to the proposed work; • the Client has been provided with the guidance to low energy shading; • the energy saving calculations of the installation are conducted in accordance with EN shading performance standards and are correct for the site dimensions and the glazing installed; • any required planning or listed building related consents have been obtained; • the installation work will result in non-compliance with the building regulations in relation to workmanship; materials; structural stability and fire safety; • the proposed installation will be compliant with any requirements stated by the manufacturer; • the site layout or conditions will impair the execution of the works; • the proposed installation will not compromise or impede the operation of the fenestration; • specialist access equipment is required; • child safety measures are required for internal window coverings; • relevant checks have been undertaken to determine if asbestos containing materials are present; • the installation to be undertaken will result in non-compliance with the Building Regulations, e.g. in relation to workmanship; materials; structural stability; fire safety; resistance to moisture.
	Installation role	Vocational competence required
B11-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B11-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B11-I5	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B11-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table B.11 – *continued*

B11-I7	Measure-specific information to be handed over to the Client in addition to 6.9	<p>Written information</p> <ul style="list-style-type: none"> • Relevant operating, maintenance, safety and security documentation relevant to the installation; <p><i>NOTE See also</i></p> <p><i>BS EN 13120: Internal blinds – Performance requirements including safety.</i></p> <p><i>BS EN 13561: External blinds – Performance requirements including safety</i></p> <p><i>BS EN 13659:2004 Shutters – Performance requirements including safety.</i></p> <ul style="list-style-type: none"> • Product warranty information and guarantees; • Product manufacturer installation and servicing instructions; • Electrical certification, if relevant; • Child safety information, if relevant; • Maintenance and cleaning recommendations (if any); and • Guidance to Low Energy Shading. <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • 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; and • Demonstration of: <ul style="list-style-type: none"> • Product operation especially with relevance to best practice for energy saving; • Child safety components, if relevant; and • What to do in the case of an emergency or perceived emergency.
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B.12 Measure BFM.12: Room-in-roof insulation

B.12.1 Additional installation requirements

When installing insulation to a room constructed in the roof space of an existing dwelling, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in **B12-I1** of **Table B.12**.

This measure includes insulating all of the relevant heat-loss elements of a RIR (flat ceiling, sloping roofs, dwarf walls and gable ends). Partial insulation of a room in roof omitting elements and thereby leaving the dwelling prone to heat loss and at risk of condensation and other related issues is not compliant with this PAS. The only exception to this, in line with Building Regulations, is where health and safety is compromised (i.e. width of stairwells, ceiling height etc) or more than 5% of the room floorspace would be lost.

B.12.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of room-in-roof insulation at location, the installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in **B12-I2** of **Table B.12**.

B.12.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of room-in-roof insulation the Installer shall employ or contract only an inspector meeting the competence requirements of **B12-I3** of **Table B.12**.

B.12.4 Operative competence

When installing room-in-roof insulation the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (**B12-I4** of **Table B.12**), with competence currency specified in **B12-I5** of **Table B.12** at the competency ratio specified in **B12-I6** of **Table B.12**.

B.12.5 Provision of information in respect of room-in-roof insulation

At the time of handover of installed room-in-roof insulation to the Client, the Installer shall ensure that the information identified at **B12-I7** of **Table B.12** is provided to the Client as part of the handover process required in **6.9**.

Table B.12 – Room-in-roof insulation (BFM12)

Measure description	Room in roof insulation (RIRI) including all heat-loss elements of the room in the roof
Measure type	As measure description (no sub-division)
B12-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer shall ensure that the methods used for the installation of insulation products or systems in a room in roof, are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, as incorporated in the installation method statement (5.1).</p> <p>In undertaking the installation, Installers shall comply with all requirements set out in I1 of the measure-specific annexes of this PAS that are relevant to the insulation types to be installed and take account of the guidance provided in A guide to retrofit room-in-roof insulation [N10] (see 10.7.2).</p>

Table B.12 – continued

B12-12	Measure-specific pre-installation building inspection requirements supplementary to those in the core of this PAS (Clause 7.2)	<p>Installers shall ensure that the pre-installation building inspection of a room in roof prior to the installation of insulation, is undertaken in accordance with all requirements set out in I2 of the measure-specific annexes of this PAS that are relevant to the insulation types to be installed and in addition that</p> <p>a) the ventilation to spaces within the roof void and not included in the Room-in-Roof space, are checked and assessed to ensure that adequate ventilation is provided and maintained (see A.5); and</p> <p>b) there is no requirement for thermal bridging to be addressed at the ridge or other connections with the main structure (A.6).</p> <p><i>NOTE 1 In undertaking pre-installation building inspections it is recommended that Installers consider using an industry recommended checklist e.g. the Room-in-Roof insulation pre-installation building inspection checklist (see 10.7.3)</i></p> <p><i>NOTE 2 It is expected that the retrofit design will provide detailed instruction for addressing both a) and b). Where the pre-installation building inspection identifies ventilation or thermal bridging issues that are perceived not to have been adequately provided for, the Installer is required to refer these to the Retrofit Coordinator (4.2.4 and 4.2.5).</i></p> <p>The findings of the pre-installation building inspection shall be independently checked by an appropriately qualified person (see B12-13) prior to commencement of installation, with at least a randomly selected 1 in 10 sample of those checks (minimum of 1) including physical inspection of the dwelling by an appropriately qualified person.</p>
	Installation role	Vocational competence required
B12-13	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B12-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B12-15	Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
B12-16	Competence ratio	<p>For each installation task to be undertaken, the installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <p>a) range, scale geographical spread and complexity of the work being undertaken;</p> <p>b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised,</p> <p>but shall not be less than one specialist operative (carded) operative per team of 4 (1 to 3), at the specified installation location at any time.</p> <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
B12-17	Measure-specific information to be handed over to the Client in addition to 6.9	<ul style="list-style-type: none"> Installers shall ensure that the information provided to the Client at handover of an insulated room in roof is in accordance with all requirements set out in I7 of the measure-specific annexes of this PAS that are relevant to the EEM installation types that have been installed including that related to any relevant product warranty information and guarantees.

B.13 Measure BFM.13: Insulation of existing park homes

B.13.1 Additional installation requirements

When installing insulation to an existing park home, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in B13-I1 of Table B.13.

B.13.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of insulation at an existing park home, the Installer shall undertake a pre-installation inspection of that particular park home in accordance, as a minimum, with the requirements set out in B13-I2 of Table B.13.

B.13.3 Inspector competence

When undertaking a pre-installation inspection of a park home in respect of the installation of insulation the Installer shall employ or contract only an inspector meeting the competence requirements of B13-I3 of Table B.13.

B.13.4 Operative competence

When installing room-in-roof insulation the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (B13-I4 of Table B.13), with competence currency specified in B13-I5 of Table B.13 at the competency ratio specified in B13-I6 of Table B.13.

B.13.5 Provision of information in respect of insulation of existing park homes

At the time of handover of installed room-in-roof insulation to the Client, the Installer shall ensure that the information identified at B13-I7 of Table B.13 is provided to the Client as part of the handover process required in 6.9.

Table B.13 – Insulation of existing park homes (BFM13)

Measure description	Insulation of existing park homes
Measure type	As measure description (no sub-division)
B13-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 9)	<p>The Installer shall ensure that the methods used for the installation of insulation products or systems in an existing residential park home, are as specified by the system supplier (where provided) and in accordance with the relevant retrofit design, as incorporated in the installation method statement (6.1).</p> <p>In undertaking the installation of insulation in residential park homes, Installers shall comply with all requirements set out in I1 of the measure-specific annexes of this PAS that are relevant to the insulation types to be installed and in addition, take account of the provisions of BS 3632. In the event of conflict between the provisions of BS 3632 and the standards cross-referenced in respect of particular insulation types, the provisions of BS 3632 shall be given precedence.</p>

Table B.13 – continued

B13-I2	Measure-specific pre-installation park home inspection requirements supplementary to those in the core of this PAS (Clause 7.2)	<p>Installers shall ensure that the pre-installation residential park home inspection is undertaken in accordance with all requirements set out in I2 of the measure-specific annexes of this PAS that are relevant to the insulation types to be installed, including:</p> <ul style="list-style-type: none"> • B2 Draught proofing; • B3 Energy efficient glazing and doors including replacement insulating glass units; • B4 External wall insulation (including rendered and pre-finished external wall insulation systems); • B5 Flat roof insulation; • B6 Floor insulation; • B9 Loft insulation (including both blown and roll insulation); and • B10 Pitched roof insulation. <p>and, in addition, that:</p> <p>a) the ventilation to any spaces within the park home that are not included in the insulation retrofit project, are checked and assessed to ensure that ventilation is provided and maintained at least in accordance with the requirements of BS 3632:2015, 4.10; and</p> <p>b) there is no requirement for thermal bridging to be addressed, in addition to that included in the retrofit design provided, either in areas covered by the project or other connected spaces within the residential park home (A.5).</p> <p><i>NOTE 1 In undertaking pre-installation inspections of residential park homes, it is recommended that Installers consider using an industry recommended checklist.</i></p> <p><i>NOTE 2 It is expected that the retrofit design will provide detailed instruction for addressing both a) and b). Where the pre-installation inspection of a residential park home identifies ventilation or thermal bridging issues that are perceived not to have been adequately provided for, the installer is required to refer these to the Client (7.2.4 and 7.2.5).</i></p> <p>The findings of the pre-installation residential park home inspection shall be independently checked by an appropriately qualified person (see B13-I3) prior to commencement of installation, with at least a randomly selected 1 in 10 of those checks (minimum of 1) including physical inspection of the particular residential park home by an appropriately qualified person.</p>
	Installation role	Vocational competence required
B13-I3	Park Homes Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B13-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
B13-I5	Competence Currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.

Table B.13 – continued

<p>B13-I6 Competence ratio</p>	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
<p>B13-I7 Measure-specific information to be handed over to the Client in addition to 6.9</p>	<ul style="list-style-type: none"> • Installers shall ensure that the information provided to the Client at handover of a retro-insulated park home, is in accordance with all requirements set out in I7 of the measure-specific annexes of this PAS that are relevant to the EEM installation types that have been installed including that related to any relevant product warranty information and guarantees.

Annex C (normative)

BSM energy efficiency measures

C.1 Measure BSM.1 Condensing boilers, natural gas-fired and liquefied petroleum gas-fired

C.1.1 Additional installation requirements

When installing a gas-fired condensing boiler, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C1-I1 of Table C.1.

C.1.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the gas-fired condensing boiler at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C1-I2 of Table C.1

C.1.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of a gas-fired condensing boiler, the Installer shall employ or contract only an inspector meeting the competence requirements of C1-I3 of Table C.1.

C.1.4 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 (C1-I4 of Table C.1), at the competency ratio specified in C1-I6 of Table C.1.

NOTE *Gas Safe registration is a legal requirement for anyone carrying out gas work in the United Kingdom, Isle of Man and Guernsey under the Gas Safety (Installation and Use) Regulations 1998 [N17].*

C.1.5 Provision of information in respect of gas-fired condensing boilers

At the time of handover of a gas-fired condensing boiler to the Client, the Installer shall ensure that the information identified at C1-I7 of Table C.1 is provided to the Client as part of the handover process required in 6.9.

Table C.1 – Measure-specific requirements for gas-fired condensing boilers (BSM.1)

Measure description	Condensing Boilers, Natural Gas-fired and Liquefied Petroleum Gas-fired
Measure type	As measure description (no sub-division)
C1-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p>Where relevant to the type of installation being undertaken, the requirements or guidance given in:</p> <ul style="list-style-type: none"> i. BS 6798 <i>Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net;</i> ii. BS 6644, <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> iii. BS 6891, <i>Installation of low pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas). Specification;</i> iv. BS 54401 <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> v. BS 54402 <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>

Table C.1 – continued

	<ul style="list-style-type: none"> vi. BS 7593 <i>Code of practice for treatment of water in domestic hot water central heating systems</i>; vii. UKLPG, <i>Code of practice 22, Design, installation and testing of LPG piping systems</i> [N11]; viii. BS 54821, <i>Code of practice for domestic butane and propane gas burning installations – Part 1: Permanent dwellings</i>; ix. 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> [N12]; and x. <i>The Domestic Building Services Compliance Guide</i> (published by MHCLG) [N13]. <p>NOTE Attention is drawn to the need, where relevant, for all gas-fired condensing boiler installation work to comply with:</p> <ul style="list-style-type: none"> a) <i>the current Gas Safety (Installation and Use) Regulations</i> [N14] that apply in the UK country or locality in which the installation is being carried out. <i>The Gas Safety (Installation and Use) Regulations</i> [N14] have requirements relating to both technical gas safety standards and qualification and supervision of persons carrying out gas work; b) <i>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 is provided in Approved Documents A-P</i> [N2] <i>and Regulation 7: Workmanship and Materials</i> [N3]. <i>Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R</i> [N4] <i>and guidance on Regulation 7: Workmanship and Materials</i> [N3]. <i>Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook</i> [N5] <i>and Non-Domestic Technical Handbook</i> [N6]; c) <i>the current Water Supply (Water Fittings) Regulations or Water Byelaws</i> [N15] that apply in the UK country in which the installation is being carried out; and d) <i>the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671)</i> [N9].
<p>C1-I2 Pre-installation building inspection requirements</p>	<p>As a minimum, the pre-installation building inspection shall investigate and determine if:</p> <ul style="list-style-type: none"> • the condition of the building fabric is satisfactory in relation to the proposed work; • the condition of the existing electrical installation 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 dwelling is located in a hard water area (above 200 ppm); • water conditioning arrangements are required in relation to the water hardness; and • relevant checks have been undertaken to determine if asbestos containing materials are present.

Table C.1 – continued

Installation role	Vocational competence required
C1-I3 Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C1-I4 Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
C1-I4 Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work , vocational competence (3.26) through EAS compliance (3.6).
C1-I5 Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C1-I6 Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
C1-I7 Measure-specific information to be handed over to the Client in addition to 6.9	<p>Written information</p> <ul style="list-style-type: none"> • 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); and • 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). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided; • An explanation of what controls/components should not be adjusted by the system user; and • Demonstration of: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.

C.2 Measure BSM.2 Oil-fired condensing boilers

C.2.1 Additional installation requirements

When installing oil-fired condensing boilers, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in C2-I1 of Table C.2.

C.2.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the oil-fired condensing boiler at location, the installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C2-I2 of Table C.2.

C.2.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of oil-fired condensing boilers, the installer shall employ or contract only an inspector meeting the competence requirements of C2-I3 of Table C.2.

C.2.4 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 (C2-I4 of Table C.2), at the competency ratio specified in C2-I6 of Table C.2.

C.2.5 Provision of information in respect of oil-fired condensing boilers

At the time of handover of the oil-fired condensing boiler to the Client, the installer shall ensure that the information identified at C2-I7 of Table C.2 is provided to the Client as part of the handover process required in 6.9.

Table C.2 – Measure-specific requirements for oil-fired condensing boilers (BSM.2)

Measure description	Condensing Boilers, Oil-fired
Measure type	Oil-fired Condensing Boilers
C2-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p>Where relevant to the type of installation being undertaken, the requirements or guidance given in:</p> <ul style="list-style-type: none"> a) BS 54101, <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 54102, <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, <i>Code of practice for treatment of water in domestic hot water central heating systems</i>. <p>NOTE Attention is drawn to the need, where relevant, for all oil-firing condensing boiler installation work to comply with:</p> <ul style="list-style-type: none"> 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 is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6]; b) the current Water Supply (Water Fittings) Regulations or Water Byelaws [N15] that apply in the UK country in which the installation is being carried out; and c) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].

Table C.2 – continued

C2-I2	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and determine if:</p> <ul style="list-style-type: none"> • the condition of the building fabric is satisfactory in relation to the proposed work; • the condition of the existing electrical installation 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 safety regulations; <ul style="list-style-type: none"> • the proposed installation will be compliant with any requirements stated by the boiler manufacturer; • the proposed fuel storage arrangements are compliant with regulatory requirements/recognized industry standards; • the proposed installation may or will result in a plume nuisance situation; • any special condensate disposal arrangements are required; • the dwelling 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.
	Installation role	Vocational competence required
C2-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C2-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	<p>Able to demonstrate vocational competence as defined in 3.26 of this PAS</p> <p>For electrical installation work, vocational competence (3.26) through EAS compliance (3.6).</p>
C2-I5	Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C2-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative as defined in 3.6 of this PAS. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table C.2 – continued

<p>C2-17</p> <p>Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • 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); <ul style="list-style-type: none"> • mechanical; and • electrical. • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required in participating regions and will be provided within 30 days); and • 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). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.
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C.3 Measure BSM.3 Flue-gas heat recovery devices

C.3.1 Additional installation requirements

When installing Flue-gas recovery devices, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in C3-I1 of Table C.3

C.3.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the gas-fired condensing boiler at location, the installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C3-I2 of Table C.3.

C.3.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of Flue-gas recovery devices, the installer shall employ or contract only an inspector meeting the competence requirements of C3-I3 of Table C.3.

C.3.4 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 (C3-I4 of Table C.3), at the competency ratio specified in C3-I6 of Table C.3.

C.3.5 Provision of information in respect of Flue-gas recovery devices

At the time of handover of the Flue-gas recovery device to the Client, the installer shall ensure that the information identified at C3-I7 of Table C.3 is provided to the Client as part of the handover process required in 6.9.

Table C.3 – Measure-specific requirements for Flue-gas recovery devices (BSM.3)

Measure description	Flue-gas Heat Recovery Devices for use with gas-fired condensing boilers
Measure type	As measure description (no sub-division)
C3-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer’s instructions.</p> <p>Where relevant to the type of installation being undertaken, the requirements or guidance given in:</p> <ul style="list-style-type: none"> • BS 54401, <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>; and • BS 54402, <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>. <p>NOTE Attention is drawn to the need, where relevant, for all Flue-gas recovery device installation work to comply with:</p> <ol style="list-style-type: none"> a) the current <i>Gas Safety (Installation and Use) Regulations [N14]</i> that apply in the UK country or locality in which the installation is being carried out. The <i>Gas Safety (Installation and Use) Regulations [N14]</i> 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 <i>Building Regulations</i> that apply in the UK country in which the installation is being carried out. Further guidance on the requirements of the <i>Building Regulations in England</i> is provided in <i>Approved Documents A-P [N2]</i> and <i>Regulation 7: Workmanship and Materials [N3]</i>. Further guidance on the requirements of the <i>Building Regulations in Wales</i> is provided in <i>Approved Documents A-R [N4]</i> and guidance on <i>Regulation 7: Workmanship and Materials [N3]</i>. Further guidance on the requirements of the <i>Building Regulations in Scotland</i> is provided in the <i>Domestic Technical Handbook [N5]</i> and <i>Non-Domestic Technical Handbook [N6]</i>; c) the current <i>Water Supply (Water Fittings) Regulations or Water Byelaws [N15]</i> that apply in the UK country in which the installation is being carried out; and d) the current edition of the <i>Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9]</i>.

Table C.3 – continued

C3-I2	Pre-installation building inspection requirements	As a minimum the pre-installation building inspection shall investigate and determine if the: <ul style="list-style-type: none"> • 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; and • relevant checks have been undertaken to determine if asbestos-containing materials are present.
	Installation role	Vocational competence required
C3-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C3-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work , vocational competence (3.26) through EAS compliance (3.6).
C3-I5	Competence currency	To be verified by the Installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C3-I6	Competence ratio	For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the: <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
C3-I7	Measure-specific information to be handed over to the Client in addition to 6.9	Written information <ul style="list-style-type: none"> • 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; and • Installer details: <ul style="list-style-type: none"> • mechanical; and • electrical. Verbal information and/or demonstration <ul style="list-style-type: none"> • An explanation of the purpose and relevance of the written information provided.

C.4 Measure BSM.4: Heating system insulation (ducting, pipes and cylinders)

C.4.1 Additional installation requirements

When installing heating system insulation (ducting, pipes and cylinders), in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the installer shall also work to any standards, specifications, instructions or guidance identified in C4-I1 of Table C.4.

C.4.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the heating system insulation (ducting, pipes and cylinders) at location, the installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C4-I2 of Table C.4.

C.4.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of heating system insulation (ducting, pipes and cylinders), the installer shall employ or contract only an inspector meeting the competence requirements of C4-I3 of Table C.4.

C.4.4 Operative competence

When installing heating system insulation (ducting, pipes and cylinders), the installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (C4-I4 of Table C.4), at the competency ratio specified in C4-I6 of Table C.4.

C.4.5 Provision of information in respect of heating system insulation (pipes and cylinders)

At the time of handover of the heating system insulation (ducting, pipes and cylinders) to the Client, the installer shall ensure that the information identified at C4-I7 of Table C.4 is provided to the Client as part of the handover process required in 6.9.

Table C.4 – Measure-specific requirements for heating system insulation (including ducting, pipes and cylinders) (BSM.4)

Measure description	Heating System Insulation (ducting, pipes and cylinders) including retrofitting of insulation to existing ducting and pipework or cylinders to refurbish or enhance the system
Measure type	As measure description
C4-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>Where relevant to the type of installation being undertaken, the requirement or guidance given in:</p> <p>BS 5970 <i>Code of practice for thermal insulation of pipework and equipment in the temperature range of -100°C to +870°C, shall be applied.</i></p> <p>NOTE 1 <i>The relevant installation methods will have been included under current certification issued by a product certification body, with respect to the product/system to be installed, against UK requirements and regulation and the Installer should be aware that training from the supplier or training acceptable to the supplier may be necessary before an application for assessment/certification is made to a certification body.</i></p> <p>NOTE 2 <i>Attention is drawn to the need, where relevant, for all heating system insulation installation work to comply with 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: fire safety; resistance to moisture; ventilation; and conservation of fuel and power. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p>

Table C.4 – continued

C4-12	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine as far as practicable:</p> <ul style="list-style-type: none"> • if the proposed heating system insulation work will be compliant with the requirements of the Building Regulations relating to conservation of fuel and power/energy; • pre-existing damage to the areas that will be accessed by the installation operatives; • the extent of the heating system elements to be insulated; • if relevant checks have been undertaken to determine if asbestos-containing materials are present; • if the proposed installation would be non-compliant with any requirements stated by the designer/specifier; and • if the site layout or conditions will impair the execution of the works in relation to appropriate access to the property and to the heating system elements to be insulated.
	Installation role	Vocational competence required
C4-13	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C4-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C4-15	Competence currency	To be verified by the Installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C4-16	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> range, scale geographical spread and complexity of the work being undertaken; supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
C4-17	Measure-specific information to be handed over to the Client in addition to 6.9	Any relevant product warranty information and guarantees.

C.5 Measure BSM.5 Heating, hot water system, air conditioning or ventilation controls and components

C.5.1 Additional installation requirements

When installing controls and/ or components for heating, hot water system, air conditioning or ventilation, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C5-I1 of Table C.5.

C.5.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of controls and/ or components for heating, hot water system, air conditioning or ventilation at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C5-I2 of Table C.5

C.5.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of controls and/ or components for heating, hot water system, air conditioning or ventilation, the Installer shall employ or contract only an inspector meeting the competence requirements of C5-I3 of Table C.5.

C.5.4 Operative competence

When installing controls and/ or components for heating, hot water system, air conditioning or ventilation, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (C5-I4 of Table C.5), at the competency ratio specified in C5-I6 of Table C.5.

C.5.5 Provision of information in respect of heating and hot water controls

At the time of handover of controls and/ or components for heating, hot water system, air conditioning or ventilation to the Client, the Installer shall ensure that the information identified at C5-I7 of Table C.5 is provided to the Client as part of the handover process required in 6.9.

Table C.5 – Measure-specific requirements for Heating, hot water system, air conditioning or ventilation controls and components (BSM.5)

Measure description	Heating, hot water system, air conditioning or ventilation, controls and components	
Measure type	BSM.5.1	Heating and hot water system controls (domestic)
	BSM.5.2	Air conditioning controls
	BSM.5.3	Ventilation controls
	BSM.5.4	Low energy circulator pumps
	BSM.5.5	Low temperature radiators and fan convectors

Table C.5 – continued

<p>C5-I1</p> <p>Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)</p>	<p>As applicable:</p> <ul style="list-style-type: none"> • BS EN 3781 <i>Refrigerating systems and heat pumps. Safety and environmental requirements. Basic requirements, definitions, classification and selection criteria</i> • BS EN 3783 <i>Refrigerating systems and heat pumps. Safety and environmental requirements. Installation location and personal protection</i> • BS EN 3784 <i>Refrigerating systems and heat pumps. Safety and environmental requirements. Operation, maintenance, repair and recovery</i> • BS EN 14336 <i>Heating systems in buildings – Installation and commissioning of water based heating systems.</i> • BS EN 164841 <i>Building automation and control systems (BACS). Project specification and implementation</i> <p>The requirements or guidance given in product manufacturer's instructions.</p> <p><i>NOTE Attention is drawn to the need, where relevant, for all heating hot water air conditioning and ventilation controls installation work to comply with:</i></p> <p>a) <i>the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for 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 is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6];</i></p> <p>b) <i>the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9];</i></p> <p>c) <i>the current F gas Regulations [N16] that apply in all EU countries or locality in which the installation is being carried out. The Regulations have requirements relating to businesses and persons who install, service or maintain systems that contain or are designed to contain refrigerant gases. The Regulations set both the technical standards for the Business and the qualifications and supervision of persons carrying out work; and</i></p> <p>d) <i>For the installation of Low-Temperature Heating Systems, information contained in the publication <i>Design of low temperature domestic heating systems – A guide for system designers and installers</i> [N17] published by BRE Trust, could be of assistance.</i></p>
<p>C5-I2</p> <p>Pre-installation building inspection requirements</p>	<p>As a minimum the pre-installation building inspection shall investigate and determine if the:</p> <ul style="list-style-type: none"> • proposed control arrangement is compatible with any existing controls for heating, hot water system, ventilation or air conditioning; • installation work will result in non-compliance with the Building Regulations; • proposed installation will be compliant with any requirements stated by the heating controls product manufacturer; and • relevant checks have been undertaken to determine if asbestos containing materials are present.

Table C.5 – continued

Installation role	Vocational competence required
C5-I3 Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C5-I4 Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist) Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work , vocational competence (3.26) through EAS compliance (3.6).
C5-I5 Competence currency	To be verified by the installer at no greater than 12 monthly intervals, as defined in 3.30 of this PAS.
C5-I6 Competence ratio	For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the: <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
C5-I7 Measure-specific information to be handed over to the Client in addition to 6.9	<p>Written information</p> <ul style="list-style-type: none"> • Product manufacturer installation and servicing instructions; • Product manufacturer user manuals/guides; • Product warranty information and guarantees; • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days), where required; and • 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). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; and • any safety checks that the system user should undertake.

C.6 Measure BSM.6 Hot water systems

C.6.1 Additional installation requirements

When installing a hot water system, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C6-I1 of Table C.6.

C.6.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the hot water system at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C6-I2 of Table C.6.

C.6.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of a hot water system, the Installer shall employ or contract only an inspector meeting the competence requirements of C6-I3 of Table C.6.

C.6.4 Operative competence

When installing a hot water system, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (C6-I4 of Table C.6), at the competency ratio specified in C6-I6 of Table C.6.

C.6.5 Provision of information in respect of hot water systems.

At the time of handover of a hot water system to the Client, the Installer shall ensure that the information identified at C6-I7 of Table C.6 is provided to the Client as part of the handover process required in 6.9.

Table C.6 – Measure-specific requirements for hot water systems (BSM.6)

Measure description		Hot water systems including hot water systems with heat recovery.
Measure type		BSM.6.1 Hot water system (domestic)
C6-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>As applicable, BS EN 8061 <i>Specifications for installations inside buildings conveying water for human consumption. General</i> BS EN 8064 <i>Specifications for installations inside buildings conveying water for human consumption. Installation</i> BS EN 8065 <i>Specifications for installations inside buildings conveying water for human consumption. Operation and maintenance</i> BS 8558 <i>Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings</i> The requirements or guidance given in product manufacturer's instructions.</p> <p>NOTE Attention is drawn to the need, where relevant, for all hot water system installation work to comply with:</p> <p>a) <i>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; hot water safety, combustion appliances and fuel storage systems, conservation of fuel and power and electrical safety. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6];</i></p> <p>b) <i>The current Water Supply (Water Fittings) regulations or Water Byelaws [N15] that apply in the UK country in which the installation is being carried out; and</i></p> <p><i>Particular guidance can be found in the following:</i></p> <p>c) <i>The current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].</i></p>

Table C.6 – continued

C6-12	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and determine if:</p> <ul style="list-style-type: none"> the condition of the building fabric is satisfactory in relation to the proposed work; proposed hot water system arrangement is compatible with the existing heating and hot water system installation and fittings; the installation work will result in non-compliance with the Building Regulations in relation to workmanship; materials; structural stability; fire safety; resistance to moisture; hot water safety; combustion appliances and fuel storage systems, conservation of fuel and power; electrical safety; the proposed installation will be compliant with any requirements stated by the hot water system product manufacturers; and The asbestos register for the dwelling has been reviewed and relevant checks have been undertaken to determine if any asbestos containing materials are present in the areas where work is to be carried out.
	Installation role	Vocational competence required
C6-13	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C6-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	<p>Able to demonstrate vocational competence as defined in 3.26 of this PAS.</p> <p>For electrical installation work, vocational competence (3.26) through EAS compliance (3.6).</p>
C6-15	Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C6-16	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> range, scale geographical spread and complexity of the work being undertaken; and supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table C.6 – continued

C6-17	Measure-specific information to be handed over to the Client in addition to 6.9	<p>Written information, as applicable</p> <ul style="list-style-type: none"> • Product manufacturer installation and servicing instructions; • Product manufacturer user manuals/guides; • Product warranty information and guarantees; • Revisions to the building Health and Safety file; • Revisions to the building log book; • A commissioning certificate that meets the requirements of the Building Regulations; • A user guide that meets the requirements of the Building Regulations; • Building regulations compliance certificate or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days, where required; and • A copy of any electrical inspection and testing certificates that have been completed to meet the requirements the current version of BS 7671 (IET Wiring Regulations). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided. • An explanation of what controls/components should not be adjusted by the system user. • Demonstration of: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; • any maintenance activity that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.
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C.7 BSM.8 Mechanical Ventilation with Heat Recovery

C.7.1 Additional installation requirements

When installing a mechanical ventilation with heat recovery (MVHR) system, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C7-I1 of Table C.7.

C.7.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the mechanical ventilation and heat recovery system at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C7-I2 of Table C.7.

C.7.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of a mechanical ventilation and heat recovery system, the Installer shall employ or contract only an inspector meeting the competence requirements of C7-I3 of Table C.7.

C.7.4 Operative competence

When installing a mechanical ventilation and heat recovery system, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (C7-I4 of Table C.7), at the competency ratio specified in C7-I6 of Table C.7.

C.7.5 Provision of information in respect of Mechanical Ventilation and Heat Recovery systems

At the time of handover of a mechanical ventilation and heat recovery system to the Client, the Installer shall ensure that the information identified at C7-I7 of Table C.7 is provided to the Client as part of the handover process required in 6.9.

Table C.7 – Measure-specific requirements for Mechanical Ventilation with Heat Recovery (BSM.7)

Measure description	Mechanical Ventilation with Heat Recovery
Measure type	As measure description (no sub-division)
C7-I1 Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p><i>NOTE Attention is drawn to the need, where relevant, for all Mechanical Ventilation and Heat Recovery installation work to comply with:</i></p> <ol style="list-style-type: none"> <i>the current Building Regulations are those that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; ventilation, conservation of fuel and power and electrical safety. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6]; and</i> <i>the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].</i>

Table C.7 – continued

C7-I2	Pre-installation building inspection requirements	As a minimum, the pre-installation building inspection shall investigate and determine if: <ul style="list-style-type: none"> 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; ventilation; conservation of fuel and power; the proposed duct work (routing) is appropriate; the proposed installation will be compliant with any requirements stated by the equipment manufacturers; and The asbestos register for the dwelling has been reviewed and relevant checks have been undertaken to determine if any asbestos containing materials are present in the areas where work is to be carried out.
	Installation role	Vocational competence required
C7-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C7-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work, vocational competence (3.26) through EAS compliance (3.6)
C7-I5	Competence currency	To be verified by the Installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C7-I6	Competence ratio	For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the: <ol style="list-style-type: none"> range, scale geographical spread and complexity of the work being undertaken; and supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</p>

Table C.7 – continued

<p>C7-17</p> <p>Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • Product manufacturer installation and servicing instructions; • Product manufacturer user manuals/guides; • Product warranty information and guarantees; • Revisions to the building Health and Safety file; • Revisions to the Building log book; • Commissioning records that confirm that the system is balanced and the air supply or extract rates from each room are within 5% of the rates specified in the design; • A commissioning certificate that meets the requirements of the Building Regulations; • A user guide that meets the requirements of the Building Regulations; • Installer details (if not included in the commissioning certificate), e.g. mechanical, electrical; • Evidence that the installation has been notified to Building Control; and • A copy of any electrical inspection and testing certificates that have completed to meet the requirements the current version of BS 7671 (IET Wiring Regulations). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided; • An explanation of what controls/components should not be adjusted by the system user; and • Demonstration of: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.
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C.8 Measure BSM.8 Under-floor heating

C.8.1 Additional installation requirements

When installing under-floor heating, in addition to meeting the core requirements set out in Clauses 4 to 10, of this PAS the Installer shall also work to any standards, specifications, instructions or guidance identified in C8-I1 of Table C.8.

C.8.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the under-floor heating at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C8-I2 of Table C.8.

C.8.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of under-floor heating, the Installer shall employ or contract only an inspector meeting the competence requirements of C8-I3 of Table C.8.

C.8.4 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 (C8-I4 of Table C.8), at the competency ratio specified in C8-I6 of Table C.8.

C.8.5 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 C8-I7 of Table C.8 is provided to the Client as part of the handover process required in 6.9.

Table C.8 – Measure-specific requirements for under-floor heating (BSM.8)

Measure description		Under-floor Heating (wet systems)
Measure type		As measure description
C8-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p>The requirements stated in BS EN 12644, <i>Water based surface embedded heating and cooling systems – Part 4: Installation</i>.</p> <p>NOTE Attention is drawn to the need, where relevant, for all under-floor heating system work to comply with:</p> <ul style="list-style-type: none"> a) the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for 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 is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6]; b) the current Water Supply (Water Fittings) Regulations or Water Byelaws [N15] 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; and c) the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].

Table C.8 – continued

C8-I2	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine if the:</p> <ul style="list-style-type: none"> • structural precondition 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; and • relevant checks have been undertaken to determine if asbestos-containing materials are present.
	Installation role	Vocational competence required
C8-I3	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C8-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	<p>Able to demonstrate vocational competence as defined in 3.26 of this PAS.</p> <p>For electrical installation work, vocational competence (3.26) through EAS compliance (3.6).</p>
C8-I5	Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C8-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table C.8 – continued

<p>C8-17</p> <p>Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • Product manufacturer’s user manuals/guides and guarantee documents; • Testing and commissioning certificates; • Water treatment records; • Electrical certification, if relevant; • Building Regulations Compliance Certificate; and • Installer details: <ul style="list-style-type: none"> • mechanical; and • electrical. <p>Diagrammatic information</p> <ul style="list-style-type: none"> • Hydraulic schematic; and • Wiring schematic. <p>Verbal information/demonstration</p> <ul style="list-style-type: none"> • Setting of controls; • Awareness of the effect that changing to a different type of floor covering may have on system output; and • Awareness of which system components should only be adjusted by a competent engineer.
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C.9 Measure BSM.9 Warm-air heating systems

C.9.1 Additional installation requirements

When installing gas and /or oil-fired warm-air heating systems (domestic and non-domestic), in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C91 of Table C.9.

C.9.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the gas and /or oil-fired warm-air heating systems (domestic and non-domestic) at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C9-I2 of Table C.9.

C.9.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of gas and /or oil-fired warm-air heating systems (domestic and non-domestic), the Installer shall employ or contract only an inspector meeting the competence requirements of C9-I3 of Table C.9.

C.9.4 Operative competence

When installing gas and /or oil-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 (C9-I4 of Table C.9), at the competency ratio specified in C9-I6 of Table C.9

C.9.5 Provision of information in respect of gas-fired warm-air heating systems

At the time of handover of the gas and /or oil-fired warm-air heating system (domestic and non-domestic), the Installer shall ensure that the information identified at C9-I7 of Table C.9 is provided to the Client as part of the handover process required in 6.9.

Table C.9 – Measure-specific requirements for gas and /or oil-fired warm-air heating systems (domestic and non-domestic) (BSM.9)

Measure description		Gas and /or oil-fired warm-air Heating Systems
Measure type		BSM.9.1 Natural gas-fired and liquefied petroleum gas-fired warm air heating systems
		BSM.9.2 Oil-fired warm air heating systems
<i>NOTE Electric warm air heating systems are provided for under measure BSE.1 Electric storage heaters</i>		
C9-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p>Where relevant to the type of installation being undertaken, the requirements or guidance given in:</p> <ul style="list-style-type: none"> a) BS 54101 <i>Code of practice for oil firing. Installations up to 45 kW output capacity for space heating and hot water supply purposes;</i> b) BS 54401, <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> c) BS 54402, <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> d) BS 5864, <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> e) BS 6891, <i>Installation of lo- pressure gas pipework of up to 35 mm (R1 1/4) in domestic premises (2nd family gas). Specification;</i> f) IGEN/UP/7, Edition 2, <i>Gas installations in timber-framed and light steel buildings</i> [N18]; g) UKLPG, <i>Code of Practice 22, Design, installation and testing of LPG piping systems</i> [N11];

Table C.9 – continued

		<p>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> [N12]; and</p> <p>i) <i>The Domestic Building Services Compliance Guide</i> (published by MHCLG) [N13].</p> <p>NOTE Attention is drawn to the need, where relevant, for all gas-fired warm air heating system installation work to comply with:</p> <p>a) <i>the current Gas Safety (Installation and Use) Regulations</i> [N14] that apply in the UK country or locality in which the installation is being carried out. <i>The Gas Safety (Installation and Use) Regulations</i> [N14] have requirements relating to both technical gas safety standards and qualification and supervision of persons carrying out gas work and work on gas appliances;</p> <p>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 is provided in Approved Documents A-P</i> [N2] and <i>Workmanship and Materials. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R</i> [N4] and <i>guidance on Regulation 7: Workmanship and Materials</i> [N3]. <i>Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook</i> [N5];</p> <p>c) <i>the current Water Supply (Water Fittings) Regulations or Water Byelaws</i> [N15] that apply in the UK country in which the installation is being carried out; and</p> <p>d) <i>the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671)</i> [N9].</p>
C9-12	Pre-installation building inspection requirements	<p>As a minimum the pre-installation building inspection shall investigate and determine if the:</p> <ul style="list-style-type: none"> • 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; • where applicable, 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 and/or oil-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; and • relevant checks have been undertaken to determine if asbestos-containing materials are present.
	Installation role	Vocational competence required
C9-13	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C9-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work, vocational competence (3.26) through EAS compliance (3.6).
C9-15	Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.

Table C.9 – continued

<p>C9-16 Competence ratio</p>	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
<p>C9-17 Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • mechanical; and • 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); <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided; • An explanation of what controls/components should not be adjusted by the system user; and • Demonstration of: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency; • any safety checks that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.

C.10 BSM.10 Water efficient taps and showers

C.10.1 Additional installation requirements

When installing water efficient taps and showers, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in C10-I1 of Table C.10.

C.10.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the water efficient taps and showers at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in C10-I2 of Table C.10.

C.10.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of water efficient taps and showers, the Installer shall employ or contract only an inspector meeting the competence requirements of C10-I3 of Table C.10.

C.10.4 Operative competence

When installing water efficient taps and showers, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (C10-I4 of Table C.10), at the competency ratio specified in C10-I6 of Table C.10.

C.10.5 Provision of information in respect of Water efficient taps and showers

At the time of handover of water efficient taps and showers to the Client, the Installer shall ensure that the information identified at C10-I7 of Table C.10 is provided to the Client as part of the handover process required in 6.9.

Table C.10 – Water efficient taps and showers (BSM.10)

Measure description		Water efficient taps and showers excluding taps for cold water only (Sanitary tapware e.g. showers, pillar taps, mixing taps etc)
Measure type		As measure description (no sub-division)
C10-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The requirements or guidance given in product manufacturer's instructions.</p> <p><i>NOTE Attention is drawn to the need, where relevant, for all hot water system installation work to comply with:</i></p> <ol style="list-style-type: none"> <i>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; resistance to moisture; hot water safety and electrical safety. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6];</i> <i>The current Water Supply (Water Fittings) regulations or Water Byelaws [N15] that apply in the UK country in which the installation is being carried out. Particular guidance can be found in WRAS water regulations guide; and</i> <i>The current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].</i>
C10-I2	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and assess if the:</p> <ul style="list-style-type: none"> condition of the existing water supply and sanitary tapware installation is satisfactory in relation to the proposed work; condition of the building fabric is satisfactory in relation to the proposed work; the existing or proposed water supply system is compatible with the sanitary tapware to be installed; sanitary tapware installation work will result in non-compliance with the building regulations in relation to workmanship; materials and sanitation, hot water safety and water efficiency; sanitary tapware installation work will result in non-compliance with the water regulations in relation to waste, misuse, undue consumption or contamination or erroneous measurement of the water supplied; and proposed installation will be compliant with any requirements stated by the sanitary tapware product manufacturer.

Table C.10 – continued

	Installation role	Vocational competence required
C10-13	Building Inspector	Able to demonstrate vocational competence as defined in 3.26 of this PAS.
C10-14	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence as defined in 3.26 of this PAS. For electrical installation work , vocational competence (3.26) through EAS compliance (3.6).
C10-15	Competence currency	To be verified by the installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
C10-16	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the installer in relation to the:</p> <ul style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>
C10-17	Measure-specific information to be handed over to the Client in addition to 6.9	<p>Written Information</p> <ul style="list-style-type: none"> • Product manufacturer installation and servicing instructions; • Product manufacturer user manuals/guides; and • Product warranty information and guarantees. <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance of the written information provided; • An explanation of the product controls; • How the controls affect the efficiency of water delivery and how that impacts on the efficiency of the hot water supply; and • Any safety requirements that the user should regularly undertake.

Annex D (normative)

BSE energy efficiency measures

D.1 Measure BSE.1 Electric storage heaters (including electric warm air heating units that incorporate heat storage)

D.1.1 Additional installation requirements

When installing electric storage heaters, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in D1-I1 of Table D.1.

D.1.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of the electric storage heaters at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in D1-I2 of Table D.1.

D.1.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of electric storage heaters, the Installer shall employ or contract only an inspector meeting the competence requirements of D1-I3 of Table D.1.

D.1.4 Operative competence

When installing electric storage heaters, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (D1-I4 of Table D.1), at the competency ratio specified in D1-I6 of Table D.1.

D.1.5 Provision of information in respect of electric storage heaters

At the time of handover of electric storage heaters to the Client, the Installer shall ensure that the information identified at D1-I7 of Table D.1 is provided to the Client as part of the handover process required in 6.9.

Table D.1 – Measure-specific requirements for Electric storage heaters (BSE.1)

Measure description	Electric Storage Heaters (including electric warm air heating units that incorporate heat storage and high heat retention storage heaters)	
Measure type	BSE.1.1	Domestic electric storage heaters
	BSE.1.2	Domestic electric storage heaters with warm air heat distribution
	BSE.1.3	Non-domestic electric storage heaters with warm air heat distribution
D1-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>The Installer is responsible for:</p> <ul style="list-style-type: none"> • following the requirements of guidance given in product manufacturer's instructions; and • ensuring all electric storage heater work complies with the current edition of the Institution of Engineering and Technology (IET) Wiring Regulations (BS 7671) [N9].

Table D.1 – continued

D1-I2	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and determine if the:</p> <ul style="list-style-type: none"> • condition of the existing electrical installation is satisfactory in relation to the proposed work; • 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, conservation of fuel and power and electrical safety; • storage heater installation work will result in non-compliance with the IET Wiring Regulations; • proposed installation will be compliant with any requirements set by the storage heater product manufacturer; and • relevant checks have been undertaken to determine if asbestos containing materials are present.
	Installation role	Vocational competence required
D1-I3	Building Inspector	Able to demonstrate vocational competence (3.26) through EAS compliance (3.6)
D1-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence (3.26) through EAS compliance (3.6)
D1-I5	Competence currency	To be verified by the Installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
D1-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table D.1 – continued

<p>D1-17 Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days) as relevant to the requirements of the Building Regulations; • 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); • Product manufacturer's installation and servicing instructions; • Any manufacturer or product data or information sheets; • Product warranty information and guarantees; and • Commissioning certificate that meets the requirements of the Building Regulations. <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided; • An explanation of what controls/components should not be adjusted by the system user; • Demonstration of: <ul style="list-style-type: none"> • how to set user controls for maximum efficiency, including an explanation of tariffs; • any safety checks that the system user should undertake; and • what to do in the case of an emergency or perceived emergency.
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D.2 Measure BSE.2 Lighting fittings, lighting systems and lighting system controls

D.2.1 Additional installation requirements

When installing lighting fittings, systems and or controls, in addition to meeting the core requirements set out in Clauses 4 to 10 of this PAS, the Installer shall also work to any standards, specifications, instructions or guidance identified in D2-I1 of Table D.2.

D.2.2 Pre-installation building inspection requirements

Prior to commencing the physical installation of lighting fittings, systems and or controls at location, the Installer shall undertake a pre-installation building inspection in accordance, as a minimum, with the requirements set out in Section D2-I2 of Table D.2.

D.2.3 Inspector competence

When undertaking a pre-installation building inspection in respect of the installation of lighting fittings, systems and or controls, the Installer shall employ or contract only an inspector meeting the competence requirements of D2-I3 of Table D.2.

D.2.4 Operative competence

When installing lighting fittings, systems and or controls, the Installer shall employ or contract only operatives with the required level of competence attained through one of the permitted routes (D2-I4 of Table D.2) at the competency ratio specified in D2-I4 of Table D.2.

D.2.5 Provision of information in respect of lighting fittings

At the time of handover of the lighting fittings, systems and or controls to the Client, the Installer shall ensure that the information identified at D2-I7 of Table D.2 is provided to the Client as part of the handover process required in 6.9.

Table D.2 – Measure-specific requirements for Lighting fittings, lighting systems and lighting system controls (BSE.2)

Measure description		Lighting fittings, lighting systems and lighting system controls
Measure type		BSE.2.1 Lighting fittings
D2-I1	Additional installation requirements to those in the core of this PAS (Clauses 4 to 10)	<p>Any requirements provided in the manufacturers' instructions</p> <p><i>NOTE 1 Attention is drawn to the need for all lighting fittings work to comply with the current Building Regulations that apply in the UK country in which the installation is being carried out. In particular, the need for compliance in relation to the following aspects is highlighted: workmanship; materials; structural stability; fire safety; resistance to moisture; conservation of fuel and power, electrical safety. Further guidance on the requirements of the Building Regulations in England is provided in Approved Documents A-P [N2] and Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Wales is provided in Approved Documents A-R [N4] and guidance on Regulation 7: Workmanship and Materials [N3]. Further guidance on the requirements of the Building Regulations in Scotland is provided in the Domestic Technical Handbook [N5] and Non-Domestic Technical Handbook [N6].</i></p> <p><i>NOTE 2 Attention is drawn to the need for all work relating to non-domestic electrical work to comply with the Electricity at Work Regulations [N19].</i></p>

Table D.2 – continued

D2-I2	Pre-installation building inspection requirements	<p>As a minimum, the pre-installation building inspection shall investigate and assess if the:</p> <ul style="list-style-type: none"> • condition of the existing electrical installation is satisfactory in relation to the proposed work; • condition of the building fabric is satisfactory in relation to the proposed work; • the existing or proposed lighting control arrangement is compatible with the lighting fittings, systems and or controls to be installed; • 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, electrical safety; • installation work will result in non-compliance with the IET Wiring Regulations; • proposed installation will be compliant with any requirements stated by the product or system manufacturer; and • relevant checks have been undertaken to determine if asbestos-containing materials are present.
	Installation role	Vocational competence required
D2-I3	Building Inspector	Able to demonstrate vocational competence (3.26) through EAS compliance (3.6).
D2-I4	Operative, (threshold)	Able to demonstrate that vocational competence is being acquired as defined in 3.27 of this PAS.
	Operative, (specialist)	Able to demonstrate vocational competence (3.26) through EAS compliance (3.6).
D2-I5	Competence currency	To be verified by the Installer at no greater than twelve-monthly intervals, as defined in 3.30 of this PAS.
D2-I6	Competence ratio	<p>For each installation task to be undertaken, the Installer shall employ or subcontract at the particular location, at least one vocationally competent operative. For each installation, the vocational competence ratio (see 3.28) shall be determined by the Installer in relation to the:</p> <ol style="list-style-type: none"> a) range, scale geographical spread and complexity of the work being undertaken; and b) supervision and experience of the individual that meets the vocational competence requirements for the relevant tasks and the relative experience of the operatives being supervised. <p><i>NOTE 1 Where a vocationally competent operative is newly qualified, it may be appropriate for a lower competency ratio to be applied.</i></p> <p>For each installation task to be undertaken at a particular location, supervision, inspection and confirmation of compliance of all work undertaken in respect of that task at that location shall be undertaken by a vocationally competent operative appointed by the Installer to do so.</p> <p><i>NOTE 2 It is recommended that vocationally competent operatives carry a document supporting the nature, currency and source of that competency, for production upon request.</i></p>

Table D.2 – continued

<p>D2-17</p> <p>Measure-specific information to be handed over to the Client in addition to 6.9</p>	<p>Written information</p> <ul style="list-style-type: none"> • Product manufacturer’s installation and maintenance instructions; • Product warranty information and guarantees; • Building Regulations compliance certificate (or information explaining that a Building Regulations compliance certificate is required and will be provided within 30 days) as relevant to the requirements of the Building Regulations; and • 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). <p>Verbal information and/or demonstration</p> <ul style="list-style-type: none"> • An explanation of the purpose and relevance the written information provided; • How to set user controls for maximum efficiency; • An explanation of what controls/components should not be adjusted by the system user; and • Where end-user maintenance is possible, details how to undertake the maintenance including details of any product or tools that shall be used and details of where to obtain the required products and tools.
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Annex E (informative)

PAS 2030:2017 to PAS 2030:2019 – Substantive change

Table E.1 – Substantive change introduced in PAS 2030:2019

PAS 2030 Clause Reference		Nature of changes
2017	2019	
Foreword	Foreword	Explains that PAS 2030 has been updated to align with PAS 2035 <i>Retrofitting Dwellings for Improved Energy Efficiency: Specification and Guidance</i> which is applicable only to dwellings. Consequently, PAS is no longer applicable to non-dwellings, and may only be used in conjunction with PAS 2035. Other minor editorial changes.
Introduction	Introduction	Explains the most significant areas of change to PAS 2030: <ul style="list-style-type: none"> • removal of guidance about the scope and content of designs for EEMs, which has been moved to PAS 2035; • removal of guidance about the interactions between EEMs (except for the <i>Measures Interaction Matrix</i>), which has been moved to PAS 2035; • removal of guidance about assessment and upgrading of existing ventilation systems, which has been moved to PAS 2035; and • for demonstration of competence, requirement for the use of regulated and industry agreed vocational qualifications or apprenticeships, personal certificates of competence relevant to the EEM to be installed or for electrical work, compliance with the EAS to replace the reliance on Minimum Technical Competencies that was applicable in earlier editions. Other minor editorial changes.
1 Scope	1 Scope	Modified to reflect changes to the detail and structure of the revised PAS 2030. Includes reference to the addition of retrofit design validation requirements and to the amended annexes.
2 Normative references	2 Normative references	Updated and made consistent with PAS 2035.
3 Terms and definitions	3 Terms and definitions	Updated and made consistent with PAS 2035.
	4 Retrofit project management	Introduces a new requirement for the Retrofit Coordinator whose appointment is required by PAS 2035 to be identified to the Retrofit Installer and given access to the installation work to inspect progress and quality.
	5 Retrofit Design	New requirement for the Retrofit Installer to use a retrofit design that complies with PAS 2035. Clarification about the use of subcontractors and some minor editorial changes (see 5.6).
4 Installation process	6 Installation process	Updated requirements for validation of the PAS 2035-compliant retrofit design, for briefing of operatives by the Retrofit Coordinator and for testing, commissioning and handover. Changes to requirements in relation to 'business and financial probity (6.9), clarifying/ enhancing requirements for product liability insurance, guarantees and warranties and for clarity of contractual liability where Installers are contracted on a design and build basis.
5 Installation process management	7 Installation process management	Minor editorial changes for clarification and ease of understanding. New requirements added for proposed changes to the retrofit design to be referred to the Retrofit Coordinator for approval, and for photographic records to be made of installation work.

Table E.1 – continued

6 Service provision	8 Service provision	Minor editorial changes for clarification and ease of understanding.
7 Claims of conformity	9 Claims of conformity	Specified claim enhanced to include and clarify responsibility for the retrofit design.
8 Documents essential to the application of the annexes of this PAS	10 Documents essential to the application of the annexes of this PAS	Existing references confirmed or updated where necessary. Additional references added for Fenestration. Statement included with regard to on-going reliance on MTC Annexes NOS and NVQ for competence requirements. Additional and updated references to new insulation guidance documents added.
Annex A Energy efficiency measures/ types with PAS references	Annex A Measure-specific Annex selection and co-installation requirements	Annex A still contains the definitive list of included measures and measure types and an updated matrix providing information about the interaction and potential conflict between measures installed in the same building. Additional information has been included in respect of thermal bridging. Requirements to assess and, if necessary, upgrade ventilation in buildings where the installation of one or more EEM has improved the airtightness have been moved to PAS 2035. The following non-domestic measures, and their annexes, have been removed from this PAS: <ul style="list-style-type: none"> • chillers (previously Annex C.1); • non-domestic heating and hot water system controls (previously part of Annex C.6); • non-domestic hot water systems (previously part of Annex C.7); • non-domestic ventilation systems with heat recovery (previously part of Annex C.8); • radiant heating (previously Annex C.9); • non-domestic electric storage heaters (previously part of Annex D.1); • non-domestic electric storage heaters with warm-air heat distribution (previously part of Annex D.1); • variable-speed drives for fans and pumps (previously Annex D.3); and • non-domestic light fittings, lighting systems and controls (previously part of Annex D.1); Consequently, most sections of Annexes C and D have been re-numbered , as summarized in Table A.2 and Table A.3 .
Annex B	Annex B	Annex B.1 Significant change in respect of pre-installation building inspection requirements. Annex B.3 Additional cross references added for Fenestration. Adjustment to routes to competence. Annexes B.4, B.7 and B.8, Significant changes, particularly with regard to Installer responsibilities in respect of design/ specification. Annex B.12 Flexible thermal linings no longer included. New Annex B.12 Annex for Room-in Roof Insulation (RIRI) included. New Annex B.13 for Insulation of Park Homes included. Other annexes some minor editorial changes.

Table E.1 – continued

Annex C	Annex C	<p>Updating of NOS references. Some minor editorial changes.</p> <p>The following non-domestic measures, and their annexes, have been removed from this PAS:</p> <ul style="list-style-type: none"> • Chillers (previously Annex C.1); • Non-domestic heating and hot water system controls (previously part of Annex C.6); • Non-domestic hot water systems (previously part of Annex C.7); • Non-domestic ventilation systems with heat recovery (previously part of Annex C.8); and • Radiant heating (previously Annex C.9). <p>Consequently, most sections of Annex C have been re-numbered, as summarized in Table A.2.</p>
Annex D	Annex D	<p>Updating of NOS references Some minor editorial changes.</p> <p>The following non-domestic measures, and their annexes, have been removed from this PAS:</p> <ul style="list-style-type: none"> • Non-domestic electric storage heaters (previously part of Annex D.1); • Non-domestic electric storage heaters with warm-air heat distribution (previously part of Annex D.1); • Non-domestic light fittings, lighting systems and controls (previously part of Annex D.2); and • Variable-speed drives for fans and pumps (previously Annex D.3). <p>Consequently, most sections of Annexes D have been re-numbered, as summarized in Table A.3.</p>
Annex E	Annex E	Annex updated to provide comparison between PAS 2030:2017 and PAS 2030:2019 and identifying salient points of change.
Annex F	Annex F	Annex providing guidance on the application of PAS 2030:2019.
Annex G	Annex G	Example 'installation project information collation form', modified to reflect the changes introduced by 2019 revision.

Annex F (informative)

Installer guidance on the use and application of PAS 2030:2019

F.1 Overview

In addition to setting out requirements to be met by Retrofit Installers in undertaking the installation of EEM in existing buildings, PAS 2030 presents a logical approach to such activity, providing a suggested sequence of actions that if followed, should enable the Installer to ensure and demonstrate, that all required actions have been undertaken in compliance with the PAS requirements.

Before making use of PAS 2030, it is important that Installers understand that this PAS is prepared against the assumption that a retrofit design compliant with PAS 2035 *Retrofitting Dwellings for Improved Energy Efficiency: Specification and Guidance* has been made available to the Installer, and that a Retrofit Coordinator has been assigned to the project (as required by PAS 2035). It is expected that the retrofit design will be based on an assessment of the dwelling(s) and will be functionally and environmentally compatible with the designated building(s) and with any other EEM that are already installed or may later be installed in the same building(s).

It is acknowledged that in some situations, the dwelling(s) assessment and the preparation of a PAS 2035 compliant retrofit design could be undertaken by the same organization as that undertaking the EEM installation, but in other circumstances this may not be so and to accommodate this fundamental difference in approach, PAS 2030 treats the installation process as being wholly independent of those of assessment and retrofit design.

For this reason, the PAS 2030 installation process begins with a detailed review of the content and relevance of the retrofit design, leading to an inspection of the designated building (the pre-installation building inspection) to enable the Installer to satisfy him/herself that what has been specified in the retrofit design is complete, appropriate for the building concerned, technically feasible and capable of delivering the intended efficiencies.

The PAS includes specific instruction that where the circumstances or conditions at the building are not as provided for in the retrofit design, the Installer is required to refer such matters back to the Retrofit Coordinator for resolution. It could be that the Retrofit Coordinator seeks contribution from the Installer in the determination of corrective action, but this is not a requirement of PAS 2030 and such contribution is outside the remit of this PAS.

F.2 A staged approach to installation

The core text of PAS 2030 (Clauses 4 to 10) are presented in the sequence recommended for their application.

Clause 5.1. Sets out the requirement for Installers not only to be in possession of a retrofit design compliant with PAS 2035 but also to take some responsibility for ensuring that the retrofit designs they are provided with are complete and appropriate for the buildings in which the EEM are to be installed.

This does not however include any requirement or expectation that the Retrofit Installer should be responsible for correcting or enhancing the design in the event that it is judged to be inadequate or inappropriate. PAS 2030:2019 is quite specific in requiring the Installer to refer back to the Retrofit Coordinator where any such inadequacy is identified or where the pre-installation building inspection identifies potential issues in respect of the building designated for installation or with other EEM that have been or are to be installed in the same building.

Subclause 5.2 Sets out the principle retrofit design elements that the installer should expect to find in the provided design and as such whilst providing the detail of what the installer is required to look for and confirm provision of, it also establishes the basis for the Installer to refer back to the Retrofit Coordinator where there are concerns about the retrofit design provided.

In setting out requirements against which the Installer's processes and procedures will be assessed, Clause 6 together with the measure-specific annexes relevant to the measures installed, also provides the installer with a route map to planning and undertaking each installation.

All stages of installation are included from planning (installation method statement Clause 6.1), through the provision of equipment and tools (6.2), the checking and handling of materials (6.3), and the selection, training, instruction and supervision of operatives (6.4 and 6.5).

The PAS also addresses installer responsibilities when subcontracting all or part of an installation (6.6), and for commissioning and handing over installed EEM (6.7 and 6.9).

Finally, in 6.10 and 6.11, the PAS, deals with the requirements for process control, documentation and record keeping that are so important for demonstrating good process management.

Clause 7 enlarges on the theme of installation process management, initially by providing detailed requirements for the undertaking of a pre-installation building inspection (7.2) that is proving to be such a significant element of good EEM installation.

This inspection is the final opportunity, before installation commences, to confirm that the retrofit design is appropriate for the building in which EEM are to be installed and that the Installer's plan for installation has been correctly prepared, taking account not only of the details of the EEM to be installed but also of the condition and status of the building (including the presence of protected species) as well as the presence of other measure types that could have implications for or impact on the performance or effectiveness of the measure(s) any particular installer is to install.

This Clause also covers the Installer's responsibility to provide for any required intermediate inspections (7.3).

The remainder of Clause 7 (7.4 to 7.9) sets out a standard procedure for process management (along ISO 9000 lines) that is intended to ensure that the quality intentions of the installation process are not only delivered but can be audited subsequent to installation. Installers will find that close attention to following this procedure will contribute meaningfully to the performance and reputation of their business.

Clause 8 establishes requirements for Installers to have and operate a basic procedure for receiving and dealing with Client complaints and generally interacting with clients.

Finally, Clause 9 sets out in precise terms, how an Installer can claim compliance with PAS 2030:2019, including identification of the EEM that the Installer is qualified to install, the source of the retrofit design and whether the claim is made on the basis of the Installer's own assessment or has been validated by another party, particularly by an independent third-party certification body.

Retrofit Installers can claim compliance with PAS 2030:2019 on the basis of their own assessment provided they use the correct form of declaration and are confident that they can demonstrate such compliance through their recorded procedures, installation documentation and installation performance, if required to do so.

It is important to recognize however that terms of particular contracts or of some energy efficiency funding schemes can require that compliance with PAS 2030 be validated by an external party and indeed for some schemes (e.g. the UK Government ECO scheme), validation by an accredited certification body is required.

Other party validation is not therefore a requirement of this PAS, but the PAS makes provision for self-assessment, other party validation and independent, third party (certified body) validation. For all of these, use of the correct form of declaration is part of the requirement for compliance with this PAS.

Whether or not external validation is required by scheme requirements or commercial contract, Installers should be aware that clients can have greater confidence in work for which the correct undertaking has been validated by another party, particularly if that other party is an organization that has itself been independently accredited as being fit to do so.

Annex G (informative)

Example installation project information collation form

G.1 Use of this form

This form is provided to assist Installers in meeting the record keeping requirements of PAS 2030. It is presented in a form that may be copied and used by Installers as required.

PAS 2030 Installation Process Record

Unique reference for installation to which this record relates

It is recommended that the reference allocated here should be the primary identifier used to collate the set of information required to support each application of PAS 2030, including for the elements of the method statement.

G.2 Location of installation

Record full address of the dwelling in which the specified EEM is/are, to be installed.

G.3 Measure(s) to be installed

Identify each measure/ measure type, to be installed as part of this project.

_____	measure specific annex	_____
_____	measure specific annex	_____
_____	measure specific annex	_____
_____	measure specific annex	_____

Confirmation that all required measures are within scope of installer certification _____

G.4 Source of PAS 2035 compliant design (5.1)

In-organization or independent third party provided.

If independent third-party record name and contact details.

Design claimed to comply with PAS 2035.

Document Reference: _____

Date liaison with Client confirmed (4): _____

G.5 Validation of design (5.2)

G.5.1 Design adequacy (5.2.1)
Installer assured of validity of PAS 2035 compliance: Date:

Document references:

G.5.3 Design scope, adequacy and suitability (5.2.3)
Installer assured of design content: Date:

Document references:

G.5.4 Suitability of specified EEM (5.2.3)
Installer agrees that installation project specified is in line with Client expectations and is in accordance with information provided. Date:

Document references:

G.5.5 Ventilation requirements (5.2.4)
Installer assured the retrofit design provided includes appropriate and sufficient provision for the maintenance/enhancement of ventilation in the property in which the installation specified is to be undertaken. Date:

Document references:

G.5.6 Testing and commissioning (5.2.5)
Installer confirmation of provision of testing and commissioning requirements:
Document references:

G.6 Products and/or system specified/ to be installed

<p>Product 1:</p> <hr/> <p>Available date:</p> <hr/>
<p>Product 2:</p> <hr/> <p>Available date:</p> <hr/>
<p>Product 3:</p> <hr/> <p>Available date:</p> <hr/>
<p>System:</p> <hr/> <hr/> <p>Available date:</p> <hr/>

G.7 Installation method statement

The installer is required to possess and make available when required, the information that constitutes the method statement applicable to each EEM installation, before commencement of its installation (6.1). Completion of the following fields could assist the creation of the required record.

G.7.1 Reference for the retrofit design provided by the Retrofit Coordinator (6.1.1 & G.5)

G.7.2 Identification of the relevant measure-specific installation Annex(es) from PAS 2030 (6.1.2).

Annex(es)

G.7.3 The method(s) to be used for installing the product, including all constituent tasks (6.1.3, 6.1.4, 6.1.5).

Enter references to all relevant methods

G.7.4 Requirement for intermediate inspections (6.1.6)

Confirmation that the installer is aware of any requirement for intermediate inspections and that the method statement includes appropriate provision for their undertaking.

Inspection required at (stage)

Anticipated date:

G.8 Installation process

G.8.1 Equipment and tools

Identification/availability of the tooling and equipment required for the installation, including any requirement for calibration (5.2).

G.8.2 Materials and Supplies

Identification/availability of product related checking, handling and storage instructions (6.3).

G.8.3 Operative instructions

Confirmation of provision of installation instructions to operatives (6.4).

G.8.4 Operative selection, training, work assignment and briefing

The training and competence required of operatives by the installer to install the measure(s) in compliance with this PAS and its constituent Annexes (6.5). This should cross reference relevant personnel and training records and be reflected in record G.11.

G.8.5 Name(s) of operatives undertaking this installation, their vocational competence and project specific briefing

Operative name:

Vocational competence and record reference:

Briefing given for this installation:

Date:

Operative name:

Vocational competence and record reference:

Briefing given for this installation:

Date:

Operative name:

Vocational competence and record reference:

Briefing given for this installation:

Date:

Operative name:

Vocational competence and record reference:

Briefing given for this installation:

Date:

Operative name:

Vocational competence and record reference:

Briefing given for this installation:

Date:

G.8.6 Installation supervision

Confirmation that the installer has assessed the vocational competence of operatives assigned to this project and has allocated operatives to provide a vocational competence ratio appropriate to the requirements of the project as well as arranging for appropriate supervision (6.5.3).

Vocational competence confirmed.

Vocational competence ratio confirmed:

Supervisor(s) designated:

G.8.7 Subcontracting

Enter the identification of any subcontractors to be engaged for this installation (5.6) together with confirmation that the primary installer’s contract with the subcontractor requires that the subcontractor will comply with all requirements of this PAS that are relevant to the installation related tasks to be undertaken and that sub-contracted operatives have the necessary skills and competence for the installation tasks sub-contracted.

G.8.8 Testing and Commissioning

Detail of any ‘commissioning’ action required of the installer (6.7 & 6.8).

G.8.9 Handover

The information to be delivered to the Client at handover (6.9).

Identity of operatives authorized to undertake handover (6.9.2).

G.8.10 Installation control

This will be the identification of the competent person authorized by the installer to sign off the satisfactory completion of the installation (6.10).

Installer signature:

Date:

G.9 Operation and process oversight

Confirmation that the installer has in place, and operates, procedures designed to ensure that pre installation building inspection and installation processes in relation to the installation the EEM measures undertaken in this project (7.1), are undertaken and completed in accordance with the retrofit design, to the satisfaction of the Client(s) and in accordance with the requirements of this PAS, particularly in respect of:

The measures installed:

The use of specified installation methods:

Any required ventilation upgrade including where necessary the procurement and installation of any required ventilation upgrade from a ventilation specialist:

Avoidance of thermal bridging:

Testing:

Commissioning:

Handover:

G.10 Pre-installation building inspection

G.10.1 inspection findings

Date of notification to relevant certification body (7.2.2).

Record report reference and brief description of any issues raised, including in relation to:

- The suitability and completeness of the design specification; (7.2.3);
- The suitability and completeness of the installation method statement (7.2.4);
- Confirmation that the specified EEM can be safely and effectively installed at the designated location and is in accordance with the Client's expectations (7.2.5);
- Potential for moisture build-up as a result of the installation;
- Confirmation of the adequacy of ventilation prior to installation;
- Potential instances of thermal bridging and planned actions for amelioration;
- Risk to functionality and/or safety of installed services (7.2.6);
- The presence of protected species (7.2.7).
- Other issues recorded:

Date report issued to Client:

G.11 Provision for any intermediate inspection required (7.3)

Confirmation that where an intermediate inspection is required, adequate provision has been made for its undertaking and that any issues arising from that inspection have been communicated to the Client for resolution.

Date of any communication with Client:

G.12 Installation change (7.4)

Installer confirmation that any proposed changes to the retrofit design or method statement (including the substitution of alternative materials, products, construction details or processes) have been submitted to/ approved by, the Retrofit Coordinator prior to installation (7.4.1).

Installer confirmation that any change approved has been checked for compatibility with the installation of other measures being installed at the same site (7.4.2).

Installer confirmation that project related feedback from the Retrofit Coordinator, inspectors' operatives or assessment bodies has been documented, reviewed and actioned where appropriate (7.4.3).

G.13 Process continuity (7.5)

Identification of alternative installation resource for use should the installer be unable to complete the installation.

Approval received from Retrofit Coordinator:

G.14 Process control records (7.6 & 7.8)

References for the installation process control records relevant to this project:

G.15 Details of any problems encountered during installation, corrections agreed and remedial work undertaken

Please provide a brief record of the nature and extent of the problem(s), the date of reporting to the Client and the method and timing of its resolution. This record should include reference to any tools or equipment requiring recalibration. Include references to any relevant documentation held separately.

Date or reporting to Retrofit Coordinator:

G.16 Client complaints (8)

Date complaint received:

Date acknowledged to customer:

Date complaint reported to Retrofit Coordinator:

Date certification body informed (when requested):

Nature of complaint
(e.g. complaint related to: installation, installer attitude, operative behaviour, measure efficiency, measure suitability, timing, delay).

Complaint resolution
(Where complaint to be corrected or resolved by installer, record action taken and date of resolution.)

Action taken:

Date of resolution:

G.17 Commissioning – EEM performance testing carried out

Record date of commissioning, tests undertaken and any adjustments made. Date of commissioning:

Retrofit Coordinator informed:

Tests and adjustments:

G.18 Record of information left with Client at handover

Record identity of Client actually receiving information, items of information left, any physical demonstration provided and date of handover Customer name:

Information provided:

Date of handover:

G.19 Installation sign-off

The following statement is to be signed off by a competent person authorized to do so on behalf of the installer.

The installation identified in this process record has been undertaken in accordance with PAS 2030 and is confirmed as meeting the relevant design specification.

Name of authorized signatory:

Signature:

Date:

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

PAS 2031, *Certification of energy efficiency measure installation in existing buildings and insulation in residential park homes*

Other publications

[1] BRE. Information Paper, *IP1/06 Assessing the effects of thermal bridging at junctions and around openings*. BRE, 2006.

[2] THE STATIONERY OFFICE. *The Party Wall etc. Act 1996*. London: 1997.

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