

GENERAL GUIDANCE FOR THE INSTALLATION, RISK ASSESSMENT & COMMISSIONING OF SOLID FUEL BATCH FED APPLIANCES FITTED WITH A DEDICATED EXTERNAL AIR SUPPLY

1. Scope

This document sets out relevant guidance for the installation of appliances incorporating a dedicated external air supply (DEAS). The document covers the principal considerations for the installation, risk assessment and commissioning procedures for the safe and efficient installation of solid burning appliances.

The contents of this guidance document is applicable to installations of batch fed closed appliances where the adequate supply of air for combustion is taken directly from outside via a dedicated external air supply duct, and covers both roomsealed and non-roomsealed appliances.

This document excludes installations involving draught stabilisers that take air from the room the appliance is installed. For further guidance please contact the manufacturer of the draught stabiliser, appliance and air supply kit directly.

2. Building Regulation Requirements

Installers will be advised of their responsibilities during installation by the general principles found in their training, in relevant standards and in the requirements of Building Regulations. In particular they will look at page 9 of ADJ where the law is set out under the provisions of J1 to J5. In relation to dedicated external air supply appliances, J1 and J2 are the parts most applicable and state

J1 Air Supply: Combustion appliances shall be so installed that there is an adequate supply of air to them for combustion, to prevent overheating and for the efficient working of any flue.

J2 Discharge of Products: Combustion appliances shall have adequate provision for the discharge of products of combustion to the outside air.

Manufacturers of appliances will also have considered the purpose for which their appliances will be used, and will have tested and verified that their appliances are capable of being fitted in accordance with the above. Manufacturer instructions will confirm that the appliance is suitable for installation in this configuration and give clear guidance on installing the appliance and dedicated air kit, and together along with the appropriate risk assessment and commissioning, will confirm to the installer of the safe installation and operation of the appliance.

3. Principle Responsibilities

Along with the regulatory requirements referenced in Building Regulations, the following due considerations are to be met for the installation of appliances with a dedicated external air supply;

- ✓ The manufacturers' instructions confirm that the appliance can be installed in this way safely and the manufacturer has provided clear guidance on installing the appliance and air kit together.
- ✓ That the dedicated air kit used meets the requirements of the manufacturer and that the appliance is fitted in accordance with manufacturer's instructions
- ✓ The installer must risk assess and commission the appliance in accordance to manufacturer's instructions and ensure HETAS commissioning guidelines and tests are adhered to and evidenced correctly.
- ✓ If at commissioning stage the appliance cannot be confirmed as operating safely, it will be disconnected from the chimney and placed somewhere that it can't be used.
- ✓ In some cases it may be that an ADJ vent is the only solution to supplying additional air for safe and correct operation, and the consumer should be advised of this compliance requirement where appropriate.

4. Provision of Direct Air Supply Appliances

An appliance with a dedicated external air supply isolates the air for combustion and chimney operation from the room in which the appliance is installed, which can offer improved overall dwelling efficiency and save money on energy bills for the consumer. However with the chimney and air supply disconnected from the room environment, the added benefit of the chimney driving the dwelling's ventilation no longer exists. Therefore any spillage during refuel of an appliance can only be cleared by the correct use of the dwelling's designed ventilation systems.

4.1. Ventilation

The continual ongoing developments to improve energy efficiency and reduce heat losses in properties has led to an increase in the use of mechanical extract ventilation systems in kitchens and bathrooms and trickle ventilators in all habitable rooms, and in more recent cases the installation of mechanical heat ventilation

recovery systems. (MVHR)

4.1.1. Maintaining Indoor Air Quality

It is important for consumers to be made aware that any passive ventilation systems shall be opened in instances of spillage in order to maintain the indoor air quality of the property and allow a means for dispersion of any products of combustion entering the room under these conditions

4.1.2. Mechanical Heat Ventilation Recovery (MVHR)

In instances where a MVHR system is installed, it is important to obtain further information from the appliance manufacturer and guidance within instructions to ensure the appliance's suitability under these conditions. Clarification from the ventilation system designer that the MVHR unit has been commissioned to provide an overpressure in the room(s) containing the appliance, flue system and external air supply duct will also be required and they may also need to aid the appliance installer in setting the required 'normal operating' scenario during the appliance commissioning check procedure.

Consumers should be made aware of the need for frequent maintenance of both the appliance and the MVHR system. This is required to ensure their efficient operation as well as to check that the MVHR filters are not blocked and can be operated in balance and as quietly as possible.

4.2. The Appliance

There are different variations of dedicated external air supply appliances on the market today, which all perform in different ways in relation to obtaining the relevant supply of primary, secondary and tertiary air for combustion. These can be summarised as the following;

Appliance Type	Classification
Non Roomsealed	<i>Appliances that are available with a dedicated external air supply where supplementary air is required from within the room the appliance is located for either ignition, operation of the air wash system or additional air during refuel. Manufacturer instructions should be referenced to determine the required amount of supplementary ventilation required. Permanent ADJ ventilation may still be required with this type of appliance.</i>
Roomsealed	<i>An appliance available with an external air supply that takes 100% of operational combustion air from the external air supply system. The manufacturer's instructions should be referenced to determine the suitability of fitting roomsealed appliances into passive houses with mechanical ventilation systems. Spillage during refuel is not tested and relies on an on-site spillage test carried out during commissioning, see HETAS_TN_0021 (2016),</i>

4.3. The Chimney

The chimney should be designed and installed to comply with the guidance in ADJ and its supporting standards, in particular BS EN 15287-1. As an appliance with a dedicated external air supply takes the required air directly from outside the building, the temperature differential between the air at the top of the chimney and air in the inlet of the dedicated air duct can sometimes be the same. This can mean that little or no motive force is present to help provide the relevant draw up the chimney and aid may be needed for the initial lighting of the appliance.

4.4. Manufacturer's Instructions

The appliance will have been designed and tested for safe operation when using a Dedicated External Air Supply and will be supplied with a set of comprehensive installation instructions relative to the correct installation and operation and giving guidance on the relevant suitability in different construction and ventilation scenarios. It is important for the installer to read the installation instructions before commencing works on a DEAS installation and ensure the instructions for the air kit are clear, concise and referenceable throughout.

HETAS advice is to only install a dedicated external air kit supplied or specified by the manufacturer of the appliance, and which is installed in a way that meets all required provisions of the manufacturer's instructions, local Building Regulations requirements and appropriate standards. The details and minimum specification within the manufacturer instructions should include the following information;

- In-depth guidance on how to specify, install and inspect the appliance and the fixing of the direct air kit
- The minimum diameter of duct, or minimum cross sectional area and shortest side if a square or rectangular duct is specified.
- Maximum total length of the duct, maximum number of bends permitted and specification of the air inlet terminal
- Measures to be taken to ensure the air duct inlet does not become blocked from snow, debris, and water ingress and not prone to collapse due to heat or other effects.
- The appliance's suitability for installation in different property construction and air tightness scenario

5. Risk Assessment

Before commencing any work on a DEAS appliance, an assessment of appliance type, property construction and ventilation design, must be undertaken along with the basic assessment as required for all wood and solid fuel appliance installations. This includes appliance sizing, location, hearth requirements, chimney performance, effects of extract fans & CO alarm provisions as well as special attention to the following areas;

5.1. Assessment of Air Permeability

It is important to assess the property's air tightness to ensure there is enough adventitious air available for combustion during use and when the door is open for refuel, whilst maintaining clean air within the room for the safety and comfort of the occupants. Assessment should be made regarding the age of the property and any property improvements in reducing heat loss (draught proofing, cavity wall insulation, increased loft insulations etc.)

The age and modifications to the property's construction can have an effect on its air permeability attributes, which can mean the air requirement for a DEAS is greater. These are typically categorised as follows;

Year of Construction	Refurbished	Typical Dwelling Ventilation
Post 2008 (Class 1)	No	<i>Significantly reduced energy demand due to air tightness of the building. Typically double/triple glazed windows with high levels of roof and cavity insulation. Passive ventilation through trickle vents and mechanical extracts in kitchens/bathrooms. Special attention to mechanical heat ventilation recovery systems is required in this type of property construction.</i>
Between 1975-2008 (Class 2)	Yes	<i>Reduction to the original energy demand due to improvements in properties air leakage. Typical additions include double glazing, cavity wall and loft insulation and draught proofing of windows/doors. Typically passive ventilation through trickle vents and mechanical extracts in kitchens/bathrooms. Special attention to mechanical heat ventilation recovery systems is required in this type of property construction</i>
Between 1975-2008 (Class 3)	No	<i>A large proportion of properties fall into this category and the energy requirement of these dwellings become greater due to higher heat loss rates through the building fabric. They normally have basic passive ventilation with supplementary mechanical ventilation incorporated. As the age of the property increases, the amounts of insulation incorporated decreases, leading to higher leakage rates.</i>
Pre-1975 (Class 4)	Yes	<i>Old style housing with moderate/significant improvements in the form of double glazing, inclusion of cavity wall and loft insulation. Addition of mechanical ventilation in the form of extract fans in kitchens/bathrooms. Additional improvements reduce the properties overall energy requirement.</i>
Pre-1975 (Class 5)	No	<i>Old style housing with single glazing with a high energy requirement due to increased leakage through the building structure. Typically basic passive ventilation through vents in the wall/floor and by opening of windows with no insulation or additional draught proofing measures incorporated.</i>

5.2. Assessment of the Appliance

With a range of appliance configurations available it is important to assess that the appliance's suitability and its ventilation characteristics for the property. Where the air sealed nature of the building becomes progressively tighter, the choice of appliance also becomes more critical. The appliance manufacturer's instructions should contain suitability on installation in a range of dwelling airtightness scenarios, however should this information not be made available by the manufacturer, the liability for performance and operation of the system will lie with the installer. It is therefore important that a declaration of suitability of the appliance is confirmed with the manufacturer directly, and in cases where this cannot be confirmed, then it is advisable to reconsider fitting that particular appliance or alternatively ensuring compliance by fitting an ADJ vent into the room in which the appliance is installed in. *Section 4.2* above gives further information on the different types of DEAS appliances.

5.3. Assessment Procedure

To carry out a risk assessment it will be necessary to grade the risks associated with the property, including construction of property and ventilation, appliance selection, appliance instructions and design. An example of the HETAS risk assessment form can be found below. Please note a copy of this should be left with the copy of the installation certification as to prove compliance that this procedure has been completed.

5.3.1 Effects of Extract Fans

ADJ advises that the installation of a solid fuel appliance in a room with extraction should be avoided. But in modern homes there is likely to be mechanical ventilation either in the room in which the product is fitted or in an adjacent room. Test work has shown that solid fuel appliances when provided with an adequate air supply in accordance with the amounts specified in ADJ can maintain an effective flue draught as long as the room is not de-pressurised by more than 6 Pa.

The appliance manufacturer's instructions should always be referenced and followed when installing into dwellings that have extraction systems present.

Risk Assessment - Sample

Assessment of the Property							
Address:							
Age and construction of property:							
Property Construction & Ventilation	Appliance Type	Appliance Installation & Operating Instructions	Installation Design				
House pre or post 2008 – with MVHR system confirmed as not suitable for use with direct air supply by manufacturer and/or MVHR system specifier	5	Not specifically designed or verified for use with direct air supply	5	No Instructions included	5*	Not followed manufacturer instruction guidance	5*
Modern House post 2008 or Between 1975 – 2008 - with improvements (Class 1 or 2)	4	Non Roomsealed or Roomsealed appliance with no clear information from manufacturer or instructions	4	Poor general installation instructions included with no clear guidance for specification or fitting dedicated external air supply kit	4	Followed manufacturer instructions with some bespoke tailored installation practices	4
Between 1975-2008 - with no improvements (Class 3)	3	Roomsealed appliance with clear manufacturers' instructions for dedicated external air supply followed	3	Good general installation instructions included but no clear guidance for specification and fitting dedicated external air supply	3	Followed manufacturer instructions with some bespoke tailored installation practices confirmed by manufacturer in writing	3
Pre 1975 – with improvements (Class 4)	2	Roomsealed appliance with clear instructions for dedicated external air supply followed and verification from manufacturer obtained	2	Good general installation instructions with good clear guidance for specification and fitting dedicated external air supply	2	Followed manufacturer instructions accordingly	2
Pre 1975 – no improvement (Class 5)	1	Roomsealed appliance where durability and pressure testing carried out against DIBT test	1	Excellent concise detailed installation and commissioning procedures for the appliance and air supply system.	1	Followed manufacturer instructions accordingly and obtained declaration that installation design is suitable	1

Risk Score	Risk Rating	Notes
Any 5's	INTOLERABLE	Don't not fit the appliance
Any 4's	High	Fit appliance with dedicated kit but may need to include an external ADJ vent
Any 3's	Medium	Manufacturer clarification required, review with commissioning result
Any 2's	Medium to Low	OK to Fit, review with commissioning result
Any 1's	Low	OK to Fit

Declaration

Declaration: Risk assessment has been carried out in accordance with HETAS guidance notes under clause 5 of HETAS_TN_0020

Installer Name:		Company:	
Signed:		Date:	

6. Commissioning Testing

Once a suitable flue draught has been established, and to ensure that during start-up operation and refuel that spillage does not occur, it is advised to carry out the following 3 step spillage test procedures and record the results using the form below. Before commencing the commissioning process, it is important for the installer to ensure the following have been met;

- ✓ The installer has read and understood this guidance document and has taken account of the guidance contained within the appliance manufacturer's installation instructions.
- ✓ A relevant risk assessment of the property and appliance has been carried out
- ✓ The chimney, hearth and appliance is installed in accordance with the requirements of ADJ and their suitability/soundness has been verified as compliant
- ✓ The air supply duct has been installed in accordance with the specification detailed by the appliance manufacturer and within manufacturer instructions
- ✓ A CO alarm has been fitted

Commissioning is the final stage of an installation and intended to evidence that the appliance works safely at the time the commissioning takes place. All dedicated external air supply installations are subject to the relevant commissioning and site testing provisions as required for under Building Regulations and are to be notified through the HETAS CPS scheme, where a certificate of compliance is to be issued, a copy retained by the installer and a copy left with the consumer for their records.

The commission procedure detailed in point 6 below can be followed to confirm compliance for DEAS appliances. Further supporting information on commissioning may be available from recognised product specific manufacturer's instructions, and should be referenced during the commissioning process.

A copy of the form should be left with the consumer and a copy retained by the installer for their records

Step 1 – Cold Spillage Test – Appliance Door Shut.

1. Close all external doors and windows, internal doors to the room the appliance is located in and ensure all openable ventilators are closed and any devices that extract air from the dwelling are off.
2. Preheat the flue by lighting a small fire using kindling, a blow lamp or electric heater.
3. Light a small smoke pellet (5m3/30 sec), place into the appliance and shut the appliance door. All air-controls should be set to their maximum open position.
4. Check that all of the smoke enters the flue and none comes back into the room through any part of the stove, connecting flue pipe or air supply duct.

Note: *If visible smoke enters the room then repeat the flue preheat detailed in point 2 above, to generate additional flue draw. If the test still fails, progressively open a window in the room the appliance is installed. If the flue starts to draw the smoke, this will indicate a fault due to air starvation and the appliance is not being provided with adequate air for the flue to function correctly. Note the additional area of ventilation required and add permanently open ventilation into the room by that amount to correct the problem.*

5. If applicable, correct any highlighted issues and re-test using steps 1-4 above. If smoke continues to spill after opening a window, this indicates a more serious problem (i.e. flue blockage) which must be addressed and then this commissioning process repeated.

Step 2 - Extraction Test (Using a flue draught gauge)

A flue pressure testing device shall be fitted to the flue of the appliance.

1. Ensure all doors to the room and all external doors, windows and air vents designed to be closable are closed, and all ventilation fans are switched off.
2. Light the appliance and allow for the optimum operating temperature to be reached
3. The flue draught reading should be recorded and checked that it is in the parameters specified by the appliance manufacturer.
4. Open any internal doors interconnecting the room in which the appliance is installed to rooms where extraction fans are present within the property
5. Turn on all extract fans within the property to the maximum speed setting allowed
6. Run the extract systems for ten minutes, and then, record the flue draught reading. The reading should not be lower than the previous reading obtained with extracts running and not fall below the parameters specified by the appliance manufacturer.
7. Once the tests confirm satisfactory operation, remove the test device and seal any apertures in the flue way if required.

Note: *If at any stage during commissioning the flue draught reading taken differs from the draught parameters specified by the manufacturer, action should be taken to locate the cause of the discrepancy and the installation rectified before proceeding with further testing. The extraction test is a means to verify that the manufacturer's required flue draught during operation is met under the relevant conditions. In some cases spillage can still occur and so it is important to carry out the prescribed smoke spillage tests detailed*

Step 3 – Hot Spillage Test - Refuelling

Now that initial chimney draw has been verified as adequate, light a fire in the appliance using the recommended amount of kindling/small logs and manufacturer's recommended air control position and allow the appliance to reach its normal operating temperature. At the end of the banking period and before refuelling;

1. Close all external doors and windows, ensure all openable ventilators are closed.
2. Open the appliance door and with a smoke match/pen (15 sec burn time) pass over the top and side edge of the opening of the combustion chamber, observe and record if the smoke/combustion products are drawn into the chimney or spill back into the room. Once the smoke is extinguished, close the appliance door
3. Repeat this test with all extraction fans running and internal doors open connecting the room the appliance is installed in to the extraction device(s) (see extraction test above)

Note: *If smoke or combustion enter the room, then additional ventilation may be required to compensate for the extraction device(s). This can be tested by gradually opening a window and observing the relevant smoke patterns during operation.*

If the smoke continues to fail to draw up the flue, or fails with additional ventilation beyond that advised by ADJ Table 1, thoroughly inspect the flue/chimney and termination for other faults.

Check the appliance/flue/chimney draw with a flue draught gauge and ensure draught is within manufacturer's guidelines. If no gauge is available, or no draught reading is given, you can test with smoke as a "safety check" but there is no substitute for using the correct tools and undertaking the correct tests

On Site Verification of HETAS Spillage Test Procedure

1. Property Details	
Address:	
Installation Location:	
Installation Type:	
Assumed Dwelling Permeability Low to High (see risk assessment document and guidance):	

Appliance Details		2. Direct Air Supply Details (if applicable)	
Appliance Type:		Ducting Length:	
Make/Model:		Number of Ducts:	
Fuel:	Wood / Mineral Fuel / Pellet / Chip	Exhaust Air Requirement: (mm)	
Nominal Output (kW):		Is it Sealed	Yes / No
Gross Efficiency (%):		Is it extra vented to room (mm ²)	
Freestanding/Inset:		In compliance with manufacturer's instructions	Yes / No
Air Control Type:	Manual / Automatic		

Commissioning Details					3. Installation Details	
	Compliance (please circle)		Notes/Measurements			Compliance (please circle)
	Extract Off	Extract On	Extract Off	Extract On	Manufacturer's Specifications	
Extraction Test	Pass / Fail	Pass / Fail				In compliance with manufacturer instructions? Yes / No
Cold Spillage Test	Pass / Fail	Pass / Fail				In compliance with ADJ? Yes / No
Hot Spillage Test	Pass / Fail	Pass / Fail				Direct External Air Supply Present? (see section 5) Yes / No

4. Declaration			
Name:		Company:	
Signed:		Date:	
Other Notes/Comments:			