3. MCS PLANNING STANDARD FOR AIR SOURCE HEAT PUMPS

3.1 The MCS Planning Standard for air source heat pumps is as follows:

(a) The air source heat pump product shall be certificated in accordance with MCS 007[3];

(b) The air source heat pump shall be installed by an MCS Contractor in accordance with MIS 3005[4]; and

(c) The installation shall be carried out in compliance with the calculation procedure contained in Table 2. MCS Contractors must complete the 'results/notes' column in Table 2 for each step of the calculation procedure to show how it has been followed.

AIR SOURCE HEAT PUMP CALCULATION PROCEDURE

3.2 The air source heat pump calculation procedure is set out in Table 2. MCS Contractors must complete one table for each assessment position that could potentially be affected by noise from the air source heat pump. To follow the instructions and complete the table, MCS Contractors will need to refer to the definitions at the start of the table and Notes 1-7 set out after the table. A glossary of terms can be found in Section 4.

3.3 MCS Contractors must insert their results in the 'results/notes' column for each step of the calculation procedure to show how it has been followed. MCS Contractors must retain one copy of the completed table for their records and provide another copy to the client.

3.4 Explanation of the calculation procedure is supported by a worked example which is in italics at the end of each step in the table. In the example, an air source heat pump with a sound power of 55 dB(A) mounted on the ground and against a single wall is used. An assessment position is 4 metres away. This example is used for the purposes of illustrating the calculation procedure only.

[3]The Microgeneration Certification Scheme Standard MCS 007 – Issue 4.0. Product Certification Scheme Requirements: Heat Pumps. Dated 01/05/2015

[4]The Microgeneration Certification Scheme MCS Contractor Standard MIS 3005 – Issue 4.2. Requirements for Contractors Undertaking the Supply, Design, Installation, Set to Work Commissioning and Handover of Microgeneration Heat Pump Systems. Dated 01/05/2015

TABLE 2: USE ONE TABLE FOR EACH ASSESSMENT POSITION TESTED

Date calculation undertaken:

Note: for the purposes of this calculation procedure:

- **Assessment position** means a position one metre external to the centre point of any door or window to a habitable room of a neighbouring property as measured perpendicular to the plane of the door or window.
- **Habitable room** means a room other than a bathroom, shower room, water closet or kitchen.
- **Neighbouring property.** Means any building used for any of the purposes of Class C of the Town and Country Planning (Use Classes) Order 1987 (as amended) (includes dwellings, houses, hotels, residential institutions and houses in multiple occupation). In instances where the air source heat pump would be installed on block of flats, neighbouring property includes flats within the same block of flats (excluding the flat of the "owner(s)" of the air source heat pump.

Description of assessment position tested

(This must be detailed enough to allow for identification, including property address and exact location of window / door opening and floor level. It is recommended that a map, sketch, photo or other record be attached to these workings.)

The assessment position is the first floor bedroom window of Sunfold and it is 8m away from the location of the proposed air source heat pump.
The location of the proposed air source heat pump is not visible from the assessment point and is situated behind a 0.8m thick Cotswold stone wall

Summerfield House,
The Broadway,
Oakridge Lynch
Stroud
GL6 7NY

Example: The assessment position is the first floor bedroom window of 1 Oak Street and it is 4 metres away from the location of the proposed air source heat pump.

Step	Instructions	MCS contractor results / notes
1.	**From manufacturer's data, obtain the A-weighted sound power level of the heat pump. See '<u>Note 1: Sound power level</u>'. The highest sound power level specified should be used (the power in "low noise mode" should not be used).** *Example: Manufacturer's data states the sound power level of the heat pump is 55 dB(A).*	STEP 1 RESULT = Mitsubishi Electric PUZ-WM112VAA(-BS) Ecodan R32Air Source Heat Pump Sound Power Level = 60 dB(A)
2.	**Use '<u>Note 2: Sound pressure level</u>' and '<u>Note 3: Determination of directivity</u>' below to establish the directivity 'Q' of the heat pump noise.** *Example: The heat pump is to be installed on the ground and against a single wall hence the directivity (Q) of the heat pump noise is Q4.*	STEP 2 RESULT = The heat pump is to be installed on a platform 1.2m off the ground and has a wall behind it and to one side, so two reflective surfaces. Directivity (Q) = 4
3.	**Measure the distance from the heat pump to the assessment position in metres.** *Example: Distance between heat pump and assessment position is 4 metres.*	STEP 3 RESULT = The distance from the heat pump to the assessment position = 8m
4.	**Use table in '<u>Note 4: dB distance reduction'</u> below to obtain a dB reduction.** *Example: 4metres @ Q4 = -17 db.*	STEP 4 RESULT = 8 metres @ Q4 = -23 dB

5.	**Establish whether there is a solid barrier between the heat pump and the assessment position using 'Note 5: Barriers between the heat pump and the assessment position' and note any dB reduction.** *Example: There is a brick wall between the heat pump and the assessment position. Moving less than 25cm enables the assessment position to be seen. dB reduction = -5 dB.*	STEP 5 RESULT = There is a substantial Cotswold stone wall between the heat pump and the assessment position. The heat pump will only be visible from within the site. dB reduction = -10 dB
6.	**Calculate the sound pressure level (see 'Note 2: Sound pressure level') from the heat pump at the assessment position using the following calculation:** **(STEP 1) + (STEP 4) + (STEP 5)** *Example (55) + (-17) + (-5)=55 – 17 – 5 =33 dB(A) Lp*	STEP 6 RESULT = (60) + (-23) +(-10) = 27 dB(A)Lp
7.	**Background noise level. For the purposes of the MCS Planning Standard for air source heat pumps the background noise level is assumed to be 40 dB(A) Lp. For information see 'Note 6: MCS Planning Standard for air source heat pumps background noise level'.** *Example: Background noise level is 40 dB(A).*	STEP 7 RESULT = 40 dB(A)
8.	**Determine the difference between STEP 7 background noise level and the heat pump noise level using the following calculation:** (STEP 7) – (STEP 6)	STEP 8 RESULT = 40 dB(A) - 27 dB(A) = 13 dB(A)

	Example: 40 dB(A) (background) – 33 dB(A) (heat pump) = 7dB(A).	
9.	**Using the table in 'Note 7: Decibel correction' obtain an adjustment figure and then add this to whichever is the higher dB figure from STEP 6 and STEP 7. Round this number up to the nearest whole number.** *Example: Adjustment figure is 0.8 dB and the higher figure is 40 dB(A).* *40 + 0.8 = 40.8 dB(A).* *Rounded up to 41 dB(A)* *Final result at this assessment position is 41 dB(A).*	FINAL RESULT= Adjustment figure is 0.2 dB and the higher figure is 40 dB(A) 40 + 0.2 = 40.2 dB(A) Rounded up to 41 dB(A) Final result at this assessment position is 41 dB(A)
10.	**Is the FINAL RESULT in STEP 9 equal to or lower than the permitted development noise limit of 42.0 dB(A)?** **If YES - the air source heat pump will comply with the permitted development noise limit for this assessment position and may be permitted development (subject to compliance with other permitted development limitations/conditions and parts of this standard). NOTE - Other assessment positions may also need to be tested.** **If NO – the air source heat pump will not be permitted development. This installation may still go ahead if planning permission is granted by the local planning authority.** *Example: 41 dB(A) is equal to or lower than 42.0 dB(A).*	Final result is equal to or lower than 42.0 dB(A) YES - lower

NOTE 1: SOUND POWER LEVEL (STEP 1)

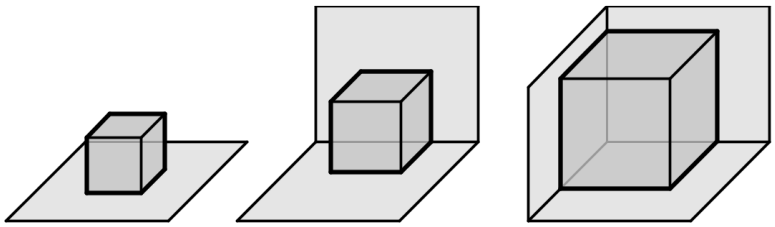
Sound power is the ***total*** acoustical energy emitted by a sound source and is an absolute value. It is **not** affected by the environment or the location of the listener.

NOTE 2: SOUND PRESSURE LEVEL (STEP 2)

Sound pressure is what we hear. It is a pressure disturbance at a specific point in the atmosphere whose intensity is influenced not only by the sound power of the source, but also by the surroundings and the distance from the source to the point at which the sound is heard.

NOTE 3: DETERMINATION OF 'DIRECTIVITY' (STEP 2)

The sound pressure level increases with the number of reflecting surfaces. Use the illustrations below to establish the directivity 'Q' for the installation. A reflective surface is any surface (including the ground) within 1 metre of the air source heat pump.



The following examples may be used as a guide:

- Q2 = an air source heat pump with one reflecting surface (i.e. the ground or a single wall if mounted on a wall off the ground).
- Q4 = an air source heat pump with two reflecting surfaces (i.e. ground mounted and against a wall or mounted off ground level against two walls)
- Q8 = an air source heat pump with three reflecting surfaces (i.e. ground mounted and against two walls or mounted off ground level between three walls).
- **NOTE – an air source heat pump with more than three reflective surfaces (for example those within small lightwells) will not meet the MCS planning standards.**

NOTE 4: DB DISTANCE REDUCTION (STEP 4)

Distance from Heat Pump (metres) (STEP 3 RESULT)														
	1	1.5	2	3	4	5	6	8	10	12	15	20	25	30
Q (STEP 2 RESULT)														
2	-8	-11	-14	-17	-20	-21	-23	-26	-28	-29	-31	-34	-36	-37
4	-5	-8	-11	-14	-17	-19	-20	-23	-25	-26	-28	-31	-33	-34
8	-2	-5	-8	-11	-14	-16	-17	-20	-22	-23	-25	-28	-30	-31

Where a precise distance is not indicated in the above table, then the next lowest value for that distance should be used. E.g. if the distance was 2.5m, then the values for 2m should be used.

NOTE 5: BARRIERS BETWEEN THE HEAT PUMP AND THE ASSESSMENT POSITION (STEP 5)

A correction should be made for attenuation due to barriers between the air source heat pump and an assessment position. A correction will be necessary if an MCS Contractor is unable to see an assessment position from the top edge of the air source heat pump. Use the following instructions to determine whether a correction is appropriate:

- For a solid barrier (e.g. a brick wall or a fence) that completely obscures an MCS Contractor's vision of an assessment position from the top edge of the air source heat pump attenuation of -10 dB may be assumed.
- Where a solid barrier completely obscures an MCS Contractor's vision of an assessment position from the top or side edges of the air source heat pump, but moving a maximum distance of 25 cm in any direction to the air source heat pump allows an assessment position to be seen, attenuation of -5 dB may be assumed.
- If it is possible for an MCS Contractor to see any part of an assessment position from the top or side edges of the air source heat pump no attenuation may be assumed.

NOTE 6: MCS PLANNING STANDARD FOR AIR SOURCE HEAT PUMPS BACKGROUND NOISE LEVEL (STEP 7)

The MCS Planning Standard assumes a background noise level of 40 dB(A) for the purposes of the air source heat pump calculation procedure. A different value for background noise should not be used as part of this calculation procedure.

NOTE 7: DECIBEL CORRECTION (STEP 9)

Please note that the left hand column should be used for both positive and negative differences (e.g. a difference of +3 and -3 both attract a correction of 1.8 dB).

Difference between the two noise levels (db) (+/-)	Add this correction to the higher noise level (db)
0	3.0
1	2.5
2	2.1
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
9	0.5
10	0.4
11	0.3
12	0.3
13	0.2
14	0.2
15	0.1