



Our reference: 9393/BL
Date: 8th April 2022

Dear Kasia,

Laystall St, Manchester - Roof Top Plant

The following provides our review of the roof top plant and how it could affect the hotel rooms adjacent and below in terms of noise.

1. Plant Noise Limits

External Limits

Any plant associated with the proposed hotel is understood to operate 24 hours a day. We have provided plant noise limits at the nearest noise sensitive dwellings and hotel based on the monitoring data obtained in our former report, British Standards 4142:2014 and the Marriott Brand Standards.

Based on the above criteria and operational hours, the maximum cumulative rating sound level limit of noise from plant associated with the development are as follows.

Table 1: Free-field Plant Rating Level limits

Location	Period	Plant Limits L _{Ar,15min} dB
Existing Dwellings	Day (07:00 - 23:00)	53
	Evening (19:00 - 23:00)	51
	Night (23:00 - 07:00)	49

The plant should be selected to ensure any character (tonality, intermittency or other sound characteristics) are not readily distinguishable at the dwellings. If character is present a character correction should be applied as per BS4142:2014.

Internal Limits

The Marriott Brand Standards provide the following noise criteria for building services:

Figure 1: Marriott Brand NC for Building Services

3. Maximum NC 37 for Public Spaces and Guestrooms and NC 40 for Back-of-House areas.

We understand this relates to plant within the room, it is advised that noise from plant from outside the room should be at least 10dB below this and no more than NR27.



2. Proposed Plant

We have been advised that the proposed plant is all supplied by Mitsubishi and is as follows:

Table 2: Manufacturers Noise Levels

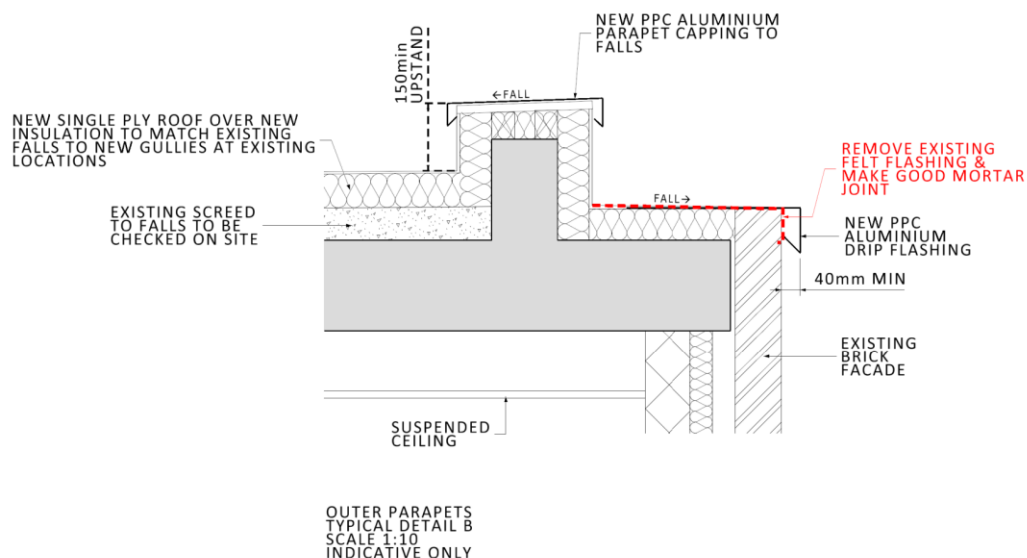
Ref.	Model	Sound Pressure Level at 1m, dB							
		63	125	250	500	1k	2k	4k	8k
01	PUZ-ZM35VKA2	58.0	51.0	45.0	44.0	40.0	37.0	32.0	31.0
02	PUZ-ZM35VKA2	58.0	51.0	45.0	44.0	40.0	37.0	32.0	31.0
03	PUZ-ZM35VKA2	58.0	51.0	45.0	44.0	40.0	37.0	32.0	31.0
04	PUZ-ZM71VHA2	53.0	52.0	53.0	44.0	43.0	39.0	33.0	27.0
05	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
06	PURY-P350YNW-A1	69.0	63.5	64	61.5	56.5	51.5	46.5	40.0
07	PURY-P450YNW-A1	73.5	64.0	66.5	64.5	59.5	55.0	49.5	45.5
08	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
09	PURY-P450YNW-A1	73.5	64.0	66.5	64.5	59.5	55.0	49.5	45.5
10	PURY-P400YNW-A1	73.5	63.5	66.0	64.0	59.0	54.5	48.5	45.0
11	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
12	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
13	PURY-P400YNW-A1	73.5	63.5	66.0	64.0	59.0	54.5	48.5	45.0
14	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
15	PURY-P350YNW-A1	69.0	63.5	64.0	61.5	56.5	51.5	46.5	40.0
16	PURY-P200YNW-A1	77.0	61.0	60.5	57.5	51.0	46.5	44.0	41.5
17	PURY-P250YNW-A1	78.0	62.5	61.5	59.0	52.0	48.5	48.5	43.0
18	PURY-P250YNW-A1	78.0	62.5	61.5	59.0	52.0	48.5	48.5	43.0
Cumulative		85.4	75.8	76.0	73.7	69.7	64.6	59.1	54.2

3. Airborne Noise Transfer Via Roof

Roof Construction

The roof we understand is concrete and at least 200mm thick with a plasterboard ceiling below. This should be confirmed by the client, but is based on the below detail:

Figure 2: Roof Detail





Beneath the slab the ceiling should comprise of:

- 1 layer of 12.5mm Wallboard (mass at least 8 kg/m²).
- Metal frame creating 100mm cavity.
- 25mm of mineral wool in cavity.

This roof and ceiling construction is calculated to achieve the following sound reduction index:

Table 3: Sound Reduction Index of Roof

Type	Sound Reduction Index, R, dB							
	63	125	250	500	1k	2k	4k	8k
Roof	40	51	61	69	77	83	83	83

Predicted Level In Rooms Below

The predicted level in the rooms below is NR24 which is within the criteria above, and therefore acceptable, subject to the ceiling upgrades.

4. External Noise Levels

Predicted External Level

The hotel rooms on level 5 are the most sensitive to the noise from these units. The hotel rooms are 10m away from the centre of the plant compound.

This gives a reduction of 20dB due to distance, however an allowance should also be added for reflections, and we have applied +6dB.

This gives an overall level at the Level 5 hotel rooms of NR57, internally via a partially open window this would equate to NR42. The plant will be louder than acceptable.

Plant Noise Control

To control noise we would advise an acoustic enclosure is installed around the plant which reduce plant noise by at least 15dB(A), and a higher reduction where possible.

Specialist enclosure suppliers such as Wakefield Acoustics, Allaway and Caice should be able to provide a solution to meet the above.

5. Vibration

All plant, flues, duct, and equipment should be provided with vibration control provisions. The installer/manufacturer of the plant should confirm the proposed system will not cause excessive vibration and/or structure-borne noise to any parts of the building.

It is advised that the proposed fans and compressors are provided with vibration control provisions. They will all require anti-vibration supports. The supports, however, will need to be of a specialist supply. The supports should be selected by specialist suppliers to provide an isolation efficiency of at least 95% at the lowest forcing frequency. Please note that the systems will deflect, and the design would need to cater for this element.



It will also be necessary to provide flexible vibration isolation provisions on the duct connections. If required this would include the pipe work, ductwork, and electrical services (which can be coiled) connections. The isolated ductwork and pipe work support to all services should be fitted with specialist mounts to provide an isolation efficiency of at least 95% at the lowest forcing frequency.

It is advised that the necessary anti-vibration provisions on plant and equipment are made to ensure compliance with the design noise and vibration levels. It is likely that inertia bases are required below the plant, the bases should be selected to suitably control airborne, structure born and vibrations from the plant. The exact specification will be based on the final plant selection.

I trust this is of assistance. Please do not hesitate to contact me if you require anything further.

Yours sincerely,

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Director
For Acoustic Consultants Limited