INFO SHEET

Noise Rating (NR)

Noise Ratings serve as a standard way to measure and specify noise in buildings and occupied spaces. The single figure rating also takes into account the frequency content of the noise.

Applications

They are often used in the measurement of noise from mechanical sources such as air conditioning systems in environments such hotels, cinemas and schools.

The NR standard

Noise Rating curves were developed by the International Organization for Standardization (ISO) to determine the acceptable indoor environment for hearing preservation, speech communication and annoyance. These curves range from NR 0 to NR 130 – a simplified version can be seen as a table in figure 1 and as a graph in figure 2.

The reason for having many different curves is that acceptable sound pressure levels vary by room type and its use, covering a variety of locations from concert halls, rock concerts, lecture rooms and offices to clay target shooting ranges.

Calculating NR values

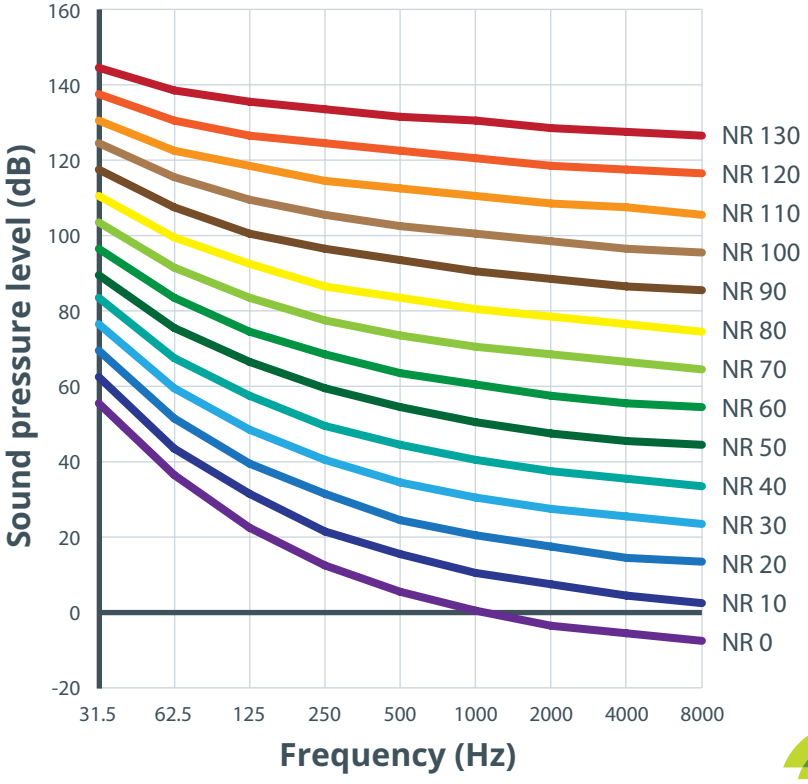
To calculate the NR value of a space, the noise level in each 1:1 octave band is compared to the values in the NR table or graph for each corresponding band.

The NR curve number which applies to each frequency band is the highest numerical value that is not exceeded in that band. The overall NR value is the highest of the individual NR values for the frequency bands.

Figure 1. Simplified Noise Rating curves table

Noise Rating (NR) curve	Maximum Sound Pressure Level (dB)								
	Octave band mid-frequency (Hz)								
	31.5	62.5	125	250	500	1000	2000	4000	8000
NR 0	55	36	22	12	5	0	-4	-6	-8
NR 10	62	43	31	21	15	10	7	4	2
NR 20	69	51	39	31	24	20	17	14	13
NR 30	76	59	48	40	34	30	27	25	23
NR 40	83	67	57	49	44	40	37	35	33
NR 50	89	75	66	59	54	50	47	45	44
NR 60	96	83	74	68	63	60	57	55	54
NR 70	103	91	83	77	73	70	68	66	64
NR 80	110	99	92	86	83	80	78	76	74
NR 90	117	107	100	96	93	90	88	86	85
NR 100	124	115	109	105	102	100	98	96	95
NR 110	130	122	118	114	112	110	108	107	105
NR 120	137	130	126	124	122	120	118	117	116
NR 130	144	138	135	133	131	130	128	127	126

Figure 2. Simplified Noise Rating curves graph



NR values and applications

The NR level for different uses should not exceed the Noise Ratings indicated in figure 3.

Figure 3. Maximum recommended Noise Rating (NR) Levels

Noise Rating Curve (NR)	Application
NR 25	Concert halls, broadcasting and recording studios, churches
NR 30	Private dwellings, hospitals, theatres, cinemas, conference rooms
NR 35	Libraries, museums, court rooms, schools, hospitals operating theatres and wards, flats, hotels, executive offices
NR 40	Halls, corridors, cloakrooms, restaurants, night clubs, offices, shops
NR 45	Department stores, supermarkets, canteens, general offices
NR 50	Typing pools, offices with business machines
NR 60	Light engineering works
NR 70	Foundries and heavy engineering works

Important note

Noise Rating (NR) is most commonly used in Europe.

Noise Criterion (NC) is a similar system more common in the USA.

It is important to know which one you are using as each method will produce different end values; e.g. NR 60 is not the same as NC 60.

Calculating Noise Ratings: an example

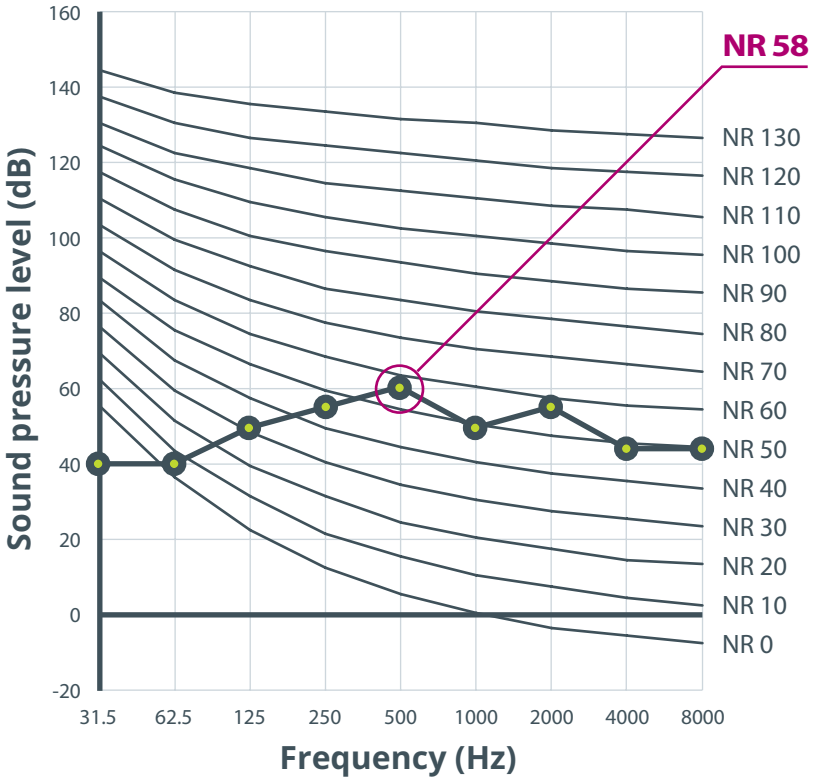
In our example, sound pressure level readings taken from an open plan office might be as follows:

31.5 Hz 40 dB
62.5 Hz 40 dB
125 Hz 50 dB
250 Hz 55 dB
500 Hz 60 dB
1000 Hz 50 dB
2000 Hz 55 dB
4000 Hz 45 dB
8000 Hz 45 dB

Plotted onto an NR curve graph they will look like figure 4.

The overall NR value , i.e. the highest of the individual NR values over all the frequency bands, is 58. Therefore the room can be said to have a value of NR 58.

Figure 4. Calculating an example NR



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SUZ-SA71VA2
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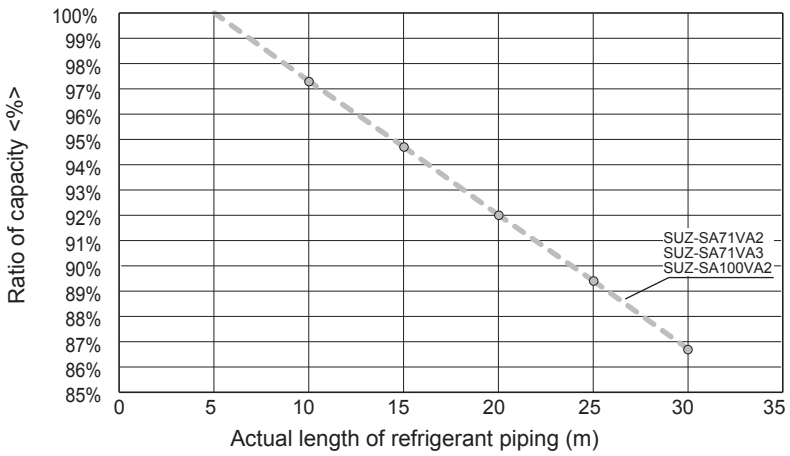
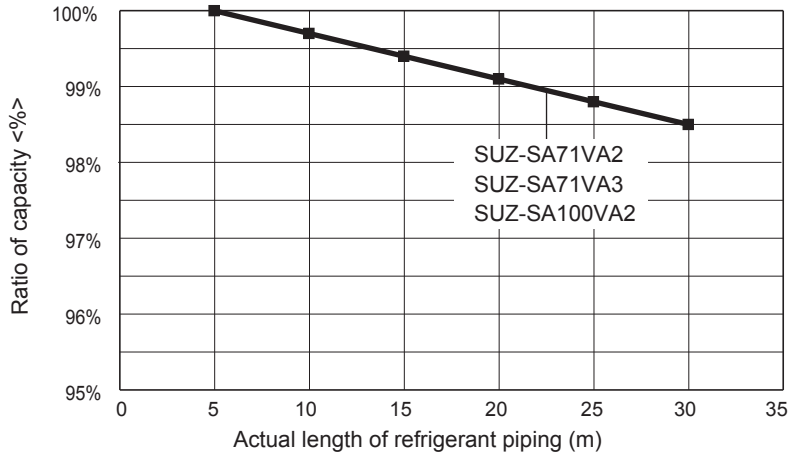
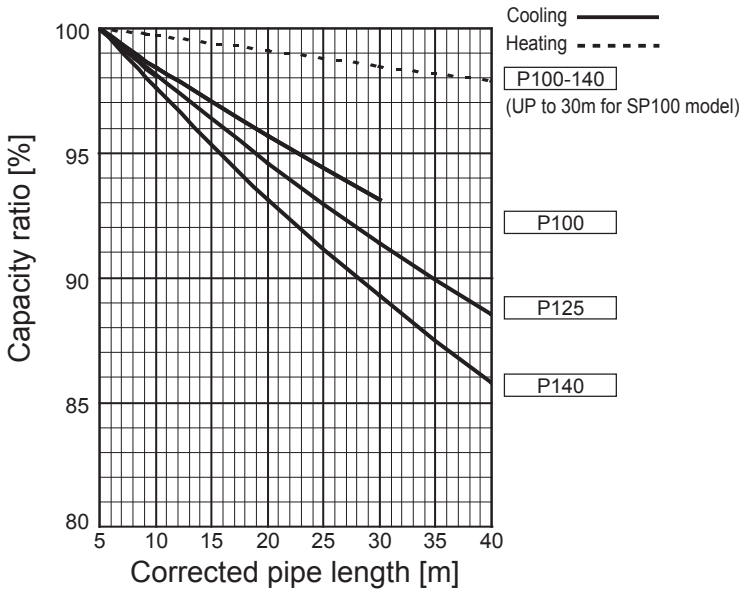
Correction ratio of capacity according to the length of piping (cooling)



Correction ratio of capacity according to the length of piping (heating)

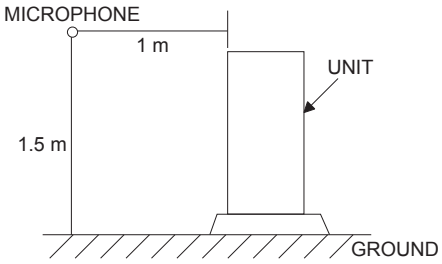


PUHZ-SP100YKA
PUHZ-SP125VKA
PUHZ-SP125YKA
PUHZ-SP140VKA
PUHZ-SP140YKA



A.8.5 NOISE CRITERIA CURVES

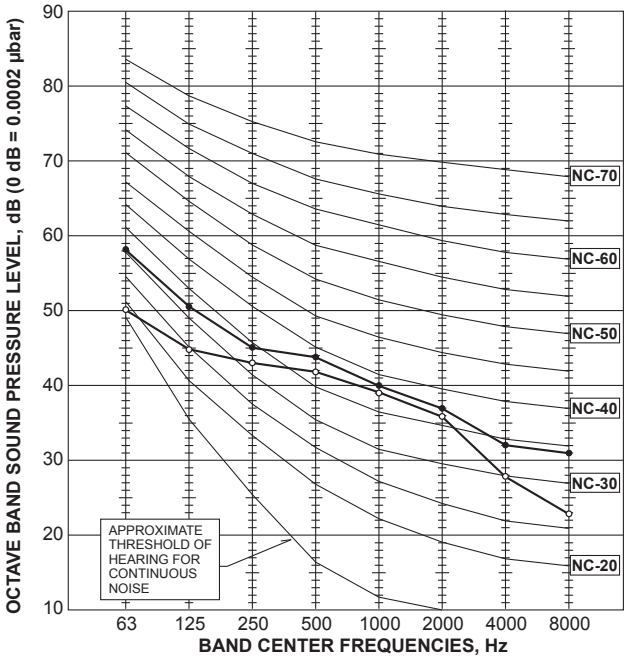
A.8.5.1 R32 type



<Notes>
1) Sound data is taken when the system is running stably.
2) Relatively large noise could be heard transiently in the case 4-way valve, or LEV operates.

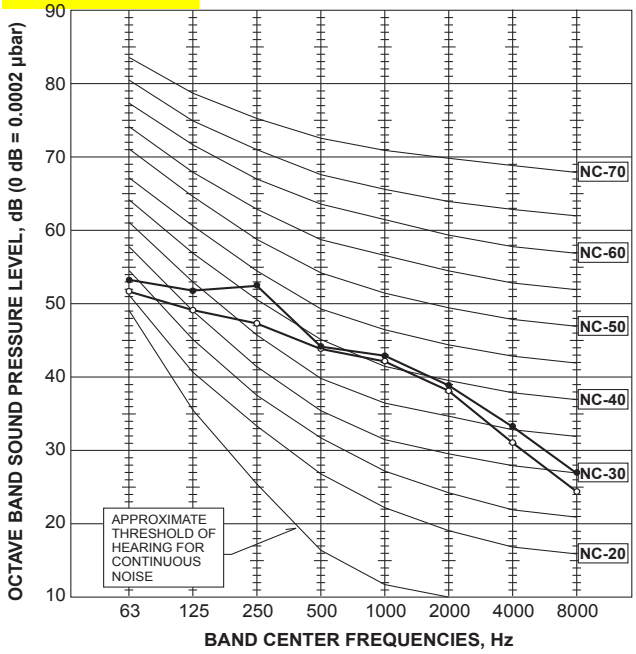
PUZ-ZM35VKA
PUZ-ZM50VKA

MODE	SPL(dB)	LINE
COOLING	44	○—○
HEATING	46	●—●



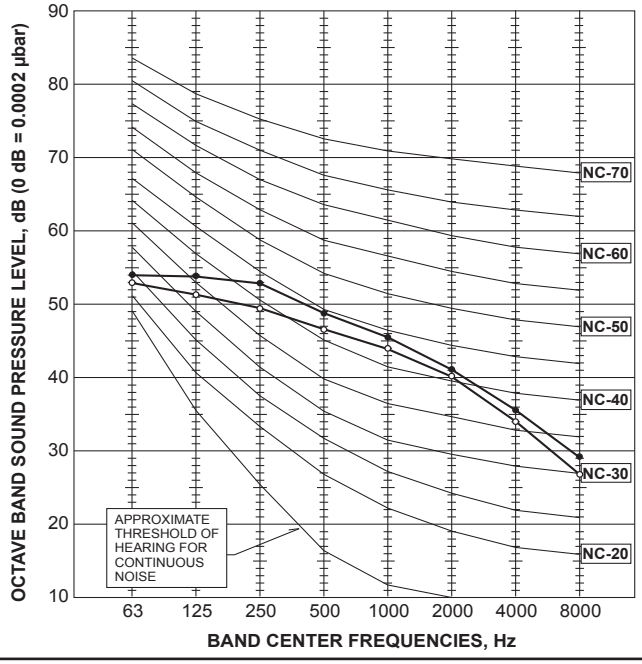
PUZ-ZM60VHA
PUZ-ZM71VHA

MODE	SPL(dB)	LINE
COOLING	47	○—○
HEATING	49	●—●



PUZ-ZM100VKA
PUZ-ZM100YKA

MODE	SPL(dB)	LINE
COOLING	49	○—○
HEATING	51	●—●



PUZ-ZM125VKA
PUZ-ZM125YKA
PUZ-ZM140VKA
PUZ-ZM140YKA

MODE	SPL(dB)	LINE
COOLING	50	○—○
HEATING	52	●—●