



The Noise Characteristics and its Improvement by the Measurement Points of Road Traffic Noise

Young Min Park¹; Kyoung Min Kim²

^{1,2} Korea Environment Institute, Republic of Korea

ABSTRACT

In Korea, the road traffic noise impact assessment in the high floor apartment has applied the outdoor noise. But, the Apartment residents will hear the road traffic noise in the room. It has not been an accurate assessment about the road traffic noise in a high-floor. We need for research on improved indoor measuring method of road traffic noise. Therefore, in this study, analysis road traffic noise characteristics in accordance with the indoor and outdoor measurement points. (Include the application effect of the sound absorbing material and noise reduction frame.)

Keywords: Road Traffic Noise, Transmission, Measurement Point

1. INTRODUCTION

The Korean Noise standard in the high-floor apartment has applied the outdoor noise, but the noise measurement method is not clear (Different method of measuring the environmental standards and road noise control standards, etc.) and not been an accurate assessment about the road traffic noise in a high-floor. In Figure 1, mostly exceed the environmental noise standard in Korea (1). Therefore, we need for research on improved indoor measuring method of road traffic noise. In this paper, we are analysis road traffic noise characteristics in accordance with the indoor and outdoor measurement points. Also, we investigate application effect of the sound absorbing material and noise reduction frame.

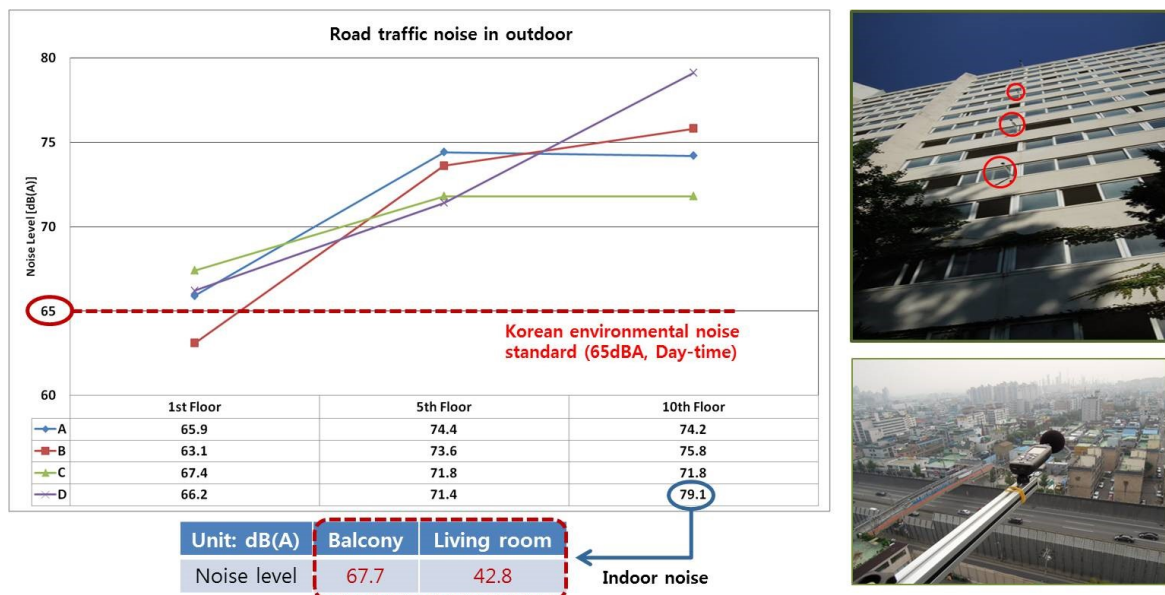


Figure 1 - The present conditions of road traffic noise in outdoor in Korea

¹ ympark@kei.re.kr

² kmkim@kei.re.kr

2. METHODS

In principle, it is measure from the outside for outdoor noise at Apartments in Korea. However, it is necessary to consider the indoor noise measurement because of a residents are hear outdoor noise in the room. To do this, it is first necessary to analyze the noise level differences between indoor and outdoor in each point. Select the outdoor and indoor measurement points (include separated point 1m from the outer wall) targeting apartments over 15 floors by the roadside (Figure 2). Here is, separation distance between measurement points and roadside is 20~100m.

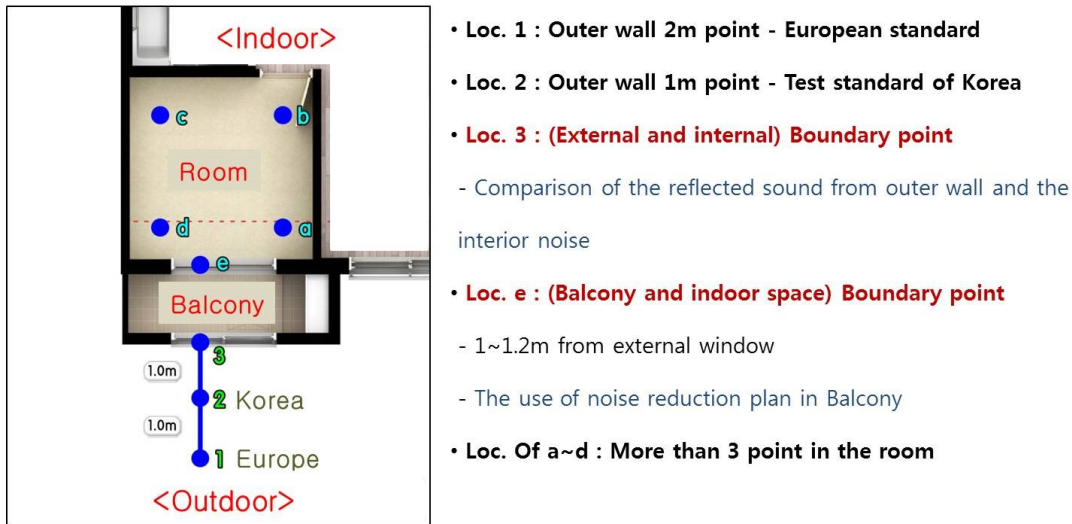


Figure 2 - In/outdoor noise measurement points at Apartment

Analyze the noise reduction performance according to the soundproofing facilities (Figure 3).

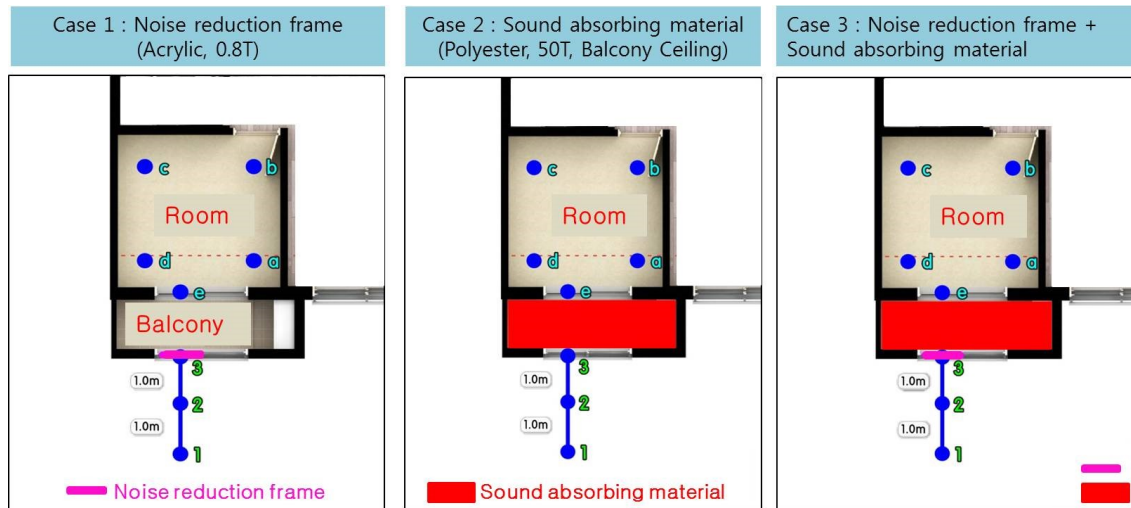


Figure 3 - The design of the measurement method by condition (soundproofing facilities)

3. RESULTS AND CONCLUSIONS

It is measured (in/outdoor) 2,216 points and the results are given in Table 1. Overall, the Korea's outdoor measurement noise level (1.0m from the outer wall) is excessively higher than the actual exposure noise levels – average 0.15dB higher than the European measurement point (2.0m from the outer wall) and 1.71dB higher than the boundary point of in/outdoor (because of the influence of the reflected sound from the outer wall). If we are change the measuring point '2' to 'e', possible establish the indoor reduction measures (average 4.4dB effects than existing 1m from the outer wall).

Table 1 - Results for measurement noise level (Difference of Korea's point '2')

Section	Point '1' (Europe)	Point '3' (Boundary of in/outdoor)	Point 'e'	Point 'a'~'d'
(1) General	0.22	1.43	4.4	8
(2) Noise reduction frame (Acrylic, 0.8T)	0.1	1.8	7.1	10
(3) Sound absorbing material (Polyester, 50T, Ceiling)	0.13	1.65	5.4	8.8
(4) reduction frame+absorbing material	0.16	1.96	8.4	11.3
Average	0.15	1.71	6.3	9.5

Measurement noise level each floor are shown in Table 2. External measurement points ('1', '2') is no consistent trend each floor. However, the difference between points '2' & 'e', and points '3' & 'e' showed a trend increasing toward high-floor. Here is, Loc. '2' is Outer wall 1m, Loc. '3' is (External and internal) Boundary point, Loc. 'e' is (Balcony and indoor space) Boundary point.

Table 2 - Differences of average noise level each floors (General, No soundproofing facilities)

Floor	Korea and European (‘2’-‘1’)	Korea and Boundary In/outdoor (‘2’-‘3’)	Korea and Boundary Room/Balcony (‘2’-‘e’)	Korea and Room (‘2’-‘a~d’)	Boundary In/outdoor and Room/Balcony (‘3’-‘e’)	Boundary In/outdoor and Room (‘3’-‘a~d’)
1	0.16	1.31	4.10	7.64	2.79	3.54
3	-0.02	1.41	4.09	7.89	2.68	3.80
5	0.24	1.59	4.53	7.92	2.93	3.40
8	0.19	1.51	4.32	7.78	2.81	3.47
10	0.10	1.23	4.08	7.66	2.85	3.58
13	0.23	1.38	4.31	8.00	2.93	3.69
15	0.40	1.04	4.27	7.68	3.22	3.41
18	0.25	1.41	4.46	7.99	3.05	3.53
20	0.69	2.63	5.79	9.83	3.16	4.04

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