

# 공기 압축기 고체음 저감에 대한 연구

## A study on the reduction of structure-borne noise from air condensing compressor

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**Key Words :** 고체음(Structure-borne Noise), 왕복동식 공기압축기(Reciprocating Air Condensing Compressor)

### ABSTRACT

In the ship-building industry, reciprocating air condensing compressors are usually applied in the HVAC system because of their good performance, efficiency and the convenience. However, the inertia force and pressure fluctuation of the compressor may generate unexpected excessive noise and vibration in the near by cabins. This paper presents a theoretical background and appropriate countermeasures on the reduction of structure-borne noise from the compressors.

### 1. 서론

(HVAC )

가

가

/ 가

가 가 .

/

### 2. 개요

2.1 선실 소음 현상  
 가

Fig.1

Table 1

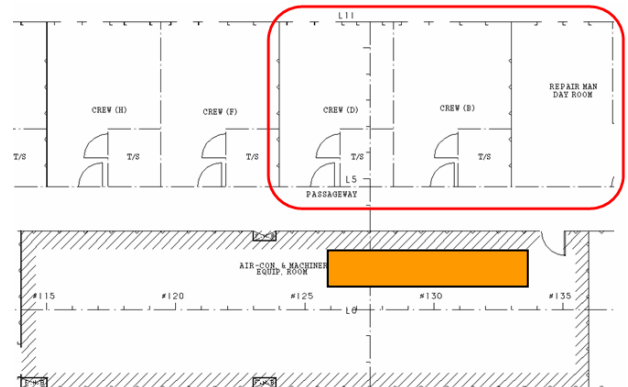


Figure 1.

( box: )

Table 1.

| Room            | Overall Level [dB(A)] |                |
|-----------------|-----------------------|----------------|
|                 | Limit                 | Measured Level |
| Air-Con. Room   | 90+3                  | 88             |
| Crew (D)        | 55+3                  | 61             |
| Crew (B)        | 55+3                  | 64             |
| Repair Day Room | 55+3                  | 60             |



Figure 2.

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## 2.2 소음 원인 분석

Fig. 3

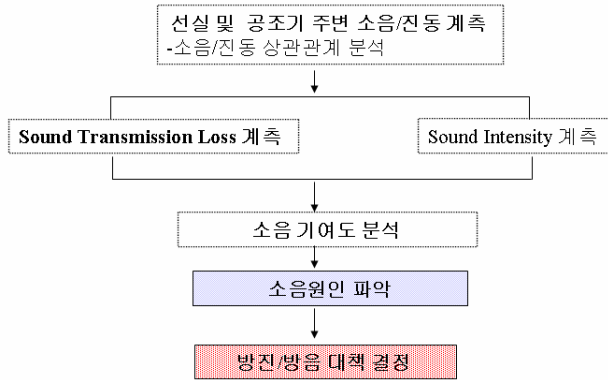


Figure 3

250Hz,  
500Hz  
(peaks)  
(1750rpm)

가  
가 0.7Hz

Table 2

Table 2.

| Location | Sound Transmission Loss [dB] |       |
|----------|------------------------------|-------|
|          | 250Hz                        | 500Hz |
| 선실 벽     | 32                           | 34    |

가  
20dB, 22dB  
250Hz, 500Hz

(sound intensity)

Fig. 4

가  
가  
가  
crew(B)  
가  
Fig. 5

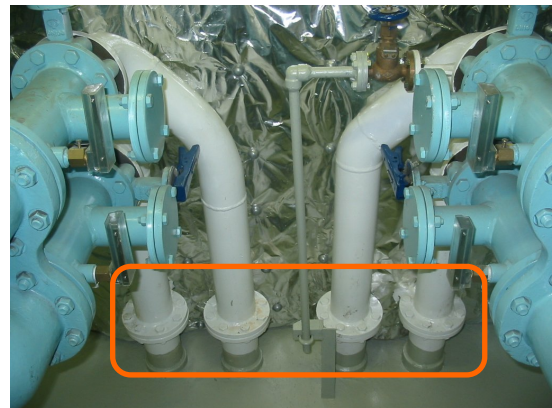


Figure 4

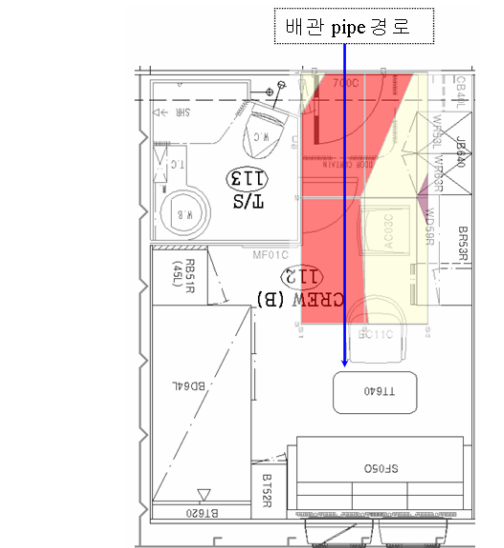


Fig. 6

가  
(condenser) (common bed)  
(steel deck)

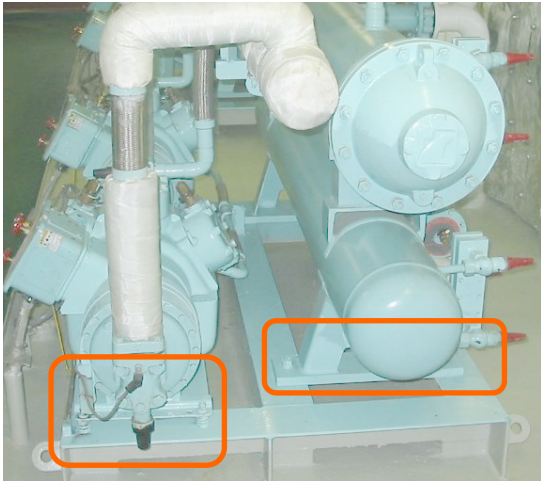


Figure 6

(structure - borne noise)

### 3. 선실 소음 저감 대책

가

#### 3.1 배관 파이프 절연

Fig. 4

(flexible joint)

(steel deck)

(U - bolt support)

가

#### 3.2 시멘트(cement) 시공

Fig. 6

(resilient mount)

가

$$\frac{F^2}{r_s t}$$

(1)

$$\frac{r}{r_s^2 W}$$

(2)

F :

$r_s$  : (kg/m<sup>2</sup>)

W : 가

t :

r :

20mm

(cement)

가

### 3.3 적용 결과

/ Table 3

crew(B)

Fig.7

Table 3.

| Room            | Overall Level [dB(A)] |                |       |
|-----------------|-----------------------|----------------|-------|
|                 | Limit                 | Measured Level |       |
|                 |                       | before         | after |
| Crew (D)        | 58                    | 61             | 57    |
| Crew (B)        | 58                    | 64             | 57    |
| Repair Day Room | 58                    | 60             | 56    |

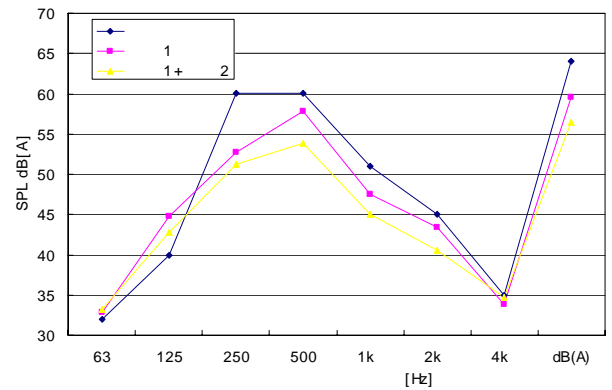


Figure 7 crew(B)

Table 3

7dB(A) 가 crew(B) 가

가

crew(D) repair day room 4  
dB(A)

(3) J.W.E. Pettersen, 1975, "Noise Control in Ships",  
NTNF-report.

#### 4. 결 론

가

(1) 가

(2) 가

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