THE ANNALS OF “DUNAREA DE JOS” UNIVERSITY OF GALATI
FASCICLE XI – SHIPBUILDING. ISSN 1221-4620, e-ISSN 2668-3156
2018

NOISE ONBOARD 9000 CBM OIL TANKER

Bosoanca Ioan
“Dunarea de Jos” University of Galati,
Faculty of Naval Architecture, Galati, Domneasca
Street, No. 47, 800008, Romania,
E-mail:ioan.bosoanca@ugal.ro

ABSTRACT

The paper shows the noise levels in cabins or work places for seafarers. The measured values are compared with the Marine Safety Committee acceptable limits, revised by MSC 337(91) CODE ON NOISE LEVELS ONBOARD SHIP for a better acoustic comfort, both for crew and passengers.
The results obtained from measurements in sea trials, showed some consistent exceeding of the limit values in certain spaces which could be avoided if a noise prediction for this ship would be provided early in design stage of vessels.

Keywords: Noise, pollution factor, *Code on noise levels onboard ships*, acoustic comfort, noise prediction

1. INTRODUCTION

Noise is an important pollution factor onboard ships, affecting both crew and passengers.
Why has noise become so important in these days? A lot of papers have shown the adverse effects of noise:

- Noise hearing: the hearing threshold can increase irremediable and the human subject can lose the perception of noise, if a stimulus greater than 80 dB(A) acts a longer time (more than 8 hours / day);
- Sleeping problems: the sleep is very important for human being, because during sleep process the organism recovers the physical and psyche force including work capacity;
- Noise can induce hart diseases by vasoconstriction effect;
- Affects communication with others persons and can induce auto isolation;
- Increases the gastric secretion. An increase of the gastric juice can induce ulcer.

These are just some of hazardous effects of high noise exposure levels on a longer period of time.
Therefore, the latest revision of CODE ON NOISE LEVELS ONBOARD SHIP, MSC 337(91) [**1**] has been released. The new version of the Marine Safety Committee (MSC) introduced a noise level decreasing with 5 dB(A) for certain spaces, onboard commercial and passenger ships; the new values have been adopted instantly by all the classification societies and became mandatory.

2. 9K CBM OIL TANKER

This ship has twin screw, oil/chemical tanker, having a capacity of 9000 dwt.
The ship is:
- diesel mechanic driven;
- single deck;
- double hull;
- with 2 CPP propeller / 4 blades / 3.0 m diameter.

The vessel is suitable for transport of oil and chemical products having a flash point of bellow 60^{O}C, 5 segregations with double valves.

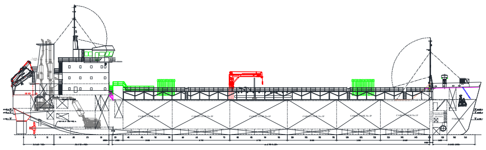

Fig. 2.1 *Lateral view of the ship*

MAIN PARTICULARS:

Hull:
- length overall approx. 119.5 m;
- length between p.p. approx. 115.32 m;
- breadth molded approx. 21.6 m;
- depth approx. 8.64 m;
- design draft 6.2 m;
- deadweight 9000 dwt.

Machinery:
- 2 main engines 2040 kW / 1000 rpm at MCR;
- 2 diesel generator 860 kW / 1000 rpm fueled with marine gas oil (MGO);
- 2 CPP with 4 blades at 224.7 rpm; propeller diameter = 3.00 m;
- 2 shaft generators of 861 kW.

3. TRIALS CONDITIONS

The noise measurements have been performed on the Black Sea (Constantza harbor area), in sea trials, after endurance tests have been completed.
Draught at trials: T_{fore} = T_{aft} = Tm = 6.2 m (full load condition).
Weather conditions:
- sea: 2 ^{O} D;
- wind force: 3 ^{O} B;
- water temperature: 17 ^{O} C.

Water depth was more than 5 times under keel draught (minimum depth = ab. 34 m).
The results are shown in the bellow table, in accordance with [**2**]:

Table 3.1 Measuring results

Measuring point				Reading Leq[dB (A)]	Limit Leq [dB (A)]
Pos-ition	Room	Deck	Room No.		
1.	Wingbridge PS	Bridge		71.5	70
2.	Wheelhouse PS	Bridge		60.2	65
3.	Wheelhouse SB	Bridge		60.7	65
4.	Wingbridge SB	Bridge		68.4	70
5.	AC room	Bridge		80.2	95
6.	Chart room	Bridge		63.5	65
7.	Ch. Eng. living	B		57.4	60
8.	Ch. Eng. bedroom	B		56.7	60
9.	2nd Eng.	B		57.1	60
10.	2nd Off.	B		57.8	60
11.	Ch. Off. living	B		63.1	60
12.	Ch. Off. bedroom	B		58.3	60
13.	Captain bedroom	B		58.5	60
14.	Captain living	B		57.3	60
15.	Single cabin 4	A		59.6	60
16.	Single cabin 3	A		60.2	60
17.	Single cabin 2	A		59.9	60
18.	Single cabin 1	A		58.8	60
19.	Change room	A		69.2	90
20.	Single cabin 8	A		59.8	60
21.	Single cabin 7	A		62.3	60
22.	Single cabin 6	A		63.6	60

Table 3.1 *Measuring results (continue)*

Measuring point				Reading [dB (A)]	Limit [dB (A)]
Pos-ition	Room	Deck	Room No.		
23.	Single cabin 5	A		61.1	60
24.	Dayroom	Main Deck		69.5	65
25.	Off. Messroom	Main Deck		67.5	65
26.	Crew Messroom	Main Deck		71.3	65
27.	Galley	Main Deck		69.4	75
28.	Emergency Gener. room	Main Deck		80.3	90
29.	Deck Office	Main Deck		64.3	65
30.	Duty mess	Main Deck		70.2	65
31.	Smoking room	Main Deck		72.1	65
32.	Single cabin	Main Deck		67.9	60
33.	Cargo Control room	Main Deck		73.7	75
34.	Medical Treatment room	Main Deck		65.3	60
35.	ECR	Platform		73.6	75
36.	Between DGs	Platform		107.5	110
37.	Steering Gear room	Platform		87.6	90
38.	Separators room	Platform		88.7	90
39.	E/R aft side	Tank Top		104.2	110
40.	E/R fore side	Tank Top		106.7	110
41.	Bowthruster room	Under MD		82.4	90

The above ***Table no. 3.1*** shows the results in every space with measured values (***Reading*** column) and permissive values (***Limit*** column) according to [**1**], SOLAS Ch. II-1, Reg. 3-12 Noise Code MSC. 337(91): *CODE ON NOISE LEVELS ONBOARD SHIPS*.

4. LOCATION OF MEASURING POINTS

Very important in analysis is choosing of space where the measurement would be performed. Therefore, should choose the places where seafarers live and work: resting cabins, messrooms, dayrooms, wheelhouse, workshop, ER, ECR, wingbridge, office, galley, cargo control room, steering gear room, etc... The location of all measuring points is shown in the below ***Fig. 4.1…4.7,*** according to [**2**]:

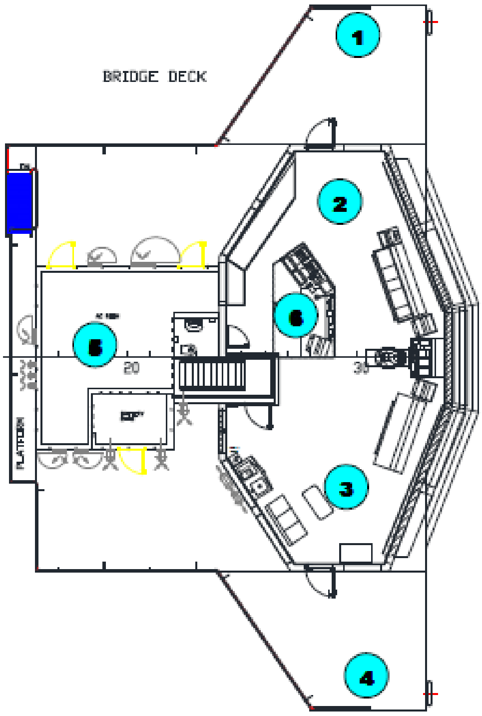

Fig. 4.1 *BRIDGE Deck*

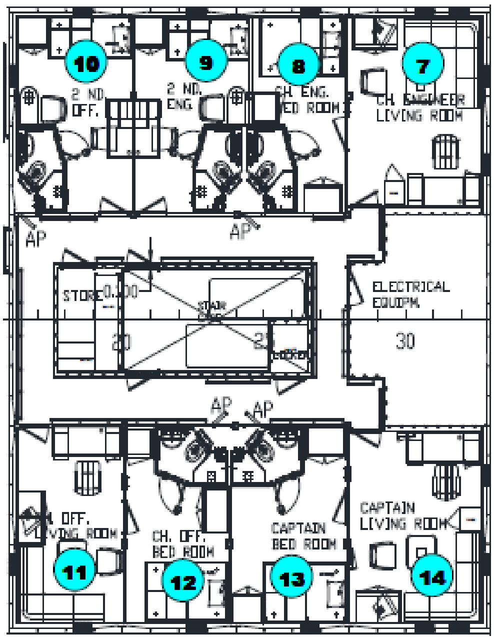

Fig. 4.2 *B Deck*

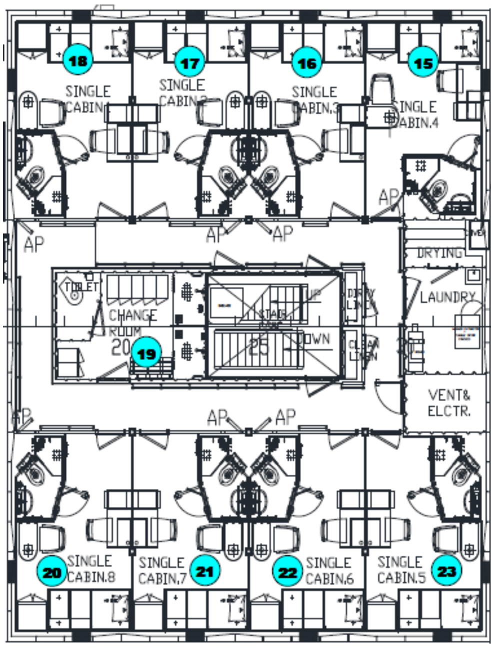

Fig. 4.3 A Deck

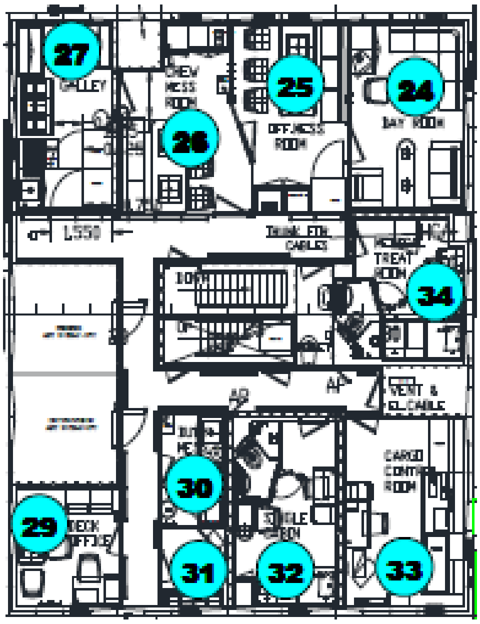

Fig. 4.4 Main Deck

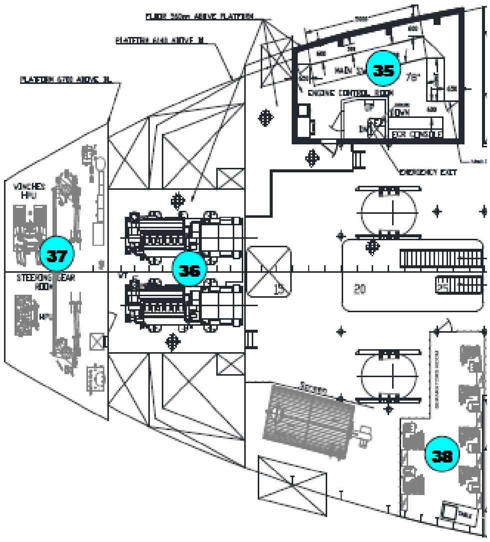

Fig. 4.5 Platform under Main Deck

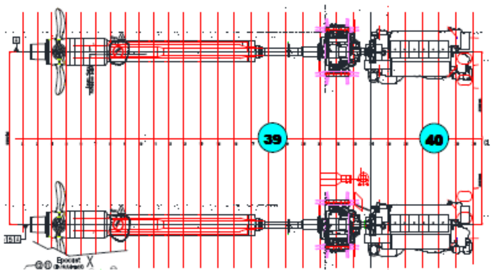

Fig. 4.6 Engine Room

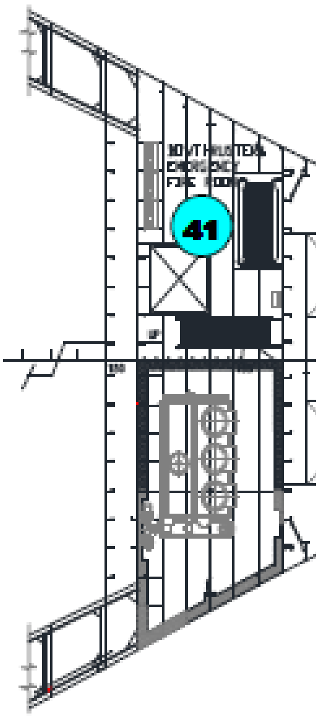

Fig. 4.7 *Platform under Main Deck*

The measurements have been performed with a 2250L Brüel & Kjaer - Denmark sound level meter. Before and after measurements, the instruments have been calibrated with a NC-74 Rion - Japan acoustic calibrator, having a valid certificate.

5. CONCLUDING REMARKS

The structure and noise sources from this paper are similar with [**3**] which shows the noise levels under the limits of [1].

The analysis of measured results for this vessel (oil/chemical tanker) showed certain exceeding of limit values which can put in danger the health of seafarers:

- PS Wingbridge (position 1);
- Chief Officer Livingroom (position 11);
- Single cabin 3 (position 16);
- Single cabin 7 (position 21);
- Single cabin 6 (position 22);
- Single cabin 5 (position 23);
- Dayroom (position 24);
- Officer Dayroom (position 25);
- Crew Dayroom (position 26);
- Single cabin (position 32);
- Medical Treatment room (position 34);

To fix these exceeding and to decrease the noise levels under limits of MSC 337(91), some consistent expenses was necessary for:

- an additional mineral wool layer mounted in walls;
- an additional mineral wool layer mounted in ceiling;
- floating floor, etc…

All these expenses could have been avoided if a detailed analysis (a noise prediction) would have been done early, in design stage of the ship.

Because this noise prediction was missing, the designer was not able to take suitable measures to reduce noise in the above spaces. Certainly, a noise prediction would reveal in the design stage, the potential exceeding points and the cost with fixing these problems would have been much lower.

Acknowledgements

The research was supported by the *Research Department of Diagnose and Measurements Group Ltd.* Galati, inside the partnership with CONSTANTZA SHIPYARD SA.

The author thanks to Mr. Dipl.eng. Marius CORNEA and Mrs. Dipl. eng. Luminita BASCHIR from Constantza Shipyard SA, who made possible this research onboard a vessel built for a foreign owner.

6. REFERENCES

[1]. ***Resolution MSC 337(91) "*CODE ON NOISE LEVELS ONBOARD SHIPS", 2012;*

[2]. ***Diagnose and Measurements Group srl Galati, "*Noise Measurements Report* *(in accommodation) onboard Oil/Chemical Tanker 9000 cbm M/T MAYOURY"*, 2017;

[1]. **[3] Bosoanca**, **I., "***Noise onboard FT module carrier vessel"* - The Annals of "Dunarea de Jos" University of Galati, Fascicle XI - Shipbuilding, pp. 81-84, 2017.

Paper received on December 31th, 2018