Innspill i Workshop :

Lavfrekvent støy – en undervurdert helserisiko

”Revisjon av Norsk olje og gass retningslinje 114 – anbefalte retningslinjer for håndtering av hørselsskadelig støy”

.

14. juni 2013

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Foto: Halvor Erikstein

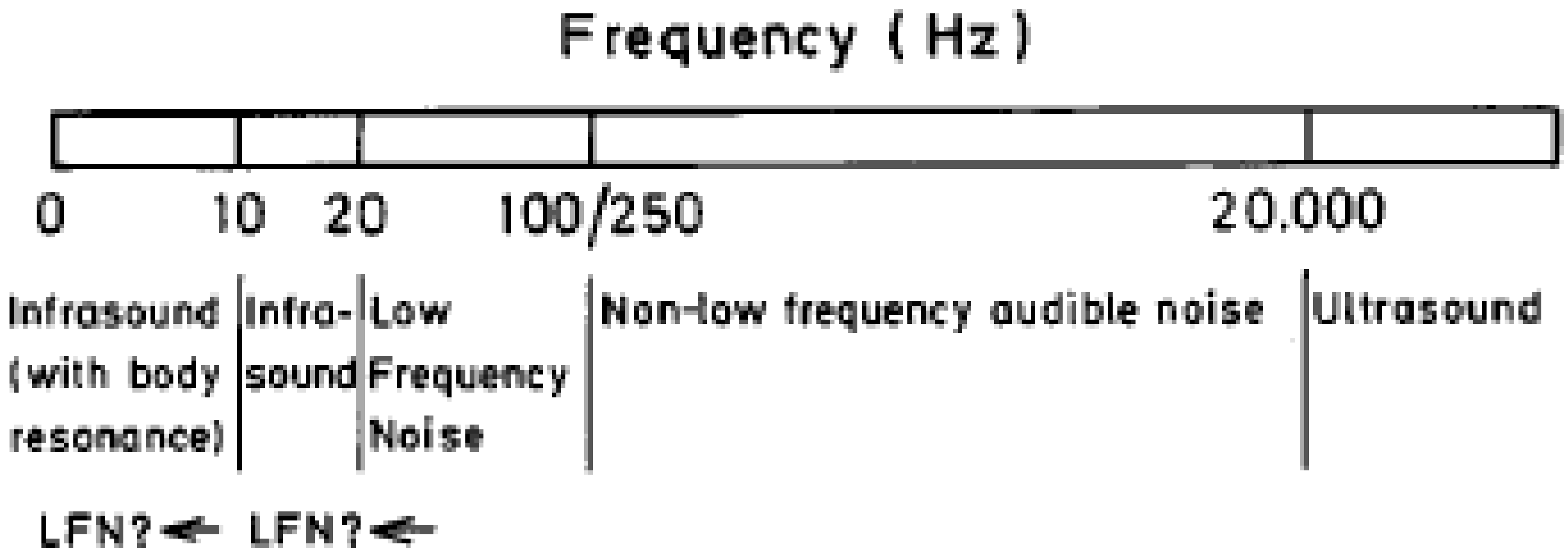
Kjemisk eksponering skal reduseres ved hjelp av tekniske tiltak

Foto; Olesen Consult www.olesen-hvac.no

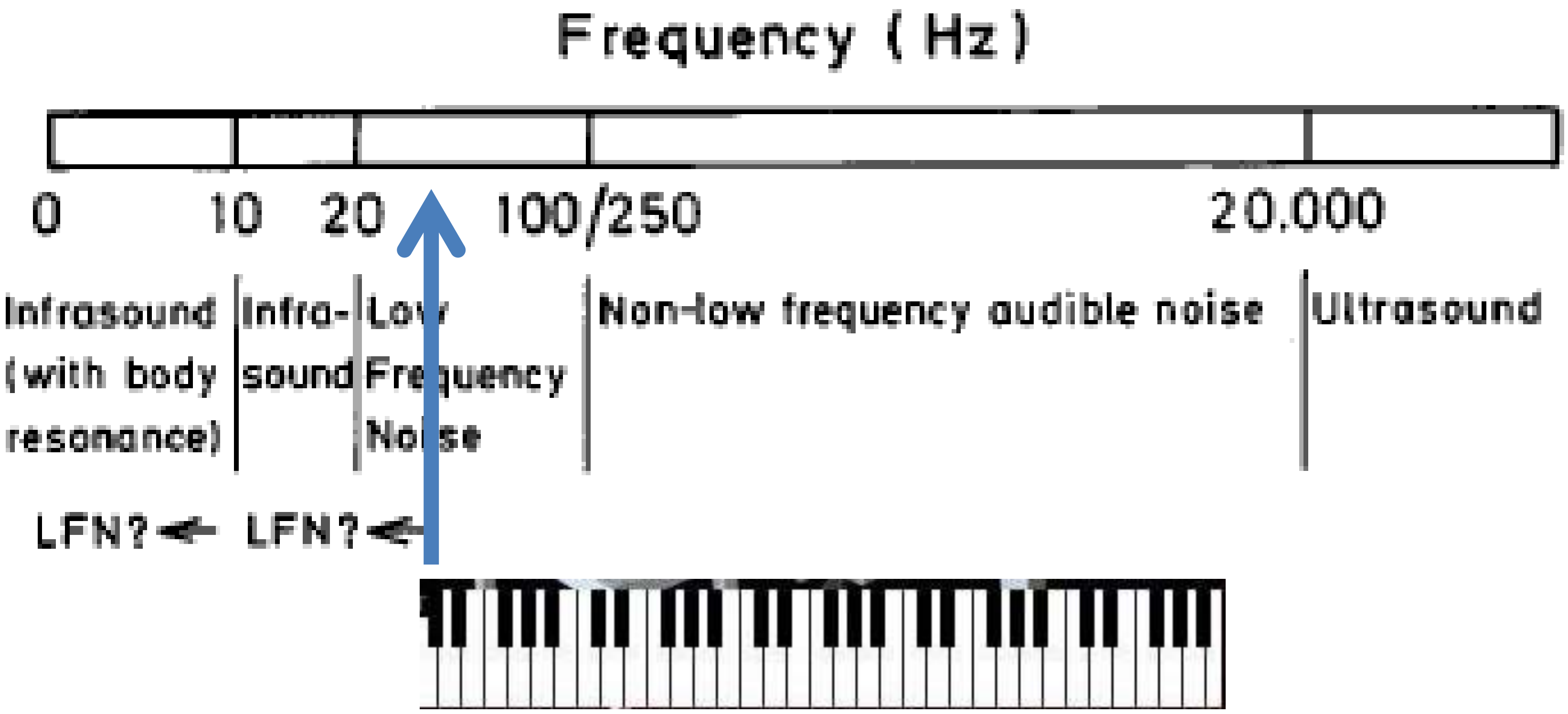

VSM300

Laveste C på et piano 32 Hz

Lavfrekvent/infra lyd 10 – 100Hz



J. Acoust. Soc. Am., Vol. 99, No. 5, May 1996



Laveste C på et piano 32 Hz

J. Acoust. Soc. Am., Vol. 99, No. 5, May 1996 co.za/noise/lowfreqnoise.pdf#page=2&zoom=auto,0,2

A Review of Published Research on Low Frequency Noise and its Effects

Report for Defra by Dr Geoff Leventhall
Assisted by Dr Peter Pelmear and Dr Stephen Benton

May 2003

http://www.salbu.co.za/noise/lowfreqnoise.pdf#page=2&zoom=auto,0,2

NORSOK STANDARD

S-002 N

Rev. 4, august 2004

Arbeidsmiljø

http://www.standard.no/PageFiles/1053/S-002N.pdf

Norsok S-002 Støydataark

SDS-050 Støydataark vedlagt

NORSOK S-002	Støydataark	SDS-050 Rev. 3, Nov. 1997 Side 1 av 1
Pakkenummer	**Dokumentnr.**	**Rev.**

Tag no ______ Lokalisering/modul ______
Enhet ______ Antall ______
Funksjon ______ Forespørselsnr. ______
Størrelse og type ______ Tilbudsnr. ______
Leverandør ______ Ordrenr. ______
Produsent ______ Jobbnr. ______
Modell ______ Serienr. ______

1 **KONSTRUKSJONSDATA**
2 ______ Beregnet Δ L = SWL - SPL ______ dB (Merknad 1)
3 ______ Virkningsgrad ______ %
4 Utstyrsstørrelse (l x b x h) ______ m Motortype ______
5 Effekt ______ kW Motorhastighet ______ rpm
6 Kapasitet ______ Rotasjonshastighet for utstyr ______ rpm
7 Utløpstrykk ______ Gear tooth contact rate ______ Hz
8 Innløpstrykk ______ Bladfrekvens skovlpasseringer ______ Hz
9 Utstyrsvekt ______ kg Forholdet mellom antall stator/rotor skovler ______
10

			Senterfrekvens i oktavbånd, Hz								
11	**SELSKAPSSPESIFIKKE DATA**										
12	Støynivågrenser (Merknad 1)	dB	31.5	63	125	250	500	1000	2000	4000	8000
13											
14											
15											
16											

17 Spesielle krav: ______
18
19
20 Krav til støytest Ja O Nei O Valgfritt O
21

			Senterfrekvens i oktavbånd, Hz								
22	**LEVERANDØRDATA**										
23	Garantert støynivå (Merknad 1)	dB	31.5	63	125	250	500	1000	2000	4000	8000
24											
25											
26											
27											

28 Smalbåndskomponent: Ja O Nei O Frekvens/oktavbånd: Hz ______
29 Metode for støytest: ______
30
31 Beskrivelse av iverksatte støyreduserende tiltak/annen informasjon ______
32
33
34

			Senterfrekvens i oktavbånd, Hz								
35	**STØYDATA /AS BUILT**										
36	Målte støynivåer (Merknad 1)	dB	31.5	63	125	250	500	1000	2000	4000	8000
37											
38											
39											
40											

41 Spesiell informasjon: ______
42
43
44 [illegible]

Lavfrekvent støy

Krav til støytest Ja O Nei O Valgfritt O

LEVERANDØRDATA		Senterfrekvens i oktavbånd, Hz								
Garantert støynivå (Merknad 1)	dB	31.5	63	125	250	500	1000	2000	4000	8000

Smalbåndskomponent: Ja O Nei O Frekvens/oktavbånd: Hz

31,5 Hz

Laveste C på et piano 32 Hz

Sources and effects of low-frequency noise

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(Received 14 February 1995; revised 30 March 1995; accepted 2 January 1996)

The sources of human exposure to low-frequency noise and its effects are reviewed. Low-frequency noise is common as background noise in urban environments, and as an emission from many artificial sources: road vehicles, aircraft, industrial machinery, artillery and mining explosions, and air movement machinery including wind turbines, compressors, and ventilation or air-conditioning units. The effects of low-frequency noise are of particular concern because of its pervasiveness due to numerous sources, efficient propagation, and reduced efficacy of many structures (dwellings, walls, and hearing protection) in attenuating low-frequency noise compared with other noise. Intense low-frequency noise appears to produce clear symptoms including respiratory impairment and aural pain. Although the effects of lower intensities of low-frequency noise are difficult to establish for methodological reasons, evidence suggests that a number of adverse effects of noise in general arise from exposure to low-frequency noise: Loudness judgments and annoyance reactions are sometimes reported to be greater for low-frequency noise than other noises for equal sound-pressure level; annoyance is exacerbated by rattle or vibration induced by low-frequency noise; speech intelligibility may be reduced more by low-frequency noise than other noises except those in the frequency range of speech itself, because of the upward spread of masking. On the other hand, it is also possible that low-frequency noise provides some protection against the effects of simultaneous higher frequency noise on hearing. Research needs and policy decisions, based on what is currently known, are considered.

PACS numbers: 43.50.Qp, 43.28.Dm

SOURCES AND EFFECTS OF LOW-FREQUENCY NOISE

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SOURCES AND EFFECTS OF LOW-FREQUENCY NOISE

The industrialization and mobilization of human endeavor have led to increased noise production across the full range of noise frequencies, leading to a global problem of reduced human well-being due to noise (see, e.g., Hede and Bullen, 1982; Kihlman, 1993; Schultz, 1978; WHO, 1980). The effects of noise on humans have been extensively reviewed, but apart from hearing loss (King *et al.*, 1992; Kryter, 1985, 1994; Ward, 1993) and annoyance (Fidell *et al.*, 1991; Job, 1988) are not uniformly agreed upon (Andersson and Lindvall, 1988; Berglund *et al.*, 1986; Berglund *et al.*, 1990). Low-frequency noise is a common component of occupational and residential noise which has received less attention. However, low-frequency noise has features not shared with noises of higher pitch. Low-frequency noise (infrasound included) is the superpower of the frequency range: It is attenuated less by walls and other structures; it can rattle walls and objects; it masks higher frequencies more than it is masked by them; it crosses great distances with little energy loss due to atmospheric and ground attenuation; ear protection devices are much less effective against it; it is able to produce resonance in the human body; and it causes great subjective reactions (in the laboratory and in the community studies) and to some extent physiological reactions in humans than mid- and high frequencies. These features dictate that the effects of low-frequency noise deserve independent attention. The present review considers low-frequency noise exposures and their physical, physiological, and psychological effects on humans.

I. DEFINITION OF LOW-FREQUENCY NOISE

The range of human hearing is generally considered to be 20–20 000 Hz for young individuals, the upper limit declining with increasing age. Frequencies above 20 kHz (ultrasound) are generally considered to be inaudible by convention (see Kryter, 1985, p. 456), even though frequencies up to 30 kHz have been "heard" through bone conduction (as cited by Yeowart, 1976). The focus of the present review is on the lower end of the frequency spectrum. In selecting the frequency range, we decided to treat low-frequency noise as including what is normally taken to be infrasound (see Fig. 1).

There are three reasons for this decision. First, sound below 20 Hz is generally termed infrasound and not included in low-frequency noise on the grounds that it is inaudible (see, e.g., Backteman *et al.*, 1983a). However, sound below 20 Hz can be perceived by humans, reflecting interindividual differences in hearing threshold. This is shown in Fig. 2,

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ON MEASURING LOW-FREQUENCY NOISE INDOORS

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ABSTRACT

Due to standing waves, the sound pressure within a room may vary 20-30 dB. For assessment of annoyance from low-frequency noise, it is important to measure a level that adequately represents the exposure that may give rise to the annoyance, rather than some room average level. Thus, mainly areas of the room with high sound pressure levels are of interest, since persons present in such areas are not helped by the existence of much lower levels elsewhere. Sound fields in rooms were investigated using numerical simulations and scanning measurements of the entire sound pressure distributions in three different rooms. Measurements were also performed in three-dimensional corners as well as according to Swedish and Danish guidelines. The sound pressure level that is exceeded in only 10% of the space of a room (L10) is proposed as a reasonable target for a measurement method. The Swedish method showed good results, however its use of C-weighting during scanning for maximum can lead to the maximum for wrong frequency components, i.e. components other than those that give rise to annoyance. The Danish method was found to have a high risk of significantly underestimating the noise present in a room, unless complainants can precisely appoint the measurement positions. It was found that a very good estimate of the L10 target level is obtained by measuring only in four three-dimensional corners.

1. INTRODUCTION

http://www.ver.is/bnam2008/Session%20IV%20Low%20Frequency%20Noise/Steffen%20Pedersen.pdf

Tilpass til vindusbredde og aktiver rulling

that of the air. A volume-vel … vels were adjusted, so that the highest sound pressure is 90 dB in all the examples. The examples are based on a rectangular enclosure with the dimensions 5.7 m by 3.8 m by 2.8 m (L x W x H).

A series of simulations were performed to investigate the sound pressure distribution in rooms. Three different sound sources were used, all positioned on one end-wall of the room; a piston source, a line source and an entire end-wall. Several frequencies were used, with emphasis on both modal and non-modal frequencies. Two examples of three-dimensional wave propagation are given in Figure 1. Since the level varies vertically, the figure contains two-dimensional plots at various heights.

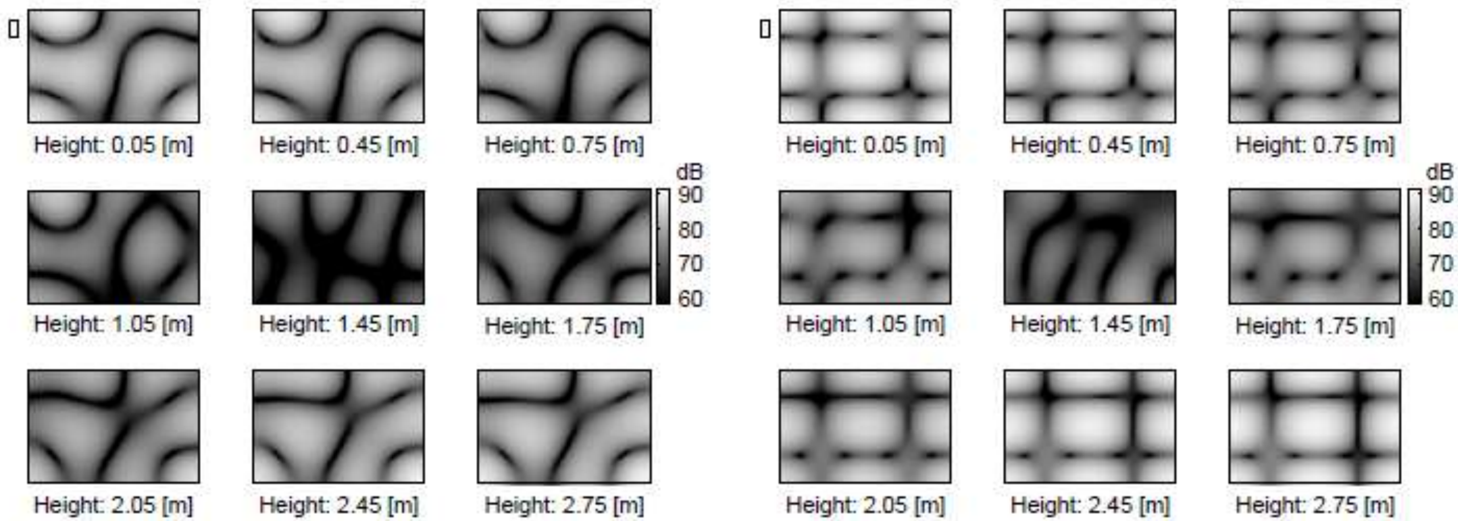
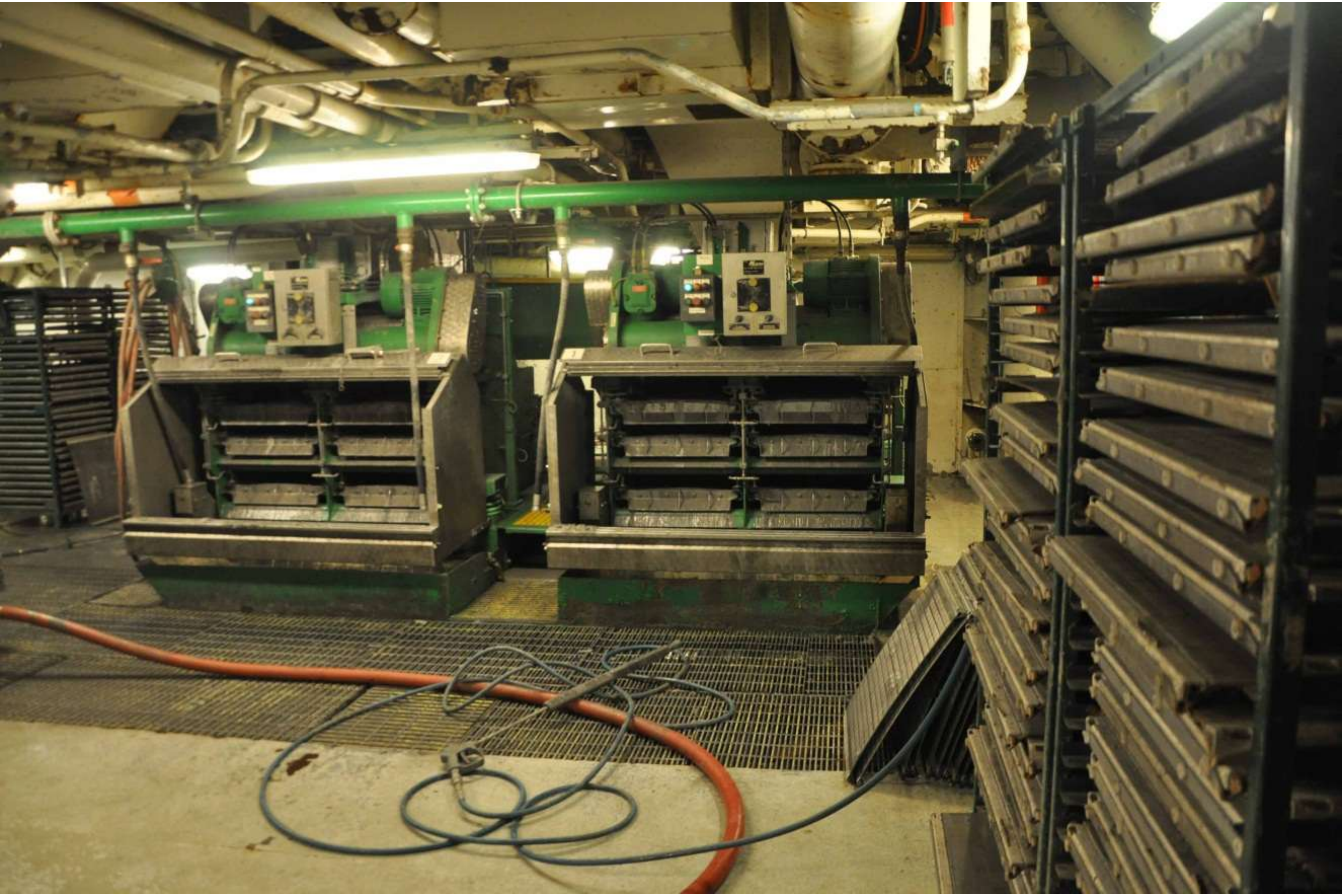
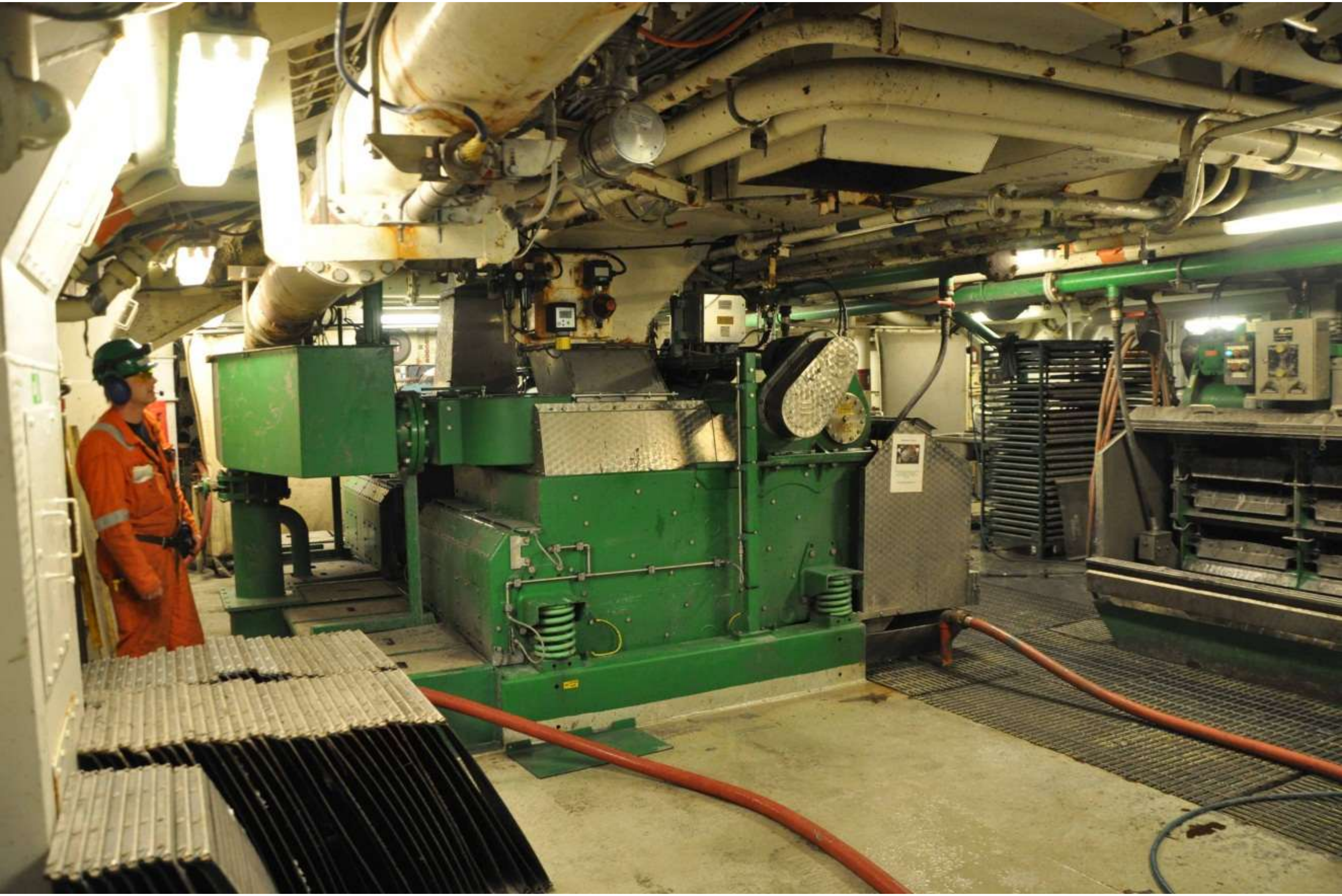


Figure 1: *Sound pressure distribution in a 5.7 m by 3.8 m by 2.8 m (L x W x H) room. Left: Sinusoidal sound wave at 114 Hz. Right: Sinusoidal sound wave at 124 Hz (mode 2,2,1). Sound generated by piston in lower left corner indicated by rectangle. Simulated using FDTD with 0.1 m cell size and 6 kHz sampling frequency.*

http://www.ver.is/bnam2008/Session%20IV%20Low%20Frequency%20Noise/Steffen%20Pedersen.pdf





Støyprosjektet

ratur om lavfrekv × Møter, seminarer og konf ×

www.norskoljeoggass.no/no/Stoy/Temamoter/

MØTER, SEMINARER OG KONFERANSER

Åpne møter og seminarer holdt i regi av støyprosjektet vil bli lagt ut her.

STØY

- Frokostmøte HØR! Hvordan oppstår hørselskader? 17.02.12
- Ptil/ Prosjekt Støy seminar - Historier som bryter støymuren 10.04.12
- Frokostmøte HØR! Tinnitus – djevelens orkester 03.05.12
- Frokostmøte HØR! Leisure time noise 07.09.12
- Frokostmøte HØR! Nye muligheter med hørselvern 19.10.12
- Morning seminar on hearing protectors and effective hearing conservation (HONEYWELL) 07.11.12
- Frokostmøte HØR! Noise from Compressors - Is pipework insulation the only answer? 25.01.2013
- Frokostmøte HØR! Måling av lydnivå 15.02.13
- Frokostmøte HØR! Mud Cube – Mindre støy og like god ytelse som vanlige «shakere» 15.03.13
- Frokostmøte HØR! Ubemannede maskinrom - hva er det? 26.04.2013
- Frokostmøte HØR! Pilotprosjekt fjernstyrte operasjoner - håndholdt verktøy 24.05.2013

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Viktig "Frokostmøte" fra støyprosjektet

Norsk olje&gass

Hva ser du etter?

FAKTASIDER VIRKSOMHETEN PUBLIKASJONER PRESSE KALENDER

Du er på siden: Forsiden / Kalender / Frokostmøte HØR! Mud Cube – Mindre støy og like god ytelse som vanlige «shakere» 15.03.13

FROKOSTMØTE HØR! MUD CUBE – MINDRE STØY OG LIKE GOD YTELSE SOM VANLIGE «SHAKERE» 15.03.13

26.02.2013

Fjerning av faste stoffer i boreslam (mud) har hittil skjedd ved bruk av store vibrasjons-sikter (shale shakers). Disse store vibratorene støyer mye og krever kraftig ventilasjon. MudCube fra Cubility er et helt annet konsept – en lukket løsning med betydelig mindre støy. Som første boreselskap har nå Maersk tatt i bruk et MudCube-system i full skala. Hva er så erfaringene i forhold til tradisjonelle shakere.

http://www.norskoljeoggass.no/no/Kalender/Frokostmote-HOR-Mud-Cube--Mindre-stoy-og-like-god-ytelse-som-vanlige-shakere/

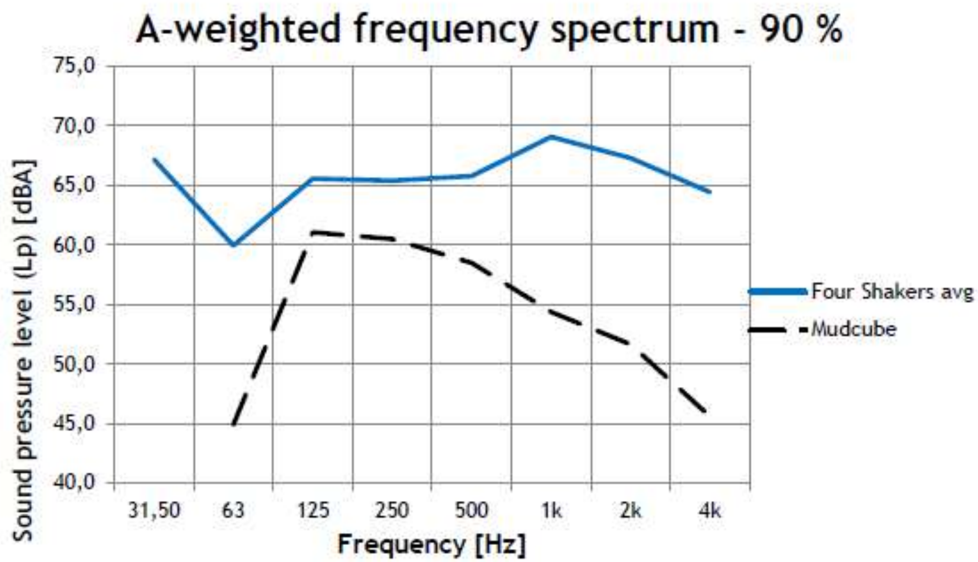

http://norskoljeoggass.no/no/Kalender/Frokostmote-HOR-Mud-Cube--Mindre-stoy-og-like-god-ytelse-som-vanlige-shakere/
MUDCUBE
www.cubility.no

Støy fra shaker og MudCube

Norsk olje&gass

Shakerrom preges av mye lavfrekvent støy
Siktene drives av eksentermasse med frekvens ca 30Hz.

Mye av støydata er oppgitt som A-veidenivåer:
Tradisjonelle shaker 75-80dBA ved 1m 90% kapasitet
MudCube 68dBA ved 1m 90% kapasitet
Begge fritt felt – ingen refleksjoner fra rommet, kun 1 enhet



LIFETEC AS

http://www.norskoljeoggass.no/no/Kalender/Frokostmote-HOR-Mud-Cube--Mindre-stoy-og-like-god-ytelse-som-vanlige-shakere/


MUDCUBE
1

http://www.dagbladet.no/nyheter/2007/06/12/503356.html

Analysis of Helicopter Sound for the Development of A New Generation Active Headset

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Abstract - **Helicopters generate substantial noise levels, especially at low frequency. These noise levels are normally not harmful for the ear. However, the low frequency content masks the speech . Therefore, pilots tend to set the communication system at maximum level so that the sound levels reach severe amplitudes for the ear. These high sound levels are exposing the ear to fatigue and hearing loss. The low speech intelligibility caused by the background noise is also a safety issue since it is most important that all commands can be understood correctly.**

The risk of noise induced hearing loss can normally be evaluated by sound pressure level measurements. However, in some cases, the standardized methods for these measurements does not take into account some secondary effects of the frequency distribution of the sound pressure levels. This paper adresses a noise exposure

BPF	Blade passage frequency
rpm	Rotation per minute
SPL	Sound Pressure Level
NIHL	Noise Induced Hearing Loss
dBA, dBC	Weighted dB sound pressure

1. INTRODUCTION

Noise-induced hearing loss (NIHL) is caused by exposure o f high sound pressure levels (SPLs). The risk of NIHL from high SPLs is dependent of the frequency distribution of SPL. Interna-tionally, the standardized A-weighted function is used to express the integrated SPLs in the frequency range of hearing. In mos t parts of the world 85 dBA is an accepted maximum equivalent

http://www.bth.se/fou/forskinfo.nsf/all/f05182f873f85767c12568a3002caa31/$file/Analysis%20of%20helicopter%20sound....pdf

7. SUMMARY

The conventional (standardized) SPL measurements, recorded at normal cruise speed but in two different ventilation situations; showed high levels in the low frequency range, 16 -20 Hz (110-115 dB). The C-weighted level varied between 107 and 110 dB and the A-weighted between 96 and 100 dB. The ear canal measurements behind the hearing protectors (ear muffs) mounted in the helmets showed corresponding levels between 87 and 88 dBA and about 94 dBC, without communication. However, with communication (internal and external) the A-weighted levels were increased by 3-10 dB to a total of 91-98 dBA. The permitted exposure time in Sweden for the actual sound levels, without communication, is 4-5 hours a day, which is more than the normal exposure time for the helicopter crews. However, with communication the exposure time permitted would decrease to less than 30 minutes a day.

The major masking tones are due to the rotors. The BPF of main rotor, 17.5 Hz, is below the hearing range and is creating an infra-sound. The second, third and fourth order of the BPF for the main rotor are important components to treat. The BPF of the tail rotor, 105 Hz, is also important to treat. Since the passive damping in the helmet is not able to handle this low frequency damping, an increased damping is foreseen to be achieved with an active system.

http://www.bth.se/fou/forskinfo.nsf/0/f05182f873f85767c12568a3002caa31/$FILE/Analysis%20of%20helicopter%20sound....pdf