

Accepted Manuscript

Engineering out the Noise

Kurt Yankaskas, Raymond Fischer, Jesse Spence, Jeff Komrower

PII: S0378-5955(16)30281-7

DOI: [10.1016/j.heares.2017.01.004](https://doi.org/10.1016/j.heares.2017.01.004)

Reference: HEARES 7304

To appear in: *Hearing Research*

Received Date: 29 June 2016

Revised Date: 20 December 2016

Accepted Date: 5 January 2017



Please cite this article as: Yankaskas, K., Fischer, R., Spence, J., Komrower, J., Engineering out the Noise, *Hearing Research* (2017), doi: 10.1016/j.heares.2017.01.004.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Engineering out the Noise

Kurt Yankaskas, ONR
 Raymond Fischer, Noise Control Engineering LLC
 Jesse Spence, Noise Control Engineering LLC
 Jeff Komrower, Noise Control Engineering LLC

Abstract- The US Navy, through an Office of Naval Research (ONR) lead effort on Noise Induced Hearing Loss (NIHL), is investigating methods and techniques to mitigate hearing loss for the crews and warfighters. Hearing protection is a viable and increasingly popular method of reducing hearing exposure for many ship crewmembers; however, it has limitations on comfort and low frequency effectiveness. Furthermore, Personal Hearing Protection (PHP) is often used improperly. Proper vessel planning, programmatic changes and advances in noise control engineering can also have significant impacts by inherently reducing noise exposure through ship design and use of noise control treatments. These impacts go beyond hearing loss mitigation since they can improve quality of life onboard vessels and provide enhanced warfighter performance. Such approaches also can be made to work in the lower frequency range where hearing protection is not as effective. This paper describes non-hearing protection methods being implemented to mitigate and control noise within the US Navy and US Marine Corps. These approaches reflect the latest changes to Mil-Std 1474E, Appendix F.

I. INTRODUCTION

Mil-Std 1474E – Department of Defense Design Criteria Standard, Noise Limits - sets the allowable criteria for US Navy vessels. As stated in this Standard, ‘Engineering controls shall be the primary means to protect personnel from hazardous noise. Hearing protectors and other measures such as warning signs shall not be solely relied upon unless all noise reduction design approaches have been pursued.’ Methodologies and tools exist to facilitate “engineering out the noise” in an optimal manner. Beyond reducing the warfighters noise exposure, the added benefit in designing a quieter vessel is an overall positive Return-On-Investment (ROI) and improved warfighter effectiveness. These engineering approaches will be highlighted.

II. ACOUSTIC CRITERIA

Per Mil-Std 1474E, Tables 1 and 2 list the allowable limits for steady state noise and intermittent¹ noise, respectively. The limit is between 60 and 70 dBA in quarters areas. Other limits are 1) that the maximum allowable peak SPL for a compartment or for a work station shall not exceed 140 dB for any operating condition, 2) maximum allowable time-weighted average (TWA) exposure for personnel shall not exceed 84 dBA in an 8-hour period (per OPNAVINST 5100.23), and 3) maximum allowable peak sonar transmission SPL at sonar transmission frequency shall not exceed 84 dB.

Table 1. Maximum allowable steady state Sound Pressure Level (SPL) for compartments and work stations.

Airborne Noise Category	Maximum Allowable SPL Limit for Steady State Condition, (dBA)	Maximum Allowable Unweighted Octave Band SPL Limit, (dB re 20 μ Pa)								
		Octave Band Center Frequency, (Hz)								
		32	63	125	250	500	1,000	2,000	4,000	8,000
A-3	70	81	78	75	72	69	66	63	60	57
A-12	60	72	69	66	63	60	57	54	51	48
B	65	78	75	72	69	66	63	60	57	54
C	60	72	69	66	63	60	57	54	51	48
D	85	98	95	92	89	86	83	80	77	74

¹ Per Mil-Std 1474, intermittent noise is ‘sounds that are present for a short duration consisting of a noise burst lasting from one second to 15 minutes that interfere with speech communication.’

Download English Version:

<https://daneshyari.com/en/article/5739441>

Download Persian Version:

<https://daneshyari.com/article/5739441>

[Daneshyari.com](https://daneshyari.com)