Whole-body vibration exposure on board a Polar Supply and Research Vessel in open water and in ice

A. Bekker, K.I. Soal, K.J. McMahon

PII: S0165-232X(16)30164-1
DOI: doi:10.1016/j.coldregions.2017.06.008
Reference: COLTEC 2409

To appear in: *Cold Regions Science and Technology*

Received date: 23 August 2016
Revised date: 31 May 2017
Accepted date: 19 June 2017

Please cite this article as: Bekker, A., Soal, K.I., McMahon, K.J., Whole-body vibration exposure on board a Polar Supply and Research Vessel in open water and in ice, *Cold Regions Science and Technology* (2017), doi:10.1016/j.coldregions.2017.06.008

Whole-body vibration exposure on board a Polar Supply and Research Vessel in open water and in ice

A. Bekker[a,*], K.I. Soal[a], K.J. McMahon[a]

[a]*Department of Mechanical and Mechatronic Engineering, University of Stellenbosch, Private Bag X1, Matieland, 7602, South Africa*

Abstract

The Requirements for Polar Ships specify the requisites by the International Association of Classification Societies to ensure a safe journey for crew travelling on steel ships that navigate in ice-infested polar waters. One identified problem in these requirements is that they do not yet contain guidelines to direct shipbuilders as to the allowable vibration limits for human vibration exposure. This is attributed to the absence of scientifically reported field research on vibration conditions in human environments gathered when ships break through ice. This study investigated the levels of whole-body vibration exposure associated with open water and ice passage of a Polar Supply and Research Vessel. It was found that occupants are exposed to perceivable vibration for most of the voyage and are likely to experience vibration at levels considered "not uncomfortable". As a result of high crest factors r.m.s. metrics do not offer a robust means of quantifying in-service ship-borne vibration. In comparison with sailing in calm water, whole-body vibration exposure increased by 21 times in rough open water and up to eleven-fold during ice-passage.

Keywords: Whole-body vibration, Ice-going ship, Vibration Dose Value,

*Corresponding author. A.Bekker. Tel: +27 21 808 3914. Email: annieb@sun.ac.za