

CHAPTER III

Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)

Part B-2 Vibrations

Regulation 1 Application

- 1 The provisions in this part shall apply to any type of work where the worker is exposed or is likely to be exposed to vibrations in connection with the execution of the work.
- 2 The provisions implement Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration).

Regulation 2 Definitions

For the purposes of this part, the following terms shall mean:

- .1 “hand-arm vibration”: vibration that, when transmitted to the human hand-arm system, entails risks to the health and safety of workers, in particular vascular, bone or joint, neurological or muscular disorders;
- .2 “whole-body vibration”: vibration that, when transmitted to the whole body, entails risks to the health and safety of workers, in particular lower-back morbidity and trauma of the spine.

Regulation 3 Exposure limit values and action values

- 1 For hand-arm vibration:
 - .1 the daily exposure limit value standardised to an eight-hour reference period shall be 5 m/s^2 .
 - .2 the daily exposure action value standardised to an eight-hour reference period shall be $2,5 \text{ m/s}^2$.

Workers’ exposure to hand-arm vibration shall be assessed or measured on the basis of the provisions of Annex 1 of this part.
- 2 For whole-body vibration:
 - .1 the daily exposure limit value standardised to an eight-hour reference period shall be $1,15 \text{ m/s}^2$;
 - .2 the daily exposure action value standardised to an eight-hour reference period shall be $0,5 \text{ m/s}^2$.

Workers’ exposure to whole-body vibration shall be assessed or measured on the basis of the provisions of Annex 2 of this part.

Regulation 4 Workplace assessment

- 1 If workers are exposed to vibrations in connection with the work on board, the workplace assessment, cf. Chapter I A, regulation 2, shall contain an assessment, or if necessary, a measurement of the level of daily vibration exposure in accordance with Annex 1 and Annex 2 of this part.

The level of exposure to vibration may be assessed by means of observation of specific working practices and reference to relevant information on the level of vibration of the applied equipment or at the workplace in question when such relevant information is available. The assessment does not require the use of specific apparatus and appropriate methodology.

The assessment and measurement shall be planned and carried out at suitable intervals.

When carrying out the workplace assessment, particular attention shall be given to the following:

- .1 the level, type and duration of exposure;
- .2 the exposure limit values and the exposure action values as laid down in regulation 3 of this Chapter;
- .3 any effects concerning the health and safety of workers at particularly sensitive risk;
- .4 any indirect effects on worker safety resulting from interactions between vibration and the workplace or other work equipment. Particular attention shall be given to the fact that vibrations may influence the durability and stability of the workplace, and constitute a disturbing factor in the correct operation of equipment or when carrying out readings of instruments;
- .5 information provided by the manufacturer on the applied work equipment;
- .6 the existence of replacement equipment designed to reduce the levels of exposure to vibration;
- .7 the extension of exposure to whole-body vibration on board the ship beyond normal working hours, specifically in the accommodation and sleeping quarters. The exposure shall be reduced to a level, which is attuned with the use of the room;
- .8 specific working conditions such as low temperatures;
- .9 appropriate information obtained from health surveillance.

The workplace assessment shall identify which measures must be taken in accordance with regulations 5 and 6 in this Chapter.

The workplace assessment shall be kept up-to-date on a regular basis, particularly if there have been significant changes which could render it out-of-date, or when the results from the health surveillance show it to be necessary.

Regulation 5 Prevention of exposure

- 1 The work shall be planned and carried out in such a way that the risks arising from exposure to vibration shall be reduced to a minimum. The reduction of such risks shall be based on the general principles of prevention set out in Chapter 1, including the elimination of the vibrations at their source to the extent possible.

- 2 If the daily exposure to vibrations exceed the exposure action values laid down in regulation 3, the reason for this must be examined and technical and/or organisational measures intended to reduce to a minimum exposure to vibration shall be established. When choosing which measures to establish, the following should in particular be taken into account:
 - .1 other working methods that require less exposure to vibration;
 - .2 the choice of appropriate work equipment of appropriate ergonomic design and, taking account of the work to be done, producing the least possible vibration;
 - .3 the provision of auxiliary equipment that reduces the risk of injuries caused by vibration, such as seats that effectively reduce whole-body vibration and handles which reduce the vibration transmitted to the hand-arm system;
 - .4 appropriate maintenance programmes for work equipment, the workplace and workplace systems;
 - .5 the design and layout of workplaces and work stations;
 - .6 adequate information and training to instruct workers to use work equipment correctly and safely;
 - .7 limitation of the duration and intensity of the exposure;
 - .8 appropriate work schedules with adequate rest periods;
 - .9 the provision of clothing to protect exposed workers from cold and damp.
- 3 In any event, workers shall not be exposed above the exposure limit value set out in regulation 3. If, however, an exposure limit value is exceeded, the shipping company shall take immediate action to:
 - .1 reduce exposure below the exposure limit value,
 - .2 identify the reasons why the exposure limit value has been exceeded, and
 - .3 amend the protection and prevention measures accordingly in order to prevent it being exceeded again.
- 4 The shipping company shall adapt the measures referred to in this Chapter to the requirements of workers at particular risk.

Regulation 6 Worker information and training

- 1 The shipping company shall ensure that workers who are exposed to vibration at work receive information and training relating to the outcome of the workplace assessment concerning in particular:

- .1 the measures taken to eliminate or reduce to a minimum the risk of exposure to vibration;
- .2 the exposure limit values and the exposure action values;
- .3 the results of the assessment and measurement of the vibration carried out in accordance with regulation 4 of this Chapter and the potential injury arising from the work equipment in use;
- .4 why and how to detect and report signs of injury;
- .5 the circumstances in which workers are entitled to health surveillance;
- .6 safe working practices to minimise exposure to vibration.

Regulation 7 Health surveillance

1 If the workplace assessment indicates, in accordance with regulation 4, a risk to the worker's health, the worker in question shall be given access to health surveillance in compliance with the provisions in Chapter IX, part A. The results of the examination shall be considered at the initiation of preventive measures at the workplace. Such examination shall be appropriate where:

- .1 the exposure of workers to vibration is such that a link can be established between that exposure and an identifiable illness or harmful effects on health,
- .2 it is probable that the illness or the effects occur in a worker's particular working conditions, and
- .3 there are tested techniques for the detection of the illness or the harmful effects on health.

In any event, workers exposed to vibration in excess of the values stated in regulation 3 shall be entitled to appropriate health surveillance.

2 Where, as a result of health surveillance, a worker is found to have an identifiable disease or adverse health effect which is considered by a doctor or occupational health-care professional to be the result of exposure to vibration at work on board, the shipping company shall:

- .1 review the workplace assessment,
- .2 review the measures provided for to eliminate or reduce risks carried out pursuant to regulation 5,
- .3 take into account the advice of the occupational health-care professional or other suitably qualified person or competent authority, and
- .4 arrange continued health surveillance and provide for a review of the health status of any other worker who has been similarly exposed.

Regulation 8 Transitional period

1 The provisions in regulation 5 (3) shall be applicable after 6 July 2010 with regard to:

- .1 equipment made available to the worker before 6 July 2007,
and
 - .2 ships delivered before 6 July 2007,
- which are not able to observe the exposure limit values in consideration of the latest technical progress and organization measures.

Regulation 9 Derogations

- 1 The Danish Maritime Authority may in duly justified circumstances and after consulting the shipping companies and crewmember organizations respectively allow derogations from regulation 5 (3) with respect to whole-body vibration where, given the state of the art and the specific characteristics of workplaces, it is not possible to comply with the exposure limit value despite the technical or organization measures.
- 2 In a case where the exposure of a worker to vibration is usually below the exposure action values given in regulation 3, but varies from time to time and may occasionally exceed the exposure value limit, the Danish Maritime Authority may also after consulting the shipping companies and crewmember organizations respectively grant derogations from regulation 5(3). However, the exposure limit value averaged over 40 hours must be less than the exposure limit value and there must be evidence to show that the risks from the pattern of exposure to the work are lower than those from exposure at the limit value.
- 3 The derogations referred to in (1) and (2) shall be accompanied by conditions which guarantee that the resulting risks are reduced to a minimum and that the workers concerned are subject to increased health surveillance. Such derogations shall be reviewed every four years.

Annex 1 Hand-arm vibration

- 1 The assessment of the level of exposure to hand-arm vibration is based on the calculation of the daily exposure value normalised to an eight-hour reference period $A(8)$, in accordance with ISO standard 5349-1(2001), Chapter 4 and 5 and annex A.

$$A(8) = a_{hv} \sqrt{\frac{T}{T_0}}$$

where:

a_{hv} is the vibratory force in m/s^2

T is the duration of the vibratory force a_{hv}

T_0 is eight hours

$$a_{hv} = \sqrt{a_{hwx}^2 + a_{hwy}^2 + a_{hwz}^2}$$

The vibratory force, a_{hv} , is calculated by using the formula:

where:

a_{hwx} , a_{hwy} and a_{hwz} are the rms (total value) of the frequency-weighted acceleration values, measured in three right angles to each other at the position where the vibrating surface is in contact with the hand.

- 2 If, during the workday, one or more work operations with different vibratory force are to be carried out, the daily exposure $A(8)$ shall be calculated using the formula:

$$A(8) = \sqrt{\frac{1}{T_0} \sum_{i=1}^n a_{hvi}^2 T_i}$$

where:

n is the number of work operations during the day

a_{hvi} is the vibratory force for work operation i , and

T_i is the duration of work operation i .

- 3 If both hands are exposed to vibrations, the highest value of the vibratory force a_{hv} shall be used to calculate the daily vibration exposure.
- 4 The assessment of exposure may be based on information about vibration levels provided by the manufacturer of the applied equipment or it may be based on measuring.
- 5 If the assessment is based on measuring, the methods applied may include random sampling, which represents the exposure of the worker. Methods and measuring equipment shall be adjusted to the vibration type and be in accordance with ISO standard 5349-2 (2001).

Annex 2 Whole-body vibration

The assessment of the level of exposure to whole-body vibration is based on the calculation of the daily exposure value normalised to an eight-hour reference period $A(8)$, in accordance with ISO standard 2631-1(1997), Chapter 5, 6 and 7, and annex A and B.

$$A(8) = k a_w \sqrt{\frac{T}{T_0}}$$

Where:

a_w is the rms (total value) of the frequency-weighted vibratory force in m/s^2 , measured in three right angles to each other, x, y and z. When calculating the rms values, only vibrations of more than 1 Hz shall be included.

T is the duration of the exposure of the vibratory force a_w .

T_0 is eight hours.

k is 1,4 for x and y directions and k is 1 for z direction.

The daily exposure to vibrations is calculated separately for each of the three directions x, y and z. The assessment of the exposure i based on the highest value in relation to the three directions..

- 2 If, during the workday, one or more work operations with different vibratory force are to be carried out, the daily exposure $A(8)$ shall be calculated using the formula:

$$A(8) = k \sqrt{\frac{1}{T_0} \sum_{i=1}^n a_{wi}^2 T_i}$$

where:

n is the number of work operations during the day

a_{wi} is the vibratory force for work operation i , and

T_i is the duration of work operation i .

- 3 The assessment of exposure may be based on information about vibration levels of the workplace or it may be based on measuring.
- 4 If the assessment is based on measuring, the methods applied may include random sampling, which represents the exposure of the worker. Methods and measuring equipment shall be adjusted to the vibration type