



Vibrations

In this section you can learn about the preventive measures to take to avoid harmful effects from exposure to vibrations from machines and engines. This involves both the vibrations affecting hands and arms and those affecting the whole body.

Hand-arm vibrations arise when using hand tools or when operating machines manually.

Whole-body vibrations are for instance those coming from the ship. The measures are listed in Notice A from the Danish Maritime Authority, Chapter III B-2 on physical affects from the working environment – vibrations.

In the annex to the Chapter, you will find the methods of calculation to be used when estimating hand-arm vibrations and whole-body vibrations respectively. The regulations are complementary to the regulations in Notice A on the performance of the work, arrangement of the technical facilities, and occupational medical examinations. The preventive measures are drawn up on the basis of an EU directive (the EU Directive on minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibrations) (2002/44/EF)).

Injuries that may arise

Hand-arm vibrations may cause vascular, bone, joint, neurological or muscular disorders. Your fingers may go numb and tingly, and you may experience that your ability to grip is weakened. If you have been exposed to vibrations for a long time, you may get “white fingers” (Raynaud’s phenomenon). Your fingers go white when the blood vessels contract strongly and suddenly. The fingers turn white and become numb.

In the long term, whole-body vibrations may cause body joint disorders or joint diseases. These kinds of diseases are especially common in the spine. Persons standing on a vibrating foundation may get symptoms such as pain in feet, legs and back.

Assessment and measurement

The strain of vibrations is measures in m/s^2 and calculated on the basis of the strength and the duration of your exposure to the vibrations. The assessment of the strength of the vibration can be made according to the manufacturer’s information on the equipment or tools used. It is



important that the working situation is comparable with the one that the manufacturer based the information on. The level of vibrations at the individual work place, including the ship's vibrations, must be included in the assessment. Should noticeable vibrations occur and you are unable to get useful information on the strength of the vibrations, measurements should be carried out.

Measurements are to be carried out in accordance with the general international standard (DS/EN ISO standard 5349-2) and the standard on guidance on the assessment of vibrations in its entirety on trade vessels (ISO/DIN standard 6954). The last mentioned standard takes into account the measurement of ships in commission, apart from particular circumstances such as port operations or dynamic positioning. If the particular circumstances cause whole-body vibrations, these have to be measured and assessed.

Hand-arm vibrations

The level of hand-arm vibrations to which you may be exposed is called the exposure limit value, and it must not exceed 5 m/s^2 for an 8-hour working day. Already at 2.5 m/s^2 (the action value), you must examine the cause and prevent exposure. Both values are to be seen as average values during a working day. Therefore, short periods with strong vibrations are allowed.

Whole-body vibrations

The level of whole-body vibrations to which you may be exposed must not exceed 1.15 m/s^2 (the exposure limit value) for an 8-hour working day. Already at 0.5 m/s^2 (the action value), you must examine the cause and prevent exposure.

Workplace assessment

It is important to plan and arrange the work properly. This involves the preparation of a total assessment of the safety and health conditions on board the ship. The workplace assessment of the work place must be carried out in cooperation between the ship management and the employees.



The workplace assessment should always include an assessment of the exposure to whole-body vibrations on board the ship. It must be complemented by an assessment of hand-arm vibrations for specific routines when relevant.

A special attention should be paid to the following when preparing the workplace assessment:

- Level, type and duration of the exposure.
- The action values and the exposure limit values.
- Effect on workers at particularly sensitive risk.
- Any indirect effects of vibrations on safety, e.g. operation of control arrangements or reading of instruments.
- Information from the manufacturers.
- The possibility of using equipment with fewer vibrations.
- Exposure to whole-body vibrations on board ships after work,
- especially in the accommodation and sleeping quarters.
- Particular working conditions, e.g. work at low temperatures.
- Any results of examinations carried out by an occupational medical expert.

You should see to it that the workplace assessment is revised currently, and always in case of considerable changes, or if the investigations carried out by the occupational health-care professional proves it necessary.

Prevention

The action value states when to take action according to the level of vibration. The tables below show the tolerated period of time for daily exposure to vibrations, if the action values on 2.5 m/s^2 for hand-arm vibrations and 0.5 m/s^2 for whole-body vibrations respectively are not exceeded.



HAND-ARM VIBRATIONS

Exposure	Maximum time of exposure
2,0 m/s ²	12 hours
2,5 m/s ²	8 hours
3,5 m/s ²	4 hours
5 m/s ²	2 hours
7 m/s ²	1 hour
10 m/s ²	30 min

WHOLE-BODY VIBRATIONS

Exposure	Maximum time of exposure
0,3 m/s ²	24 hours
0,5 m/s ²	8 hours
0,7 m/s ²	4 hours
1,0 m/s ²	2 hours
1,4 m/s ²	1 hour

It is important that you avoid, remove or minimize the risk of harmful strain from vibrations during your working day. The best way to do this is to use the “principles of prevention”.

This means that at first you should try to remove the vibrations at their source. Should the action values be exceeded, you should examine the possibility of:

- using other working methods,
- using work equipment of appropriate ergonomic design and with the least possible vibration,
- improving auxiliary equipment, e.g. seats that effectively reduce whole-body vibrations and handles that reduces hand-arm vibrations,
- maintaining the equipment currently,



- improving design and arrangement,
- reducing the exposure by reducing the hours of work, and
- using personal protection against cold as an example.

You should not under any circumstances be exposed above the exposure limit values.

If the limit value is exceeded, the shipowner should take action to reduce the exposure.

Information and training

It is important that you are correctly informed about and trained in the handling of the equipment. In addition, you should be informed of the outcome of the assessments and of the measurements carried out as well as which preventive measures are to be taken according to the workplace assessment to reduce the exposure as much as possible. It is also important that you know how to detect signs of occupational injuries and how they should be reported.

Examinations carried out by the occupational health-care professional

You are entitled to be examined by an occupational health-care professional if the exposure to vibrations exceeds the action values. You are also entitled to an examination if the workplace assessment shows that your health is endangered, or if a disease or deterioration of your health is a result of the exposure. Transitional periods and exemption Equipment made available to workers before 6 July 2007 and ships delivered before the same date may be exempted from exceeding the exposure limit value until 6 June 2010. Delivered means that ownership is passed on from the shipyard to the shipowner.