**Guide to application of the Machinery Regulation (EU) 2023/1230**

**Annex III, 1.5.9, 2.2.1.1, 3.6.3.1 - vibrations**

**Final version – 18 October 2026**

*Note that references to other paragraphs (§xx) are references to the paragraph numbers in the current guide for the Machinery Directive Edition 2.3 – April 2024*

***1.5.9. Vibrations***

*Machinery or related products shall be designed and constructed in such a way that risks resulting from vibrations produced by the machinery or related product are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.*

*The level of vibration emission may be assessed with reference to comparative emission data for similar machinery or related products.*

## §231 Vibrations

The requirement set out in section 1.5.9 deals with risks associated with the exposure to vibrations generated by machinery or related products. Vibrations can be generated by the operation of the machinery or related product itself, for example due to rotating or reciprocating masses, gas pulsation or aerodynamic phenomena such as those generated by fans, or by the impact of hand-held machinery or related product on hard materials. Vibrations can also be generated by interaction between the machinery or related product and its environment such as, for example, the movement of mobile machinery or related product over rough ground.

Exposure to vibrations transmitted through the feet or the seat to the whole body can cause or aggravate musculoskeletal disorders such as back pain and damage to the spine. Exposure of the hand/arm system to vibrations can cause damage to blood vessels in fingers and hands (e.g. hand-arm vibration syndrome, commonly known as white finger disease) and damage to the peripheral nervous system, tendons, muscles, bones and joints of the hands and arms.

It is important to distinguish the exposure of persons to vibrations from the emission of vibrations by machinery or related products. It should be noted that the exposure of workers to vibrations is subject to the national provisions implementing Directive 2002/44/EC [1]. That Directive sets daily exposure limit values and action values for the measurement parameter for hand-arm vibration and whole-body vibration.

The daily exposure of persons to vibrations cannot be simply deduced from the measurement of vibration emission from machinery or related products, since exposure also depends on the duration and conditions of use of the machinery or related product concerned. The lower the level of emission of vibrations from the machinery or related product, the easier it is for users to respect the exposure limits set by Directive 2002/44/EC. Users therefore have an interest in selecting machinery or related products with as low vibration emission as possible for the required performance – see §275: comments on section 1.7.4.3.

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The manufacturer's approach to preventing risks due to vibration emission must take account of the principles of safety integration set out in section 1.1.2:

- the first priority must be given to design and construction measures to reduce the generation of vibrations at source, for example, by ensuring that the resonance frequencies of machine parts are not close to the vibration excitation frequencies, by choosing materials for the construction of machinery or related products that have high inherent damping characteristics, by including auxiliary mass or by balancing rotating or reciprocating parts;

- the second priority must be given to integrated protective measures: isolating measures can be taken to prevent the transmission of vibrations to the whole body or to the hand-arm system. Isolating measures include the fitting of metal or elastomeric springs, the fitting of friction, liquid or gas dampers or fitting a combination of material and dampers;

- the third priority must be given to informing the user about the residual vibration emission so that the necessary protective measures can be taken such as, for example, measures relating to the installation of the machinery or related product or providing appropriate training – see §264 and §267: comments on sections 1.7.4.2 (j) and (l), §279: comments on section 2.2.1.1, and §325: comments on section 3.6.3.1.

The second paragraph of section 1.5.9 refers to an approach for assessing the adequacy of the measures taken to reduce the risks due to vibrations: comparison of the risk level with that of similar machinery or related product. This method shall be applied in the same conditions as the equivalent requirement for comparative noise emission data – see §230: comments on section 1.5.8.

In addition to the general requirements set out in section 1.5.9, supplementary requirements relating to seating on machinery or related product subject to vibrations are set out in section 1.1.8.

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*2.2.1.1. Instructions for use*

*The instructions for use shall give the following information concerning vibrations, expressed as acceleration ($m/s^2$), and trans mitted by portable handheld or hand-guided machinery or related products:*

*(a) the vibration total value from continuous vibrations to which the hand-arm system is subjected;*

*(b) the mean value of the peak amplitude of the acceleration from repeated shock vibrations, to which the hand-arm system is subjected;*

*(c) the uncertainty of both measurements.*

*The values referred to in the first subparagraph shall either be those actually measured for the machinery or related product in question or those established on the basis of measurements in respect of a technically comparable machinery or related product, which is representative of the state of the art.*

*If harmonised standards or common specifications adopted by the Commission in accordance with Article 20(3) cannot be applied, the vibration data shall be measured using the most appropriate measurement code for the machinery or related product.*

***§279 Declaration of vibrations transmitted by portable hand-held and hand-guided machinery or related products***

The requirement set out in section 2.2.1.1 is complementary to the general requirements relating to the instructions set out in section 1.7.4.

Exposure to vibrations can lead to harm (see §231, 2nd paragraph).

The declaration of vibration emissions of the machinery or related product has three main purposes:

- to help users to choose machinery or related products with reduced vibration emissions;
- to provide information useful for the workplace risk assessment to be carried out by the employer according to the national provisions implementing Directive 2002/44/EC on the exposure of workers to the risks arising from vibrations[217].
- to collect data on repeated shock vibrations to assess the risk arising from repeated shock vibrations.

In this respect, it should be recalled that the level of exposure of workers to vibrations cannot be simply deduced from the manufacturer's declaration of vibration emissions, since the exposure of operators is also influenced by other factors – see §231: comments on section 1.5.9.

Indent (a) of the first paragraph of section 2.2.1.1 requires the declaration of the vibration total value from continuous vibrations transmitted by portable hand-held and hand-guided machinery or related product to the hand-arm system. The continuous vibrations

transmitted by the machinery or related product must therefore be measured by the manufacturer using an appropriate test method.

Indent (b) of the first paragraph of section 2.2.1.1 requires the declaration of the mean value of the peak amplitude of the acceleration from repeated shock vibrations, to which the hand-arm system is subjected. The data for repeated shock vibrations transmitted by the machinery or related product must therefore be determined and declared by the manufacturer using an appropriate test method.

Indent (c) of the first paragraph of section 2.2.1.1 requires the uncertainties associated with the declared value to be specified. Guidance on determining the uncertainty associated with the measurement of vibrations transmitted by the machinery or related product should be given in the relevant test codes.

The second paragraph of section 2.2.1.1 implies that, in the case of series production, measurement can be carried out on a representative sample or samples of technically comparable machinery or related product. In the case of one-off production, the manufacturer must measure the vibrations transmitted by each machinery or related product supplied.

The third and fourth paragraphs of section 2.2.1.1 concern the methods to be used for measuring vibrations. Operating conditions have a strong influence on the vibrations transmitted by machinery or related product. Measurement of vibrations should therefore be carried out under representative operating conditions. Where the test code specified in a harmonised standard state the operating conditions under which the measurement is to be made, a reference to the harmonised standard is sufficient to indicate the operating conditions and measurement methods used. Where other test methods are used, the operating conditions and measurement methods used must be indicated in the declaration of vibration emission values.

Principles for evaluation of vibration emission for portable handheld or hand-guided machinery or related product are specified in the relevant standards[1].

It should be noted that the value declared in the instructions relating to vibrations must also be included in sales literature relating to the performance characteristics of the machinery or related product – see §273: comments on section 1.7.5.

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[1] Note: CEN TC 231 elaborate for example the following standards which gives guidance
- EN ISO 20643 (B-Type Standard)
- EN ISO 5349-3 for the repeated shock vibrations
- EN 12096 for the declaration of vibration emission values and their uncertainty.

***3.6.3 Instructions for use***
***3.6.3.1. Vibrations***

*The instructions for use shall give the following information concerning vibrations, expressed as acceleration ($m/s^2$), transmitted by the machinery or related products to the hand-arm system or to the whole body:*

*(a) the vibration total value from continuous vibrations to which the hand-arm system is subjected;*
*(b) the mean value of the peak amplitude of the acceleration from repeated shock vibrations, to which the hand-arm system is subjected;*
*(c) the highest root mean square value of weighted acceleration to which the whole body is subjected, if it exceeds 0,5 $m/s^2$; where this value does not exceed 0,5 $m/s^2$, this shall be mentioned;*
*(d) the uncertainty of measurements.*

*These values shall be either those actually measured for the machinery or related product in question or those established on the basis of measurements taken in respect of technically comparable machinery or related products which are representative of the machinery or related products to be produced.*

*Where harmonised standards or common specifications adopted by the Commission in accordance with Article 20(3) cannot be applied, the vibration shall be measured using the most appropriate measurement code for the machinery or related products concerned.*

*The operating conditions during measurement and the measurement codes used shall be described.*

***§325 Declaration of vibrations transmitted by mobile machinery or related product***

The requirement set out in section 3.6.3.1 is complementary to the general requirements relating to the instructions set out in section 1.7.4. In particular, the requirements relating to the language of the instructions apply – see §257: comments on sections 1.7.4.1 (a) and (b).

Exposure to vibrations can lead to harm (see §231, 2nd paragraph).

The declaration of vibration emissions of the machinery or related product has three main purposes:

- to help users to choose machinery or related products with reduced vibration emissions;
- to provide information useful for the workplace risk assessment to be carried out by the employer according to the national provisions implementing Directive 2002/44/EC on the exposure of workers to the risks arising from vibrations[217].
- to collect data on repeated shock vibrations to assess the risk arising from repeated shock vibrations.

In this respect, it should be recalled that the level of exposure of workers to vibrations cannot be simply deduced from the manufacturer's declaration of vibration emissions, since the exposure of operators is also influenced by other factors – see §231: comments on section 1.5.9.

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Indent (a) of the first paragraph of section 3.6.3.1 requires the declaration of continuous vibrations transmitted by mobile machinery or related product to the hand-arm system. The continuous vibrations transmitted by the machinery or related product must therefore be measured by the manufacturer using an appropriate test method.

Indent (b) of the first paragraph of section 3.6.3.1 requires the declaration of the mean value of the peak amplitude of the acceleration from repeated shock vibrations, to which the hand-arm system is subjected. The data for repeated shock vibrations transmitted by the machinery or related product must therefore be determined and declared by the manufacturer using an appropriate test method.

Indent (c) of the first paragraph of section 3.6.3.1 requires the declaration of weighted acceleration to which the whole body is subjected by mobile machinery or related product.
For whole body vibrations the values measured on the machinery or related product must be declared if they exceed 0,5 $m/s^2$. If the values measured on the machinery or related product do not exceed these values 0,5 $m/s^2$, that fact must be declared. The vibrations transmitted by the machinery or related product must therefore be measured by the manufacturer using an appropriate test method, unless it has been established that, for the category of machinery or related product concerned, the measured values never exceed 0,5 $m/s^2$ – this may be stated in the C-type standard for the category of machinery or related product concerned.

In this respect, it should be recalled that the level of exposure of workers to vibrations cannot be simply deduced from the manufacturer's declaration of vibration emissions, since the exposure of operators is also influenced by other factors – see §231: comments on section 1.5.9.

Indent (d) of the first paragraph of section 3.6.3.1 requires the uncertainties associated with the declared value to be specified. Guidance on determining the uncertainty associated with the measurement of vibrations transmitted by the machinery or related product should be given in the relevant test codes.

The second paragraph of section 3.6.3.1 implies that, in the case of series production, measurement can be carried out on a representative sample of technically comparable machinery or related product. In the case of one-off production, the manufacturer must measure the vibrations transmitted by each machinery or related product supplied.

The third and fourth paragraphs of section 3.6.3.1 concern the methods to be used for measuring vibrations. Operating conditions have a strong influence on the vibrations transmitted by machinery or related product. Measurement of vibrations should therefore be carried out under representative operating conditions. Vibration test codes for machinery or related product specify the operating conditions or the range of operating conditions under which the measurements shall be made. Where a test code specified in a harmonised standard state the operating conditions under which the measurement is to be made, a reference to the harmonised standard is sufficient to indicate the operating conditions and measurement methods used. Where other test methods are used, the operating conditions and measurement methods used must be indicated in the declaration of vibrations.

Principles for evaluation of vibration for mobile machinery or related product (hand-arm and whole-body vibration) are specified in the relevant standards[2].

[2] Note: CEN TC 231 elaborate for example the following standards which gives guidance
- EN ISO 1032 (B-Type Standard)
- EN ISO 5349-3 for the repeated shock vibrations
- EN 12096 for the declaration of vibration emission values and their uncertainty.

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It should be noted that the values declared in the instructions relating to vibrations must also be included in sales literature relating to the performance characteristics of the machinery or related product – see §273:  comments on section 1.7.5.

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