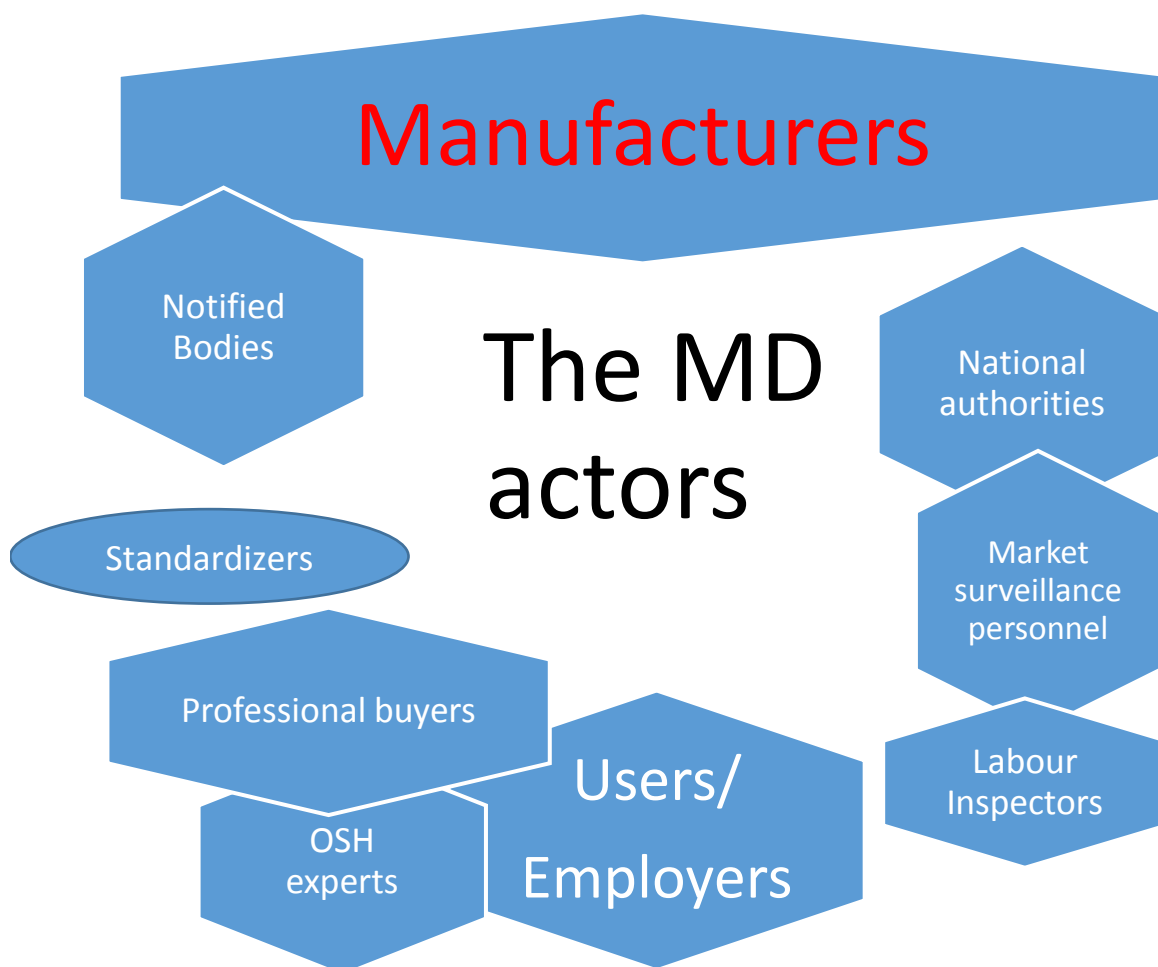


**Guide for manufacturers on how to report noise emission in instruction manuals and other literature in accordance with Machinery Directive 2006/42/EC and Outdoor Equipment Directive 2000/14/EC**



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The **NOMAD** project was a survey to examine the noise-related content of instructions supplied with machinery offered for purchase in the European Economic Area (EEA). **NOMAD** project started in 2008 and is the first joint Member States project under the Machinery Directive aiming at market surveillance.

## 1. Introduction

- 1.1 The Machinery Directive [1] has a dual objective: to permit the free movement of machinery within the European internal market while ensuring a high level of protection of health and safety. Many parties are involved in applying the Machinery Directive, including machinery manufacturers, importers and distributors, Notified Bodies, standards bodies, occupational health and safety agencies and officials of the relevant national administrations and market surveillance authorities.
- 1.2 This guide concerns noise emissions and is for machinery manufacturers. It addresses how to declare noise emission according to the Machinery Directive (MD) and how the process is modified when the Outdoor Equipment Directive (OED) also applies. Guidance on the application of the MD to all risks, including general requirements that also apply to noise, is available for all interested parties [2].
- 1.3 The aim of this guide is to help you – as a manufacturer - meet the legal duties placed on you by the Machinery Directive 2006/42/EC and Outdoor Equipment Directive 2000/14/EC to report the noise generated by your machinery in the instruction manual (and in the technical sales literature).
- 1.4 The MD does not set noise emission limits, but requires you to reduce the risks from noise from your machines to the lowest level, taking account of technical progress and the availability of methods for reducing noise. Providing information about noise is the final step in helping machine users identify and manage noise risk.
- 1.5 The OED requires the guaranteed A-weighted sound power level to be marked on 58 types of outdoor machines. The OED sets limits on the sound power level for 22 classes of machines within these 58 machine types.
- 1.6 Prolonged exposure to noise from machinery is the main cause of occupational noise-induced hearing loss. Exposure to noise from machinery can also contribute to workplace accidents and to stress.
- 1.7 Employers are expected to assess and manage the risks from noise using the noise-related information supplied with machines. These are expectations of the Physical Agents (Noise) Directive 2003/10/EC [3], which sets exposure limit values and exposure action values in respect of the daily noise exposure levels and peak sound pressure levels of workers. The lower the noise emission from your machinery, the easier it is for users to manage noise exposure as required by Directive 2003/10/EC.
- 1.8 Employers are seeking to buy quieter machinery. Their many reasons include:
  - to protect their employees from noise-induced hearing damage.
  - to avoid safety risks caused by failure to hear important audible warning signals and messages.
  - to reduce work having to be redone because of poor communication in noisy environments or reduced attention caused by noise stress.
  - to avoid the cost of retrospective engineering noise controls.
  - to minimize the cost of providing and managing the use of hearing protection.
  - to avoid the cost of providing health surveillance for noise.
  - to avoid enforcement action by national authorities.
  - to prevent civil claims from employees for hearing loss caused by workplace noise exposure.

There has never been a better time to gain market advantage from quieter machinery.

## 2. Glossary of terms

2.1 This section provides meanings for some of the terms you will come across when reading this guide. The standards and legislation where the terms appear provide full definitions.

- **Noise emission:** The airborne sound radiated, for example, a machine. The noise emission includes the sound power level of the machine and the emission sound pressure levels at the workstation and other specified positions (if any) around the machine.

**Note:** Sound power level and emission sound pressure level **cannot** be compared numerically. The sound power level is typically between 10 and 20 dB higher than the emission sound pressure level.

- **A-weighted sound power level:** A measure of the time-averaged total sound energy emitted by, for example, a machine into the air. It is a characteristic of the machine and independent of the acoustic environment in which the machine is located. It is measured in watts (W) and is normally given as an A-weighted sound power level,  $L_{WA}$ , in decibels (dB).
- **A-weighted emission sound pressure level:** The sound directly caused by the machine at a given position, for example its workstation(s), independently of the environment where the machine operates. It is generally given as an A-weighted sound pressure level  $L_{pA}$ , in decibels. It is affected by factors such as the installation of the machine, the conditions of use of the machine, the position of the person with respect to the machine. It is not affected by the characteristics of the workplace and the noise generated by other sources. The emission sound pressure level should be representative of the sound pressure level at the workstation(s) for a full work cycle during a typical noisy operation of the machine, and as such, be of use in a noise risk assessment.
- **Peak C-weighted instantaneous sound pressure value:** The highest value reached by the sound pressure as it varies with time. It is generally used to characterize impact and impulsive sources of noise. Declarations of machinery noise emissions require the C-weighted peak sound pressure level,  $L_{pCpeak}$ , determined at a workstation of the machine, to be given if it exceeds 130 dB.
- **Noise exposure:** A daily noise 'dose' - a combination of 'how loud' and 'how long exposed' for the various noises that a person is exposed to during a day. It is generally reported in decibels. The noise exposure of workers **should not** be confused with the emission sound pressure level. The former takes account of all sources of noise to which a worker is exposed and the duration of those exposures; the latter describes a specific source of noise.
- **Harmonized standard:** A harmonized standard confers a presumption of conformity with the essential health and safety requirements covered by the standard. Using a harmonized standard can provide a manufacturer with a direct route to demonstrating conformity but use of harmonized standards is voluntary. Other methods can be used to demonstrate compliance with the essential health and safety requirements.
- **Harmonized standards for noise emission measurement:** A range of noise emission measurement methods has been standardized to facilitate practical measurement on a wide range of machine types, sizes, etc. The standard for the most convenient acoustic environment can be used. 'Engineering grade' accuracy is preferred. Standards such as these, applicable to a wide range of machine types and classes, are sometimes referred to as type-B standards. Basic measurement standards for noise emission include:
  - ISO 3740 series for the determination of sound power level by sound pressure measurements.

- ISO 9614 for the determination of sound power level by sound intensity measurements.
- ISO 11200 series for the determination of emission sound pressure level at the workstation(s).
- **Harmonized Standards for particular machines or groups of machines:** Most machine classes have machine safety standards dealing with detailed safety requirements of that particular machine or group of machines. These machine specific standards are sometimes referred to as type-C standards.
- **Noise test code:** A noise test code describes a procedure for the measurement of noise emissions for a specific machine or machine type. It describes the operating and mounting conditions of the machine during measurement and the measurement methods to be used. It also describes the form and method for declaring the noise emission values. Noise test codes can be incorporated in machine-specific safety standards (C-type standard), or can be separate standards. Measurement methods are normally described by reference to a general noise emission measurement standard (B-type standard).

2.2 For manufacturers whose machinery is also covered by the Noise Emission in the Environment by Equipment for Use Outdoors Directive 2000/14/EC (referred to as the Outdoor Equipment Directive or OED in this guide), you will also need to be familiar with the following terms:

- **Measured sound power level:** A sound power level determined either from a single machine representative for the type of equipment or from the average of a number of machines.
- **Guaranteed sound power level:** Takes account of the variations (uncertainties) in several measured sound power levels due to production variations and measurement procedures such that a guaranteed sound power level is calculated that will not be exceeded. The manufacturer, or his authorized representative established in the Community, has to demonstrate and provide evidence in technical documentation that the guaranteed sound power level is not exceeded.
- **Permissible sound power level:** This is a limit value placed on the sound power level for some types of machinery, which must not be exceeded. If exceeded machinery may not be placed on the market. The OED has defined permissible sound power levels (limits) for 22 types of equipment.

### 3. Manufacturers' duties under Machinery Directive 2006/42/EC

3.1 The MD establishes essential health and safety requirements (EHSRs) for machinery hazards including general and specific requirements regarding noise. This guide concentrates on your duty to report the noise generated by your machinery – EHSR 1.7.4.2(u) and, where machines are also covered by the OED, how the two Directives interface. Your duties with regard to noise include -

- EHSR 1.5.8 Noise **This guide assumes that you have already designed and constructed your machinery in such a way that noise is minimized in accordance with EHSR 1.5.8 Reduction of noise.** Guidance on designing low noise machinery and equipment is given in EN ISO 11688-1 [5]; EN ISO 11689 [6] provides guidance on comparing and evaluating noise emission data for a particular family, type or group of machinery.
- EHSR 1.7.4.2 Contents of instructions
  - EHSR 1.7.4.2 (j) Installation and assembly for reducing noise and vibration

- EHSR 1.7.4.2 (k) Training of operators
- EHSR 1.7.4.2 (l) Information about residual risks
- EHSR 1.7.4.2 (m) Information on protective measures including PPE
- EHSR 1.7.4.2 (r) Maintenance and preventative maintenance measures
- EHSR 1.7.4.3 Sales literature

***Reporting airborne noise emissions - EHSR 1.7.4.2 (u)***

- 3.2 You are required to provide information in the instructions on airborne noise emission – this is called the noise emission declaration and it has two main purposes:
- To help users choose machinery with reduced noise emission.
  - To provide information useful for the risk assessment, which the employer is required to carry out according to Directive 2003/10/EC on the exposure of workers to the risks arising from noise.
- 3.3 You will need to provide information on three different noise emission quantities – either in the form of numerical values or a statement confirming that the noise emission does not exceed specified levels. The declared noise emission quantities are:
- The A-weighted emission sound pressure level produced by machinery at its workstation(s).
    - The emission sound pressure level is determined using an appropriate test code, whether or not the machinery is considered noisy.
    - If the measured value does not exceed 70 dB(A), you must state this in the instructions.
    - If the measured value exceeds 70 dB(A), you must include the measured value in the instructions.
  - The peak C-weighted instantaneous sound pressure value at workstation(s).
    - The value is relevant for machinery that emits strongly impulsive noise, for example drop hammer, nail gun.
    - You only need to include this value in the instructions if the measured value exceeds 130 dB(C).
  - The A-weighted sound power level emitted by the machinery.
    - You have to measure and include the sound power level in the instructions if the A-weighted emission sound pressure level at any of the workstations exceeds 80 dB(A).
- 3.4 You need to provide uncertainty data, K, associated with the emission sound pressure level(s) and sound power level. You are not expected to provide uncertainty data for peak sound pressure levels. Guidance on determining uncertainty data is given in the relevant noise test codes.
- 3.5 If your machinery is within the scope of the Outdoor Equipment Directive, you must determine the guaranteed sound power level in accordance with the method specified in that Directive. This will be your declared sound power level and, in this case, it is required regardless of the value of the emission sound pressure level. **You must also declare the emission sound pressure level and the peak sound pressure level in accordance with the MD.**
- 3.6 Instructions provided with machinery may also need to include information on noise control measures and personal protective equipment (hearing protection), which is designed to

reduce the risks associated with noise. Machinery safety standards may indicate what information should be provided.

#### **4. Manufacturers' duties under the Outdoor Equipment Directive 2000/14/EC (OED)**

4.1 The OED lays down provisions relating to noise for 58 types of machine. Detailed information is provided in guidance [7], which includes:

- A list of the machinery to which the Directive applies.
- Flow charts which show the steps you need to follow to place compliant machinery on the market.

4.2 If your machinery comes under the OED you must determine the guaranteed sound power level by taking account of the variations (uncertainties) in measured sound power levels.

4.3 The OED specifies:

- the way sound power levels are to be measured (using standards EN ISO 3744:1995 and EN ISO 3746:1995 and not their more recent revisions).
- machine specific information on measurement method, mounting and operating conditions during noise tests.

A few noise test codes harmonized for the MD include a method for measuring sound power level that differs from that specified by the OED. The method specified in the OED applies for determining sound power for reporting in the instruction manual.

4.4 For some types of machinery the guaranteed sound power level must not exceed the permissible sound power level specified in the OED. These limits are defined in the Directive.

4.5 The relationship between the OED and the MD means that for machinery covered by both Directives you must:

- Indicate the emission sound pressure level and, if over 130 dB(C), the peak sound pressure level at the workstation(s) in the instructions according to the MD.
- Indicate the guaranteed sound power level in the instructions and label the guaranteed sound power level on the machine as indicated in the OED.

#### **5. Determining noise emission using in-house technical and acoustics expertise**

5.1 You will need to determine noise emission values specified in EHSR 1.7.4.2 (u). You are encouraged to use the appropriate noise test code to determine the noise emission values for your machine.

5.2 The appropriate noise test code is often included in or referenced from the machine safety standard. If not, a list of harmonized standards can be found at [http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/machinery/index\\_en.htm](http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/machinery/index_en.htm) (English language version).

5.3 If you cannot identify the appropriate noise test code, seek advice from your manufacturer's association or your national standards committee.

5.4 The noise test code should specify the test environment, instrumentation standards, installation and operation of the machinery during noise tests, methods used to determine emission sound pressure level at the workstation(s) and sound power level (unless the required method is specified in the Outdoor Equipment Directive), measurement uncertainty, and information to be reported. The noise measurement details may be

defined within the noise test code or by reference to appropriate noise emission measurement standards.

- 5.5 There may be practical or technical reasons that prevent you from fulfilling all the requirements of the harmonized standard. Where this is the case, your test report (to appear on your technical file) should state, for example 'that measurements have been conducted in conformity with the requirements of the standard, except for .....' and clearly identify the discrepancies. In this case, the term "full conformity" must not be stated or implied.
- 5.6 All safety standards should have a section on *noise emission declaration and verification* within the section on *information for use*. These will specify what information you need to provide with regard to the noise generated by your machinery and additional information on safety measures, for example hearing protection requirements.
- 5.7 The declared emission sound pressure level at the workstation is key information to help the user determine the likelihood of risk from noise for their intended application of the machine. Therefore, the operating conditions specified in a noise test code should be representative of a typical use of the machine that gives rise to noise in the upper part of the range of noise emission.
- 5.8 Some current noise test codes are better at representing the noise emission of some machines in a class than others. A few test codes specify operating conditions that result in unrealistic noise emission values. For example, when drafting the noise test code, under load may have been considered economically unrealistic or only possible when the machine is installed at the purchaser's premises.
- 5.9 Peak instantaneous sound pressure values above 130 dB(C) are unusual. Some machines have been found to produce peak noise above the declaration threshold when the noise test code does not provide advice on how to report peak noise. Determining the uncertainty of peak noise can be difficult. Where no other guidance is available, it will usually be sufficient to report your highest measured peak instantaneous sound pressure value without an uncertainty value.
- 5.10 As a manufacturer, your experience gained when measuring noise emission should make you aware of when noise emission values obtained during standard tests under- or over-estimate the noise hazard associated with typical use. Where this is the case, you should supplement a potentially misleading noise declaration with, for example, a range of noise emission values for foreseeable or typical in-use operating conditions.
- 5.11 Noise test codes can be improved. You should report any practical difficulties or ambiguities in a standard to your national standards body. Such feedback from users of standards is always welcome and will be addressed when the standard comes up for review. Serious problems may trigger an immediate revision.
- 5.12 Where your declaration of the sound power level is to be in accordance with the OED you must follow the requirements and standards as dated in the references made in the OED. In case of difficulty, you should seek advice from your national authority.

***A harmonized noise test code does not exist for your machinery***

- 5.13 If there is no harmonized noise test code for your machinery, you will have to establish your own method of determining noise emission values. You will also have to demonstrate that the noise emission values obtained using your own test method meet the requirements of relevant EHSRs.
- 5.14 The noise test method you define should provide the noise emission values required by EHSR 1.7.4.2 (u) and described in sections 3.2 to 3.6 of this guide.
- 5.15 Consider the following when designing a noise test method:

- Identify a noise emission measurement standard which best suits the environment in which you carry out the noise measurements. You should try to achieve 'engineering grade' accuracy. Harmonized standards include ISO 11201 to 11205 for  $L_{pA}$ , ISO 3741 to ISO 3747 and the ISO 9614 Parts 1 to 3 for  $L_{WA}$ .
- Determine operating conditions that will result in noise emission values which are reproducible and representative of the foreseeable conditions of use of the machinery under test. If there is more than one foreseeable operating condition, you should include at least the operating condition that will give rise to noise emissions in the upper part of the range.
- Identify operator positions around your machinery where  $L_{pA}$  will be measured. Describe these positions in the instruction manual.
- If you are manufacturing a series of machinery, emission values can be obtained from a representative sample of technically comparable machinery. In the case of unique machinery, you must determine the emission values for each item supplied.
- For very large machinery, you can declare emission sound pressure levels at specified positions around the machinery in place of sound power level (except if covered by the OED). You will need to demonstrate why you have classed your machinery as very large. You can do this by considering the distribution and directivity of the sound sources on the machinery and the effort required to determine the sound power level.
- There may not be well-defined workstations for your machinery. Where this is the case, you must measure A-weighted sound pressure levels at a distance of 1 m from the surface of the machine and at a height of 1.6 m from the floor or access platform. Your noise declaration must include the position and maximum value of the measured noise emission value, that is, you must work out where noise around the machine is highest and report that highest value.
- Determine the uncertainty associated with your measurements of emission sound pressure level and sound power level, or follow the guidance provided in the noise emission measurement standards you have used.

### ***Drafting declared noise emission information for instructions***

- 5.16 Managing the data collected for the manual requires first, a careful compilation of the Technical File. Once the Technical File content is in place it becomes straightforward to select the information required for the Manual and the Technical Literature. The content of the Technical File is specified in Annex VII to Machinery Directive 2006/42/EC. Machinery covered by the OED must also have the technical documentation described in Annexes to that Directive.
- 5.17 You should use EN ISO 4871: 2009 [8] to help you draft a noise declaration from the noise emission values you have measured.
- 5.18 A harmonized safety standard to determine emission values should tell you what information needs to be included in the declaration and/or instructions. The noise emission declaration should include the following:
- Noise emission values as required by EHSR 1.7.4.2 (u) and associated uncertainty data.
  - Details of the measurement methods used and the operating conditions under which the noise emission values were obtained. If you follow a harmonised standard, a full reference to this standard (i.e. date and part number where appropriate) is sufficient to indicate these details. A full dated reference is essential to demonstrate traceability to



the measurement method and operating conditions used in the noise tests, which may change when the standard is revised.

- Where you have designed and followed your own noise test code, your noise declaration should also include the following:
  - Workstation position(s) at which measurements were made. If it was not possible to define workstation(s), information is required on the positions where emission sound pressure levels were obtained, including the location at which the maximum emission sound pressure level was measured.
  - Full references for all the standards used to define the measurement method, including the date of publication and/or part number.
  - A detailed description of the operating conditions under which noise emission values were determined. This information should include machine components in operation (in principle all significant sources of noise on the machine should have been in use during the tests, if this is not the case list which ones were not), key operating parameters, and a description of the load of the machine, for example, the material being processed.
- Additional information and/or warnings if the declared noise emission values do not adequately represent the emissions during the intended uses of the machinery. This information should help the user assess and manage the noise hazard, and could include provision of a range of emission sound pressure levels at the workstations during foreseeable or typical uses of the machine.
- Instructions for safe use, which may include providing information on hearing protection, low noise modes, noise control measures, residual risks (a noise emission declaration that represents the noise hazard during intended use covers this) and operator training. You should find guidance on what information should be provided in the relevant safety standard for your machinery, under *Information for Use*.

## 6. Employing a consultant

- 6.1 You may need to use a noise consultant from outside your company to help you measure noise emission values specified in EHSR 1.7.4.2 (u) and draft a noise declaration to appear in the instructions supplied with your machine.
- 6.2 You are ultimately responsible for demonstrating compliance and are therefore responsible for obtaining the required information from an external noise consultant. You need to make it very clear that the information provided by the noise consultant is required to help you fulfill your legal duties under the MD, and maybe the OED.
- 6.3 You should check that your noise consultant is familiar with the essential health and safety requirements related to noise and the information you need to fulfill your legal duties regarding noise.
- 6.4 You should ensure that your noise consultant is familiar with the contents of this guidance document.
- 6.5 You should work with your consultant to ensure that you get your required noise emission data. You may need to help the consultant identify - harmonized standards relevant to your machine, workstation position(s), operating conditions for which the machine is designed, key sources of noise in the machinery and noise control measures that you have applied to reduce the noise hazard.
- 6.6 You should ensure that the consultant provides you with all the information you need to draft the noise declaration and provide instructions for use on noise – see sections 5.14 to 5.16.

## 7. Common failings with regard to noise emission declarations and how to avoid them

- 7.1 This guide for manufacturers has been prepared after a European survey (referred to as NOMAD [7]) showed that the general state of compliance of machinery instructions with the noise-related requirements of the MD were very poor; 80% of the instructions assessed did not meet the noise requirements of the MD. The main failings were:
- Absent or incomplete declared noise emission values.
  - Absent or incomplete traceability to operating conditions or noise emission measurement methods for declared noise emission values.
  - Declared noise emission values were not credible either against stated operating conditions or as warnings of likely risk in real use.
- 7.2 Table 1 identifies some of the common failings and shows how they can be avoided.

**Table 1: Common failings and how to avoid them**

Common failing	Avoid by
Some required emission values are missing from the noise emission declaration	<p>For machinery covered by the Machinery Directive, you must provide the values of the A-weighted emission sound pressure level, <math>L_{pA}</math>, and the A-weighted sound power level, <math>L_{WA}</math>, if <math>L_{pA}</math> is more than 80 dB(A). You must report the peak C-weighted instantaneous sound pressure value <math>L_{pCpeak}</math> if it exceeds 130 dB(C).</p> <p>Where both the Machinery Directive and the OED apply, you must always provide <math>L_{pA}</math> (and <math>L_{pCpeak}</math>) values in accordance with the Machinery Directive and <math>L_{WA}</math> values in accordance with the OED (even if the value of <math>L_{pA}</math> is less than 80 dB(A)).</p>
Incorrect terminology is used to describe noise emission, for example noise emission, sound level, sound exposure	Use the full names of the terms described. For example, A-weighted emission sound pressure level, $L_{pA}$ , A-weighted sound power level, $L_{WA}$
Lack of traceability to noise emission measurement methods	<p>Following an appropriate machine specific standard or noise test code will usually give an adequate description of noise emission measurement methods through reference to other standards. If the machine specific standard permits use of several noise emission measurement standards, you must provide a full reference to the standards you have used including the date and part number. For example, <i>EN ISO 11202: 2010</i> or <i>EN ISO 3744: 2010</i>.</p> <p>If you are working to the OED you must use the standards specified in the Directive (some of which are now withdrawn), for example, <i>EN ISO 3744: 1995</i>.</p> <p>If you follow your own test code, you need to include details of the measurement positions, measurement equipment used, corrections made for the environment and the background noise, calculations made, how the machine was mounted and installed during tests, etc.</p>

<p>Lack of traceability to operating conditions during the test</p>	<p>Provide a full reference, including the date and the part number, to machine specific standards or noise test code used, for example, <i>EN ISO 60745-2-4: 2009</i>. The date is essential as the test code may have changed, for example moving from a no load test to a test carried out under load. The part number is essential because the operating conditions for the particular machine type will be included here.</p> <p>If you are working to the OED you must use standards specified in the Directive (some of which are no longer current), you should use, for example, ISO 6395: 1988 and not its replacement.</p> <p>If you follow your own test code, details of the operating conditions under which the machine was tested need to be recorded on the technical file. These operating conditions should be representative of the noisier operations of the machine in typical usage. The noise test report should be available to users, for example, from your website.</p>
<p>Machinery is tested under conditions which produce noise emission values that do not reflect typical in-use values. It is not sufficient to give a vague statement about the noise being higher than declared.</p>	<p>Where you know that declared noise emission values do not represent the actual noise emission levels when using the machine, you must provide additional information to help the user assess and manage the noise hazard. For example:</p> <ul style="list-style-type: none"> <li>• <i>The declared A-weighted emission sound pressure level at the workstation of 76 dB was obtained with machine running .... When it is used to..., the A-weighted emission sound pressure level at the workstation can be up to 10 dB higher.</i></li> </ul> <p>Note: When examples of this type are found, it is expected that formal objection actions will be made disputing harmonized standards.</p>

7.3 Where a declared noise emission does not represent the noise hazard and a harmonized standard providing a presumption of conformity with essential health and safety requirement 1.7.4.2(u) has been followed, it is expected that a Member State or the European Commission will make a formal objection action disputing that harmonized standard. Where the action is supported, the presumption of conformity gained by using the standard is likely to be removed. Where harmonization is withdrawn, guidance at paragraphs 5.11 to 5.13 above applies.

## 8. Examples of compliant noise information in user manuals

8.1 Examples of noise emissions to appear in the instructions in accordance with the MD are given below. The emission information must also be included in the technical sales literature.

### ***A-weighted emission sound pressure level less than or equal to 70 dB***

8.2 Machine ABC123

The emission sound pressure level at the operator's position is less than 70 dB(A) at any time during all foreseeable uses of this machine. The noise emission declaration has been obtained in accordance with harmonized standard EN xxx: 2010.

***A-weighted emission sound pressure level between 70 and 80 dB***

8.3 Machine ABC123

The emission sound pressure level at the operator's control panel is 76 dB(A), uncertainty  $K_{pA}$  is 1.5 dB(A). This was obtained in accordance with harmonized standard EN xxx: 2012 Annex A.

***A-weighted emission sound pressure greater than 80 dB***

8.4 Machine ABC123

Noise emission values were determined in accordance with EN xxx: 2004 + A2: 2009.

The A-weighted emission sound pressure level at the operator's position:  $L_{pA} = 86$  dB, associated uncertainty,  $K_{pA} = 3$  dB. The measurement standard selected from those referenced was EN ISO 11201: 1995

The A-weighted sound power level:  $L_{WA} = 97$  dB, associated uncertainty,  $K_{WA} = 3$  dB, measurement method selected from those referenced was EN ISO 3744: 1995

The information will enable the purchaser of the machine to make an evaluation of the noise hazard and compare the noise emissions when purchasing or hiring machinery.

***Machinery with emission sound pressure above 80 dB(A), for which both the Machinery Directive and the OED apply and the noise test code is known to underestimate noise emission in some real typical use***

8.5 Machine ABC123

The A-weighted emission sound pressure level at the operator's position,  $L_{pA}$ , is 87 dB(A), the uncertainty,  $K_{pA}$ , is 2 dB(A). This was obtained in accordance with the noise test code EN xxx: 2013. This noise emission declared according to this standard is useful to compare machines and for the user to make the risk assessment.

The A-weighted emission sound pressure level at the operator's position during "*insert here details of the specific operation condition of the machine not foreseen by the noise test code*" is likely to be about 96 dB.

The guaranteed A-weighted sound power level is 98 dB determined as defined by Item XY of the OED.

## 9. References

- [1] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- [2] Guide to application of the Machinery Directive 2006/42/EC, 2nd Edition, June 2010, General Editor Ian Fraser
- [3] Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)
- [4] Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors
- [5] EN ISO 11688-1: 2009 Acoustics – Recommended practice for the design of low-noise machinery and equipment. Part 1: Planning (ISO/TR 11688-1: 1995)
- [6] EN ISO 11689: 1996 Acoustics – Procedure for the comparison of noise-emission data from machinery and equipment (ISO 11689: 1996)
- [7] Guidelines for the application of the European Parliament and Council Directive 2000/14/EC on the approximation of laws of the Member States relating to the noise emission in the environment by equipment for use outdoors, Luxembourg Office for Official Publications of the European Communities, 2002, ISBN 92-828-6706-4
- [8] EN ISO 4871: 2009 Acoustics – Declaration and verification of noise emission values of machinery and equipment
- [9] Report on the NOMAD project – A survey of instructions supplied with machinery with respect to noise and the requirements of the Machinery Directive