



Machinery Noise – Legal requirements and standards

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Noise at work in the EU

- **An estimated one third of European workers (more than 60 million people) are exposed to noisy conditions for more than a quarter of their working time.**
- **Almost 40 million – an equivalent to the entire population of Spain – are exposed to noise for at least half of their working hours!**
- **Noise-induced hearing loss is still one of the most common occupational diseases in Europe, accounting for about one third of all work-related diseases.**
- **In Germany the yearly expenditures covering disability pensions and rehabilitation costs due to noise induced hearing loss is amounting to 170 million €.**

What are the reasons for the high noise levels ?

Noise emission from machines is the major cause of noise at

- **work places,**
- **in the environment.**



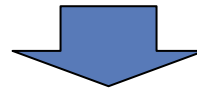
Noise emission of machines must be reduced



- **Noise reduction by design**
- **Transparent market to allow the purchase of quiet machines**

Regulatory strategy

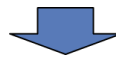
Idea: Using market forces



- **Manufacturers measure quantities characterising noise emission of machines according to International / European standards and declare the measured values**



- **Transparent market using clear information on the noise emission**



- **Machine buyers compare noise emission values provided by manufacturers and choose the quieter machine**

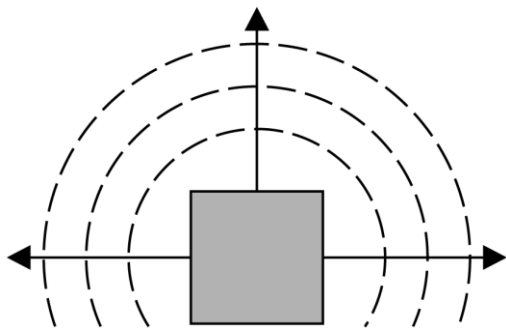


Less noise at work and in the environment

Responsibilities and key areas for noise reduction

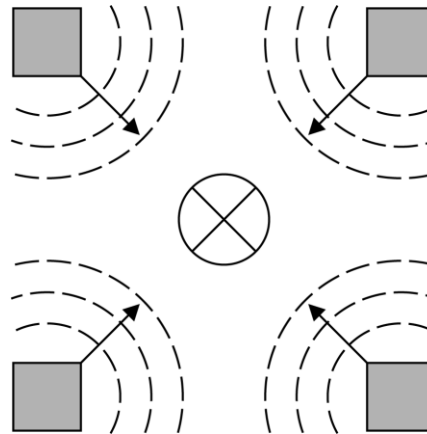
Machine manufacturer

Emission

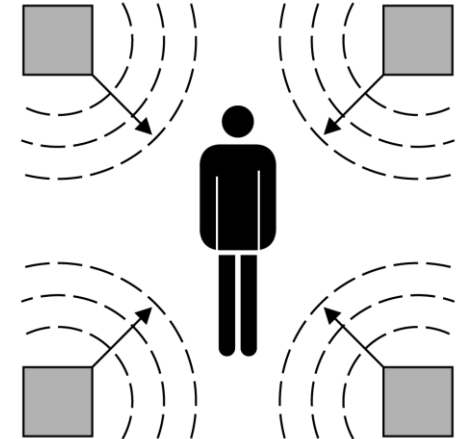


Employer

Immission



Exposure



EU Directives dealing with machinery noise

**Machinery Directive
2006/42/EC**

**"Outdoor"- Noise
Directive
2000/14/EC**

**Ecodesign Directive
2009/125/EC**

**Physical Agents
Noise Directive
2003/10/EC**

Two Pillars of EU Noise Control Legislation

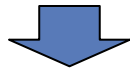
Lisbon Treaty establishing the EU

Article 114, 115

Free movement of goods,
Avoidance of trade barriers



New Approach Directives
setting essential safety and
health requirements (ESHRs)



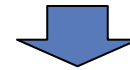
ESHRs complemented by
standards



**Machinery Directive
(2006/42/EC)**

Article 153

Health and Safety,
Minimum requirements



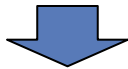
Directives to be adopted and if
wanted tightened on national
level



**Phys. Agents Noise
Directive (2003/10/EC)**

European Directives with influence on noise at work places

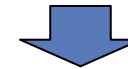
Product Safety



Machinery Directive

- noise reduction at source
- noise emission declaration
- instructions for safe use

Health and Safety at work places



Physical Agents, Noise Directive (2003/10/EC)

- exposure action values
- noise exposure limits
- risk assessment
- requirements on noise reduction and hearing surveillance

Noise reduction requirement Machinery Directive 2006/42/EC

Annex I, Chapter 1.5.8

Machinery must be designed and constructed in such a way that risks resulting from the emission of airborne noise are reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source.

The level of noise emission may be assessed with reference to comparative emission data for similar machinery.

Information on airborne noise emissions according to the MD 2006/42/EC

The **instructions and any sales literature** describing performance characteristics must contain, at least the following information on airborne noise emissions:

- A-weighted **emission sound pressure level** L_{pA} at workstations, where this exceeds 70 dB(A)
- **peak C-weighted instantaneous sound pressure** value L_{pCpeak} at workstations, where this exceeds 130 dB
- **sound power level** where the A-weighted emission sound pressure level at workstations exceeds 80 dB(A).
- the **uncertainties** surrounding these values must be specified

In addition there shall be instructions for safe use; instructions relating to installation and assembly for reducing noise and where appropriate an indication to use hearing protectors

Two complementary regulations

Manufacturers

**Machinery Directive
(2006/42/EC)**

- **minimization requirement**
 - noise reduction at source
 - construction of quiet machines
- **information about residual risks (noise emission)**



Quieter machinery on the market

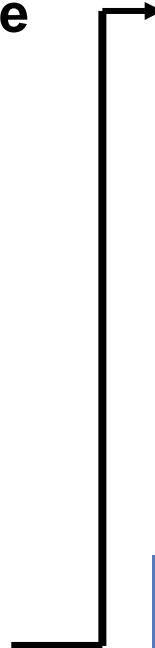
Employers

**Physical Agents Noise Directive
(2003/10/EC)**

- **Risk assessment e.g. by using emission values**
- **Choosing quiet machines and working methods**
- **Noise reduction on the propagation path (workspace) etc.**



Less noise exposure of employees



Two further EU Directives on products - Outdoor Noise Directive and Ecodesign Directive

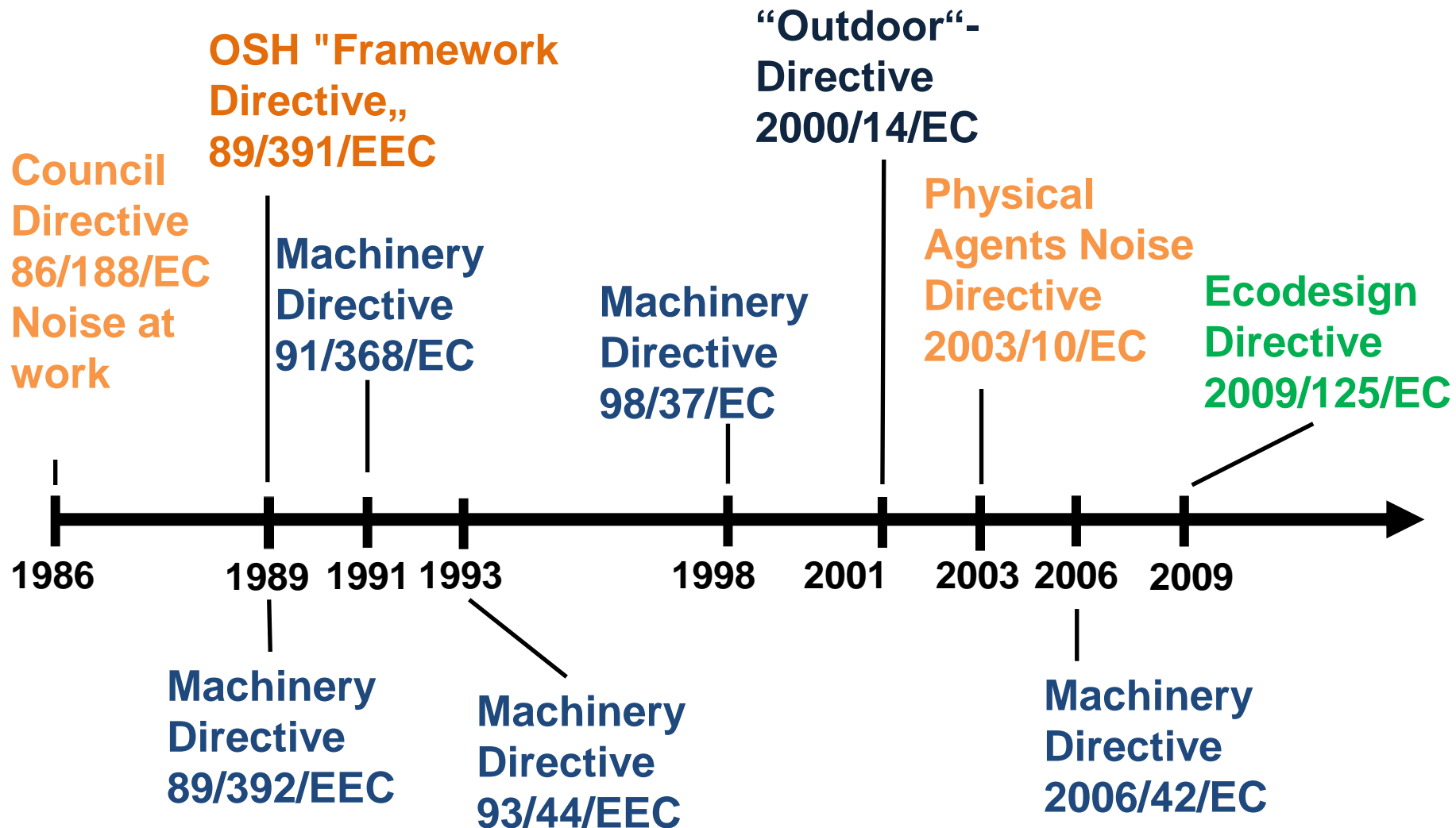
OUTDOOR Directive 2009/125/EC

- It deals solely with the noise emission of machines to be used outdoors,
- it sets limits on the noise emission, that means for the sound power level of about 22 machines such as leaf blowers and construction machines,
- it requires to mark (label) these and additional 39 machines with the guaranteed sound power level on the machine's case,
- It relies on parts of ISO 3744 but defines own operating and mounting conditions for the measurements,

ECODESIGN Directive 2009/125/EC

- It deals with ecodesign requirements for energy-related products,
- It primarily aims at reducing the energy consumption of products,
- It requires to provide the sound power level for some products like house hold appliances and computers,
- It sets benchmarks also for noise,
- It partly relies on harmonised standards,

Chronology of European Directives on Machinery Safety, Occupational Noise, Outdoor Noise, Ecodesign



Noise emission declaration according to the MD

Woodworking machine, tenoning machine, Typ 8/v

Declared **dual-number** - noise emission data – EN ISO 4871

	idling	operating
A- weighted sound power level, L_{WA} in dB re 1 pW uncertainty K_{WA}	96 2	100 2
A- weighted emission sound pressure level, L_{pA} , in dB re 20 μ Pa uncertainty K_{pA}	82 3	88 3

Data obtained according to noise test standard ISO 7960 using basic standards EN ISO 3744 and EN ISO 11204.

Noise emission declaration according to the OND

Chain saw with combustion engine, type TT 53

Declared **single/dual number** – noise emission data – **EN ISO 4871**

A - weighted guaranteed sound power level $L_{WA,d}$ in dB re 1 pW

Uncertainty K_{WA}

A – weighted emission sound pressure level, L_{pA} , in dB re 20 mPa

Uncertainty K_{pA}

Load

104

2

91

3

On a label and in the instructions

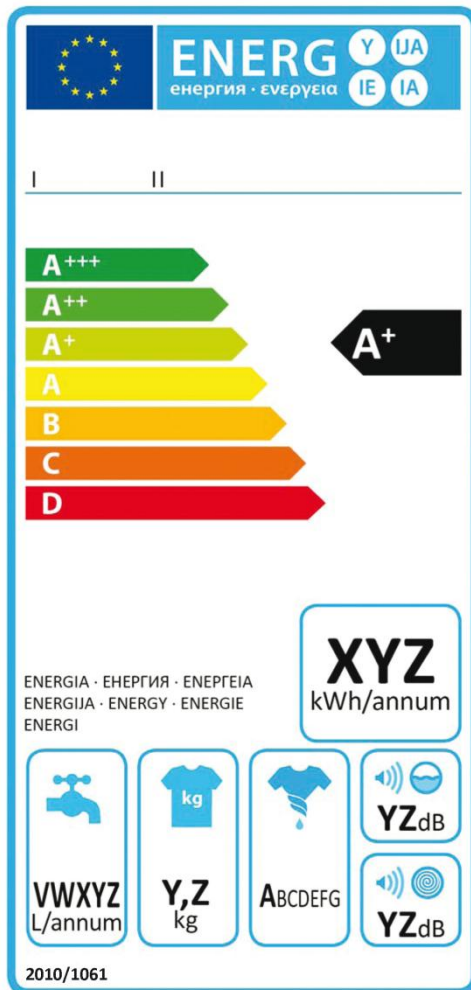


In the instructions

The values were determined according to 2000/14/EC and ISO 7182 by applying the basic standards EN ISO 3744 and EN ISO 11204.

Noise emission information according to the other Ecodesign Directive

EU energy efficiency label



Example:

Directive 2009/125/EC with regard to ecodesign requirements for **household washing machines** and of Commission Delegated Regulation (EU) No 1061/2010 supplementing Directive 2010/30/EU with regard to energy labelling of **household washing machines**

Standards help to comply with the MD, OND and ECODESIGN Directive

Noise reduction measures, measurement, declaration and verification methods are laid down in harmonised European standards listed in the OJEU.

Their application triggers the **presumption of conformity with the essential requirements of the MD.**

Outdoor Noise Dir. a partly exceptional Directive (Global approach Directive)

- The OND basically includes the different noise test codes with some exceptions, however, relies on the basic measurement method for the determination of the sound power level the EN ISO 3744.**
- C-standards about machines covered both by the MD and OND adopt these specifications for the determination of the sound power level and additionally specify the determination of the emission sound pressure level by using the operating and mounting conditions defined in the OND.**

Noise emission measurement standards

Basic standards for determining noise emission levels

ISO 3740 series for the determination of the sound power level by sound pressure measurements

ISO 9614 for the determination of the sound power level by sound intensity measurements

ISO 11200 series for the determination of the emission sound pressure level at workstation

Basic noise emission declaration and verification standard

ISO 4871 Declaration and verification of noise emission values of machinery and equipment

More than 800 machinery specific harmonised safety standards with noise test codes included or separate noise test codes

Benefit of using noise emission information

- **Selection of quiet machinery by the purchaser**
- **Information on the state of the art of noise reduction**
- **Improvement of the technical dialogue between the buyer and the supplier**
- **Noise exposure forecast**
- **High degree of transparency on the machinery market**
- **Point out comparatively quiet machines**
- **Incentive for the development of quiet machines**

**Quiet machines
increase competitiveness as
they are not only
reducing social costs
but also
economic costs!**