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## MACHINERY NOISE - THE DIRECTIVES

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### 1. INTRODUCTION

Since the introduction of a free Europe, member states have been obliged to accept legislation in the many forms issued as European Directives. Two areas are concerned with product standards and worker protection. This paper offers to untangle the relationships between directives in these two areas, emphasising those aspects which relate to noise.

### 2. TYPES OF DIRECTIVES

Directives considered in this paper fall into two main categories:-

- a) Product Standard Directives - to eliminate barriers to trade
- b) Health and Safety at Work Directives- worker protection

Initial Directives concerning Product Standards were issued under the Article 100 of the Treaty establishing the EEC (Treaty of Rome). A number of these relate to limiting noise emission, for example from construction plant and equipment; ie. Directive 84/533/EEC "The permissible sound power level of compressors".

In May 1985 Community Ministers agreed on a "New Approach to Technical Harmonisation and Standards" to remove barriers to trade. This "New Approach" was based on a series of Directives (Community Laws) giving "Essential Safety Requirements" (ESRs) which had to be met before the product can be placed on the market. Products meeting these ESRs could carry the CE mark and be marketed anywhere in the Community.

This "New Approach" to directives also removed the power of veto by member states at the voting stage. This was replaced by Qualified Majority Voting which speeds up the Directive making process.

In 1987 the Single European Act added a new Article 118A to the Treaty of Rome; this was to deal specifically with health and safety at work. The principal Directive introduced under this new Article was the Framework Directive (89/391/EEC) which served as an introduction of the measures to encourage improvements in the health and safety of workers at work.

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Another example of an Article 118A directive was the " Use of Personal Protective Equipment Directive " (89/656/EEC).

### 3. THE MACHINERY DIRECTIVE

The Machinery Directive 89/392/EEC was passed on the 1st of June 1989, and became United Kingdom legislation on the 1st of January 1993 as The Supply of Machinery ( Safety) Regulations 1992. To comply with these Regulations the following requirements must be met:-

- (a) the relevant machinery must satisfy the relevant essential health and safety requirements.
- (b) the appropriate conformity assessment procedure in respect of the relevant machinery must be carried out by the responsible person in accordance with one of the procedures described in the regulations .
- (c) the responsible person, at his election, has issued either -
  - (i) an EC declaration of conformity in accordance with regulations.
  - (ii) in the case of relevant machinery to which regulation 23 applies (machinery which cannot function independently) , a declaration of incorporation in accordance with that regulation.
- (d) except in the case of relevant machinery to which regulation 23 applies, the EC mark has been properly affixed by the responsible person to the relevant machinery in accordance with the appropriate regulation .
- (e) the relevant machinery is in fact safe.

The Essential Health and Safety Requirements (ESRs) are given in Schedule 3 of the Regulations and must be considered for all machines

Schedule 3 is divided into the following parts:-

Part 1- preliminary observations, principles of safety integration and general safety aspects.

The essential health and safety requirements are mandatory as long as the hazard exists for the machinery in question when it is used under the conditions foreseen by the manufacturer. All machinery must as far as possible be designed and constructed to meet the essential safety requirements.

Part 2 -additional requirements for agri-foodstuffs machinery, portable hand-held machinery and machinery for woodworking and similar materials.

Part 3- particular requirements for the hazards arising from mobility.

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Part 4- particular requirements for hazards associated with lifting-but not lifting people (this has been dealt with by a 2nd amending directive).

Part 5- requirements for underground working.

The requirements of the regulations in respect to **NOISE** are found in **Schedule 3** and are as follows:-

**a) Schedule 3 - 1.1.2- Principles of Safety Integration**

This section asks the manufacturer to identify the risks arising from the use of the machine and to take appropriate action to eliminate such risks that have been identified .

**b) Annex 1 - 1.5.8 - Design and construction**

"Machinery must be so designed and constructed 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 particularly at source."

**c) Annex 1 - 1.7.2 - Warning of residual risks.**

Where risks remain despite all the measures adopted ,the manufacturer must **provide** warnings of such possible risks which may not be normally evident in the normal use of the machine.

**e) Annex 1 - 1.7.4 - Instructions**

In sub paragraph (d) : Any sales literature describing the machinery must not contradict the instructions as regards any safety : it must give information regarding the airborne noise emissions referred to in sub paragraph (f).....

In sub paragraph (e) : Where necessary, the instructions must give the requirements relating to installation and assembly for reducing noise and vibration.....

In sub paragraph (f) : The instructions must give the following information concerning airborne noise emissions by the machinery, either the actual value or a value established on the basis of measurements made on identical machinery.

-Equivalent continuous A-weighted sound pressure level at the workstations, where this exceeds 70dB(A); where this level does not exceed 70dB(A), this fact must be stated.( ie. measurements must be made )

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- peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20Pa)
- sound power level emitted by the machinery where the equivalent continuous A-weighted sound pressure level at the workstations exceeds 85dB(A).
- In the case of very large machinery, instead of sound power level, the equivalent continuous sound pressure levels at specified positions around the machine may be indicated.
- Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery
- The manufacturers must indicate the operating conditions of the machinery during measurements and what methods have been used for the measurement.
- Where the workstations are undefined or cannot be defined, sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1.60 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated.

### 4. STANDARDS

To assist in compliance of the Supply of Machinery ( Safety ) Regulations a hierarchy of standards have either been produced or updated by CEN ( Comit e Europ een de Normalisation) These are :-

- a) **Type A standards (fundamental safety standards)** giving basic concepts, principles for design and general aspects that can be applied to all machinery.
- b) **Type B standards (group safety standards)** dealing with one safety aspect or one type of safety related device that can be used across a wide range of machinery.
  - Type B1 standards on particular safety aspects** e.g. safety distances, surface temperatures, noise.
  - Type B2 standards on safety related devices** e.g. two-hand controls interlocking devices, pressure sensitive devices, guards.
- c) **Type C standards (machine safety standards)** giving detailed safety requirements for a particular machine or group of machines.

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In relation to noise CEN has mandated ISO (International Organisation for Standardisation) to revise many of the existing measurement standards with a view to harmonising them to bring them in line with the requirements of the European Community.

**This harmonisation programme deals with standards for the measurement of sound power, sound pressure and sound intensity. These are 'B' type standards and are as follows ; -**

-Sound pressure ISO 6081 series revised as ISO 11200 series -to be EN 31200 series.( In parts 31200-31204).

-Sound Power ISO 3740 series revised as ISO 3740 series -to be EN 23740 series. ( In parts 23740-23747).

-Sound Intensity being drafted as ISO 9614-1 and ISO 9614-2 will be EN 29614-1 and EN 29614-2.

These revisions are being carried out by a CEN Technical Committee (CEN TC 211) which is overseen in the United Kingdom by a BSI committee ( EPC 1/4 ).

To assist the 'C' standard makers in dealing with the noise aspects of the regulations TC 211 have also prepared two other documents which are 'B' type standards :-

a) Safety of Machinery-Guidance for the Drafting of the Noise Clauses of Safety Standards..

b) ACOUSTICS -Noise Emitted by Machinery and Equipment-Rules for the Drafting and Presentation of a NOISE TEST CODE. This was numbered ISO 12001 and will become EN 32001 as a European standard.

Working groups within ISO on behalf of CEN are also preparing a number of standards as follows :-

-Design of Low Noise Machines

-Design of Low Noise Workshops

-Design of Noise Control Devices

These standards will assist the 'C' standard makers and those involved in design/ manufacture and measurement of machines to be sold within the Common Market.

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The work in drafting "C" type standards is being carried out by many organisations especially those directly related to the type of machinery being addressed and it is hoped that the relevant industries will have a large input into their formulation.

A "C" standard should address the noise clauses in the safety standards and also include a harmonised test procedure or a Noise Test Code which should indicate :-

- a) How the machine is to be tested
- b) What grade of "B" standard to use
- c) The operating and mounting conditions to use during the test.
- d) It should also indicate how the measured results are to be declared and verified.

### 5. The NOISE AT WORK DIRECTIVE 86/188/EEC

This Directive was implemented into UK legislation through The Noise at Work Regulations 1989. Whilst the primary objective of the Regulations is assessment and control of noise in the workplace, **Regulation 12** is specifically aimed at suppliers of machinery and equipment for them to provide information relating to the noise emission of their products.

This applies where the use of the machine or equipment is likely to cause any employee to be exposed to the first action level or above or to the peak action level or above. ( First action level - 85dB(A)  $L_{EPd}$ , Peak Action Level - 200 Pascals or 140 dB)

Information collected and supplied in accordance with the requirements of the Supply of Machinery (Safety) Regulations can be used for this purpose provided the Standard Test (Noise Test Code Conditions) reflects the way in which the machine is used in practice ( However this may not be the case in all situations ).

This should also assist the USER in assessing the effect of the new machine when brought into use in a new workplace or when placing the machine in an existing workplace.

### 6. PHYSICAL AGENTS DIRECTIVE (PROPOSED)

The European Commission is proposing that the European Community should adopt a new directive made under Article 118A of The Treaty of Rome, which deals with the protection of workers from exposure to Physical Agents ( of which noise is one ), which is established under the Directive 89/391/EEC Framework Directive.

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If adopted, the UK would have to produce new legislation to implement the directive. The proposal outlines various levels of exposure to noise as well as Peak levels noise at each of the new Action levels.

These are shown in the table below along side the levels contained in the existing Noise at Work Regulations 1989.

NAW 1989	Lex (8hr)	Proposed Physical Agents Directive
N/A	60dB(A)	Sleeping Areas
N/A	75dB(A)	Threshold Level (Risk and Information)
N/A	80dB(A)	Health Surveillance ( Optional) PPE (Optional) ,Provision of Information
Peak 112Pa (135dB)		
1st Action Level	85dB(A)	Training, Assessments, Control measures, Records of Assessments, Workers to be provided with results of assessments
Peak 112Pa ( 135dB)		
2nd Action Level	90dB(A)	Compulsory wearing of PPE and Health Surveillance under the Supervision of a Doctor, Marking of Hazardous Areas
Peak 200 Pa (140 dB)		
N/A	105dB(A)	Declare exposed persons to Authorities
Peak 600Pa (150dB)		

Table indicating the relationship between the existing Noise at Work regulations and the Proposed Physical Agents Directive

**The information in the table above will only apply if the proposed Directive is adopted as written**

In addition to the levels indicated above there is a general article with specific relevance to machinery. This is Article 12 it states :-

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The design of workplaces and work stations, the choice of work equipment and the choice of working and production methods referred to in Article 6(2)(d) of Directive 89/391/EEC (The Machinery Directive) shall take into account any emissions of physical agents which may result therefrom. Pursuant to the provisions of Article 3 of the Directive 89/655/EEC (Use of Work Equipment Directive - which in UK legislation is The Provision and use of Work Equipment Regulations 1992), work equipment shall be chosen by taking into account its emissions, which must be compared with those from similar equipment.

The EC Economic and Social Committee discussed this proposed Directive in June 1993 and it was forwarded to the Council of Ministers and published in September 1993. The European Parliament is due to discuss the proposal in March 1994 and an opinion is waited. It is felt that it is unlikely that there will be rapid progress in moving the proposals through the political process.

The position of the UK Government is one of opposition based on the following points:

- a) There is no evidence that the EC needs to legislate to meet the risks in the proposal, as they are adequately covered elsewhere.
- b) the EC impact assessment failed to:
  - identify the health benefits anticipated by the introduction of new controls.
  - satisfy the commitment in the existing directive on noise at work, for improvements to be made on the experience gained in the application of that Directive.
- c) the proposal would impose substantial costs on industry without the commensurate benefits.

At present it is by no means clear what is likely to happen with the above proposal.

### 7. HEALTH AND SAFETY AT WORK etc. ACT 1974

Whilst discussing the areas of legislation surrounding machinery noise Section 6 of the HSW Act must not be forgotten. Section 6 outlines the general duties of designers, manufacturers, importers or suppliers as regards articles and substances for use at work.

Section 6(a) asks "to ensure, so far as reasonably practicable, that the article is so designed and constructed that it will be safe and without risks to health ....."

As noise is considered a risk to health (hearing), consideration must be given as to what level of noise emission from a particular machine will be damaging to a person's hearing. The design and construction of such an item of machinery should attempt to eliminate such



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excessive noise emissions and produce a product which is free from this particular risk to the persons health.

### 7. CONCLUSION

Directives which are present implemented by national legislation in the form of Regulations can have a profound effect on industry both by having to apply them as in Article 118A for the protection of workers, or as Article 100 and 100A for the goods many of the industries produce.

With respect to Noise it can be seen that the drive within Europe is to lower noise emission levels and hence noise exposure levels for the workplace and the employee.

The former being driven by the Machinery Directive , ie. to lower levels from new machines and equipment, and the latter by a reduction in the actions levels allowed in Directives covering the worker.

Care must be taken when using the appropriate directive and it must be appreciated that product standard directives Article 100 and 100A refer to the **emission only** from a piece machinery or equipment, whilst the worker protective directives Article 118A apply to **exposures in the workplace**.

### 8. BIBLIOGRAPHY

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6. Noise at Work Directive - 86/188/EEC - 1986
7. Noise at Work Regulations - 1989
8. Proposed Physical Agents Directive - 1993
9. Use of Work Equipment Directive - 89/655/EEC - 1989
10. Provision and Use of Work Equipment Regulations - 1992
11. Health and Safety at Work etc. Act - 1974

