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Proposal for a

COUNCIL DIRECTIVE

amending Directive 79/113/EEC on the approximation of the laws of the Member States relating to the determination of the noise emission of construction plant and equipment

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(submitted to the Council by the Commission)

INTRODUCTION

This proposal for a Directive was drawn up under the European Communities' Environment Action Programme[1] and Social Programme[2], all of which underline the need for action on the noise emitted by noise sources in the environment and at the workplace. The need to approximate legislation on construction plant and equipment is also stressed in the Supplement of 21 May 1973[3] included by the Council, on a proposal from the Commission, in the general programme of 28 May 1969 to remove technical barriers to trade in industrial products.[4]

The proposal also follows up the statement made by the Ministers of the Environment when they adopted Directive 79/113/EEC on the approximation of the laws of the Member States relating to the determination of the noise emission of construction plant and equipment. They stated that the purpose of the Directive was to enable a limit to be fixed, in separate Directives, to the sound emission level of machines and, if necessary, to the sound pressure level at the operator's position. All the technical particulars relating to measurements at the operator's position would be entered in an annex to the separate Directives for each machine in question.

BACKGROUND

The main aim of the package of proposals for directives presented to the Council on noise from construction plant and equipment[6] was to protect the environment. It became clear during preparation of these proposals, particularly the proposal on noise emitted by jackhammers, that the noise level at the operator's position also had to be determined.

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1) OJ No 112, 20 December 1973 and OJ No C 139, 13 June 1977
2) OJ No C 165, 11 July 1978
3) OJ No C 38, 5 June 1973
4) OJ No C 76, 17 June 1969
5) OJ No L 33, 8 February 1979
6) OJ No C 82, 14 April 1975

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Noise-induced hearing loss is a major problem in our industrialized society. A large number of studies[1] have demonstrated that the probability of permanent hearing damage caused by noise is directly related to the noise level and length of exposure of the person concerned. It is hence essential, in order to protect the hearing of operators of construction plant and equipment, to know the value of the parameters for measuring their exposure to noise.

This method makes it possible to measure the noise generated by machines at the operator's position, the noise level being one of these parameters. The length of exposure can be calculated from the work performed by the machine.

LEGISLATION IN THE MEMBER STATES

There are at present general laws in the Member States on the health and safety of workers and occupational hygiene and safety. They generally stipulate that noise and vibrations must not exceed a level compatible with the health of employees exposed. Every effort must be made to reduce excessive noise and/or vibration at source. If noise cannot be sufficiently reduced by means of available technology, employers must in theory provide employees with individual protective equipment or reduce their length of exposure to the noise by means of work-breaks, for instance.

These ideas are often couched in different terms from one Member State to another; the legislation may be more or less coercive and may include practical instructions on steps to be taken or measuring methods to be used. The fact that these practical instructions and measuring methods also differ from one Member State to another may have a direct effect on the establishment or functioning of the common market.

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1) Damage and annoyance caused by noise EUR 5398e/1975

There are no special laws in the Member States on construction plant and equipment, which is covered by general legislation.

LEGAL BASIS

Because the general provisions differ from one Member State to another, they may give rise to barriers to trade when they affect products. This proposal for a Directive supplements Directive 79/113/EEC. The Annex to that Directive lays down the technical methods of determining the sound power level of construction equipment, which is essential for assessing the acoustic impact of a machine on the environment. This proposal adds a second Annex to the Directive laying down the method of determining the noise level of machines at the operator's position.

The Commission therefore presents this proposal for a Directive under Article 100 of the EEC Treaty.

CONSULTATION OF THE PARTIES CONCERNED

In preparing this Directive the Commission held extensive meetings with the parties concerned, i.e. the Advisory Committee on Safety, Hygiene and Health Protection at Work, the CECE (Committee for European Construction Equipment (manufacturers)) and the International European Construction Federation (entrepreneurs/users).

INTERNATIONAL COOPERATION

During its work on this proposal, the Commission liaised with the ISO/TC 43 Secretariat, which is preparing an international standard for the measurement of noise perceived by operators.

The aim of this cooperation is to arrive at a uniform international solution to this problem, to facilitate world trade.

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(submitted to the Council by the Commission)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas provisions the purpose of which is to limit noise at positions of work and methods of measuring noise differ from one Member State to another, which means that, when applied to construction plant, they constitute a barrier to trade in such plant, whereas such provisions should therefore be approximated;

Whereas Directive 79/113/EEC[1] seeks to harmonize methods of measuring the sound levels of construction plant and equipment;

Whereas on the occasion of the Council meeting held on 18 and 19 December 1978, the Ministers for the Environment stated that the technical provisions for the measurement of noise at the operator's position should appear in the Annexes to the separate Directive for each machine in question;

Whereas all the general technical provisions relating to the determination of the noise emissions of construction plant and equipment should be consolidated in one Directive;

HAS ADOPTED THIS DIRECTIVE:

[1] OJ No L 33, 8.2.1978.

Article 1

Directive 79/113/EEC is hereby amended as follows:

1. Article 2 shall be replaced by the following:

"Article 2

1. Where a separate Directive provides for the determination of the noise emission of the construction plant and equipment referred to in Article 1, such emission shall be determined in accordance with the requirements of Annex I.

2. Where a separate Directive provides for the determination of the noise emission at operator's positions of the construction plant and equipment referred to in Article 1, such emission shall be determined in accordance with the requirements of Annex II.

2. The Annex shall be amended as follows:

(a) The heading "Annex" shall be replaced by the heading "Annex I".

(b) Paragraphs 4.2 and 6.5 shall be deleted.

3. An Annex II shall be added, the text of which is annexed to this Directive.

Article 2

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive within eighteen months of its notification. They shall forthwith inform the Commission thereof.

2. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field governed by this Directive.

Article 3

This Directive is addressed to the Member States.

Done at Brussels,

.../...

ANNEX

"ANNEX II

METHOD OF MEASURING AIRBORNE NOISE GENERATED BY MACHINES AT THE OPERATOR'S POSITION

1. AIM

The aim of this method is to determine the noise emitted at the positions of the operators of the machines defined in Article 1 of this Directive.

The values obtained by this method may be used as the data for setting limits to noise emission from macines at the operators' positions. Save as otherwise indicated, these values include all tolerances.

This method is applicable unless separate directives lay down different or supplementary provisions taking into account the particular characteristics of certain types of machine.

2. SCOPE

2.1. Type of noise

This method is applicable to all types of noise generated at the positions of operators machines.

2.2. Type of test

This method shall be used when tests, e.g. type-approval tests, are made on machines with one or more operators' positions to determine the sound emission level. It is not applicable for measurements to determine directly the level of an operator's exposure at his position.

2.3. Type of machine

This method is suitable for all machines whether there are one or more operators' positions.

For the purposes of this method, the situation near the machine of a person who is not involved in its operation is not considered as an operator's position.

.../...

3. DEFINITIONS

3.1. Operator is any person whose presence is necessary for the normal operation of the machine.

3.2. Equivalent continuous A-weighted sound pressure level $L_{Aeq}(T)$, expressed in dB, is the quadratic mean with respect to time of the sound pressure over the measurement interval and is obtained from the following formula :

$$L_{Aeq}(T) = 10 \log_{10} \frac{1}{T} \int_0^T \left(\frac{p(t)}{p_o}\right)_A^2 dt$$

where

$p(t)$ is the sound pressure

p_o is a reference pressure of 20 pa

T is the measurement time.

4. CRITERION TO BE USED TO EXPRESS RESULTS

The acoustic criterion for the positions of operators of construction plant and equipment is expressed by the equivalent continuous A-weighted sound pressure level $L_{Aeq}(T)$.

5. MEASURING INSTRUMENTS

The specifications laid down in Chapter 5 of Annex I are to be used, with the extra requirement added to paragraph 5.3, that the external diameter of the microphone must not exceed 13 mm.

6. OPERATORS

The separate Directives specify the positions which operators are to occupy during the tests.

6.1. Clothing specifications

During the measurements, operators must wear normal working clothes and the equipment (e.g. safety helmet) normally prescribed for the operator's position in question.

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6.2. Height specifications

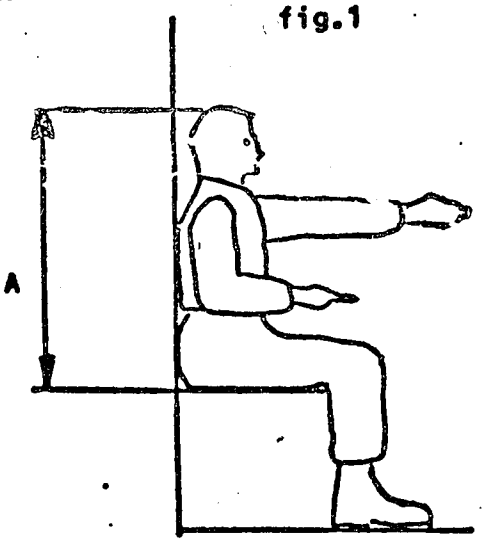
6.2.1. Standing operator

The operator's height (wearing shoes) must be between 1.62 m and 1.87 m.

6.2.2. Seated operator

The height of an operator when seated must be between 0.85 m and 1.02 m, as shown in figure 1.

fig.1



A = height of operator when seated

7. MICROPHONE LOCATIONS

7.1. General

For each operator's position, only one microphone location is laid down; it is specified in the annexes to the separate Directives. General guidance for microphone location is given in paragraphs 7.2 and 7.3.

7.2. Microphone location with no operator present

7.2.1. At the operator's position (standing operator)

The microphone is placed at the position normally occupied by the operator, at a height of 1.60 m above the surface on which the operator stands.

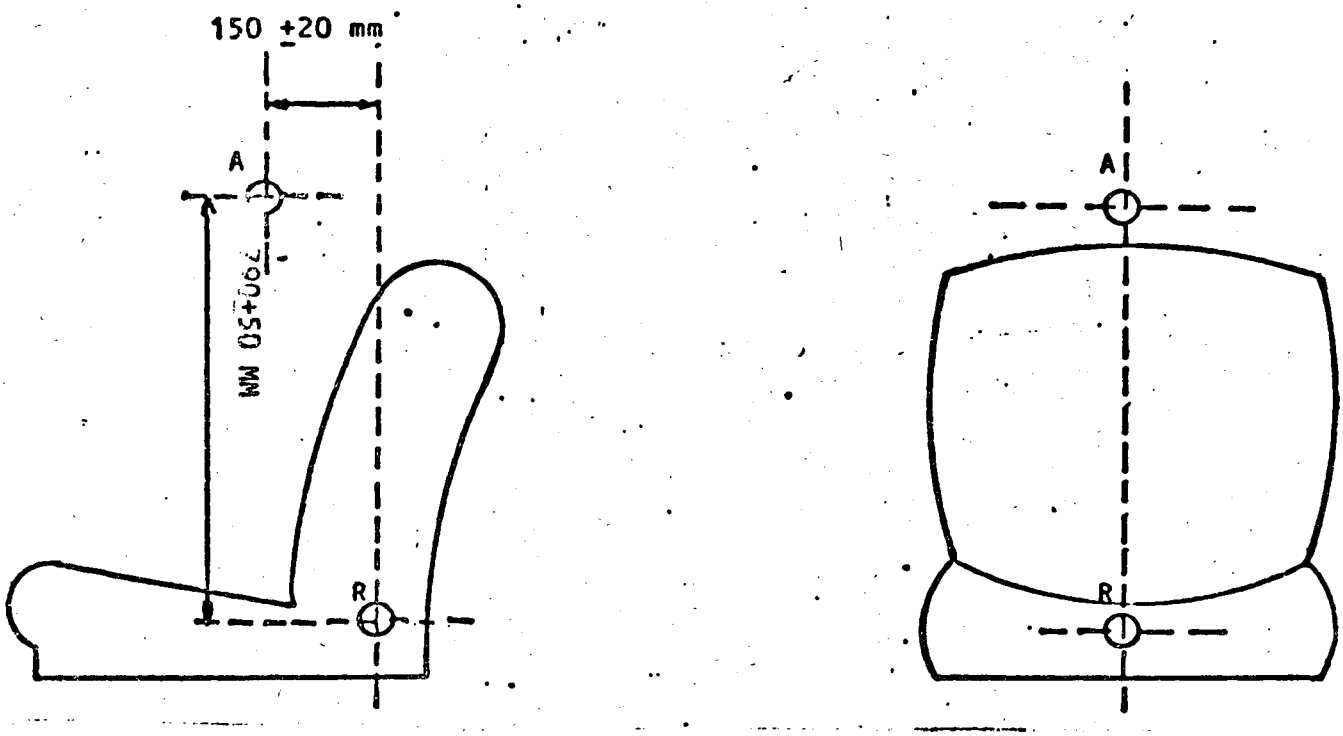
.../...

7.2.2. At the operator's position (seated operator)

The microphone is placed at point A in Figure 2.

LOCATION OF THE MICROPHONE WHEN THE OPERATOR IS SEATED fig. 2

(measurements with no operator present)



A is the microphone position

R is the seat reference point as defined by ISO 5353 : 1978. The point is to be determined with the seat placed as near as possible to the mid-point of its horizontal and vertical adjustment range, the suspension being depressed until the seat reaches the mid-point of its dynamic range.

7.3. Microphone locations with operator present

The microphone is placed : (a) to the side of the head where $L_{Aeq}(T)$ is highest, and (b) at 200 ± 20 mm from the median plane of the head and in line with the eyes.

.../...

Note : To facilitate the placing of the microphone, it can conveniently be mounted on a frame or the helmet or a shoulder harness worn by the operator.

For measurements when the operator is seated, the seat must be adjusted to allow the operator to reach the machine controls comfortably.

8. ENVIRONMENTAL CONDITIONS

8.1. Measuring site

The machine is to be installed in conditions identical to those specified in paragraph 6.3 of Annex I.

8.2. Background noise

Background noise at each microphone location must be at least 10 dB(A) lower than the noise level emitted by the machine.

9. INSTALLATION AND OPERATING CONDITIONS

9.1. General

The precise conditions required for installing and operating the machine are laid down in the annexes to the separate Directives.

These conditions must be typical either of normal use or of a prescribed mode of use which will cause the noise generated at the operator's position to be similar to that emitted under normal use (see paragraph 6.2.2 of Annex I).

These conditions must, if possible, be identified to those laid down in the Annexes to the separate Directives on the determination of the sound power level of the machine.

9.2. Operation of machines with adjustable features (such as windows that may be opened)

9.2.1. If the machine has any adjustable features which, although not directly associated with its operation, will affect the value of $L_{Aeq}(T)$, separate tests must be carried out and a report made thereon. Precise details of features to be taken into consideration will be included in the annexes to the separate Directives.

9.2.2. A machine having an operator's cab with doors and windows that may be opened during normal use must :

.../...

a) if not fitted with full air-conditioning equipment, be tested in both open and closed conditions. Where the windows are closed, any air-circulating fan or pressurizing system must operate at maximum rate. The highest $L_{Aeq}(T)$ values must be used for both open and closed conditions;

b) if fitted with full air-conditioning equipment, be tested with the windows closed and the air-circulating fan or fans operating at their maximum rate.

9.2.3. The warming-up of the machine (temperature, oil, etc.) must be carried out in accordance with the manufacturer's instructions. If the machine is fitted with fuel tanks, these must not be more than half full.

10. MEASUREMENTS AND CALCULATION OF RESULTS

10.1. Measurement interval T

The measurement interval T at each microphone location is to be specified in the separate Directives. As a guide, it must be at least 15 seconds or, in the case of a work cycle, equal to the duration of a whole number of work cycles.

10.2. Determination of the equivalent continuous A-weighted sound pressure level ($L_{Aeq}(T)$)

This level is obtained either directly by integrating $p^2(t)$ or by sampling of the pressure level L_{pA}.

10.2.1. By integrating $p(t)^2$

$L_{Aeq}(T)$ may be directly obtained by integrating the square of the A-weighted sound pressure during a period equal to the measurement interval in accordance with the formula given in paragraph 3.2. Digital or analog integration may be used, e.g. with an integrator sound level meter.

10.2.2. By using the A-weighted sound pressure levels L_{pA}

The sound pressure level L_{pA} is measured by means of an instrument defined in paragraph 5.2 of Annex I.

If a sound level meter is used, a number of readings are taken at each measuring point at a sampling rate of $\frac{1}{\Delta t}$ of the measurement interval T.

In this case, $L_{Aeq}(T)$ is obtained from the following formula :

$$L_{Aeq}(T) = 10 \log \frac{1}{10^N} \sum_{i=1}^{N} 10^{0.1 L_{pAi}}$$

.../...

where :

$N = \frac{T}{\Delta t}$ is the number of samples

L_{pAi} is the A-weighted sound pressure level of the sample i.

Note : the t value chosen will affect the degree of precision of the result. This value may have to be defined in the annexes to the separate Directives.

10.3. Measurement of ambient conditions

The requirements are laid down in paragraph 7.1.3 of Annex I.

10.4. Corrections to be made to measurements

10.4.1. Ambient conditions (temperature, humidity, altitude, etc.)

The requirements are laid down in paragraph 8.6.3 of Annex I.

Additional corrections may have to be made to take account of the pressure of a pressurized cab.

10.4.2. Background noise

No correction is to be made for background noise.

11. IMPULSIVE NOISE

The question of whether and in what way impulsive noise ought to be specially measured at the operator's position will be considered by the Committee on Adaptation to Technical Progress.

12. DATA TO BE RECORDED

The test report must contain the data needed to measure noise at operators' positions in accordance with Section 10 of Annex I.

Additional information must be given on the layout of the operator's positio in particular the cab, during the measurements.

The report must also confirm that the equivalent continuous A-weighted sound pressure levels $L_{Aeq}(T)$ were obtained strictly according to this measurement method and the separate Directives.

Note : If the measurements at the operator's position are carried out when the sound pressure level of the machine is determined, the data must be recorded in a single report.