II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 7 December 1981

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

(81/1051/EEC)

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 (1),

Having regard to the opinion of the Economic and Social Committee (2),

Whereas provisions, the purpose of which is to limit noise at operators' 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 (3) 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 Directives for each machine in question;

Whereas all the general technical provisions required to determine the noise emission of construction plant and equipment should be consolidated in one Directive,

HAS ADOPTED THIS DIRECTIVE:

Article 1

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

1. Article 1 (3) shall be replaced by the following:

   '3. Agricultural and forestry tractors are excluded from the scope of this Directive.'

2. Article 2 is hereby repealed and shall be replaced by the following: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 the operator's position(s) of the construction plant and equipment referred to in Article 1, such emission shall be determined in accordance with the requirements of Annex II.'

(1) OJ No C 147, 16. 6. 1980, p. 129.
(2) OJ No C 182, 21. 7. 1980, p. 7.
(3) OJ No L 33, 8. 2. 1979, p. 15.

3. Article 4 (1) shall be replaced by the following:

'1. A Committee on the Adaptation to Technical Progress of the Directives on the determination of the noise emissions of construction plant and equipment, hereinafter called "the Committee", is hereby set up; it shall consist of representatives of the Member States and be chaired by a Commission representative.'

4. The Annex is hereby amended as follows:

(a) the heading 'Annex' shall be replaced by 'Annex I';

(b) Sections 4.2 and 6.5 shall be deleted.

5. 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 18 months of its notification and 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 covered by this Directive.

Article 3

This Directive is addressed to the Member States.

Done at Brussels, 7 December 1981.

For the Council

The President

CARRINGTON

ANNEX

'ANNEX II

METHOD OF DETERMINING AIRBORNE NOISE EMITTED TO THE OPERATOR'S POSITION(S) BY MACHINES USED OUTDOORS

1. AIM

The aim of this method is to determine the noise emitted to the operator's position(s) by all categories of machines, parts of machines or installations used outdoors, hereinafter called 'machine', and defined in Article 1 of the Directive.

It is not applicable for measurements to determine directly the level of an operator's exposure at his post.

The values obtained by this method represent the data that make it possible to determine the equivalent continuous sound pressure level emitted by machines to the operator's position(s). Save as otherwise indicated, these values include all tolerances.

The operator's position(s) of the various machines is (are) specified in the separate Directives.

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

2. SCOPE

2.1. **Type of noise**

This method is applicable to all types of noise emitted to the operator's position(s) by machines.

2.2. **Type of machine**

This method is applicable to all machines with one or more operator's positions.

3. DEFINITIONS

3.1. **Sound pressure level L_{pA}**

See Section 3.1 in Annex I.

3.2. **Equivalent continuous sound pressure level L_{Aeq} (t_1, t_2)**

The equivalent continuous sound pressure level L_{Aeq} (t_1, t_2) is obtained by applying the A-weighting as defined in IEC publication 179, 1973, second edition, to the equivalent continuous sound pressure level L_{eq} (t_1, t_2) defined below. This weighting is obtained *inter alia* by using the A-weighting filter in the measuring system.

The equivalent continuous sound pressure level for a limited period between intervals t_1 and t_2, L_{eq} (t_1, t_2), expressed in decibels, of a noise at a given point is defined by:

$$L_{eq}(t_1, t_2) = 10 \log_{10} \left(\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} \frac{p^2(t)}{p_o^2} \, dt \right)$$

$$= 10 \log_{10} \left(\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} 10^{\frac{L_p(t)}{10}} \, dt \right)$$

where:

$p(t)$	is the instantaneous value of the sound pressure at this point, expressed in Pa;
p_o	is the reference sound pressure, equivalent to 20 μPa;
$L_p(t)$	is the sound pressure level at a given time at that point, expressed in dB;
t_1 and t_2	are the points indicating respectively the beginning and end of the reference period determining the L_{eq};
$t_2 - t_1$	is the measurement interval.

4. CRITERION TO BE USED TO EXPRESS RESULTS

The acoustic criterion for the operator's position(s) of machines is expressed by the equivalent continuous A-weighted sound pressure level L_{Aeq} (t_1, t_2).

5. MEASURING INSTRUMENTS

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

6. PRESENCE OF THE OPERATOR

The separate Directives specify whether the operator should be present or not during the tests.

6.1. **Clothing specifications**

When he is present during the measurements, the operator must wear normal working clothes and all the equipment (e.g. safety helmet) normally prescribed for the post in question.

6.2. **Height specifications of the operator(s)**

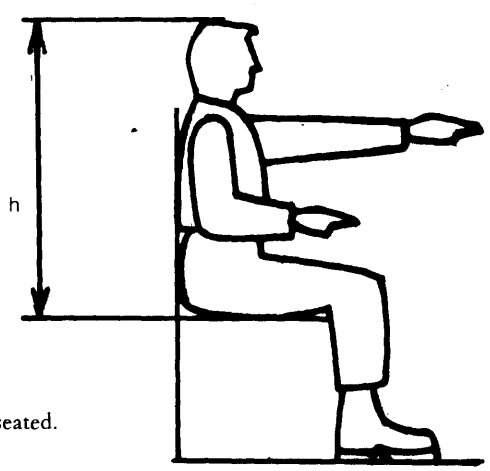
6.2.1. *Standing operator*

The height of the operator (wearing shoes) must be 1·75 ± 0·05 m.

6.2.2. *Seated operator*

The height of the operator(s) when seated (h) must be 0·93 ± 0·05 m, as shown in Figure 1:

Figure 1



h = height of operator when seated.

7. MICROPHONE LOCATIONS

7.1. **General**

The microphone locations are determined by the separate Directives. General guidance for their positioning is given in Sections 7.2 and 7.3.

7.2. **Microphone location with no operator present**

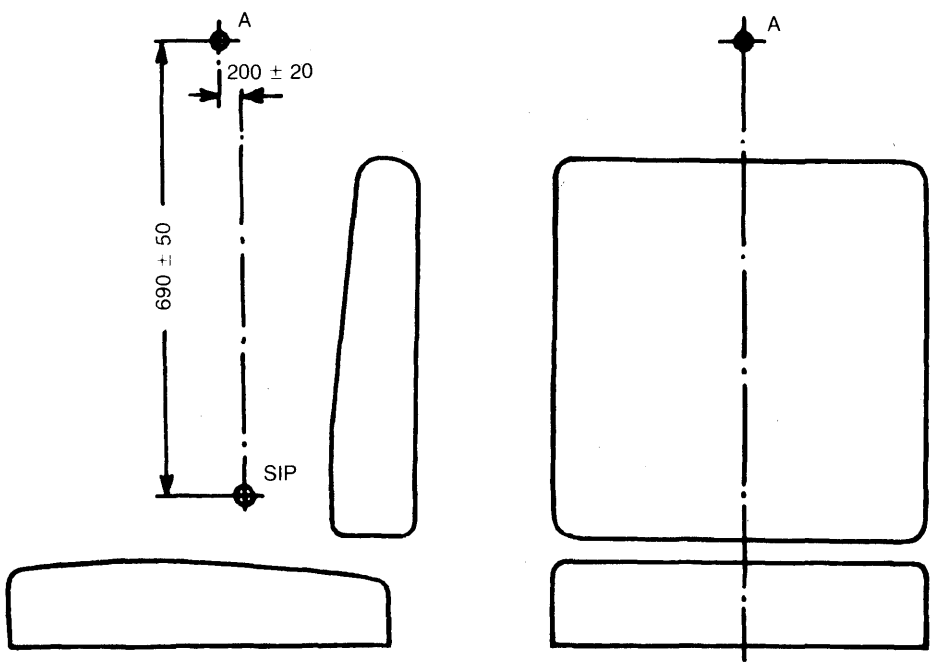
7.2.1. *At the operator's position where he is usually in a standing position*

The microphone is placed at the position normally occupied by the operator(s), at a height of 1·60 ± 0·25 m above the level on which the operator(s) stand(s).

7.2.2. *At the operator's position where he is usually in a seated position*

The microphone is placed at point A as shown in Figure 2.

Figure 2



A is the microphone position.

SIP is the seat reference point as defined by ISO 5353, 1978. This 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 at 200 ± 20 mm from the median plane of the head and in line with the eyes and to the side of the head where the L_{Aeq} (t_1, t_2) is highest.

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 must, as far as possible, be installed in conditions identical to those specified in Section 6.3 of Annex I.

8.2. **Background noise**

Background noise at each measuring point must be at least 10 dB (A) lower than the noise emitted by the machine.

9. INSTALLATION AND OPERATING CONDITIONS

9.1. **General**

The precise conditions required for installing and operating the machines are laid down in the Annexes to the corresponding separate Directives.

These conditions must, as far as possible, be the same as those laid down in the Annexes to the separate Directives on 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, may affect the value of L_{Aeq} (t_1, t_2) separate sound tests must be carried out and covered in the report referred to in Section 12.

Details of the adjustable features to be taken into consideration are given in the Annexes to the separate Directives.

9.2.2. In the case of a machine with an operator's cab, the following rules should in principle be observed:

(a) if the cab is fitted with and air-conditioning and/or ventilating device, the measurements are carried out with the doors and windows closed and the air-conditioning and/or ventilating devices operating at maximum speed;

(b) if the cab is so designed that it may also be used with the doors and windows open and it has no air-conditioning and/or ventilating system, the measurements are carried out first with the doors and windows closed, then open; the higher of the two figures obtained is the one to be used.

10. MEASUREMENTS AND CALCULATION OF RESULTS

10.1. **Measurement interval T ($= t_2 - t_1$)**

The measurement interval T at each measuring point is to be specified in the separate Directives. It must in principle be at least 15 seconds; in the case of a work cycle, it must be 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_1, t_2))**

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_1, t_2) may be directly obtained by integrating the square of the A-weighted sound pressure during a period equal to $t_2 - t_1$ in accordance with the formula given in Section 3.2.

Digital or analogue integration may be used, e.g. with an integrating 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 Section 5.2 of Annex I.

The number of measurements and the measurement interval will be determined for each type of machine in the separate Directives.

10.3. **Measurement of disturbances**

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

10.4. **Corrections to be made to measurements**

10.4.1. *Disturbances (temperature, humidity, altitude, etc.)*

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

10.4.2. *Background noise*

No correction is to be made for background noise.

11. NOISE OF AN IMPULSIVE CHARACTER

(Section 11 is being revised to take account of technical progress, the final text will be introduced by the Committee on Adaptation to Technical Progress.)

12. DATA TO BE RECORDED

The report must contain the necessary data relating to the measurement of noise at operator's positions in accordance with Section 10 of Annex I.

Additional information must be given on the layout of the operator's position during the measurements.

The report must also confirm that the equivalent continuous A-weighted sound pressure levels L_{Aeq} (t_1, t_2) were obtained strictly according to this method of measurement 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.'