COUNCIL DIRECTIVE

of 17 September 1984

on the approximation of the laws of the Member States relating to the permissible sound power level of tower cranes

(84/534/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 (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas the 1973 and 1977 action programmes of the European Communities on the environment (4) reflect the importance of the problem of noise nuisance and in particular the need for action to regulate the worst noise sources;

Whereas disparity between the measures already applicable or in preparation in the various Member States concerning the limitation of the sound emission level of tower cranes creates unequal conditions of competition and thereby directly affects the functioning of the common market; whereas it is, therefore, appropriate to proceed in that field with the approximation of laws for which Article 100 of the Treaty provides;

Whereas Directive 84/532/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to common provisions for construction plant and equipment (5) laid down, in particular, the procedure for EEC type-examination; whereas it is necessary, pursuant to that Directive, to prescribe the harmonized requirements which each category of equipment must satisfy;

Whereas Council Directive 79/113/EEC of 19 December 1978 on the approximation of the laws of the Member States relating to the measurement of the sound level of construction plant and equipment (6), as amended by Council Directive 81/1051/EEC (7), laid down, in particular, the method which should be used for establishing the acoustic criteria for tower cranes;

Whereas owing to the effect of the noise emitted by tower cranes on the environment and, more particularly, on human well-being and health, it is necessary to bring about a progressive and appreciable reduction in the permissible sound power level of tower cranes;

Whereas it is important to be able to regulate the use of tower cranes in certain areas considered to be particularly sensitive so as to limit the nuisance caused by the airborne noise emitted by such tower cranes;

Whereas technical provisions must be adapted rapidly to technical advances; whereas it is necessary to this end to provide for the application of the procedure set out in Article 5 of Directive 79/113/EEC,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. This Directive applies to the permissible sound power level of tower cranes used to perform work on civil engineering and building sites.

2. By way of derogation from the provisions of Article 1 (3) of Directive 84/532/EEC, hereinafter referred to as the 'framework Directive', this Directive is regarded as a separate Directive within the meaning of Article 3 (2) of the aforementioned Directive.

Article 2

For the purposes of this Directive, 'tower crane' means a power-driven lifting appliance which:

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(1) OJ No C 54, 8. 3. 1976, p. 63.
(2) OJ No C 125, 8. 6. 1976, p. 43.
(3) OJ No C 197, 23. 8. 1976, p. 11.
(4) OJ No C 112, 20. 12. 1973, p. 1 and OJ No C 139, 13. 6. 1977, p. 1
(5) See page 111 of this Official Journal.
(6) OJ No L 33, 8. 2. 1979, p. 15.
(7) OJ No L 376, 30. 12. 1981, p. 49.

— when in use, consists of a vertical tower with a jib fitted to the upper part,

— is equipped with means for raising and lowering suspended loads and for horizontal movement of such loads by variation of load-lifting radius and/or by slewing and/or by travelling of the complete appliance,

— is designed to be able to be removed when the work for which it was erected has been completed.

Article 3

1. The approved bodies shall issue an EEC type-examination certificate for each type of tower crane for which the sound power level of airborne noise, measured under the conditions set out in Annex I to Council Directive 79/113/EEC, as amended by Annex I to this Directive, does not exceed the permissible sound power levels given in the following table:

	Permissible sound power level in dB(A)/1 pW as from	
	18 months after notification of the Directive	5 years after notification of the Directive
Lifting mechanism	102	100
Energy generator	Levels laid down in the Directive on power generators according to the power generated	
Assembly comprising lifting mechanism and energy generator	Highest values of the two components	

2. All applications for an EEC type-examination certificate in respect of the permissible sound power level of a type of tower crane shall be accompanied by an information document conforming to the model shown in Annex II.

3. For each type of tower crane which it certifies, the approved body shall complete all the sections of the EEC type-examination certificate conforming to the model given in Annex III to the framework Directive.

4. The period of validity of EEC type-examination certificates shall be limited to five years. This may be extended by five years provided that application is made no sooner than 12 months before the expiry of the first five-year period.

However, at the end of a period of five years from notification of the Directive, EEC type-examination certificates shall cease to be valid unless they were issued for tower cranes which comply with the maximum level entering into force on that date.

5. By way of derogation from Article 19 (1) of the framework Directive, the advantages provided for in that Article shall, after a period of 5 $^1/_2$ years from notification of the Directive, no longer be available for any type of tower crane supplied with a certificate of conformity drawn up on the basis of a type-examination certificate relating to the figures in the first period; the period of validity shall accordingly be shown on the certificates of conformity concerned.

6. For every tower crane built in conformity with the type certified by EEC type-examination, the manufacturer shall complete a certificate of conformity, the model of which is given in Annex IV to the framework Directive in the columns relating to the EEC type-examination certificate.

7. Each tower crane built in accordance with the type certified by EEC-type-examination shall bear a clear and permanent mark indicating the sound power level in dB(A) with reference to 1 pW guaranteed by the manufacturer, and determined as laid down in Annex I to Directive 79/113/EEC, as amended by Annex I to this Directive, together with the symbol ε (epsilon). The model for this mark is given in Annex III to this Directive.

Article 4

The provisions of this Directive shall not affect the Member States' entitlement to limit, with due observance of the Treaty, and in particular Articles 30 to 36 thereof, the level of noise at the operator's position for tower cranes, provided that this does not involve an obligation to adapt tower cranes which comply with this Directive to different emission standards within the meaning of Annex I to the Directive.

Article 5

Member States may take measures to regulate the use of tower cranes in areas which they consider sensitive.

Article 6

Verification of the conformity of production models with the type examined, as provided for in Article 12 of the framework Directive, shall be carried out using the technical procedure stipulated in Annex IV.

Article 7

The Council shall act unanimously, within 18 months, on the proposal for a reduction in the noise levels which the Commission will present as soon as possible and no later than five years after the adoption of this Directive.

Article 8

The following shall be adopted in accordance with the procedure laid down in Article 5 of Directive 79/113/EEC, as amended by Directive 81/1051/EEC:

— the technical procedure in Annex IV for checking the conformity of production models with the type examined,

— the amendments necessary to adapt the requirements of the Annexes to technical progress.

Article 9

Member States shall take all the necessary measures to ensure that tower cranes as defined in Article 2 cannot be placed on the market unless they satisfy the provisions of this Directive and of the framework Directive.

Article 10

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive on the expiry of a period of 18 months as of its notification (1) 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 governed by this Directive.

Article 11

This Directive is addressed to the Member States.

Done at Brussels, 17 September 1984.

For the Council

The President

P. BARRY

(1) This Directive was notified to the Member States on 26 September 1984.

ANNEX I

METHOD OF MEASURING AIRBORNE NOISE EMITTED BY TOWER CRANES

SCOPE

This measurement method is applicable to tower cranes. It specifies the test procedures for use in determining the sound power level of such equipment for the purpose of EEC type-examination and testing as to conformity.

These technical procedures comply with the requirements of Annex I to Directive 79/113/EEC.

All the sections in Annex I to Directive 79/113/EEC shall apply to tower cranes, subject to the following amendments:

4. CRITERIA TO BE USED FOR EXPRESSING RESULTS

(a) Where the tower crane is powered by an independent energy source, the acoustic criterion for the environment of the tower crane shall be the sound power level of the lifting mechanism.

(b) Where the energy source is incorporated in the crane, the acoustic criterion for the environment of the tower crane shall be either:

— the sound power levels of the energy generator and the lifting mechanism when these two devices are not combined,

or

— the sound power level of the energy generator and the lifting mechanism combined.

6. MEASURING CONDITIONS

6.2. **Operation of the sound source during measurement.**

Where the lifting mechanism is situated on the jib stay, the noise measurements may be carried out with the mechanism either mounted on the jib stay or fixed to the ground.

Where the energy source powering the crane is independent from it (electrical power generator or mains, or hydraulic or pneumatic power source), only the noise level of the mechanism winch shall be measured.

Where the energy generator is attached to the crane, the energy generator and the lifting mechanism shall be measured separately if they are not combined.

Where these two devices are combined, the measurements shall refer to the whole assembly.

For noise measurements, the lifting mechanism and the energy generator shall be installed and used in accordance with the manufacturer's instructions. The energy generator incorporated in the crane shall operate at the full power rating indicated by the manufacturer. The lifting mechanism shall operate as indicated in 6.2.1 and 6.2.2 in the raising and lowering modes.

6.2.1. *A test of the sound source free of load (idling).*

The lifting mechanism shall be operating free of load, with its drum turning at the rotation speed corresponding to the maximum hook-displacement speed. This speed shall be specified by the manufacturer.

6.2.2. *Tests carried out under load.*

The lifting mechanism shall operate with a cable tension at the drum corresponding to the maximum load (for the minimum radius) with the hook moving at the maximum speed:

The load and speed figures shall be specified by the manufacturer.

The speed shall be checked during the test.

Note: The greater of the two sound power levels (raising or lowering) shall be used for the results of the test.

6.3. **Measuring site.**

6.3.1. *Measurements of the lifting mechanism.*

In order to carry out the noise measurements, the lifting mechanism shall be mounted in one of the ways described below. The position used shall be described in the test report.

(a) Lifting mechanism at ground level.

The mounted crane shall be placed on a flat reflecting surface of concrete or non-porous asphalt.

(b) Lifting mechanism on the jib stay.

The lifting mechanism shall be at least 12 m above the ground.

(c) Lifting mechanism fixed to the ground.

The lifting mechanism shall be fixed to a flat and reflecting surface of concrete or non-porous asphalt.

6.3.2. *Measurement of the energy generator.*

Where the energy generator is attached to the crane, whether or not it is linked to the lifting mechanism, the crane shall be positioned on a flat reflecting surface of concrete or non-porous asphalt.

6.4. **Measuring surface, measuring distance, location and number of measuring points.**

6.4.1. *Measuring surface, measuring distance.*

(a) Measurements carried out at ground-level.

The measuring surface to be used for the ground-level test shall be a hemisphere (figures 1 and 2). The centre of the hemisphere shall be the vertical projection on the flat reflecting surface of the geometric centre of the frame of the lifting mechanism of the energy generator or of the two combined.

The radius shall be:

— 4 m, where the greatest dimension of the lifting mechanism, the energy generator or the combined unit is not more than 1,50 m,

— 10 m, where the greatest dimension of the lifting mechanism, the energy generator or the combined unit is more than 1,50 m.

(b) Measurements carried out at jib-height.

Where the lifting mechanism is located on the jib stay, the measurement surface shall be a sphere of 4 m radius, the centre of which shall coincide with the geometrical centre of the winch (figure 3).

6.4.2. *Location and number of measuring points.*

(a) Measurements at ground-level.

For noise measurements at ground-level, there shall be six measuring points, namely points 2, 4, 6, 8, 10, 12, positioned in accordance with section 6.4.2.2 of Annex I to Directive 79/113/EEC.

For the measurements of the lifting mechanism or of the mechanism linked to the energy generator, the X-axis of the system of coordinates of the measuring points shall be parallel to the axis of the drum of the lifting mechanism.

(b) Measurement at jib-height.

Where the lifting mechanism is located on the jib stay of the crane, the measuring points shall be as follows, as illustrated in figure 3.

Four measuring points on a horizontal plane passing through the geometric centre of the mechanism (H = h/2)

with $L = \frac{r}{\sqrt{2}} = 2{,}80$ m

and $d = 2{,}80\ \text{m} - \frac{l}{2}$

r = radius of the measuring surface = 4 m;
L = half-distance between two consecutive measuring points;
l = length of mechanism (along axis of jib);
b = width of mechanism;
h = height of mechanism;
d = distance between microphone support and mechanism in direction of jib.

The other two measuring points shall be located at the points of intersection of the sphere and the vertical line passing through the geometric centre of the mechanism.

Note:

Measurement may be easier if a device is used to check from ground level the position and calibration of the microphones. For the purposes of the measurement, this device shall be mounted on the lifting mechanism, together with the microphones.

7. MEASUREMENTS

7.1.1. Only the background noise shall be taken into account for correction purposes.

Note:

At the time of measurements to determine the sound power level of the lifting mechanism, every precaution shall be taken to ensure that the parasitic noise produced directly or indirectly by the energy generator does not influence the measurements of the noise of the lifting mechanism.

7.1.5. *Presence of obstacles.*

A visual check in a circular zone with a radius of three times that of the measurement hemisphere and the centre of which coincides with the centre of that hemisphere shall be adequate to ensure that the provisions of the third subparagraph of section 6.3 of Annex I to Directive 79/113/EEC are complied with.

7.2. **Measurement of the sound pressure level L_{pA}.**

The sound pressure levels of the lifting mechanism and/or the energy generator shall be measured as specified in the first subparagraph of section 7.2 of Annex I to Directive 79/113/EEC.

The sound pressure levels L_{pA} shall be measured at least three times. If the sound power levels obtained in any two of these measurements do not differ by more than 1 dB, no further measurements shall be taken; otherwise, measurements shall continue until the results of two or three such measurements do not differ by more than 1 dB. The root mean square of the readings within 1 dB of one another obtained in this way shall be taken as the measurement result.

For the measurement of the sound pressure levels of the lifting mechanism, the measuring period shall be $(t_r + t_f)$ seconds:

— t_r being the period in seconds prior to activation of the brake, with the lifting mechanism operating in the manner specified in 6.2.1 and 6.2.2. For the purposes of the tests, $t_r = 3$ seconds,

— t_f being the period in seconds between the moment when the brake is activated and that when the hook comes to a complete standstill.

If an integrator is used, the integration period shall be equal to $(t_r + t_f)$ seconds.

8. USE OF RESULTS

For the purposes of applying the provisions of this Directive, the sound power level adopted for tower cranes shall be the highest level of those calculated in accordance with 7.2 in respect of the tests carried out free of load and under load, as provided for in 6.2.

8.1.1. *Root mean square value at a measuring point.*

The root mean square value at a measuring point i shall be given by:

$$L_{pi} = 10 \log_{10} \frac{1}{t_r + t_f} (10^{0,1} L_{1i} \cdot t_r + 10^{0,1} L_{2i} \cdot t_f);$$

t_f — given in 7.2;

t_r — given in 7.2;

L_{1i} = sound pressure level at measuring point i during time t_r as indicated in 7.2;

L_{2i} = sound pressure level at measuring point i during braking time t_f as indicated in 7.2.

8.2. Not applicable.

8.3. **Calculation of area S of the measuring surface.**

(a) Where the measuring surface is a hemisphere

The area S of the measuring surface in m^2 shall be as follows:

$$S = 2 \pi r^2$$

Note: The surface level $10 \log_{10} \frac{S}{S_o}$ shall be 20 dB where r = 4 m;
28 dB where r = 10 m.

(b) Where the measuring surface is a sphere

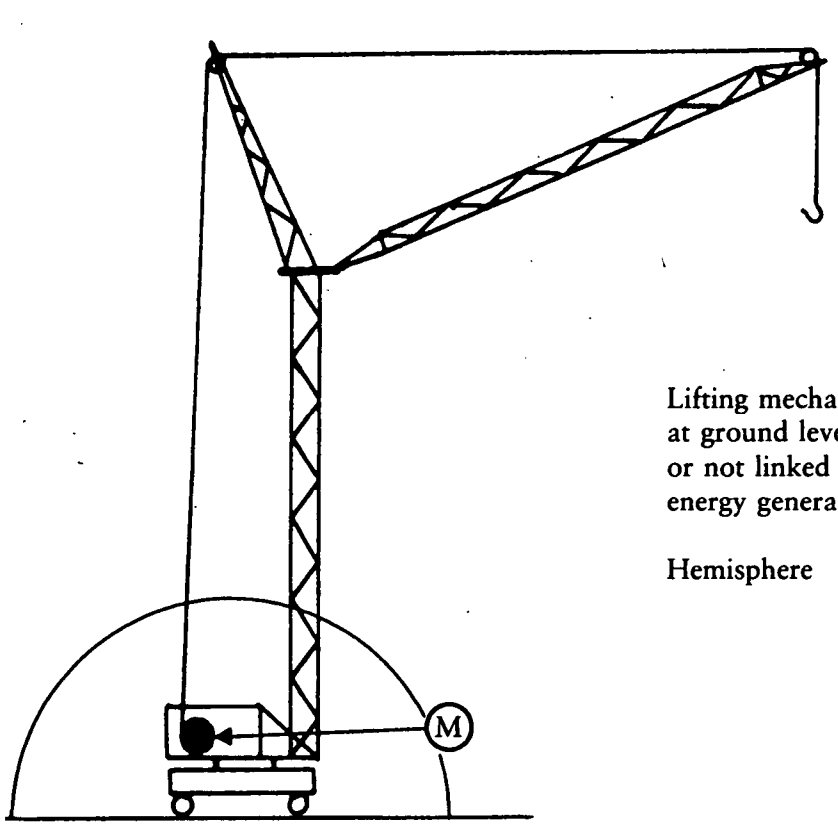
The area S of the measuring surface in m^2 shall be as follows:

$$S = 4 \pi r^2$$
$$= 200 \text{ m}^2$$

Note: The surface level $10 \log_{10} \frac{S}{S_o}$ shall be 23 dB.

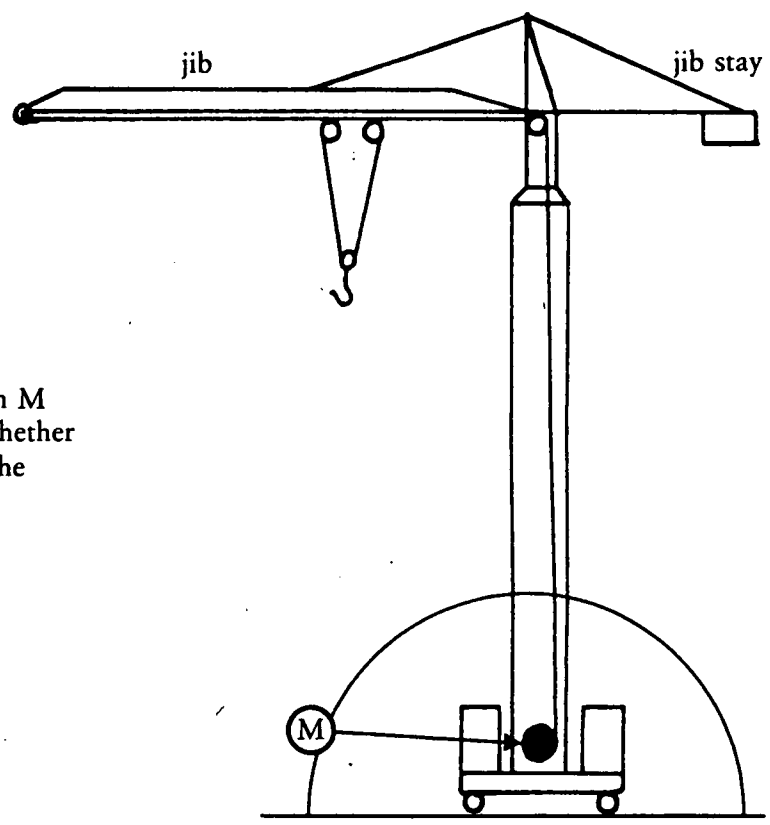
8.6.2. In view of section 6.3 in Annex I to Directive 79/113/EEC, the constant C shall not be applicable and $K_2 = 0$.

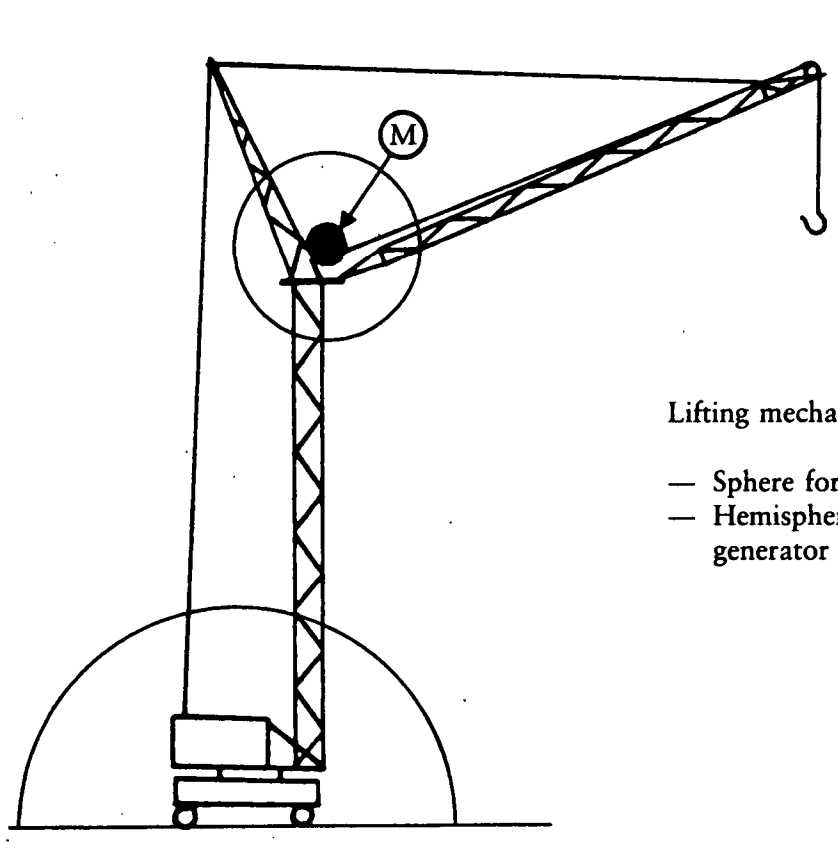
Measurement surface according to position of lifting mechanism



Lifting mechanism M at ground level whether or not linked to the energy generator

Hemisphere





Lifting mechanisms M on jibs:

— Sphere for the lifting mechanism
— Hemisphere for the energy generator if attached at ground level

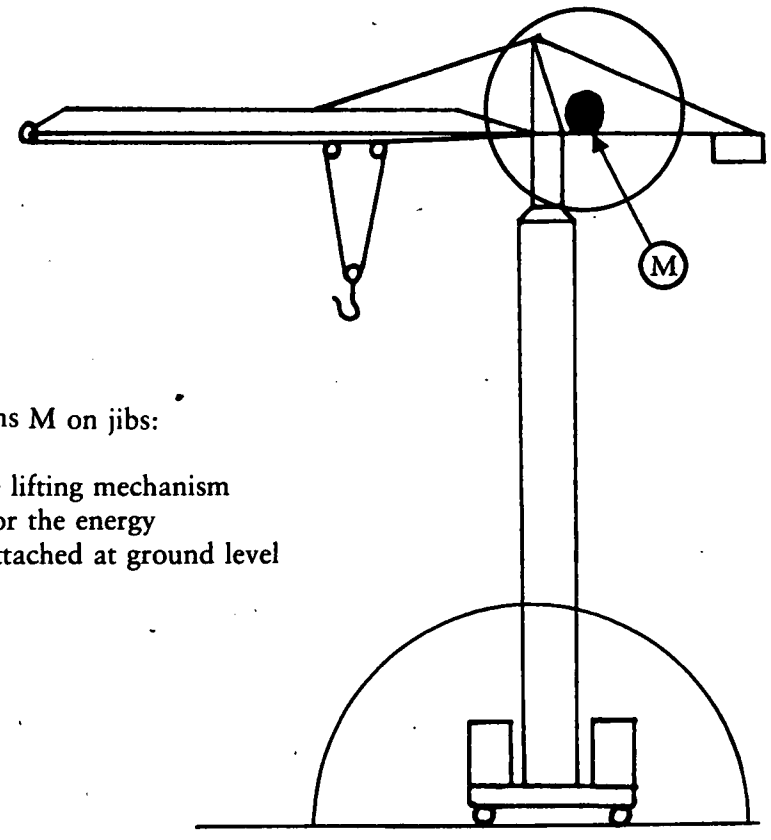
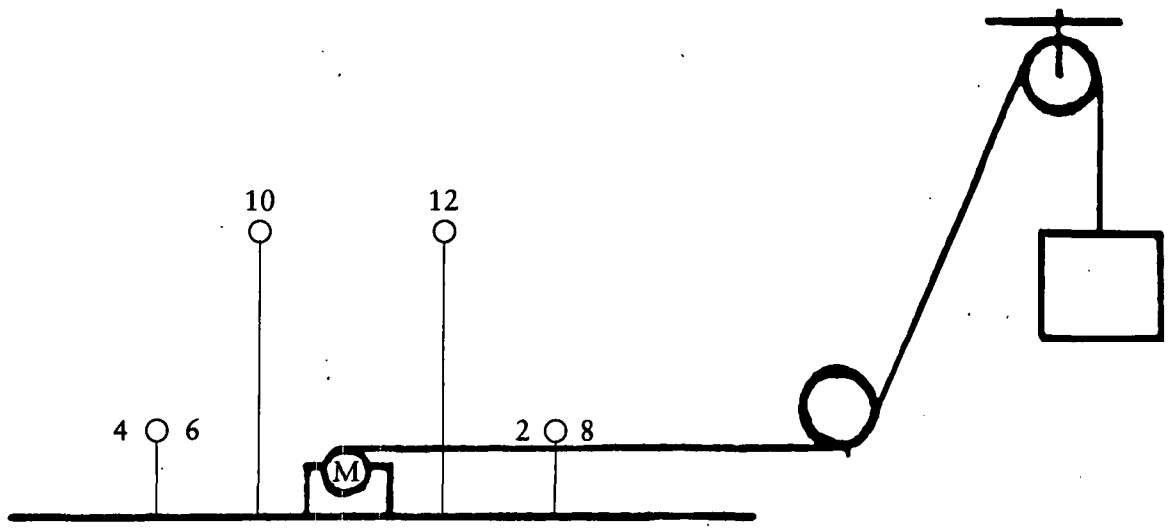


Figure 1

Arrangement of measuring points where the lifting mechanism is placed at ground level.

The measuring points are: 2, 4, 6, 8, 10, 12.



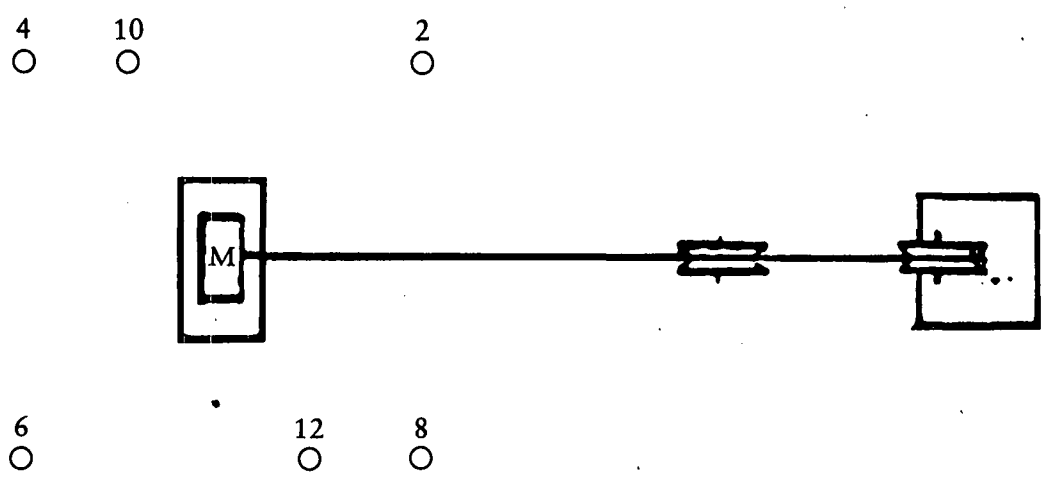
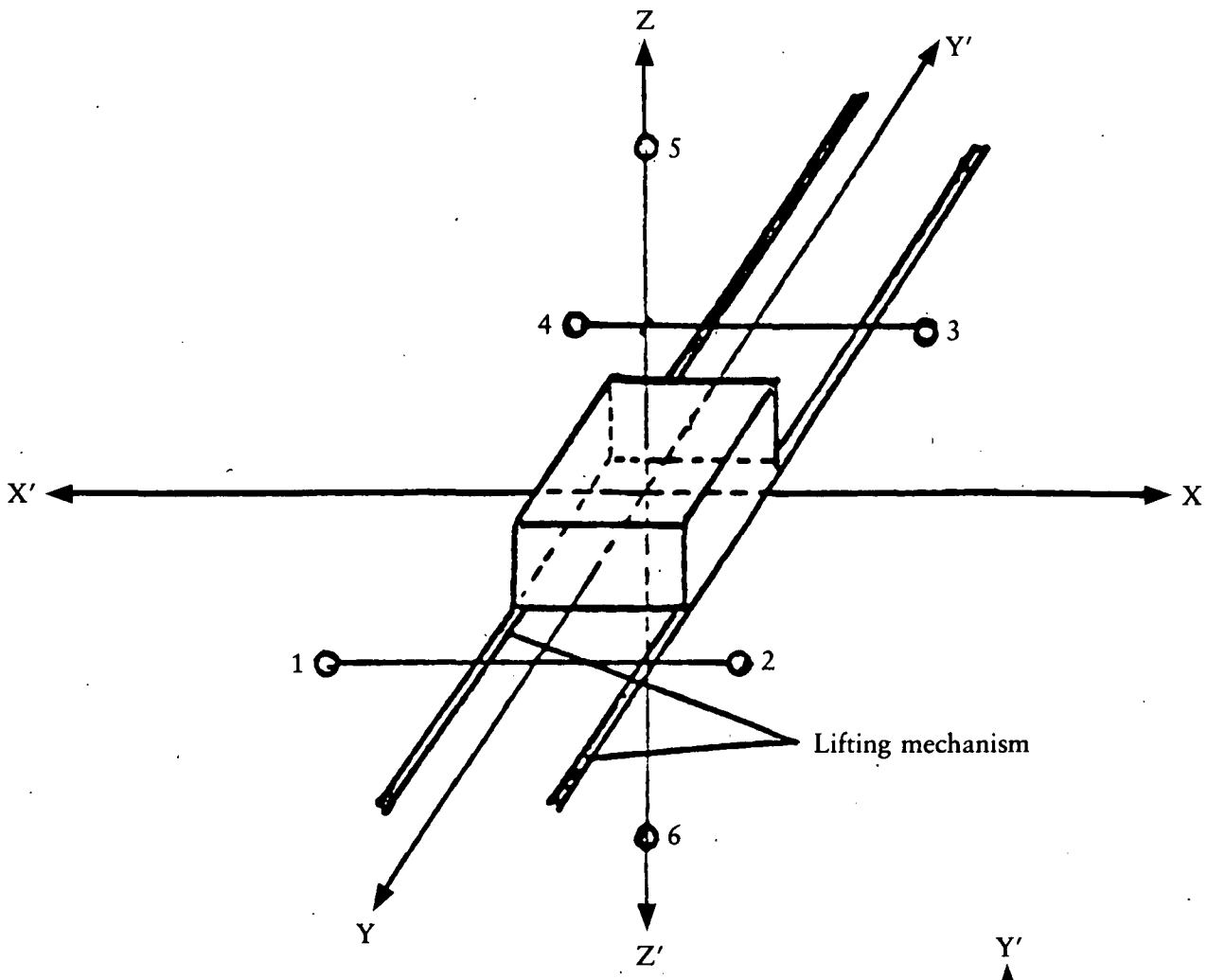
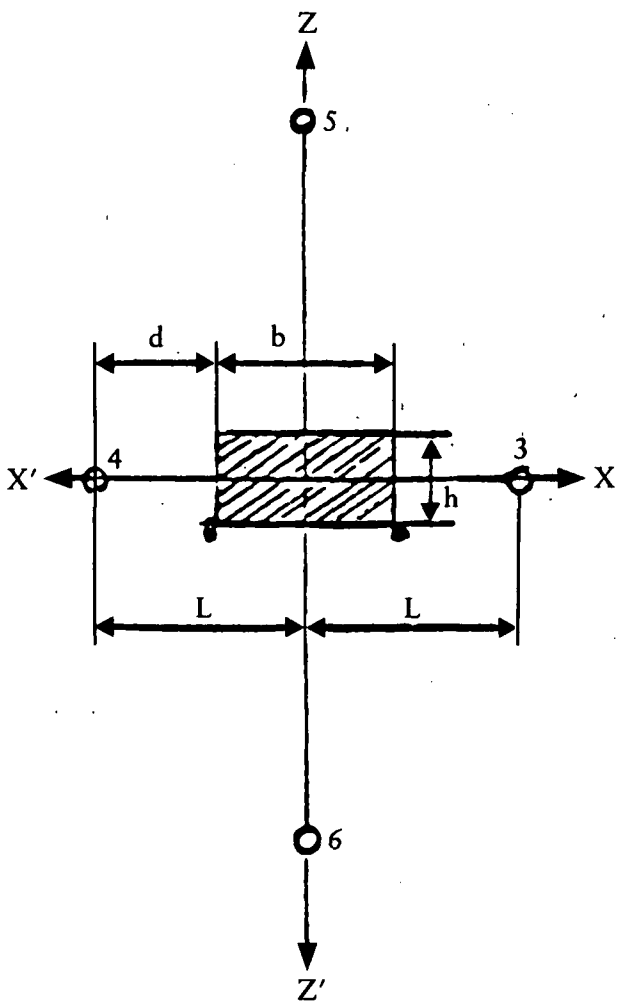


Figure 2

Arrangement of the measuring points (1 to 6) where the lifting mechanism is located on the jib stay.





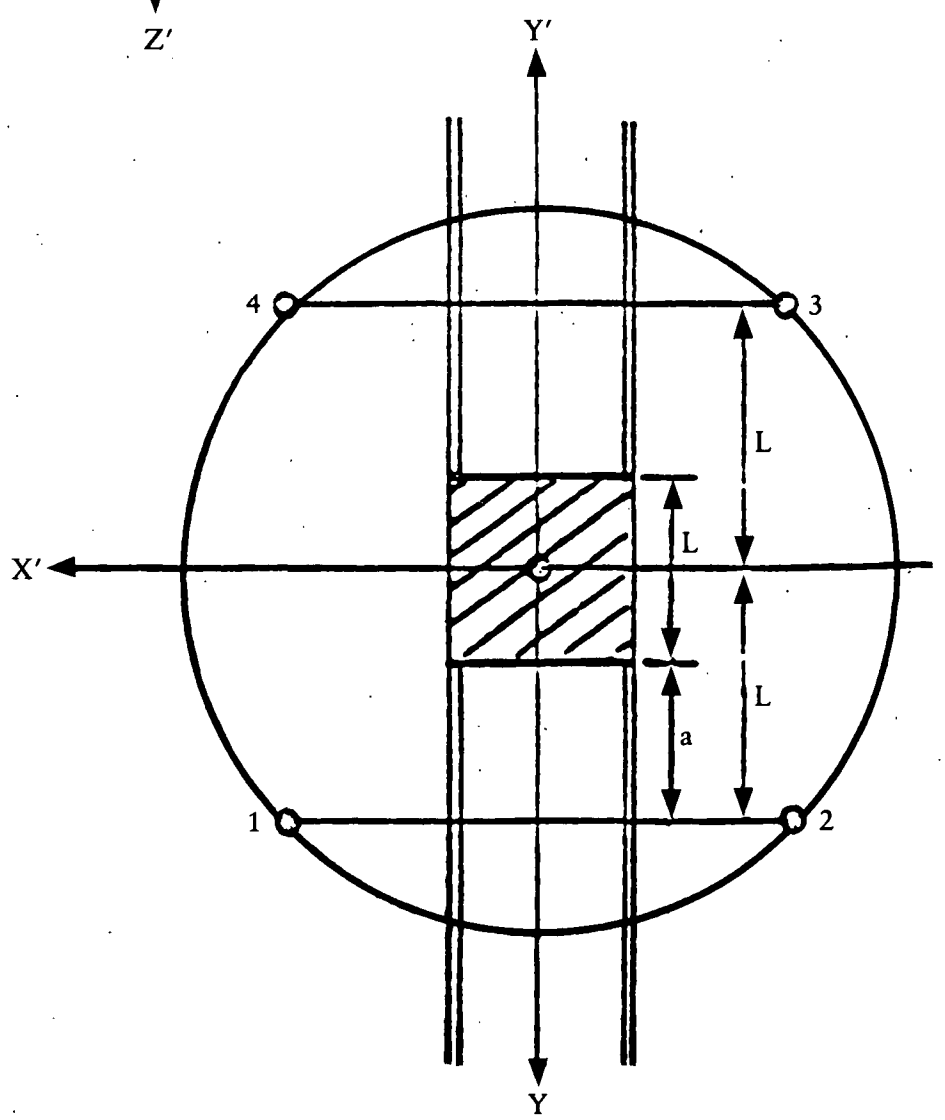


Figure 3

ANNEX II

MODEL OF INFORMATION DOCUMENT FOR A TYPE OF TOWER CRANE TO BE SUPPLIED FOR THE PURPOSES OF EEC TYPE-EXAMINATION

1. GENERAL

1.1. Name and address of manufacturer .....

1.2. Name and address of manufacturer's authorized representative (if any) .....

.....

1.3. Make (name of undertaking) .....

1.4. Trade name (mention any variations) .....

1.5. Type .....

1.6. Category .....

1.7. Location of statutory data plates and inscriptions and method of fixing .....

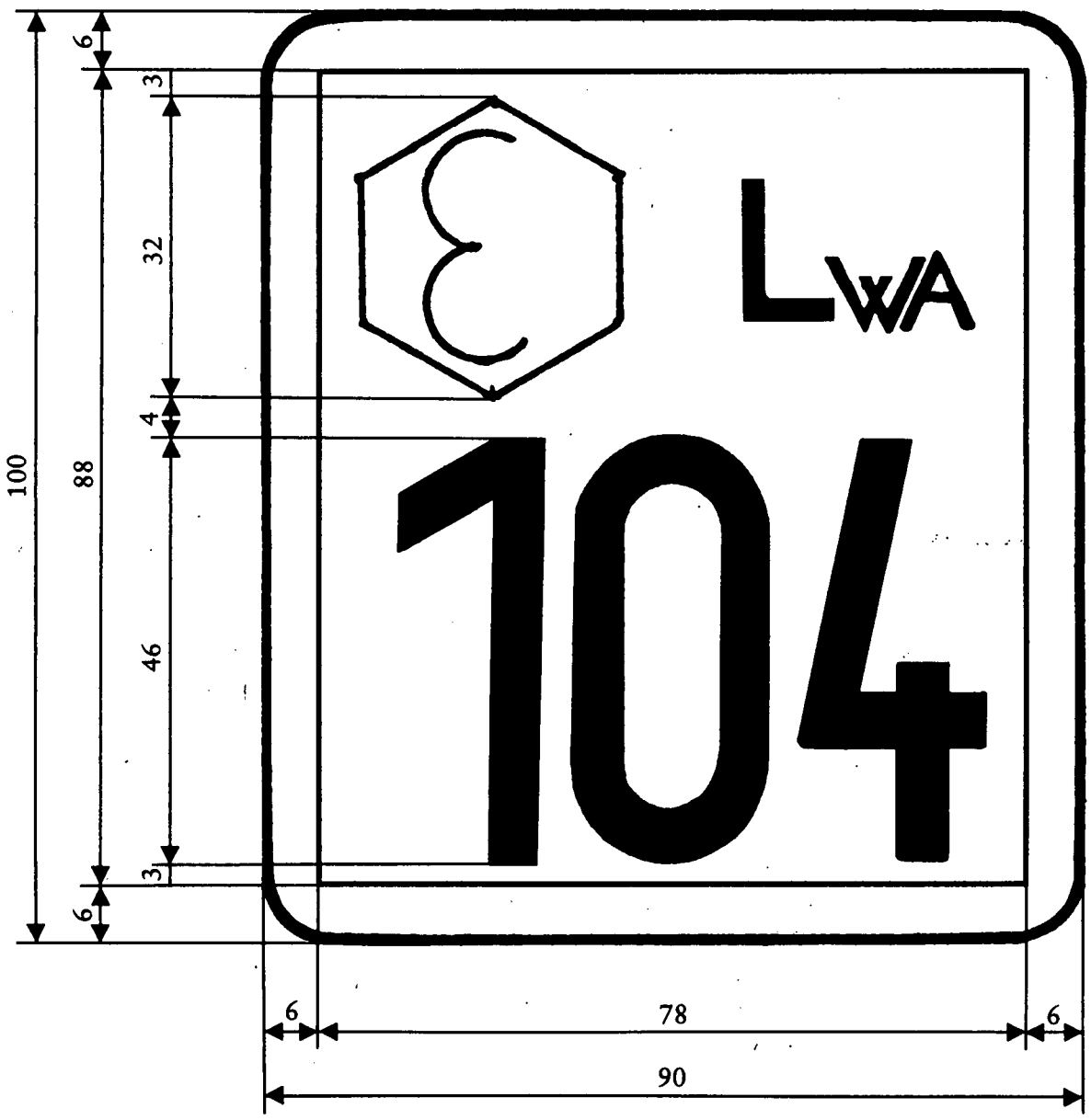
2. OPERATION

3. INSTRUCTIONS FOR USE

4. Attach descriptive trade leaflet, if any.

ANNEX III

MODEL FOR MARK FOR SOUND POWER LEVEL



ANNEX IV

TECHNICAL PROCEDURE FOR CHECKING THE CONFORMITY OF PRODUCTION MODELS WITH THE TYPE EXAMINED

The conformity of production models with the type examined shall be verified, if possible, by spot checks.