

COMMISSION OF THE EUROPEAN COMMUNITIES

COM(81) 811 final

Brussels, 6 January 1982

Proposal for a
COUNCIL DIRECTIVE
concerning airborne noise emitted by household appliances

(submitted to the Council by the Commission)

COM(81) 811 final

1. INTRODUCTION

This proposal for a directive forms part of the programme of action of the European Communities on the environment (1), which specifically refers to the need for rules on labelling and affixing stickers to noisy equipment as part of the effort to combat noise.

On 22 January 1975 the French Government informed the Commission that it intended to adopt administrative provisions to limit noise from electrical household appliances and, on 5 August 1977, that it proposed to take special measures to deal with dishwashers and washing machines.

Similar measures are now being prepared in the Federal Republic of Germany and the Netherlands. Any disparity in the labelling, measurement or inspection methods chosen could create obstacles in an area where intra-Community trade is currently extremely brisk.

Consequently, the proposal serves two objectives - namely, to combat noise and to eliminate all technical barriers to trade in these products. The Commission felt that, as a first step, the best way to achieve this two-fold aim in the highly diversified domestic appliances industry would be to call on producers to tell purchasers the level of noise emitted by their equipment, rather than to impose specific noise limits. Accordingly, the proposal lays down detailed rules on the publication of noise levels along with the general principles on which to base the noise measurements and the broad lines of the method of checking the accuracy of the figures given.

(1) OJ C 112, 20.12.1973

2. GENERAL ECONOMIC SITUATION

According to the statistics for 1970 and 1971, there were then roughly 85 million ordinary households in the EEC, compared with 67 million in the United States (in 1972) and 59 million in the USSR. There must now be around 90 million households in the Community. Together they make up the potential market for the domestic appliances industry.

It is not easy to obtain all the information needed in order to form a clear picture of this market, since some Member States regard it as a trade secret. However, the table below, which is based on data from the SOEC (Statistical Office of the European Communities), gives a general idea of the size of the market and an indication of the turnover for washing machines and dishwashers.

Source : NIMEXE/SOEC

INTERNATIONAL TRADE

'000 EUA

| Type of appliance | INTRA EUR 9 | | EXTRA EUR 9 | | WORLD | | | |
|---|-------------|---------|-------------|---------|---------|---------|---------------|--------|
| | I | E | I | E | I | E | | |
| <u>1977</u> | | | | | | | | |
| Washing machines | 325615 | 313673 | 16720 | 201429 | 342335 | 515102 | | |
| Dishwashers | 100938 | 122727 | 3587 | 79868 | 104525 | 193595 | | |
| | 426553 | 436400 | 20307 | 272297 | 446860 | 708697 | | |
| | | | | | | | OF WHICH EFTA | |
| | | | | | | | I | E |
| <u>1978</u> | | | | | | | | |
| Washing machines | 357458 | 346915 | 20608 | 192064 | 378065 | 538975 | 1664 | 94645 |
| Dishwashers | 115103 | 115689 | 2950 | 58268 | 118053 | 173958 | 2739 | 25935 |
| | 472561 | 462604 | 23558 | 250332 | 496118 | 712933 | 4403 | 120580 |
| Electrical household appliances - TOTAL | 1832701 | 1710434 | 685336 | 1020691 | 2528545 | 2940069 | 277732 | 445477 |

As the table shows, this sector has a positive trade balance with substantial exports to non-Community countries. Everything must be done to ensure that no barriers to trade are created.

3. CONTENTS OF THE PROPOSAL FOR A DIRECTIVE

The proposal for an outline Directive is subdivided into three sections as follows :

- method for measuring the level of noise emissions;
- method for checking the published noise level figures;
- publication of noise level figures.

3.1. Method for measuring the level of noise emissions

A harmonized measurement method will provide a means of comparing the noise level figures for different appliances in the same "family". The Commission has therefore made every effort to ensure close collaboration with the relevant international standardization agencies, i.e. CENELEC and ISO.

The technical Annex to the Directive reflects the latest results of the work of those organizations. It sets out the general criteria for noise measurement and gives details of the special arrangements required for certain families of domestic appliance. Under this method noise is measured in terms of sound power level, an intrinsic feature of the appliance concerned.

3.2. Method for checking the published noise level figures

Each family of domestic appliances from vacuum cleaners to dishwashers has many different members, with production series sometimes running into tens of thousands. In order to stamp out misleading advertising, it is sometimes necessary to check the facts that have been published. For economic reasons the most appropriate method appeared to be random sampling, though even that can take several different forms.

The Commission feels that the most suitable method is that set out in the draft ISO standard DP 7574. The general checking procedures set out in Annex II simply recapitulate the broad lines of the draft standard. Once the ISO draft has been adopted, the Commission will propose that direct reference be made to that standard.

3.3. Publication of noise level figures

Since there is such a wide range of domestic appliances in different shapes and sizes and designed for different jobs, it is difficult to lay down any hard-and-fast rules on labelling. The information will have to take a different form from one appliance to another. Some appliances will be labelled, whilst in other cases the noise data will be given in the user's manual.

Since some families of appliance already bear energy consumption labels, it makes sense to give the noise level figures on the same label in order to prevent any unnecessary proliferation of labels, as this could only lead to confusion and misunderstandings. In any case, the introduction in a Member State of such a system of information requires that this State have the means to check that the system is working correctly. For this reason the Commission proposes a system involving voluntary publication of noise level figures measured under standardized technical conditions. The Commission feels that a system such as this is the most likely to be implemented swiftly and effectively.

4. CONSULTATION OF GROUPS CONCERNED

When formulating its proposal, the Commission held in-depth consultations with all groups concerned, particularly with CECEDE (European Committee of Manufacturers of Electrical Domestic Equipment).

5. CONSULTATION OF PARLIAMENT AND OF THE ECONOMIC AND SOCIAL COMMITTEE

The opinion of both these bodies must be sought, as provided for by the second paragraph of Article 100 of the EEC Treaty, since implementation of the Directive would require amendments to existing legislation in all the Member States.

Proposal for a
COUNCIL DIRECTIVE
concerning airborne noise emitted by household appliances

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 the European Communities action programmes on the environment of 1973¹ and 1977² reveal the extent of the noise problem and, in particular, the need for action concerning sources of noise;

WHEREAS the preliminary programme of the European Communities for a consumer protection and information policy of 14 April 1975³ provides for the formulation and harmonization of rules for labelling as one of its priority measures;

WHEREAS the public should be informed in a manner which is as comprehensible and as uniform as possible of the level of noise emitted by household appliances; whereas accurate, relevant and comparable information may guide the public's choice towards less noisy household appliances, thereby encouraging manufacturers to take steps to reduce the noise emitted by the household appliances which they manufacture;

WHEREAS, for practical reasons and to avoid a multiplicity of labels on household appliances, the information on the noise level should be included on the label provided for by the implementing directives adopted pursuant to Council Directive 79/530/EEC of 14 May 1979 on the indication by labelling of the energy consumption of household appliances⁴ where the same family of household appliances is the subject-matter of the latter and of an implementing directive adopted pursuant to this Directive;

(1) O.J. No C 112, 20.12.1973, p.3
(2) O.J. No C 139, 13.6.1977, p.3
(3) O.J. No C 92, 25.4.1975, p.2
(4) O.J. No L 145, 13.6.1979, p.1

WHEREAS the noise emitted by each "family" of household appliances must be measured and controlled in each Member State by means of harmonized measuring methods, in order to eliminate technical barriers to trade in respect to household appliances;

WHEREAS technical progress requires rapid adaptation of the technical specifications laid down by this Directive; whereas, to facilitate implementation of the measures thereby required, provision should be made for a procedure establishing close cooperation between the Member States and the Commission within the Committee on the Adaptation to Technical Progress of the methods for measuring the noise of household appliances and the related control methods,

HAS ADOPTED THIS DIRECTIVE :

Article 1

1. The purpose of this Directive is to harmonize the laws, regulations and administrative provisions of the Member States relating to :
 - the methods of measuring the noise emitted by household appliances;
 - the arrangements for checking published information on noise levels;
 - the general principle regarding the publication of information on the noise emitted by household appliances.
2. Appliances which form an integral part of the dwelling and which can no longer perform the function for which they are intended when removed from it shall not come within the scope of this Directive.

Article 2

For the purposes of this Directive:

- a) "household appliance" means any machine, portion of a machine or installation manufactured principally for use in dwellings, including cellars, garages and other outbuildings, in particular household appliances for upkeep, cleaning purposes, preparation and storage of foodstuffs, production and distribution of heat and cold, air conditioning, and other appliances used for non-professional purposes;
- b) "family" of household appliances means all models (or types) of the various household appliances designed for the same purpose and powered by the same principal energy source. Generally, a 'family' includes several models (or types);

- c) "series" of household appliances means all household appliances belonging to the same model (or type), which have refined characteristics and which are produced by the same manufacturer;
- d) "batch" of household appliances means a specified quantity of a given series manufactured or produced under uniform conditions;
- e) "noise level" means the sound power level of the household appliances expressed in A-weighted decibels (dB), reference 1 pW.

Article 3

1. Information on the noise level of a household appliance shall be provided and its accuracy vouched for by the manufacturer or - where the manufacturer is established outside the Community - by the importer established within the Community.
2. The noise levels of each family of household appliance shall be provided in accordance with the conditions for acoustic measurement set out in Annex I and in the implementing Directive relating to that family.
3. The checking of the noise levels published for a family of household appliances shall be undertaken in accordance with the general rules given in Annex II and with the rules laid down in the implementing Directive relating to that family.

Article 4

The Member States, including those which do not make publication mandatory, shall take every appropriate step to ensure that publication of information concerning the noise level of household appliances complies with the provisions of this Directive and with those of the relevant implementing Directive.

Article 5

1. The form of publication of information on the noise level of appliances, determined in accordance with Article 3, shall be laid down for each family of household appliances in directives adopted in implementation of this directive.
2. Member States may require all manufacturers or importers marketing on their territory household appliances which belong to a family covered by an implementing directive to publish the noise level of such appliances.
3. Where, for the same family of household appliances, a label relating to energy consumption is provided for pursuant to an implementing Directive adopted under Council Directive 79/530/EEC, the information on the noise level shall be given on this label in the space provided for this purpose. The label relating to the noise level shall provide, where necessary, a space for information relating to energy consumption.
4. Where the affixing of a label is provided for by an implementing Directive, the manufacturer or the importer shall supply the labels showing the noise level for each of his household appliances the family of which is covered by an implementing directive. The labels, shall be supplied by the manufacturer or, where appropriate, the importer, shall be affixed by the trader to the corresponding appliances whenever these are displayed for sale. The label shall be affixed at the place stipulated by the implementing directive or, if no instructions are given, where it is most visible.
5. Where an implementing directive provides for publication of the noise level in some other form, for example in the instruction manual or on the guarantee certificate, the manufacturer or the importer shall supply the appropriate document. In such a case the trader shall see to it that this document is available at the place of sale, display or hire.

Article 6

1. The Member States may not refuse, prohibit or restrict the marketing of household appliances on grounds relating to information on the noise level of such appliances where the requirements of this Directive and of the relevant implementing Directive have been fulfilled.
2. Without prejudice to the outcome of any checks which may be carried out once the household appliances have been offered for sale, the Member States shall regard the publication of information on the noise level in the form prescribed by a given implementing Directive as sufficient proof that the household appliance complies with the provisions of this Directive and the relevant implementing Directive.

Article 7

1. The accuracy of the information on the noise level of household appliances of a family covered by an implementing Directive shall be checked by the Member States or by bodies approved for this purpose by the Member States. Where appropriate, the Member States shall notify the Commission and the other Member States of the name of the approved bodies.
2. If, following a check, it is found that the "noise level" is higher than the published level, the Member States may request that the marketing of the appliance be suspended pending the issue of accurate information by the manufacturer or importer.

Article 8

The implementing directives shall lay down for each family of household appliances:

- the form in which information on noise levels shall be made public;
- the conditions under which noise emissions shall be measured;
- the procedures for checking the published levels.

Article 9

Any amendments which are necessary in order to adapt the Annexes to this Directive to technical progress shall be adopted in accordance with the procedure laid down in Article 11.

Article 10

1. A Committee on the Adaptation to Technical Progress of the Directives on the Removal of Technical Barriers to Trade in the sector of household appliances (hereinafter called the Committee) is hereby set up; it shall consist of representatives of the Member States with a representative of the Commission as chairman.
2. The Committee shall adopt its own rules of procedure.

Article 11

1. Where the procedure laid down in this Article is to be followed, the matter shall be referred to the Committee by its chairman, either on his own initiative or at the request of the representative of a Member State.
2. The representative of the Commission shall submit to the Committee a draft of the measures to be adopted. The Committee shall deliver its opinion on the draft within a period set by the chairman having regard to the urgency of the matter. Opinions shall be delivered by a majority of forty-five votes, the votes of Member States being weighted as provided in Article 148 (2) of the Treaty. The Chairman shall not vote.
3. a) The Commission shall adopt the measures envisaged where they are in accordance with the opinion of the Committee.
b) Where the measures envisaged are not in accordance with the opinion of the Committee, or if no opinion is delivered, the Commission shall without delay submit to the Council a proposal on the measures to be adopted. The Council shall act by a qualified majority.

- c) If, within three months of the proposal being submitted to it, the Council has not acted, the proposed measures shall be adopted by the Commission.

Article 12

1. The Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive on 1 January 1983. They shall forthwith inform the Commission thereof.
2. The Member States shall communicate to the Commission any measures taken in the field covered by this Directive.

Article 13

This Directive is addressed to the Member States.

Done at,

For the Council,
The President,

A N N E X I

METHOD OF DETERMINING AIRBORNE NOISE EMITTED BY
HOUSEHOLD APPLIANCES

1. Object and field of application

1.1. Object

The purpose of this method is to determine the noise emitted by all types of household appliances (including their accessories or components), whether supplied from mains or from batteries or from any other energy source.

~~This method defines the various acoustic criteria which may be adopted to characterize a household and the means of determining these criteria.~~

The values obtained by this method constitute the basic data for checking the accuracy of their noise emission with the declared values. Unless otherwise indicated, these values are inclusive of tolerances.

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

1.2. Field of application

This annex is concerned with objective methods of engineering accuracy (engineering method (grade 2) according to the ISO standard 2204, first edition of 1973.05.01) for determining sound power levels L_W , expressed in decibels (dB) with reference to a sound power of 1 picowatt (1 pW), of airborne acoustical noise within the specified frequency range of interest, including the octave bands between 125 and 8000 hertz (Hz) (this interval being for practical reasons narrower than the frequency range of audible sound), and for prescribed operating conditions of the appliance to be measured.

The following sound power levels are used :

- A-weighted sound power level, L_{WA} , and
- octave band sound power levels, L_{WOct} .

In general the described methods are specified for appliances operated with no operator present. Only for the (rare) cases where an appliance can only be operated by an operator or must be fed by an operator, a standard test operator shall be present.

Notes :

- a) The uncertainties of measurements according to this method tend to result for A-weighted sound power levels in standard deviations generally not exceeding approximately 2 dB, provided that the noise spectrum does not contain pronounced discrete frequencies; if it does, the magnitude of the uncertainties will be larger and no general rules for the magnitude of the uncertainties can be given. The mentioned standard deviations reflect the cumulative effects of all causes of measurement uncertainties, excluding variations in the noise level of the appliance from test to test.
- b) The noise values obtained under the described conditions of this method will not necessarily correspond with the noise experienced under the operational conditions of practical use.

3. Definitions and terms

3.1. Definitions and terms pertinent to determination of sound power levels

These may be found in ISO Standard 3743, first edition, 1976.12.15 "Acoustics - Determination of sound power levels of noise sources - Engineering methods for special reverberation test rooms", and in ISO/DIS 3744.2 submitted on 1977.02.24 "Acoustics - Determination of sound power levels of noise sources - Engineering methods for free-field conditions over a reflecting plane".

3.2. Comparison method

That method in which the sound power level is calculated by comparing the measured sound pressure levels produced by the source to be tested with the sound pressure levels produced by a reference sound source (RSS) in the same test environment and as far as possible in the same location and position.

3.3. Direct method

That method in which the sound power level is calculated from the measured sound pressure levels produced by the source to be tested, which :

- in free-field conditions are averaged on the measured surface and in time and from the area of the measurement surface;
- in reverberant field conditions are averaged in space and time and from the volume and the reverberation time or the total absorption of the test room.

Note : The separate directives specify the method to be applied to a given family.

3.4. Period of observation

The time interval during which acoustical data are obtained. The period of observation is specified depending upon the characteristics of the noise being measured, upon the required accuracy of the measurements and upon the characteristics of the instrumentation.

3.5. Period (of operation)

A time interval during which a specified process is accomplished by the appliance to be tested.

3.6. Operational cycle

A sequence of periods occurring in the appliance during normal use.

3.7. Time history

A continuous recording of the sound pressure level (for a distinct microphone position) as a function of time as obtained during one or more periods of an operational cycle.

3.8. Standard test operator

A person necessary for operating or feeding the appliance to be tested, not wearing abnormally sound absorptive clothing which might influence sound measurements.

3.9. Center of location or position of a source (appliance)

The term used for describing the location or position of the appliance to be tested within the test environment and with respect to the co-ordinate system of microphone positions.

The center of location coincides :

- the center of a parallelepiped drawn around the main part of hand-held, suspended or stand-type appliances;
- with the center of a rectangle drawn around the projection of the main part of the appliance on the floor for floor-supported appliances and on the wall for wall-mounted appliances.

4. Measurement methods and acoustical environments

4.1. Direct method

The direct method can be used only for measurements in qualified test environments according to ISO/DIS 3744.2 submitted on 1977.02.24 for essentially free-field conditions over a reflecting plane and according to ISO Standard 3743, first edition, 1976.12.15 for special reverberation rooms.

With this method the sound power level is determined:

- in free-field conditions from the time-averaged sound pressure levels, measured on the measurement surface and the area of the measurement surface,
- in reverberant field conditions from the space and time-averaged sound pressure levels and the equivalent sound absorption of the test room (or from the reverberation time and the volume of the test room).

4.2. Comparison method

The comparison method for measurements in a special reverberation test room described in ISO 3743, first edition, 1976.12.15 section 8.3. The term "comparison method" is not explicitly given in ISO/DIS 3744.2 submitted on 1977.02.24 for measurements in essentially free-field conditions but when applying the "absolute comparison tests" for the determination of the environmental correction given in clause 8.3. of ISO/DIS 3744.2 submitted on 1977.02.24, by using a reference sound source, the procedure is in fact a comparison method.

With this method the sound power level (A-weighted, and octave bands, if required) is determined by comparing the mean-square band sound pressure levels produced by the appliance under test with the mean-square band sound pressure levels produced in the same acoustical environment by a stable, thoroughly calibrated reference sound source (RSS) of known sound power output, complying with the requirements of ISO 3741, first edition, 1975.07.15 or ISO/DIS 6926 respectively.

Note : The accuracy depends essentially on the calibration of the RSS which shall be performed in an appropriately equipped laboratory.

4.3. Acoustical environments

4.3.1. Essentially free-field conditions over reflecting planes

General requirements are given in clause 4 of ISO/DIS 3744.2 submitted on 1977.02.24.

For measurements to be carried out according to the direct method, and for measurements according to the comparison method if the A-weighted sound power level is to be determined directly from A-weighted sound pressure levels the test environment shall be qualified by the procedure specified in ISO/DIS 3744.2 submitted on 1977.02.24.

4.3.2. Special reverberation rooms

The test room requirements are given in clause 4 of ISO Standard 3743, first edition, 1976.12.15.

5. Instrumentation

5.1. Instrumentation for measuring acoustical data

Requirements are given in clauses 5 of ISO standard 3743 first edition, 1976.12.15 and ISO/DIS 3744.2 submitted on 1977.02.24 respectively.

Notes :

1. For measurements in essentially free-field conditions, the microphone(s) shall be orientated with respect to the source in accordance with the angle of incidence as specified by the manufacturer for calibration. (The angle of incidence is the angle between the direction of propagation of sound waves and the longitudinal axis of the microphone).
2. For measurements in reverberant-field conditions, the microphone(s) shall be designed for randomly incident sound.
3. If the microphone(s) may be influenced (especially at low frequencies) by a moving air stream (with velocities exceeding approximately 2 m/s) generated for example, by the appliance under test (fan heater, etc.) suitable wind-screens shall be applied for the microphone(s) and necessary corrections for changes in microphone sensitivity shall be added to the observed sound pressure levels.

Reference sound sources RSS shall have characteristics and shall be calibrated as specified in ISO standard 3741, first edition, 1975.07.15 or ISO/DIS 6926 respectively.

5.2. Instrumentation for measuring climatic conditions

5.2.1. The temperature shall be determined with instruments having an accuracy of $\pm 1^{\circ}\text{C}$.

5.2.2. The relative humidity shall be determined with instruments having an absolute accuracy of $\pm 2\%$.

5.3. Instrumentation for measuring operating conditions of appliances

5.3.1. The voltage at the plug of the cable or cord of mains powered appliances shall be measured with voltmeters having an accuracy of Class 1 instruments if the tolerance for the voltage is specified with $\pm 2\%$, and shall be measured with voltmeters having an accuracy of Class 0.5 instruments if the tolerance for the supply voltage is specified with $\pm 1\%$.

5.3.2. The voltage at the battery terminals of battery powered appliances shall be measured with voltmeters having an accuracy of Class 1 instruments.

5.3.3. The rotational speed of motors, attachments, etc. shall be measured, if necessary, with speed indicators having an accuracy of $\pm 1\%$ of full scale.

6. Operation and location of appliances under test

6.1. Equipping and preconditioning of appliances

6.1.1. The appliance shall be equipped with attachments, accessories, etc. as delivered or specified by the manufacturer for the intended use or function.

6.1.2. Care shall be taken to ensure that any auxiliary equipment, for example, electrical conduits or cables, piping for water supply or drainage, air ducts, etc., necessary for the operation of the appliance, do not radiate significant amounts of sound energy into the test environment or change the sound output of the appliance.

6.1.3. Prior to noise measurements the appliance, equipped as for the intended use, shall have been in operation for a total period of at least 2 hours for running-in at the highest speed setting, if any, and without load.

6.1.4. Immediately before each series of noise measurements, the appliance equipped as for the intended use, shall be operated 10 minutes for stabilizing at the highest speed setting, if any, without load.

Note : Care should be taken to avoid possible overheating of appliances for short-time or intermittent use. Rated operating times have to be taken into account.

6.2. Supply of electric energy and of water or gas

6.2.1. Appliances with mains powered electric motor(s) shall be supplied with rated voltage with a tolerance of $\pm 2\%$, except for commutator motors for which the tolerance shall be $\pm 1\%$, and if applicable with rated frequency. Appliances designed for d.c. only shall be supplied with d.c. Appliances not marked with rated frequency shall be supplied either with 50 Hz or with 60 Hz, as common in the country of use.

Appliances designed for a voltage range shall be supplied with the mean voltage of the range and the same tolerances as specified before, if the difference between the limits of the range does not exceed 10% of the mean voltage of the range. If the difference exceeds 10% the appliance shall be supplied with the highest voltage of the range and the same tolerances as specified before.

The supply voltage shall be measured at the plug of a non-detachable cable or cord, or at the appliance inlet if a detachable cable is provided, but in no case at the entrance of extension cables or cords.

6.2.2. Appliances with battery powered electric motor(s) shall be started for noise measurements with full-charged batteries as specified by the manufacturer and the measurements shall be interrupted when the battery voltage under load has dropped for lead-acid batteries to 0.9 times and for other batteries to 0.8 times the battery voltage under load at the beginning of the test.

The battery voltage shall be measured at the battery terminals.

6.2.3. Appliances incorporating heating, either electric or gas, shall be operated without heating if the heating does not add significant amounts to the noise emission of the appliance.

6.2.4. The water and/or gas supply, if any, shall be as specified by the manufacturer.

Appliances designed for a pressure range shall be supplied with the highest pressure of the range.

Appliances designed for cold and hot water supply shall be supplied with cold water, if they are intended to function with cold water.

6.3. Climatic conditions

In general household appliances (if not otherwise specified for a special category) shall be operated under the following climatic conditions :

| | |
|----------------------|---------------------------------|
| Temperature | $t = 15 - 30^{\circ}\text{C}$ |
| Relative humidity | $\text{RH} = 30 - 70\%$ |
| Atmospheric pressure | $p_s = 860 - 1060 \text{ mbar}$ |

6.4. Loading and operating of appliances

6.4.1. In general the loading and operating conditions should as far as practicable simulate normal use but in every case preference has to be given to simple conditions providing a satisfactory repeatability and reproducibility. Furthermore the presence of an operator should be avoided if even possible. An operator shall be present only if the application of the load, for example periodical feeding with foodstuff, is not practicable without an operator.

6.4.2. For determining noise emission of an appliance, the loading and operating conditions, if not specified in the special directives, shall be restricted to one single condition, except for appliances with multiple important main functions of longer duration (for example, automatic washing machines with the functions : washing, spin-drying, tumble-drying), where for each of the main functions one separate condition has to be specified, and for multipurpose appliances provided with special attachments or tools for several functions (e.g. kitchen machines for mixing, blending, slicing, etc.) where one single condition has to be specified, based on the function with the longest duration in practical use.

The idling (no-load) condition may be chosen as the sole condition for determining noise emission of an appliance if it is typical and steady.

For appliances provided with speed control in general the highest speed setting shall be used.

6.4.3. Appliances operated during normal use in operational cycles shall be operated likewise for determining noise emission, taking measurements during appropriate parts of the operational cycles of the main function(s) and reporting for appliances with automatic program control the duration of the operational cycle(s) of the main function(s).

Note : It is recommended to apply a graphic level recorder to make a recording of the A-weighted sound pressure level during the operational cycle(s) - time-history - at one of the microphone positions, preferably in front of the appliance to be tested.

6.4.4. When applying loading and operating conditions for noise measurements care shall be taken to avoid possible overheating of the appliance under test. Rated operating and resting times and/or manufacturer's instructions shall be followed.

6.5. Location and mounting of appliances

6.5.1. Counter-top or table-type appliances, and floor-mount appliances for placing on the floor shall be placed in normal position directly, without any resilient means other than those incorporated in the appliance,

either on the floor of the reverberation test room with a minimum distance of 1 m between any surface (including protruding parts) of the appliance and the nearest wall,

or on the reflecting plane of the essentially-free-field environment, giving consideration to the shape and size of the specified measurement surface.

6.5.2. Hand-held appliances, including their accessories, if any, shall in normal position at a height of approximately 25 cm be resiliently suspended or resiliently mounted in appropriate test fixtures, the base of the fixture being placed with intermediate means of resilient material with a thickness of approximately 1 cm, so that structure-borne noise is not transmitted from the appliance, (see Figure 8),

either on the floor of the reverberation test room with a minimum distance of 1 m between any surface of the appliance or of the test fixture and the nearest wall,

or on the reflecting plane of the essentially-free-field environment, giving consideration to the shape and size of the specified measurement surface.

Note : Care shall be taken to ensure that the means of suspension or clamping do not change the sound output of the appliance, e.g. by suppressing or emphasizing special modes of vibration of the body of the appliance or by covering radiating surfaces, air intakes, etc.

6.5.3. Floor-mount appliances, including cabinets or counters for built-in appliances, for placing on the floor against a wall, shall be placed in normal position with a distance of approximately 5 cm between the back of the appliance and a vertical wall or plane, taking care to avoid contact of protruding parts with the wall or plane, directly, without any resilient means other than those incorporated in the appliance,

- either on the floor of the reverberation test room with the mentioned distance of 5 cm of the back from a wall and with a minimum distance of 1 m between any other surface of the appliance or of the cabinet or the counter from the nearest corner of the room,
- or on the reflecting plane of the essentially-free-field environment and with the mentioned distance of 5 cm between the back of the appliance and the second vertical reflecting plane (see sub-clause 4.3.4.), giving consideration to the shape and size of the specified measurement surface.

6.5.4. Wall-mount appliances, including their accessories, if any, shall be fastened or held by an appropriate fixture in close contact, without any resilient means other than those incorporated in the appliance, at a height of the lowest edge of approximately 1.3 m from the floor,

- either on a wall of the reverberation test room with a minimum distance of 1 m of any surface of the appliance from the nearest corner of the room,
- or on the second, vertical reflecting plane of the essentially-free-field environment, giving consideration to the shape and size of the specified measurement surface.

6.5.5. Appliances for building in, shall be built-in according to the manufacturer's instructions in appropriate cabinets or counters and shall be located as specified for appliances for placing on a floor against a wall with an absorption coefficient less than 0.6.

6.5.6. Stand-type appliances, i.e. appliances designed for use on a stand, for example, hairdrying hoods, shall be placed on the stand supplied with the appliance or on a stand constructed according to the manufacturer's instructions and shall be located for floor-mounted appliances.

6.5.7. Floor-treatment appliances shall be placed on a piece of specified floor covering, representing practical application, having the smallest dimensions, necessary for placing the appliance in use, and shall be located together with the floor covering as specified for floor-mount appliances. If necessary the appliance shall be prevented from self-propelling by resilient means. Handles shall be held in normal position by resilient means.

Notes :

1. Sound radiation due to possible vibrations of the piece of floor covering shall be prevented.
2. The piece of floor covering is considered to be a part of the appliance to be tested, and its possible influence on the acoustical characteristics of the test environment, for example, of the hard reflecting plane or of the absorption (reverberation time) of reverberation test rooms shall not be taken into account.

7. Measurement of noise levels

7.1. Microphone array and measurement surface for essentially free-field conditions

7.1.1. For floor-mount free standing appliances, including built-in appliances, of larger size, the measurement surface shall be a rectangular parallelepiped with 9 microphone positions as specified in Figure 1, centered in the projection of the geometrical center of the reference box on the horizontal reflecting plane (floor), the co-ordinate system describing the microphone positions being located with the x, y -axis in the horizontal reflecting plane and the z -axis at right angles to it, and the x -axis in the longitudinal vertical plane of the reference box, the front of the appliance being directed in the direction of the x -axis.

This measurement surface can be used also for wall-mount appliances. In this case the x, y -axis are located in the vertical reflecting plane, with the x -axis directed vertically upwards and the front of the appliance being directed in the direction of the z -axis.

The area of this measurement surface is given by $S = 2 (2bc + 2ac + 2 ab)$.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 1 is recommended.

7.1.2. For floor-mount of counter-type appliances for placing against a wall, including built-in appliances, of larger size, the measurement surface shall be a rectangular parallelepiped with 6 microphone positions as specified in Figure 2, with the x-axis in the horizontal reflecting plane at right angles to the vertical reflecting plane, the front of the appliance being directed in the direction of the x-axis.

The area of this measurement surface is given by $S = 2(2ac + 2ab + bc)$.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 1 is recommended.

7.1.3. For floor-mount cabinet-type appliances for placing against a wall, including built-in appliances, of larger size, with a height exceeding 1.6 m, the measurement surface shall be a rectangular parallelepiped with 7 microphone positions as specified in Figure 3, with the x-axis in the horizontal reflecting plane at right angles to the vertical reflecting plane, the front of the appliance being directed in the direction of the x-axis.

The area of this measurement surface is given by $S = 2(2ac + bc)$.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 3 is recommended.

7.1.4. For the parallelepiped measurement surfaces according to sub-clauses 7.1.1., 7.1.2. and 7.1.3., the measurement distance, d, between the reference box and the measurement surface shall be $d = 1.0$ m.

The reference box is the smallest rectangular parallelepiped with the dimensions l_1 , l_2 , l_3 , just enclosing the appliance (parts which are unlikely major radiators of noise are disregarded) and terminating on the reflecting plane(s). The dimension l_1 is parallel to the x-axis, the dimension l_2 is parallel to the y-axis and the dimension l_3 is parallel to the z-axis.

7.1.5. For counter-top or table-type appliances, floor treatment appliances and hand-held appliances (mounted in test fixtures), placed during measurements on the horizontal reflecting plane, with the dimensions of the reference box l_1 , l_2 , l_3 each not exceeding 0.7 m the measurement surface shall be a hemisphere with 10 microphone positions as specified in Figure 4, centered in the projection of the geometrical center of the reference box on the horizontal reflecting plane (floor), the co-ordinate system describing the microphone positions being located with the x, y-axis in the horizontal reflecting plane and the z-axis perpendicular to it, and the x-axis in the longitudinal vertical plane of the reference box, the front of the appliance being directed in the direction of the x-axis.

This measurement surface can be used also for small wall-mount appliances, in this case the x, y-axis are located in the vertical reflecting plane with the x-axis directed upwards and the front of the appliance being directed in the direction of the z-axis.

The area of this measurement surface is given by $S = 2\pi R^2$.

The radius of the hemisphere shall be $R = 1.5$ m.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 8 is recommended.

7.1.6. For counter-top or table-type appliances and hand-held appliances (mounted in test fixtures), placed during measurement on the horizontal reflecting plane, with the dimensions of the reference box, l_1 and l_2 each not exceeding 0.5 m and l_3 not exceeding 0.4 m, the measurement surface shall be a hemisphere with 7 microphone positions as specified in Figure 5, centered in the projection of the geometrical center of the reference box on the horizontal reflecting plane (floor), the co-ordinate system describing the microphone positions being located with the x, y-axis in the horizontal reflecting plane and the z-axis perpendicular to it, and the x-axis in the longitudinal vertical plane of the reference box, the front of the appliance being directed in the direction of the x-axis.

The area of this measurement surface is given by $S = 2\pi R^2$.

The radius of the hemisphere shall be $R = 1.0$ m.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 4 is recommended.

7.1.7. For small floor-mount appliance for placing against a wall (for example, shoe-polishers), with the dimensions of the reference box, l_1 and l_3 not exceeding each 0.4 m and l_2 not exceeding 0.8 m, the measurement surface shall be a quarter-sphere with 5 microphone positions as specified in Figure 6, centered in the edge formed by the horizontal and the vertical reflecting planes, the co-ordinate system describing the microphone positions being located with the x, y-axis in the horizontal reflecting plane and the z-axis in the vertical reflecting plane and the x-axis at right angles to the vertical reflecting plane.

The area of this measurement surface is given by $S = \pi R^2$.

The radius of the quarter-sphere shall be $R = 1.5$ m.

Note : For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 2 is recommended.

7.1.8. For stand-type appliances, with the dimensions of the reference box, l_1 , l_2 , l_3 , each not exceeding 0.4 m and with the height of the geometric center of the reference box above the floor exceeding in normal use 1.0 m, the measurement surface shall be a sphere with 8 microphone positions as specified in Figure 7, centered in the center of the reference box, the co-ordinate system describing the microphone positions being located with the z-axis vertically and the x-axis being directed in the direction of the front of the appliance.

The area of this surface is given by $S = 4 \pi R^2$.

The radius of the sphere shall be $R = 1.0$ m.

Notes :

1. The distance between the lowest microphone position and the horizontal reflecting plane shall be at least 0.3 m.
2. For determining time histories, frequency spectra, etc., of the emitted noise, the microphone position n° 2 is recommended.

7.1.9. The measurement surface shall be distant from the inner boundaries of test environments, except from the reflecting plane(s),

- for qualified free-field conditions : at least 0.7 m;
- for unqualified free-field conditions : at least 1.0 m.

7.1.10. The measurement may be carried out by taking readings from a single microphone which is moved in steps into the specified positions, or by sampling the outputs of an adequate number of microphones located in the specified positions. For spherical measurement surfaces it may also be beneficial to rotate in steps round the z-axis either the appliance under test or the microphone(s) fastened to appropriate supports.

7.1.11. The microphone(s) shall be orientated with respect to the source such that its axis (their axis) of incidence, for which it is (they are) calibrated is (are) directed towards the geometric center of the reference box.

7.1.12. For appliances with symmetrical noise emission it may be sufficient to use only an adequate part of the specified measurement surface.

7.1.13. For a simple comparison of appliances of the same category, type and size, for example, for quality control measurements during production, the number of microphone positions may be reduced, for example, to the single position recommended for the several arrays for determining time histories, frequency spectra, etc.

7.2. Microphone array and location of reference sound sources in essentially free-field conditions

7.2.1. In general the reference sound source (RSS) used for the comparison method shall be measured with the same microphone array and measurement surface used for the appliance to be tested.

7.2.2. The reference sound source shall be placed on the horizontal reflecting plane such that the projection of the center of its reference box coincides with the projection of the center of the reference box of the appliance to be tested on the horizontal reflecting plane.

7.3. Microphone array and source location in reverberant field conditions

7.3.1. In general the number of microphone positions, N_m , shall be $N_m = 6$ and the number of source locations, N_s , shall be $N_s = 1$.

A change of these numbers shall depend on the results of a preliminary measurement according to sub-clause 7.3.2. of the appliance under test, carried out with the specified 6 microphone positions and 1 source location.

7.3.2. The standard deviation, s_M , shall be calculated from the equation :

$$s_M = (n-1)^{-1/2} \left[\sum_{i=1}^n (L_{pi} - L_{pm})^2 \right]^{1/2}$$

where :

L_{pi} is the i th value of the sound pressure level in decibels, reference 20 μ Pa;

L_{pm} is the mean value of L_{p1} , L_{p2} , ..., L_{p6} in decibels, reference 20 μ Pa;

$n = 6$.

When the range of values of L_{p1} , L_{p2} , ... L_{p6} is not greater than 5 dB, a simple arithmetic average may be used for L_{pm} . When the range is greater than 5 dB, the following expression shall be used :

$$L_{pm} = 10 \log_{10} \left[\frac{1}{6} (10^{0.1 L_{p1}} + 10^{0.1 L_{p2}} + \dots + 10^{0.1 L_{p6}}) \right]$$

Note : The magnitude of s_M will depend on the properties of the sound field in the test room. These properties are influenced by the characteristics of the test room and of the source (i.e. its directivity and the frequency spectrum of the emitted noise).

7.3.3. If the standard deviation, s_M , calculated according to sub-clause 7.3.2. is below 2.3 dB, the final measurements, shall be carried out with the same $N_m = 6$ microphone positions and $N_s = 1$ source location.

7.3.4. If the standard deviation, s_M , calculated according to sub-clause 7.3.2. is in the limits 2.3 to 4.0 dB, the final measurements have to be carried out with $N_m = 6$ microphone positions and $N_s = 2$ different separate source locations in the reverberation test room.

7.3.5. If the standard deviation, s_M , calculated according to sub-clause 7.3.2. exceeds 4 dB, the appliance under test is not permitted to be measured in the provided reverberation test room but shall be measured in an environment with essentially free-field conditions.

7.3.6. No microphone position shall be closer than 1.0 m from the surface of the source or not closer than 1.5 m from the projection of the centre of the reference box on the floor or on a wall of the test room.

7.3.7. No microphone position shall be closer than 1.0 m any wall, floor, ceiling or other room surface.

7.3.8. No microphone position shall be closer than 1.5 m from any other microphone position.

7.3.9. The microphone heights shall be different, one from another, by at least 0.2 m.

7.3.10. If microphone positions can be included within a plane, this plane shall not lie within 10° of a parallel to any room surface.

7.3.11. To the extent possible, the microphone positions shall be at different distances from the source and shall not be symmetrically located.

7.3.12. The microphone positions shall avoid areas of air discharge or direction of maximum radiation (sound beaming) from the source.

Note : The directivity is normally greatest along a centerline at right angles to the primary radiating surface or opening of the source and least along a line parallel to such surface or opening. It is recommended to locate a microphone position at least 45° away from the direction of maximum radiation.

7.3.13. The measurements may be carried out by taking readings from a single microphone which in steps is located in the specified positions, or by sampling the outputs of an adequate number of microphones located in the specified positions.

7.4. Microphone array and location of reference sound sources in reverberant field conditions

7.4.1. In general the reference sound source (RSS) used for the replacement comparison method shall be measured with the same microphone array and with the same number of source locations as used for the appliance under test.

7.4.2. The RSS shall be located on the floor or on the wall such that the projection of the center of its reference box coincides with the projection of the center of the reference box of the appliance under test.

7.5. Sound pressure level measurements

7.5.1. In general the time-averaged mean-square sound pressure levels (in octave bands or with A-weighting) of the source(s) (appliance under test), shall be measured with a dynamic characteristic of the instrumentation corresponding to the requirements for the "Slow" response of sound level meters according to the procedure given in ISO Standard 3743, first edition, 1976.12.15.

7.5.2. The measured noise levels of the source(s) shall be corrected for the influence of background noise levels according to the following table :

| Difference between sound pressure level measured with sound source operating and background sound pressure level alone | Corrections to be subtracted from sound pressure level measured with sound source operating to obtain sound source alone |
|--|--|
| dB | dB |
| < 6 | measurements invalid |
| 6 | 1,0 |
| 7 | 1,0 |
| 8 | 1,0 |
| 9 | 0,5 |
| 10 | 0,5 |
| > 10 | 0,0 |

If due to simple instrumentation, an observer has to be present, or due to the properties of the appliance under test (for example, a citrus fruit blender) an operator has to be present, this person (standard test operator) shall be at least 0.5 m from the microphone in use, on the side away from the appliance under test.

8. Calculation of sound pressure and sound power levels

8.1. Calculation of mean sound pressure levels

The mean (space-averaged) octave band pressure levels or the mean A-weighted sound pressure levels of the appliance under test and of the reference sound source shall be calculated from the pressure levels for each octave band of interest, or from the A-weighted sound pressure levels, measured for the microphone positions of the array and corrected for background noise from the equation :

$$L_{pm} \text{ (or } \overline{L_p}) = 10 \log_{10} \left[\frac{1}{n} \sum_{i=1}^{i=n} 10^{0.1 L_{pi}} \right]$$

./.

where :

- L_{pm} is the space averaged (in reverberant field conditions) octave band pressure level or A-weighted sound pressure level in decibels, reference 20 μ Pa;
- $\overline{L_p}$ is the space-averaged (in essentially-free-field and semi-reverberant field conditions) octave band pressure level or A-weighted sound pressure level in decibels, reference 20 μ Pa;
- L_{pi} is the octave band pressure level or A-weighted sound pressure level, resulting from the i th measurement in decibels, reference 20 μ Pa;
- n is the total number of measurements for a particular octave band pressure level, or A-weighted sound pressure level, i.e. the number of microphone positions multiplied (in reverberant field conditions) with the number of source locations.

8.2. Calculation of sound power levels for the comparison method

The octave band power levels or the A-weighted sound power level of the appliance under test, L_W , shall be calculated from the mean sound pressure levels of the appliance under test, L_{pme} or L_{pe} , and those of the reference sound source, determined according to sub-clause 8.1., and the known (calibrated) octave band power levels or the known (calibrated) A-weighted sound power level of the reference sound source, as follows :

$$L_W = L_{pe} + (L_{Wr} - L_{pr})$$

where :

- L_W is the octave band sound power level or the A-weighted sound power level of the appliance under test, in decibels, reference 1 pW;
- L_{pe} is the space averaged octave band pressure level or the A-weighted sound pressure level of the appliance under test, determined according to sub-clause 8.1., in decibels, reference 20 μ Pa;
- L_{Wr} is the known (calibrated) octave band power level or the known (calibrated) A-weighted sound power level of the reference sound source in decibels, reference 1 pW;
- L_{pr} is the octave band pressure level or the A-weighted sound pressure level of the reference sound source, determined according to sub-clause 8.1., in decibels, reference 20 μ Pa.

8.3. Calculation of sound power levels for measurements with the direct method in qualified essentially free-field conditions according to ISO/DIS 3744.2 submitted on 1977.02.24

The A-weighted sound power level of the appliance under test, L_W , shall be computed from the mean value of the measured sound pressure levels, L_p , determined according to sub-clause 8.1., and the area of the used measurement surface, S , from the equation :

$$L_W = \overline{L_p} + 10 \log_{10} (S/S_0) - K$$

where :

L_W is the A-weighted sound power level or the octave band of the appliance under test in decibels, reference 1 pW;

$\overline{L_p}$ is the space-averaged A-weighted surface sound pressure level or the octave band, determined from measured sound pressure levels at the specified microphone positions according to sub-clause 8.1. (under the symbol L_{pm}) in decibels, reference 20 μ Pa;

S is the area of the used measurement surface in square meters;

$S_0 = 1 \text{ m}^2$;

K is the environmental correction of the test room, determined during the qualification, in decibels, reference 1 pW.

Note : By using the "absolute comparison test" (use of a reference sound source) for the determination of K according to Annex A.3 of ISO/DIS 3744.2 submitted on 1977.02.24 ($K = L_{Wr} \text{ measured} - L_{Wr} = L_{pr} + 10 \log_{10} \frac{S}{S_0} - L_{Wr}$),

the "direct" method is in fact a comparison method according to the formula of clause 8.2. because by inserting K into the above formula, the equation of clause 8.2. is found.

8.4. Calculation of A-weighted sound power levels for measurements with the direct method in special reverberation test rooms according to ISO standard 3743, first edition, 1976.12.15

The A-weighted sound power level of the appliance under test, L_{WA} , shall be computed from the mean value of the measured A-weighted sound pressure levels, L_{pMA} , determined according to sub-clause 8.1., and the properties of the reverberation test room the equations :

if a qualified special reverberation test room is used :

$$L_{WA} = L_{pMA} - 10 \log_{10} \frac{T_N}{T_0} + 10 \log_{10} \frac{V}{V_0} - 13$$

where :

L_{WA} is the A-weighted sound power level of the appliance under test in decibels, reference 1 pW;

L_{pMA} is the space-averaged A-weighted sound pressure level, determined from measured A-weighted sound pressure levels at the specified microphone positions according to sub-clause 8.1. (under the symbol L_{pm}) in decibels, reference 20 μ Pa;

T_N is the nominal reverberation time of the test room in seconds, as defined in ISO standard 3743, first edition, 1976, 12.15

$T_0 = 1$ s;

V is the volume of the test room in cubic-meters;

$V_0 = 1$ m³.

9. Information to be recorded

The following information, if applicable, shall be compiled and recorded :

9.1. General data

9.1.1. Name and address of the laboratory where measurements are carried out.

9.1.2. File number and date(s) of measurements.

9.1.3. Name and address of company, organization or person, who ordered the measurements.

9.1.4. Purpose of measurements.

9.1.5. Statement of compliance with this method.

9.2. Description of the appliance under test

9.2.1. Family : for example, vacuum cleaner, washing-machine, etc.

9.2.2. Design characteristics : for example, hand-held, table-type, floor-mount.

9.2.3. Manufacturer or dealer, trade mark.

9.2.4. Model or type designation (name of product).

9.2.5. Serial number or production date.

9.2.6. Rating data (name plate data) : for example, voltage, input, capacity, water supply pressure, etc.

9.2.7. Declared noise emission.

9.2.8. Power source and motor data : for example, mains powered, battery powered, induction motor, commutator motor, motor speed, etc.

9.2.9. Supplied and/or advertised attachments and/or accessories.

9.3. Measurement method applied for the test

9.3.1. Comparison method.

9.3.2. Direct method.

9.4. Acoustical test environment

9.4.1. Free-field or reverberation test room.

9.4.2. Test room characteristics : for example, semi-anechoic laboratory room, outdoor area, ordinary room with or without acoustical treatment, special reverberation test room.

9.4.3. Room inner (free) dimensions, volume.

9.4.4. Acoustical treatment of surfaces.

9.4.5. Room qualification, method and data.

9.5. Instrumentation

9.5.1. Instrumentation for measuring acoustical data : name, type, serial numbers, accuracy, manufacturer of equipment and auxiliaries, date of latest calibration.

9.5.2. Reference sound source with calibration data, manufacturer.

9.5.3. Instrumentation for measuring climatic conditions : name, type, serial number, accuracy, manufacturer (if known).

9.5.4. Instrumentation for measuring operating conditions : name, type, serial number, accuracy, manufacturer (if known).

9.6. Equipment and preconditioning of appliance under test

9.6.1. Equipment, attachments, accesories, selected for measurements.

9.6.2. Running-in procedure and period.

9.6.3. Stabilizing procedure and period.

9.7. Electric cupply, water supply, etc.

9.7.1. Mains supply voltage with tolerances, a.c., d.d., frequency.

9.7.2. Battery type and capacity, full or partly charged.

9.7.3. Water supply, pressure with tolerances, hot, cold.

9.7.4. Other energie's, supply data.

9.8. Climatic conditions

9.8.1. Temperature.

9.8.2. Relative humidity.

9.8.3. Atmospheric pressure.

9.9. Operation of the appliance under test

9.9.1. Description of the applied load(s).

9.9.2. Selected operation procedure(s) : for example, period(s), cycle(s), speed of motor(s), position of controls, etc.

9.9.3. Description of period(s) or cycle(s) used for measurements.

9.10. Location and mounting of the appliance under test

9.10.1. Description of the location of the appliance under test and of the reference sound source in the test environment : for example, distances from floor and wall(s) (if necessary by making a sketch).

9.10.2. Description of the mounting of the appliance under test : for example, fixtures, building-in cabinets, resilient support(s), floor covering(s), etc.

9.11. Microphone array

- 9.11.1. Description of the array : for example, number of microphone positions, co-ordinate, measurement distance, radius of spherical measurement surface, area of measurement surface, etc.
- 9.11.2. Description of the location of the microphone array in the test environment : for example, distances from the environment boundaries, etc.
- 9.11.3. Microphone angle of incidence and orientation with respect to the source.
- 9.11.4. Number of microphones, transfer of a single microphone or scanning of the output from all microphones of the array, scanning procedure.
- 9.11.5. Attachments for microphones : for example, windshielding accessories with correction data, etc.

9.12. Measurement data

- 9.12.1. Measured sound pressure levels in octave bands and/or with A-weighting for each microphone position and for each of the selected load and operation conditions of the appliance under test and the periods or cycles used for measurements.
- 9.12.2. Measured sound pressure levels in octave bands and/or with A-weighting for each microphone position of the reference sound source.
- 9.12.3. Measured sound pressure levels in octave bands and/or with A-weighting of the background noise before and after each series of measurements.
- 9.12.4. Applied corrections to the measured values for the appliance under test and for the reference sound source referring to the influence of background noise and microphone attachments (for example, for windshielding).
- 9.12.5. Determined time histories (preferably A-weighted sound pressure levels versus time) for selected load and operation conditions and the periods or cycles used for measurements.
- 9.12.6. Determined frequency spectra in octave bands.
- 9.12.7. Remarks on subjective impression of noise character : for example, audible discrete tone(s), impulsive character, temporal character, etc.

9.13. Calculated sound pressure and sound power levels

10. Information to be reported

Only those data recorded according to clause 9 shall be reported which are of importance for the purposes of the measurements. In general, the data of the following sub-clauses may be important.

10.1. General data

10.2. Appliance under test

- 10.2.1. Family
- 10.2.2. Design characteristics
- 10.2.3. Manufacturer, dealer, trade mark
- 10.2.4. Model or type designation
- 10.2.5. Serial number, production date
- 10.2.6. Rating data
- 10.2.7. Declared noise emission
- 10.2.8. Power source
- 10.2.9. Attachments, accessories

10.3. Test conditions for the appliance

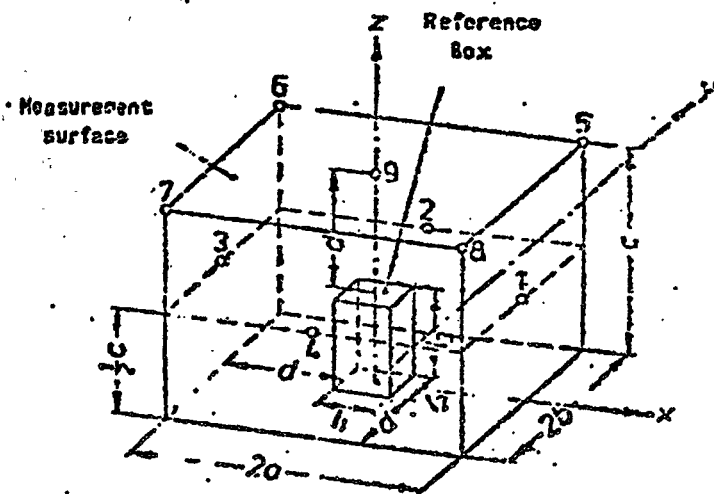
- 10.3.1. Selected attachments, accessories
- 10.3.2. Supply from mains
- 10.3.3. Supply from batteries
- 10.3.4. Water supply
- 10.3.5. Supply of other energy
- 10.3.6. Temperature
- 10.3.7. Relative humidity
- 10.3.8. Atmospheric pressure
- 10.3.9. Applied load
- 10.3.10. Operation procedure
- 10.3.11. Periods, cycle
- 10.3.12. Location in the test room
- 10.3.13. Mounting

10.4. Acoustical data

- 10.4.1. Comparison method
- 10.4.2. Direct method
- 10.4.3. Reference sound source
- 10.4.4. Test environment
- 10.4.5. Time history of operation procedure
- 10.4.6. Frequency spectra
- 10.4.7. Remarks on subjective impression of noise
- 10.4.8. Calculated octave band sound power levels
- 10.4.9. Calculated sound power level(s)

Co-ordinates of microphone positions

| No. | x | y | z |
|-----|----|----|-------|
| 1 | a | 0 | 0.5 c |
| 2 | 0 | b | 0.5 c |
| 3 | -a | 0 | 0.5 c |
| 4 | 0 | -b | 0.5 c |
| 5 | a | b | c |
| 6 | -a | b | c |
| 7 | -a | -b | c |
| 8 | a | -b | c |
| 9 | 0 | 0 | c |



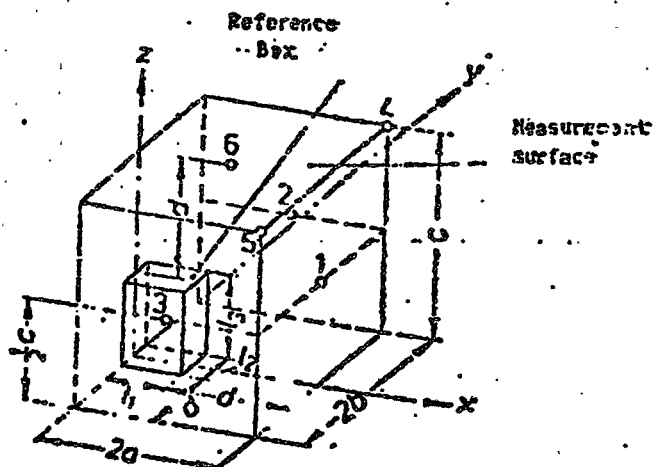
Measurement surface area $S = 2(2bc + 2ac + 2ab)$

FIGURE 1 Measurement surface - parallelepiped - with 9 microphone positions for floor-mount free standing appliances

Note.- This measurement surface can be used also for wall-mount appliances. In this case the x,y-axes are located in the plane of the vertical reflecting surface with the x-axis directed vertically upwards.

Co-ordinates of microphone positions

| No. | x | y | z |
|-----|-----|-----|-------|
| 1 | 2 a | 0 | 0.5 c |
| 2 | a | 2 b | 0.5 c |
| 3 | a | -b | 0.5 c |
| 4 | 2 a | 2 b | c |
| 5 | 2 c | 2 b | c |
| 6 | a | 0 | c |

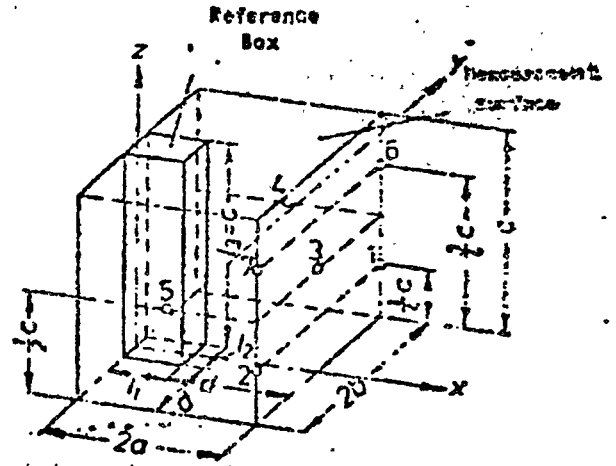


Measurement surface area: $S = 2(2ac + 2ab + bc)$

FIGURE 2 Measurement surface - parallelepiped - with 6 microphone positions for floor-mount appliances placed against a wall.

Co-ordinates of microphone positions

| No. | x | y | z |
|-----|-----|-----|--------|
| 1 | 2 a | b | 0.25 c |
| 2 | 2 a | - b | 0.25 c |
| 3 | 2 a | 0 | 0.50 c |
| 4 | a | b | 0.50 c |
| 5 | a | - b | 0.50 c |
| 6 | 2 a | b | 0.75 c |
| 7 | 2 a | - b | 0.75 c |



Measurement surface area $S = 2(2ac + bc)$

FIGURE 3 Measurement surface - parallelepiped - with 6 microphone positions for high floor-mount appliances placed against a wall

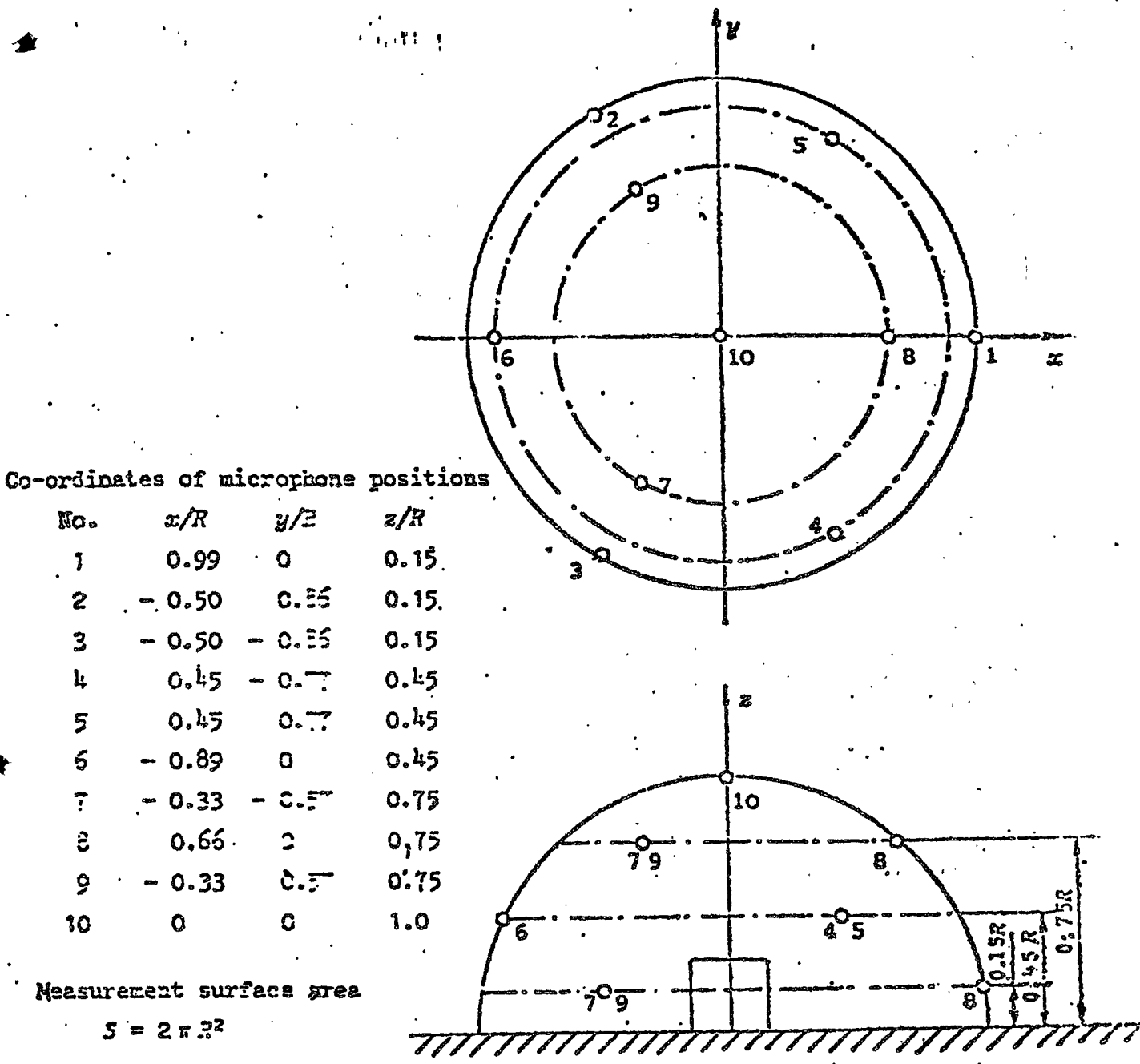
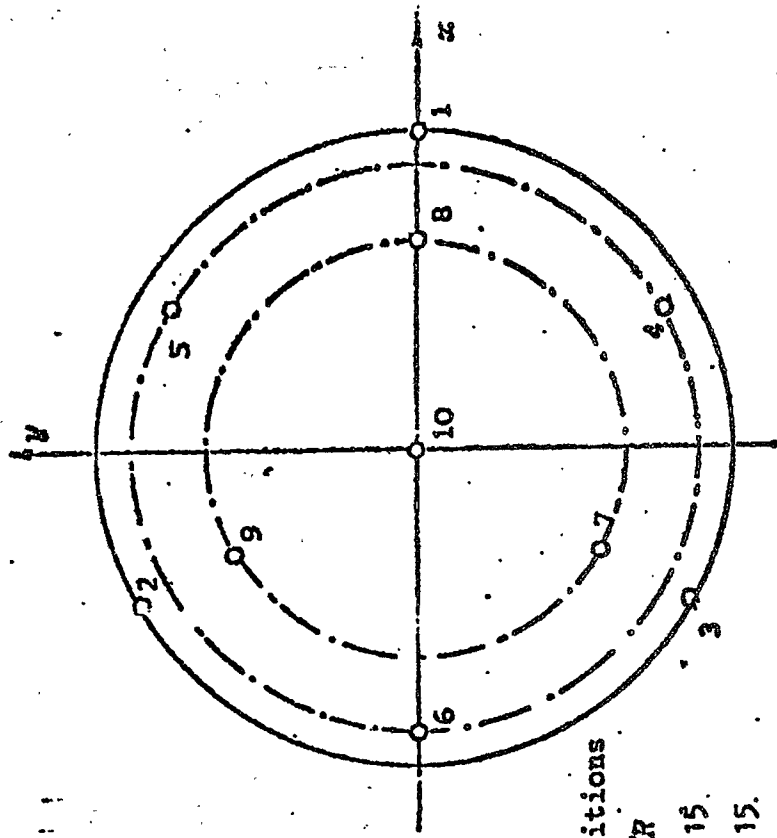
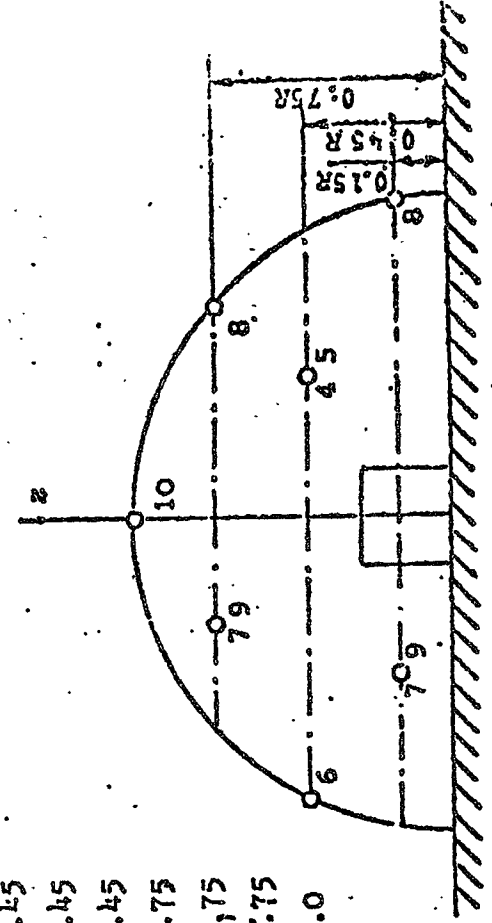


FIGURE 4 Measurements surface - hemisphere - with 10 microphone positions for hand-held, table-type and floor treatment appliances



Co-ordinates of microphone positions

| No. | x/R | y/R | z/R |
|-----|-------|-------|-------|
| 1 | 0.99 | 0 | 0.15 |
| 2 | -0.50 | 0.35 | 0.15 |
| 3 | -0.50 | -0.35 | 0.15 |
| 4 | 0.45 | -0.77 | 0.45 |
| 5 | 0.45 | 0.77 | 0.45 |
| 6 | -0.89 | 0 | 0.45 |
| 7 | -0.33 | -0.57 | 0.75 |
| 8 | 0.66 | 0 | 0.75 |
| 9 | -0.33 | 0.57 | 0.75 |
| 10 | 0 | 0 | 1.0 |



Measurement surface area

$$S = 2 \pi R^2$$

FIGURE 4 Measurements surface - hemisphere - with 10 microphone positions - for hand-held, table-type and floor treatment appliances

Co-ordinates of microphone positions

| No. | x/R | y/R | z/R |
|-----|-------|--------|-------|
| 1 | 0.47 | - 0.81 | 0.33 |
| 2 | 0.94 | 0 | 0.33 |
| 3 | 0.47 | 0.81 | 0.33 |
| 4 | 0.48 | - 0.28 | 0.83 |
| 5 | 0.48 | 0.28 | 0.83 |

Measurement surface area

$$S = \pi R^2$$

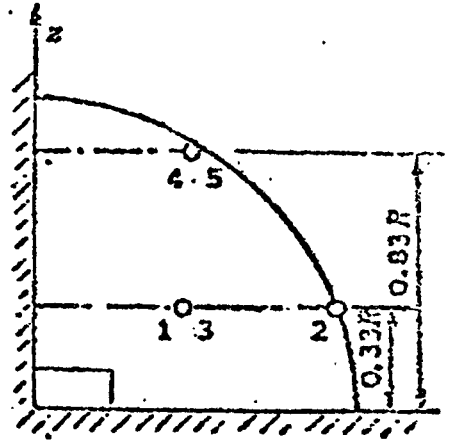
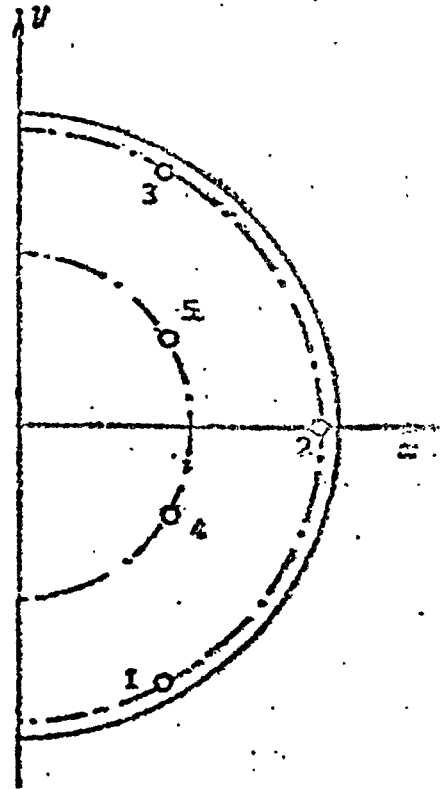


FIGURE 6 Measurement surface - quarter sphere - with 5 microphone positions for small floor-type appliances placed against wall.

Coordinates of microphone positions

| No. | x/R | y/R | z/R |
|-----|-------|-------|-------|
| 1 | 0 | 0 | -1 |
| 2 | 0.39 | 0 | -0.45 |
| 3 | -0.45 | 0.77 | -0.45 |
| 4 | -0.45 | -0.77 | -0.45 |
| 5 | 0.45 | -0.77 | 0.45 |
| 6 | 0.45 | 0.77 | 0.45 |
| 7 | -0.89 | 0 | 0.45 |
| 8 | 0 | 0 | 1 |

Measurement surface area

$$S = 4\pi R^2$$

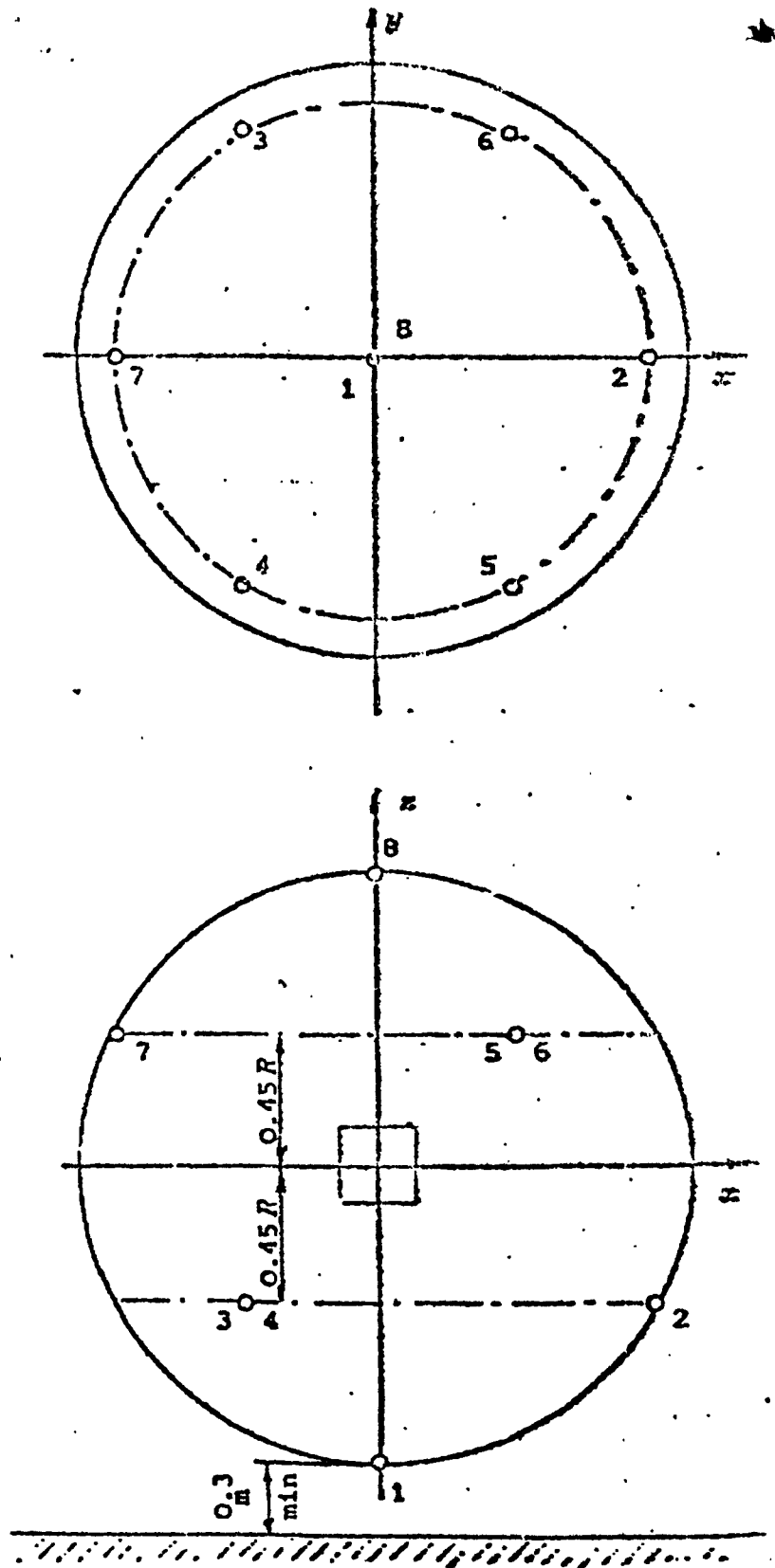


FIGURE 7 Measurement surface - sphere - with 8 microphone positions for stand-type appliances

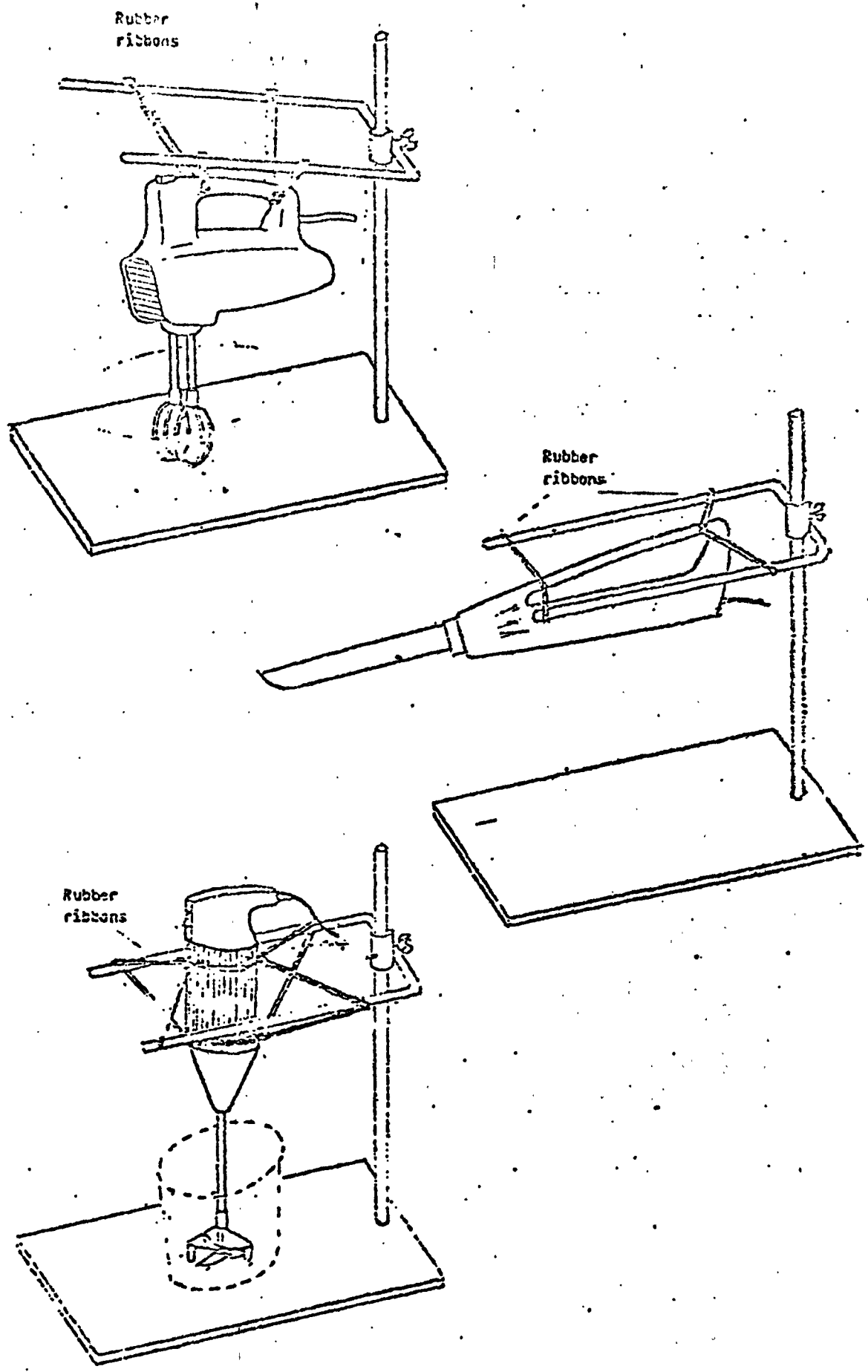


FIGURE 8 Test fixtures for hand-held appliances

ANNEX II

Technical procedure for checking the accuracy of the information on the noise level of a type examined

The conformity of the accuracy of the information on the noise level of a type examined shall, if possible, be verified by spot checks.