

Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors

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## ANNEX I

### DEFINITIONS OF EQUIPMENT

#### 1. Aerial access platforms with combustion engines

Equipment consisting of a minimum of a work platform, an extending structure and a chassis. The work platform is a fenced platform or a cage which can be moved under load to the required working position. The extending structure is connected to the chassis and supports the work platform; it allows movement of the work platform to its required position.

#### 2. Brush cutter

A combustion-engine driven portable hand-held unit fitted with a rotating blade made of metal or plastic intended to cut weeds, brush, small trees and similar vegetation. The cutting device operates in a plane approximately parallel to the ground.

#### 3. Builders' hoist for the transport of goods

A power-operated, temporarily installed builders' hoist intended for use by persons who are permitted to enter engineering and construction sites, serving

- (i) defined landing levels, having a platform
  - designed for the transportation of goods only
  - which permits the access of persons during loading and unloading
  - which permits the access and travel by authorised persons during erection, dismantling and maintenance
  - guided
  - travelling vertical or along a path within 15° max. of the vertical
  - supported or sustained by: wire, rope, chain, screwed spindle and nut, rack and pinion, hydraulic jack (direct or indirect), or an expanding linkage mechanism
  - where masts may or may not require support from separate structures, or
- (ii) either one upper landing or a work area extending to the end of the guide (e.g. a roof), having a load-carrying device:
  - designed for the transportation of goods only
  - designed that there is no need to step on it for loading or unloading purposes or for maintenance, erection and dismantling
  - from which persons are prohibited at any time
  - guided
  - which is designed to travel at an angle of at least 30° to the vertical but may be used at any angle
  - sustained by steel wire rope and a positive drive system
  - controlled by constant pressure type controls
  - which does not benefit from the use of any counterweight
  - having a maximum rated load of 300 kg
  - having a maximum speed of 1m/s
  - and where the guides require support from separate structures.

#### 4. Building site band saw machine

A hand-fed powered machine weighing less than 200 kg fitted with a single saw blade in the form of a continuous band mounted on and running between two or more pulleys.

#### 5. Building site circular saw bench

A hand-fed machine weighing less than 200 kg fitted with a single circular sawblade (other than a scoring saw) with a diameter of 350 mm or more, up to a maximum diameter of 500 mm, which is fixed during the normal cutting operation, and a horizontal table, all or part of which is fixed during operation. The sawblade is mounted on a horizontal non-tilting spindle, the position of which remains stationary during machining. The machine may have any of the following features:

- the facility for the sawblade to be raised and lowered through the table
- machine frame below the table may be open or enclosed
- the saw may be fitted with an additional, manually operated travelling table (not adjacent to the sawblade).

#### 6. Chain saw, portable

A power-driven tool designed to cut wood with a saw chain and consisting of an integrated compact unit of handles, power source and cutting attachment, designed to be supported with two hands.

#### 7. Combined high pressure flusher and suction vehicle

A vehicle which may work either as a high pressure flusher or as a suction vehicle. See high pressure flusher and suction vehicle.

#### 8. Compaction machine

A machine which compacts materials, e.g. rock fills, soil or asphalt surfacing, through a rolling, tamping or vibrating action of the working tool. It may be self-propelled, towed, walk-behind or an attachment to a carrying machine. Compaction machines are subdivided as follows:

- rollers for ride-on operators: self-propelled compaction machines with one or more metallic cylindrical bodies (drums) or rubber tyres; the operator's station is an integral part of the machine
- walk-behind rollers: self-propelled compaction machines with one or more metallic cylindrical bodies (drums) or rubber tyres in which the operation facilities for travelling, steering, braking and vibrating are disposed in such a way that the machines have to be operated by an attending operator or by remote control
- towed roller: compaction machines with one or more metallic cylindrical bodies (drums) or rubber tyres which do not possess an independent drive system and where the operator's station is to be found on a tractor unit
- vibratory plates and vibratory rammers: compactions machines with mainly flat base plates which are made to vibrate. They are operated by an attending operator or as an attachment to a carrier machine
- explosion rammers: compaction machines with mainly a flat pad as the compacting tool which is made to move in a predominantly vertical direction by explosion pressure. The machine is operated by an attending operator.

#### 9. Compressor

Any machine for use with interchangeable equipment which compresses air, gases or vapours to a pressure higher than the inlet pressure. A compressor comprises the bare compressor itself, the prime mover and any component or device supplied, which is necessary for safe operation of the compressor.

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Excluded are the following categories of device:

- fans, i.e. devices producing air circulation at a positive pressure of not more than 110 000 pascals
- vacuum pumps, i.e. devices or appliances for extracting air from an enclosed space at a pressure not exceeding atmospheric pressure
- gas turbine engines.

10. Concrete-breakers and picks, hand held

Powered (by any method) concrete-breakers and picks used to perform work on civil engineering and building sites.

11. Concrete or mortar mixer

A machine to prepare concrete or mortar, irrespective of the loading, mixing and emptying process. It may be operated intermittently or constantly. Concrete mixers on trucks are called truck mixers (see definition 55).

12. Construction winch

A power-operated, temporarily installed lifting appliance which is equipped with means for raising and lowering a suspended load.

13. Conveying and spraying machine for concrete and mortar

Items of plant pumping and spraying concrete or mortar, with or without agitator, whereby the material to be transported is conveyed to the placing position through pipelines, distribution devices or distribution booms. Conveyance is carried out:

- for concrete mechanically, by piston or rotor pumps
- for mortar mechanically by piston, worm, hose and rotor pumps or pneumatically by compressors with or without air chamber.

These machines may be mounted on trucks, trailers or special vehicles.

14. Conveyor belt

A temporarily installed machine suitable for transporting material by means of a power-driven belt.

15. Cooling equipment on vehicles

A cargo space refrigeration unit on vehicle categories N2, N3, O3 and O4 as defined by Directive 70/156/EEC.

The refrigeration unit may be powered by means of an integral part of the refrigeration unit, a separate part attached to the vehicle body, a driving engine of the vehicle, or by an independent or standby power source.

16. Dozer

A self-propelled wheeled or crawler machine used to exert a push or pull force through mounted equipment.

17. Drill rig

A machine which is used for drilling holes on construction sites by

- percussive drilling
- rotary drilling

— rotary percussive drilling.

Drill rigs are stationary during drilling. They may move from one place of work to another, under their own power. Self-propelled drill rigs include those mounted on lorries, wheeled chassis, tractors, crawlers, skid bases (pulled by winch). When drill rigs are mounted on lorries, tractors and trailers, or a wheel-based, transportation may be carried out at higher speeds and on public roads.

18. Dumper

A self-propelled machine wheeled or crawler machine having an open body, which either transports and dumps or spreads material. Dumpers may be equipped with integral self-loading equipment.

19. Equipment for loading and unloading of silos or tanks on trucks

Powered devices attached to silo or tanker trucks for loading or unloading of liquids or bulk material by means of pumps or similar equipment.

20. Excavator, hydraulic or rope-operated

A self-propelled crawler or wheeled machine having an upper structure capable of a minimum of 360° rotation, which excavates, swings and dumps material by the action of a bucket fitted to the boom and arm or telescopic boom, without moving the chassis or undercarriage during any one cycle of the machine.

21. Excavator-loader

A self-propelled wheeled or crawler machine having a main structural support designed to carry both a front-mounted bucket loading mechanism and a rear-mounted backhoe. When used in the backhoe mode, the machine normally digs below ground level with bucket motion towards the machine. The backhoe lifts, swings and discharges material while the machine is stationary. When used in the loader mode, the machine loads or excavates through forward motion of the machine, and lifts, transports and discharges material.

22. Glass recycling container

A container, built of whatever material, that is used for the collection of bottles. It is equipped with at least one opening for filling in bottles and another one for emptying the container.

23. Grader

A self-propelled wheeled machine having an adjustable blade, positioned between front and rear axles, which cuts, moves and spreads material usually to grade requirements.

24. Grass trimmer/grass edge trimmer

A combustion-engine driven portable hand-held unit fitted with flexible line(s), string(s), or similar non-metallic flexible cutting elements, such as pivoting cutters, intended to cut weeds, grass or similar soft vegetation. The cutting device operates in a plane approximately parallel (grass trimmer) or perpendicular (grass edge trimmer) to the ground.

25. Hedge trimmer

Hand-held, integrally driven powered equipment which is designed for use by one operator for trimming hedges and bushes utilising one or more linear reciprocating cutter blades.

26. High pressure flusher

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A vehicle equipped with a device to clean sewers or similar installations by means of a high pressure water jet. The device may be either mounted on a proprietary vehicular truck chassis or incorporated into its own chassis embodiment. The equipment may be fixed or demountable as in the case of an exchangeable bodywork system.

#### 27. High pressure water jet machine

A machine with nozzles or other speed-increasing openings which allow water, also with admixtures, to emerge as a free jet. In general, high pressure jet machines consist of a drive, a pressure generator, hose lines, spraying devices, safety mechanisms, controls and measurement devices. High pressure water jet machines may be mobile or stationary:

- mobile high pressure water jet machines are mobile, readily transportable machines which are designed to be used at various sites, and for this purpose are generally fitted with their own undergear or are vehicle-mounted. All necessary supply lines are flexible and readily disconnectable
- stationary high pressure water jet machines are designed to be used at one site for a length of time but capable of being moved to another site with suitable equipment. Generally skid or frame-mounted with supply line capable of being disconnected.

#### 28. Hydraulic hammer

Equipment which uses the hydraulic power source of the carrier machine to accelerate a piston (sometimes gas-assisted), which then hits a tool. The stress wave generated by kinetic action flows through the tool into the material, which causes the material to break. Hydraulic hammers need a supply of pressurised oil to function. The complete carrier/hammer unit is controlled by an operator, usually seated in the cabin of the carrier.

#### 29. Hydraulic power pack

Any machine for use with interchangeable equipment which compresses liquids to a pressure higher than the inlet pressure. It means an assembly of a prime mover, pump, with or without reservoir and accessories (e.g. controls, pressure relief valve).

#### 30. Joint cutter

A mobile machine intended for the production of joints in concrete, asphalt and similar road surfaces. The cutting tool is a rotating high speed disc. The forward motion of the joint cutter can be

- manual
- manual with mechanical assistance
- power-driven.

#### 31. Landfill compactor, loader-type with bucket

A self-propelled wheeled compaction machine having a front-mounted loader linkage with a bucket having steel wheels (drums) primarily designed to compact, move, grade, and load soil, landfill or sanitary (refuse) materials.

#### 32. Lawnmower

A walk-behind or ride-on grass cutting machine or a machine with grass-cutting attachment(s) where the cutting device operates in a plane approximately parallel to the ground and which uses the ground to determine the height of cut by means of wheels, air cushion or skids, etc., and which utilises an engine or an electric motor for a power source. The cutting devices are either

- rigid cutting elements, or

- non-metallic filament line(s) or freely pivoting non-metallic cutter(s) with a kinetic energy of more than 10 J each; the kinetic energy is determined using EN 786:1997, Annex B.

Also a walk-behind or ride-on grass cutting machine or a machine with grass-cutting attachment(s) where the cutting device is rotating about a horizontal axis to provide a shearing action with a stationary cutter bar or knife (cylinder mower).

33. Lawn trimmer/lawn edge trimmer

An electrically powered walk-behind or hand-held grass cutting machine with cutting element(s) of non-metallic filament line(s) or freely pivoting non-metallic cutters with a kinetic energy of not more than 10 J each, intended to cut grass or similar soft vegetation. The cutting element(s) operate(s) in a plane approximately parallel (lawn trimmer) or perpendicular (lawn edge trimmer) to the ground. The kinetic energy is determined using EN 786:1997, Annex B.

34. Leaf blower

A powered machine appropriate to clear lawns, paths, ways, streets, etc. of leaves and other material by means of a high velocity air flow. It may be portable (hand-held) or not portable but mobile.

35. Leaf collector

A powered machine suitable for collecting leaves and other debris using a suction device consisting of a power source which produces a vacuum inside the machine and a suction nozzle and a container for the collected material. It may be portable (hand-held) or not portable but mobile.

36. Lift truck, combustion-engine driven, counterbalanced

A wheeled, internal combustion-engine driven lift truck with counterweight and lifting equipment (mast, telescopic arm or articulated arm). These are:

- rough terrain trucks (wheeled counterbalanced trucks intended primarily for operation on unimproved natural terrain and on disturbed terrain of, e.g., construction sites)
- other counterbalanced lift trucks, excluded are those counterbalanced lift trucks that are specifically constructed for container handling.

37. Loader

A self-propelled wheeled or crawler machine having an integral front-mounted bucket-supporting structure and linkage, which loads or excavates through forward motion of the machine, and lifts, transports and discharges material.

38. Mobile crane

A self-powered jib crane capable of travelling, loaded or unloaded, without the need for fixed runways and relying on gravity for stability. It operates on tyres, crawlers or with other mobile arrangements. In fixed positions it may be supported by outriggers or other accessories increasing its stability. The superstructure of a mobile crane may be of the type of full-circle slewing, of limited slewing or non-slewing. It is normally equipped with one or more hoists and/or hydraulic cylinders for lifting and lowering the jib and the load. Mobile cranes are equipped either with telescopic jibs, with articulated jibs, with lattice jibs, or a combination of these, of such a design that may readily be lowered. The loads suspended from the jib may be handled by hook block assemblies or other load-lifting attachments for special services.

39. Mobile waste container

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An appropriate designed container fitted with wheels intended to store waste temporarily, and which is equipped with a cover.

40. Motor hoe

A self-propelled machine designed to be pedestrian-controlled

- with or without support wheel(s), in such a way that its working elements act as hoeing tools to ensure propulsion (motor hoe), and
- propelled by one or various wheel(s) directly actuated from the engine and equipped with hoeing tools (motor hoe with drive wheel(s)).

41. Paver-finisher

A mobile road construction machine used for the purpose of applying layers of construction material, such as bituminous mix, concrete and gravel on surfaces. Paver-finishers may be equipped with a high-compaction screed.

42. Piling equipment

Pile installation and extraction equipment, e.g. impact hammers, extractors, vibrators or static pile pushing/pulling devices of an assembly of machines and components used for installation or extraction of piles, which also includes:

- piling rig consisting of carrier machine (crawler, wheel or rail mounted, floating leader attachment, leader or guiding system)
- accessories, e.g. pile caps, helmets, plates, followers, clamping devices, pile handling devices, pile guides, acoustic shrouds and shock/vibration absorbing devices, power packs/generators and personal lifting devices or platforms.

43. Pipelayer

A self-propelled crawler or wheeled machine specifically designed to handle and lay pipes and carry pipeline equipment. The machine, the design of which is based on a tractor, has especially designed components such as undercarriage, main frame, counterweight, boom and load-hoist mechanism, and vertically pivoting side boom.

44. Piste caterpillar

A self-propelled crawler machine used to exert a push or pull force on snow and ice through mounted equipment.

45. Power generator

Any device comprising an internal combustion engine driving a rotary electrical generator producing a continuous supply of electrical power.

46. Power sweeper

A sweeping collection machine having equipment to sweep debris into the path of a suction inlet that would then pneumatically by way of a high velocity airstream or with a mechanical pick-up system convey the debris to a collection hopper. The sweeping and collecting devices may either be mounted to a proprietary vehicular truck chassis or incorporated into its own chassis embodiment. The equipment can be fixed or demountable as in the case of an exchangeable bodywork system.

47. Refuse collection vehicle



A vehicle designed for the collection and transportation of domestic and bulky waste based on loading via containers or by hand. The vehicle may be equipped with a compaction mechanism. A refuse collection vehicle comprises a chassis with cab onto which the bodywork is mounted. It may be equipped with a container lifting device.

48. Road-milling machine

A mobile machine used for removing material from paved surfaces using a power-driven cylindrical body, on which surface the milling tools are fitted; the cutter drums rotate during the cutting operation.

49. Scarifier

A walk-behind or ride-on powered machine which uses the ground to determine the depth of cut and which is equipped with an assembly appropriate to slit or scratch the surface of the lawn in gardens, parks and other similar areas.

50. Shredder/chipper

A powered machine designed for use in a stationary position having one or more cutting devices for the purpose of reducing bulk organic materials to smaller pieces. Generally it consists of a feed intake opening through which material (which may be held by an appliance or not) is inserted, a device which cuts up the material by whatever method (cutting, chopping, crushing or other methods) and a discharge chute through which the cut material is discharged. A collecting device may be attached.

51. Snow-removing machine with rotating tools

A machine with which snow can be removed from traffic areas by rotating means, accelerated and ejected by blower means.

52. Suction vehicle

A vehicle equipped with a device to collect water, mud, sludge, refuse or similar material from sewers or similar installations by means of a vacuum. The device may be either mounted on a proprietary vehicular truck chassis or incorporated into its own chassis embodiment. The equipment may be fixed or demountable as in the case of an exchangeable bodywork system.

53. Tower crane

A slewing jib crane with the jib located at the top of a tower which stays approximately vertical in the working position. This power-driven appliance is equipped with means for raising and lowering suspended loads and for the movement of such loads by changing the load-lifting radius, slewing, travelling of the complete appliance. Certain appliances perform several but not necessarily all of these movements. The appliance can be installed in a fixed position or equipped with means for displacing or climbing.

54. Trencher

A self-propelled, ride-on or pedestrian-controlled, crawler or wheeled machine, having a front- or rear-mounted excavator linkage and attachment, primarily designed to produce trenches in a continuous operation, through a motion of the machine.

55. Truck mixer

A vehicle which is equipped with a drum to transport ready-mixed concrete from the concrete mixing plant to the job site; the drum may rotate when the vehicle is driving or stand still. The

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drum is emptied on the job site by rotating the drum. The drum is driven either by the driving engine of the vehicle or by a supplementary engine.

56. Water pump unit

A machine consisting of a water pump itself and the driving system. Water pump means a machine for the raising of water from a lower to a higher energy level.

57. Welding generator

Any rotary device which produces a welding current.

## ANNEX II

### EC DECLARATION OF CONFORMITY

The EC declaration of conformity must contain the following particulars:

- name and address of the manufacturer or his authorised representative established in the Community
- name and address of the person who keeps the technical documentation
- description of the equipment
- conformity assessment procedure followed, and, where appropriate, name and address of the notified body involved
- measured sound power level on an equipment representative for this type
- guaranteed sound power level for this equipment
- a reference to this Directive
- the declaration that the equipment conforms to the requirements of this Directive
- where appropriate, the declaration(s) of conformity and references of the other Community Directives applied
- the place and date of the declaration
- particulars of the signatory authorised to sign the legally binding declaration for the manufacturer or his authorised representative established in the Community.

## ANNEX III

### METHOD OF MEASUREMENT OF AIRBORNE NOISE EMITTED BY EQUIPMENT FOR USE OUTDOORS

#### Scope

This Annex lays down the methods of measurement of airborne noise that shall be used for the determination of the sound power levels of equipment covered by this Directive with a view to the conformity assessment procedures of this Directive.

Part A of this Annex for each type of equipment referred to in Article 2(1) lays down

- basic noise emission standards
- general supplements to these basic noise emission standards

for measuring the sound pressure level on a measurement surface enveloping the source and for calculating the sound power level produced by the source.

- Part B of this Annex for each type of equipment referred to in Article 2(1) lays down
- a recommended basic noise emission standard including
    - a reference to the basic noise emission standard chosen from Part A
    - the test area
    - the value of the constant  $K_{2A}$
    - the shape of the measurement surface
    - the number and position of microphones to be used
  - operating conditions including
    - the reference to a standard, if any
    - requirements relating to mounting of the equipment
    - a method to calculate the resulting sound power levels in the event that several tests with different operating conditions are to be used
  - further information.

When testing specific types of equipment, the manufacturer or his authorised representative in the Community may in general choose one of the basic noise emission standards of Part A and apply the operating conditions of Part B for this specific type of equipment. In the event of a dispute, however, the recommended basic noise emission standard laid down in Part B has to be used together with the operating conditions of Part B.

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## PART A

### BASIC NOISE EMISSION STANDARD

For the determination of the sound power level of equipment for use outdoors as defined by Article 2(1) the basic noise emission standards

EN ISO 3744:1995

EN ISO 3746:1995

may generally be used subject to the following general supplements:

#### 1. Measurement uncertainty

Measurement uncertainties are not taken into account in the framework of conformity assessment procedures in the design phase.

#### 2. Operation of source during test

##### 2.1. Fan speed

If the engine of the equipment or its hydraulic system is fitted with (a) fans(s) it (they) must operate during the test. The fan speed is, in accordance with one of the following conditions, stated and set by the manufacturer of the equipment and must appear in the test report, this speed being used in further measurements.

##### (a) *Fan drive directly connected to the engine*

If the fan drive is directly connected to the engine and/or hydraulic equipment (e.g. by belt drive) it must operate during the test.

##### (b) *Fan drive with several distinct speeds*

If the fan can work at several distinct speeds the test shall be carried out either

- at its maximum working speed, or
- in a first test with the fan set at zero speed and in a second test the fan set at maximum speed. The resulting sound pressure level  $L_{pA}$  shall then be calculated by combining both test results using the following equation:

$$L_{pA} = 10 \lg \left\{ 0,3 \times 10^{0,1 L_{pA,0 \%}} + 0,7 \times 10^{0,1 L_{pA,100 \%}} \right\}$$

where:

$L^{pA,0 \%}$  is the sound pressure level determined with the fan set at zero speed

$L^{pA,100 \%}$  is the sound pressure level determined with the fan set at maximum speed.

##### (c) *Fan drive with continuous variable speed*

If the fan can work at continuous variable speed, the test shall be carried out either according to 2.1(b) or with the fan speed set by the manufacturer at no less than 70 % of the maximum speed.

#### 2.2. Test of powered equipment free of load

For these measurements, the engine and hydraulic system of the equipment must be warmed up in accordance with the instructions, and safety requirements must be observed.

The test is carried out with the equipment in a stationary position without operating the working equipment or travelling mechanism. For the purpose of the test, the engine will idle at no less than the rated speed corresponding to the net power<sup>(1)</sup>.

If the machine is powered by a generator or from the mains, the frequency of the supply current, specified for the motor by the manufacturer, shall be stable at  $\pm 1$  Hz if the machine is equipped with an induction motor, and the supply voltage at  $\pm 1$  % of the rated voltage if the machine is equipped with a commutator motor. The supply voltage is measured at the plug of a non-detachable cable or cord, or at the inlet of the machine if a detachable cable is provided. The waveform of the current supplied from the generator shall be similar to that obtained from the mains.

If the machine is powered by battery, the battery shall be fully charged.

The speed used and the corresponding net power are stated by the manufacturer of the equipment and must appear in the test report.

If the equipment is fitted with several engines, they must work simultaneously during the tests. If this is not possible, each possible combination of engine(s) is to be tested.

### 2.3. Test of powered equipment under load

For these measurements, the engine (driving device) and hydraulic system of the equipment must be warmed up in accordance with the instructions, and safety requirements must be observed. No signalling device such as a warning horn or reversing alarm is to be operated during the test.

The speed or velocity of the equipment during the test must be recorded and appear in the test report.

If the equipment is fitted with several engines and/or aggregates they must work simultaneously during the tests. If this is not possible, each possible combination of engine(s) and/or aggregates is to be tested.

For each type of equipment that is to be tested under load, specific operating conditions must be laid down which shall, in principle, produce effects and stresses similar to those encountered under actual working conditions.

### 2.4. Test of hand-operated equipment

Conventional operating conditions for each type of hand-operated equipment shall be laid down that produce effects and stresses similar to those undergone under actual working conditions.

## 3. Calculation of surface sound pressure level

The surface sound pressure level shall be determined at least three times. If at least two of the determined values do not differ by more than 1 dB, further measurements will not be necessary; otherwise the measurements shall be continued until two values differing by no more than 1 dB are obtained. The A-weighted surface sound pressure level to be used for calculating the sound power level is the arithmetic mean of the two highest values that do not differ by more than 1 dB.

## 4. Information to be reported

The A-weighted sound power level of the source under test shall be reported to the nearest whole number (less than 0,5 use the lower number; greater than or equal to 0,5 use the higher number).

The report shall contain the technical data necessary to identify the source under test as well as the noise test code and the acoustical data.

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## 5. Additional microphone positions on the hemispherical measurement surface (EN ISO 3744:1995)

In addition to clauses 7.2.1 and 7.2.2 of EN ISO 3744:1995 a set of 12 microphones on the hemispherical measurement surface may be used. The location of 12 microphone positions distributed on the surface of a hemisphere of radius  $r$  are listed in the form of Cartesian coordinates in the following table. The radius  $r$  of the hemisphere shall be equal to or greater than twice the largest dimension of the reference parallelepiped. The reference parallelepiped is defined as the smallest possible rectangular parallelepiped just enclosing the equipment (without attachments) and terminating on the reflecting plane. The radius of the hemisphere shall be rounded to the nearest higher of the following values: 4, 10, 16 m.

The number (12) of microphones may be reduced to six, but the microphone positions 2, 4, 6, 8, 10 and 12 following the requirements of clause 7.4.2 of EN ISO 3744:1995 have to be used in any case.

Generally the arrangement with six microphone positions on a hemispherical measurement surface has to be used. If there are other specifications laid down in a noise test code in this Directive for a specific equipment, these specifications shall be used.

TABLE

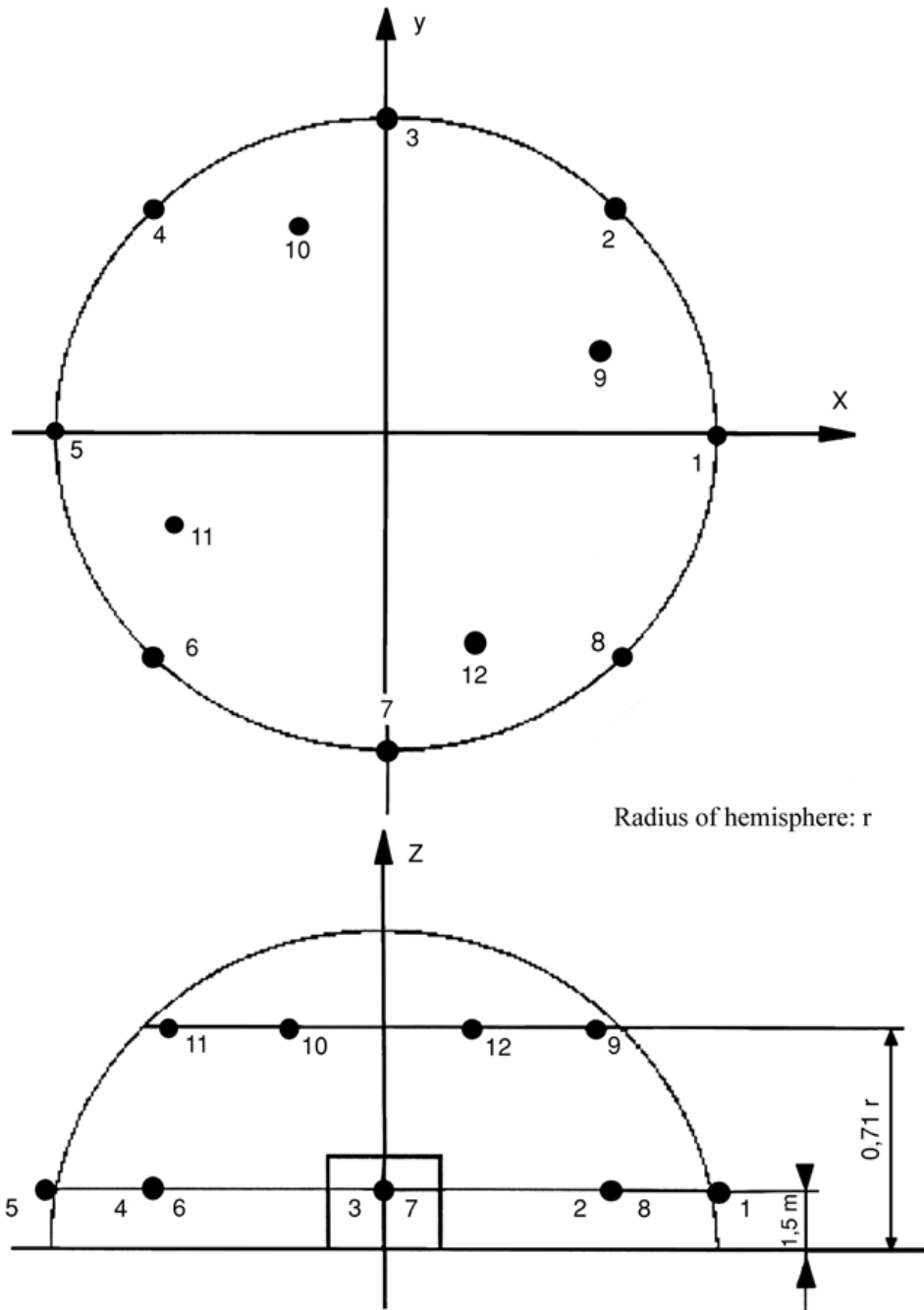
Coordinates of the 12 microphone positions

Number of microphone	$x/r$	$y/r$	$z$
1	1	0	1,5 m
2	0,7	0,7	1,5 m
3	0	1	1,5 m
4	- 0,7	0,7	1,5 m
5	- 1	0	1,5 m
6	- 0,7	- 0,7	1,5 m
7	0	- 1	1,5 m
8	0,7	- 0,7	1,5 m
9	0,65	0,27	0,71 $r$
10	- 0,27	0,65	0,71 $r$
11	- 0,65	- 0,27	0,71 $r$
12	0,27	- 0,65	0,71 $r$

## 6. Environmental correction $K_{2A}$

Equipment shall be measured on a reflecting surface of concrete or non-porous asphalt, then the environmental correction  $K_{2A}$  is set to  $K_{2A} = 0$ . If there are other specifications laid down in a noise test code of this Directive for a specific equipment, these specifications shall be used.

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## PART B

### NOISE TEST CODES FOR SPECIFIC EQUIPMENT

#### 0. EQUIPMENT THAT IS TESTED FREE OF LOAD

Basic noise emission standard

EN ISO 3744:1995

Test area

Reflecting surface of concrete or non-porous asphalt

Environmental correction  $K_{2A}$

$K_{2A} = 0$

Measurement surface/number of microphone positions/measuring distance

- (i) If the largest dimension of the reference parallelepiped does not exceed 8 m:  
hemisphere/six microphone positions according to Part A item 5/according to Part A item 5
- (ii) If the largest dimension of the reference parallelepiped exceeds 8 m:  
parallelepiped according to ISO 3744:1995 with measurement distance  $d = 1$  m

Operating conditions during test

Test free of load:

The noise tests shall be carried out according to Part A item 2.2

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

The period of observation shall at least be 15 seconds

#### 1. AERIAL ACCESS PLATFORMS WITH COMBUSTION ENGINE

See No 0

#### 2. BRUSH CUTTERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 10884:1995

Measurement surface/number of microphone positions/measuring distance

ISO 10884:1995

Operating conditions during test

Test under load

ISO 10884:1995, point 5.3

Period(s) of observation

ISO 10884:1995

#### 3. BUILDERS' HOISTS FOR THE TRANSPORT OF GOODS

See No 0



The geometrical centre of the engine shall be positioned above the centre of the hemisphere; the lift shall move without load and leave the hemisphere — if necessary — in direction of point 1

#### 4. BUILDING SITE BAND SAW MACHINES

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

ISO 7960:1995, Annex J with  $d = 1$  m

Operating conditions during test

Test under load

Corresponding to ISO 7960:1995, Annex J (point J2(b) only)

Period of observation

Corresponding to ISO 7960:1995, Annex J

#### 5. BUILDING SITE CIRCULAR SAW BENCHES

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

ISO 7960:1995, Annex A, measurement distance  $d = 1$  m

Operating conditions during test

Test under load

ISO 7960:1995, Annex A (point A2(b) only)

Period of observation

ISO 7960:1995, Annex A

#### 6. CHAIN SAWS, PORTABLE

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 9207:1995

Measurement surface/number of microphone positions/measuring distance

ISO 9207:1995

Operating conditions during test

Test under load/Test free of load

Full load sawing wood/engine at maximum revolution without load

(a) combustion-engine driven: ISO 9207:1995 points 6.3 and 6.4

(b) electric-motor operated: a test corresponding to ISO 9207:1995 point 6.3 and a test with the motor at maximum revolution without load

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

ISO 9207:1995 points 6.3 and 6.4

The resulting sound power level  $L_{WA}$  is calculated by:

$$L_{WA} = 10 \lg_2 \left[ 10^{0,1LW1} + 10^{0,1LW2} \right]$$

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where  $L_{W1}$  and  $L_{W2}$  are the average sound power levels of the two different modes of operation defined above

## 7. COMBINED HIGH PRESSURE FLUSHERS AND SUCTION VEHICLES

If it is possible to operate both items of equipment simultaneously, this shall be done according to Nos 26 and 52. If not, they shall be measured separately and the higher values are to be stated

## 8. COMPACTION MACHINES

### (i) NON-VIBRATING ROLLERS

See No 0

### (ii) VIBRATING ROLLERS FOR RIDE-ON OPERATORS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Mounting of equipment

The vibrating roller shall be installed on one or more appropriate elastic material(s) such as air-cushion(s). These air-cushions shall be made of a supple material (elastomer or similar) and shall be inflated to a pressure ensuring that the machine is elevated by at least 5 cm; resonance effects shall be avoided. The dimension of the cushion(s) shall be such that the stability of the machine under test is ensured

Test under load

The machine shall be tested in a stationary position with the engine at rated speed (stated by the manufacturer) and the moving mechanism(s) disconnected. The compacting mechanism shall be operated using the maximum compaction power corresponding to the combination of the highest frequency and the highest possible amplitude for that frequency as declared by the manufacturer

Period of observation

The period of observation shall be at least 15 seconds

### (iii) VIBRATORY PLATES, VIBRATORY RAMMERS, EXPLOSIVE RAMMERS AND WALK-BEHIND VIBRATING ROLLERS

Basic noise emission standard

EN ISO 3744:1995

Test area

EN 500-4 rev. 1:1998, Annex C

Operating conditions during test

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Test under load

EN 500-4 rev. 1:1998, Annex C

Period of observation

EN 500-4 rev. 1:1998, Annex C

## 9. COMPRESSORS

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

hemisphere/six microphone positions according to Part A item 5/according to Part A item 5

or

parallelepiped according to ISO 3744:1995 with measurement distance  $d = 1$  m

Operating conditions during test

Mounting of equipment

The compressors shall be installed on the reflecting plane; skid-mounted compressors shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation.

Test under load

The compressor under test shall have been warmed up and be operating in stable conditions as for continuous operation. It shall be properly serviced and lubricated as specified by the manufacturer

The determination of the sound power level shall be made at full-load or in an operating condition that is reproducible and is representative of the noisiest operation of typical usage of the machine under test, whichever is the noisier

Should the layout of the complete plant be such that certain components, e.g. inter-coolers are mounted away from the compressor, endeavours shall be made to separate the noise generated from such parts when performing the noise test. Separation of the various noise sources may require special equipment for the attenuation of the noise from these sources during the measurement. The noise characteristics and description of the operating conditions of such parts shall be given separately in the test report

During the test the gas exhausted from the compressor shall be piped clear of the test area. Care shall be taken to ensure the noise generated by the gas being exhausted is at least 10 dB lower than the noise to be measured at all measurement locations (e.g. by the fitting of a silencer)

Care shall be taken that air discharge does not introduce any extra noise due to turbulence at the compressor discharge valve

Period of observation

The period of observation shall be at least 15 seconds

#### 10. CONCRETE-BREAKERS AND PICKS, HAND-HELD

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

Hemisphere/six microphone positions according to Part A item 5 and the following table/according to mass of equipment as given in the following table:

<b>Mass of equipment <math>m</math> in kg</b>	<b>Radius of hemisphere</b>	<b><math>z</math> for microphone positions 2, 4, 6 and 8</b>
$m < 10$	2 m	0,75 m
$m \geq 10$	4 m	1,50 m

Operating conditions during test

Mounting of equipment

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All appliances shall be tested in the vertical position

If the test appliance has got an air exhaust, its axis shall be equidistant from two microphone positions. The noise of the power supply shall not influence the measurement of the noise emission from the tested appliance

Support of the appliance

The appliance shall be coupled during the test run to a tool embedded in a cube-shaped concrete block placed in a concrete pit, sunk into the ground. An intermediate steel piece may be inserted during tests between the appliance and the support tool. This intermediate piece shall form a stable structure between the appliance and the support tool. Figure 10.1 incorporates these requirements

Block characteristics

The block shall be in the shape of a cube  $0,60\text{ m} \pm 2\text{ mm}$  long at the edge and as regular as possible; it shall be made of reinforced concrete and thoroughly vibrated in layers of up to  $0,20\text{ m}$  to avoid excessive sedimentation

Quality of the concrete

The quality of the concrete shall correspond to C 50/60 of ENV 206

The cube shall be reinforced by 8 mm-diameter steel rods without ties, each rod being independent of the other; the design concept is illustrated in Figure 10.2

Supporting tool

The tool shall be sealed into the block and shall consist of a rammer of no less than 178 mm or no more than 220 mm diameter and a tool chuck component identical to that normally used with the appliance being tested and complying with ISO 1180:1983, but sufficiently long to enable the practical test to be carried out

Suitable treatment shall be carried out to integrate the two components. The tool shall be fixed in the block so that the bottom of the rammer is  $0,30\text{ m}$  from the upper face of the block (see Figure 10.2)

The block shall remain mechanically sound, particularly at the point where the supporting tool and the concrete meet. Before and after each test, it shall be established that the tool sealed in the concrete block is integrated with it

Positioning of the cube

The cube shall be set in a pit cemented throughout, covered by a screening slab of at least  $100\text{ kg/m}^2$ , as indicated in Figure 10.3, so that the upper surface of the screening slab is flush with the ground. To avoid any parasitic noise, the block shall be insulated against the bottom and sides of the pit by elastic blocks, the cut-off frequency of which shall not be more than half the striking rate of the appliance tested, expressed as strokes per second

The opening in the screening slab through which the tool chuck component passes shall be as small as possible and sealed by a flexible sound-proof joint

Test under load

The appliance tested shall be connected to the supporting tool

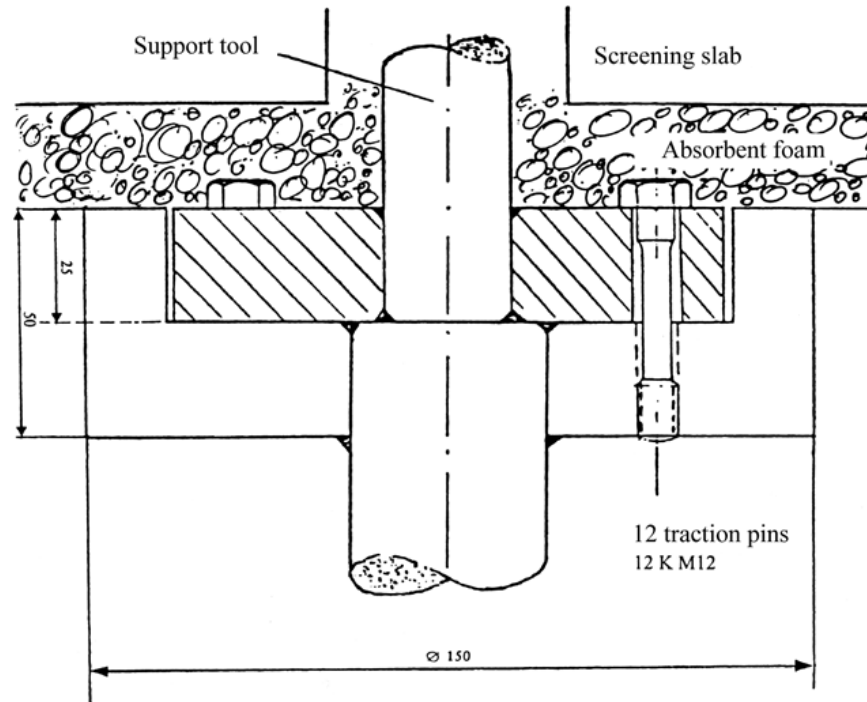
The test appliance shall be operated in stable conditions having the same acoustical stability as in normal service

The test appliance shall be operated at the maximum power specified in the instructions supplied to the purchaser

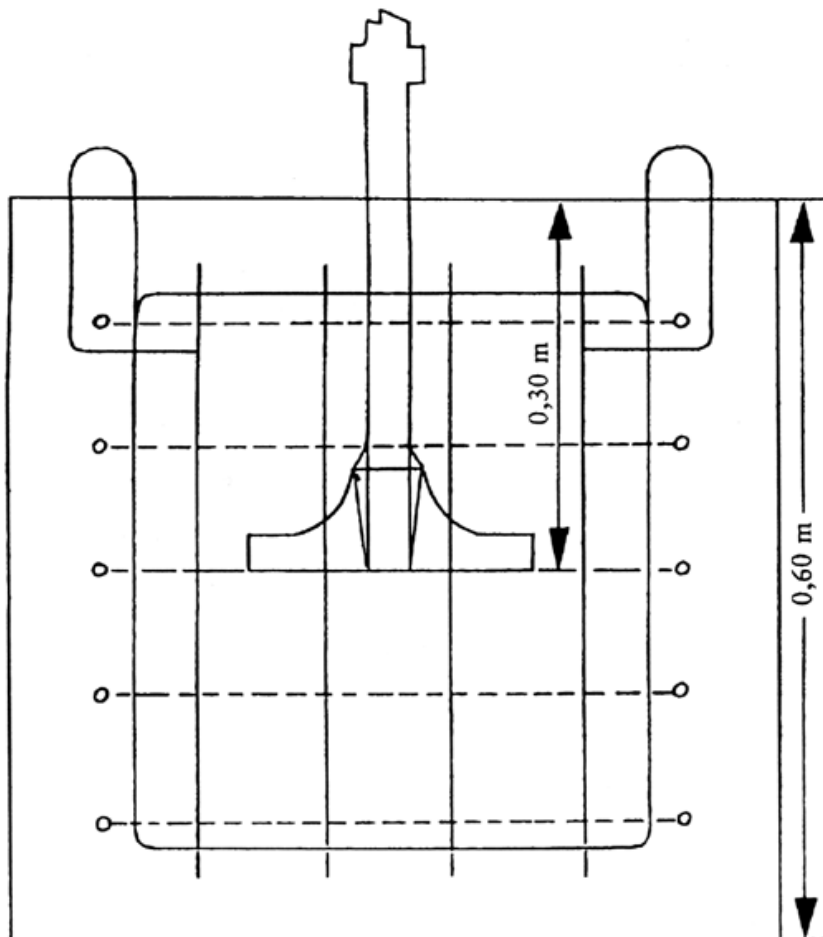
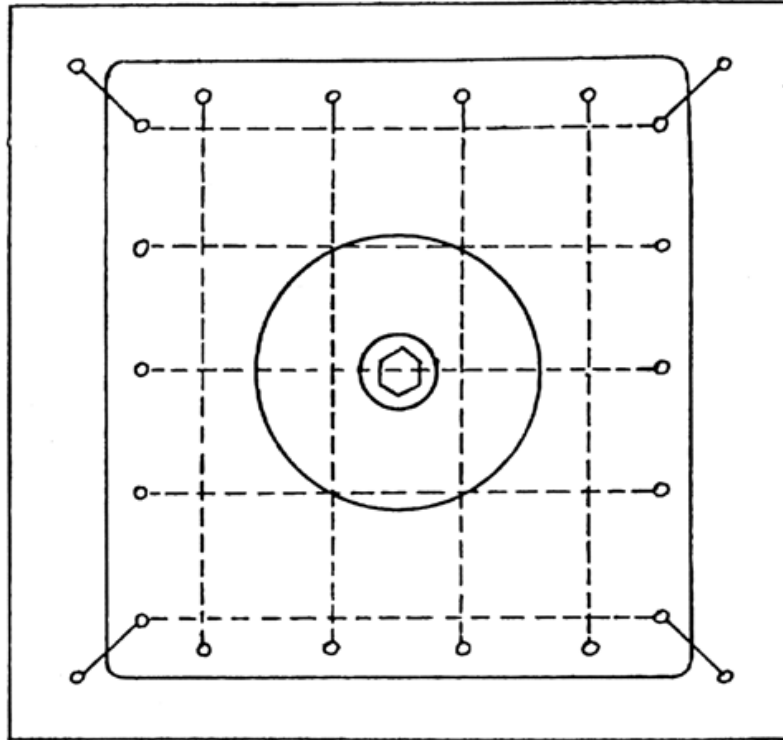
Period of observation

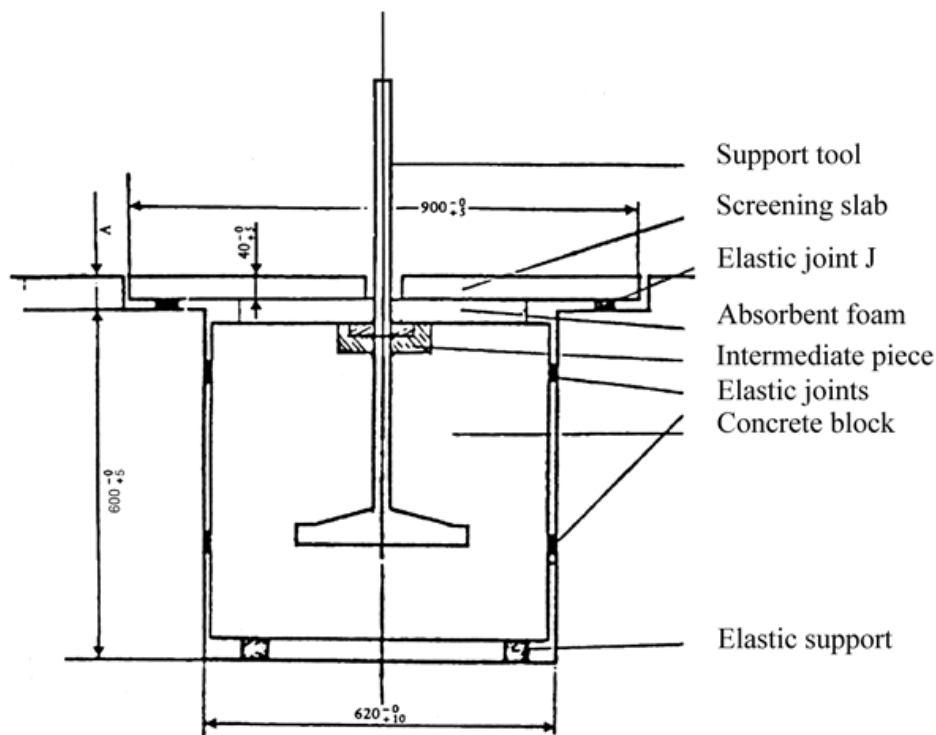
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The period of observation shall at least be 15 seconds



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The value of A should be such that the screening slab resting on the elastic joint J is flush with the ground

## 11. CONCRETE OR MORTAR MIXERS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The mixing device (drum) shall be filled to its rated capacity with sand of granulation 0 to 3 mm, the humidity shall be 4 to 10 %

The mixing device shall be operated at least at the rated speed

Period of observation

The period of observation shall be at least 15 seconds

## 12. CONSTRUCTION WINCHES

See No 0

The geometrical centre of the engine shall be positioned above the centre of the hemisphere; the winch shall be connected but no load shall be applied

## 13. CONVEYING AND SPRAYING MACHINES FOR CONCRETE AND MORTAR

Basic noise emission standard

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EN ISO 3744:1995

Operating conditions during test

If the machine is equipped with a boom, this is set upright and the pipe shall be lead back to the filler funnel. If this is not the case the machine shall be equipped with a horizontal pipe of at least 30 m leading back to the filler funnel

Test under load

(i) For machines conveying and spraying concrete:

The conveying system and the pipe shall be filled with a medium similar to concrete, the cement being replaced by an admixture, e.g. finest ash. The machine shall operate at its maximum output, the period of one working cycle being not more than 5 seconds (if this period is exceeded, water shall be added to the 'concrete' in order to reach this value).

(ii) For machines conveying and spraying mortar:

The conveying system and the pipe shall be filled with a medium similar to finishing mortar, the cement being replaced by an admixture, e.g. methyl cellulose. The machine shall operate at its maximum output, the period of one working cycle being not more than 5 seconds (if this period is exceeded, water shall be added to the 'mortar' in order to reach this value)

Period of observation

The period of observation shall at least be 15 seconds

#### 14. CONVEYOR BELTS

See No 0

The geometrical centre of the engine shall be positioned above the centre of the hemisphere; the belt shall move without load and leave the hemisphere, if necessary, in the direction of point 1

#### 15. COOLING EQUIPMENT ON VEHICLES

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The cooling equipment shall be installed in a real or simulated cargo space and be tested in a stationary position where the height of the cooling equipment shall be representative of the intended installation requirements according to the instructions supplied to the purchaser. The power source of the cooling equipment shall operate at the rate that causes the maximum speed of the cooling compressor and the fan specified in the instructions. If the cooling equipment is intended to be powered by the driving engine of the vehicle the engine shall not be used during the test and the cooling equipment shall be connected to a suitable electrical power source. Removable tractor units shall be removed during the test

Cooling equipment installed in cargo-space refrigeration units which have a choice of different power sources shall be tested separately for each power source. The test result reported shall as a minimum reflect the mode of operation which leads to the maximum noise output

Period of observation

The period of observation shall at least be 15 seconds

#### 16. DOZERS



### Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395:1988.

Operating conditions during test

Mounting of equipment

Crawler dozers shall be tested on the test site corresponding to point 6.3.3 of ISO 6395:1988

Test under load

ISO 6395:1988, Annex B

Period(s) of observation and consideration of different operating conditions, if any

ISO 6395:1988, Annex B

### 17. DRILL RIGS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

EN 791:1995, Annex A

Period of observation

The period of observation shall at least be 15 seconds

### 18. DUMPERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395: 1988

Operating conditions during test

Test under load

Equivalent ISO 6395:1998, Annex C, with the following amendment:

C 4.3, second paragraph is replaced by:

The engine shall be operated at its maximum governed speed (high idle). The transmission control shall be set to neutral. Bring the bucket to the tipped position (emptying) up to about 75 % of its maximum movement and return it to its travelling position three times. This sequence of events is considered to be a single cycle for the stationary hydraulic mode.

If no engine power is used to tip the bucket, the engine shall be operated at idling speed with the transmission in neutral. The measurement shall be performed without tipping the bucket, the period of observation shall be 15 seconds.

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

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ISO 6395:1988, Annex C

19. EQUIPMENT FOR LOADING AND UNLOADING TANKS OR SILOS ON TRUCKS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The equipment shall be tested with the truck in a stationary position. The engine driving the equipment shall operate at the speed that causes the maximum output of the equipment specified in the instructions supplied to the purchaser

Period of observation

The period of observation shall at least be 15 seconds

20. EXCAVATORS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395:1988.

Operating conditions during test

Test under load

ISO 6395:1988, Annex A

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

ISO 6395:1988, Annex A

21. EXCAVATORS-LOADERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395:1988

Operating conditions during test

Test under load

ISO 6395:1988, Annex D

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

ISO 6395:1988, Annex D

22. GLASS RECYCLING CONTAINERS

Basic noise emission standard

EN ISO 3744:1995

For the purpose of this noise test code the single-event sound pressure level  $L_{p1s}$  as defined in EN ISO 3744:1995 point 3.2.2 is used in measuring the sound pressure level at the microphone positions

Environmental correction  $K_{2A}$

Measurement in the open air

$$K_{2A} = 0$$

Measurements indoors

The value of the constant  $K_{2A}$ , determined in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB in which case  $K_{2A}$  shall be disregarded

Operating conditions during test

The noise measurement shall be carried out during a complete cycle beginning with the empty container and completed when 120 bottles have been thrown into the container

The glass bottles are defined as follows:

- capacity: 75 cl
- mass:  $370 \pm 30$  g.

The testing operator holds each bottle by its neck and with its bottom towards the filling aperture and then he pushes it gently inside through the filling aperture in the direction of the centre of the container, avoiding if possible the bottle hitting against the walls. Only one filling aperture is used for throwing the bottles and it is the one nearest to microphone position 12

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

The A-weighted single-event sound pressure level is preferably simultaneously measured at the six microphone positions for each bottle thrown into the container

The A-weighted single-event sound power level averaged over the measurement surface is calculated according to EN ISO 3744: 1995, point 8.1

The A-weighted single-event sound pressure level averaged over all 120 throwings of bottles is calculated as the logarithmic mean of the A-weighted single-event sound pressure levels averaged over the measurement surface

## 23. GRADERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395:1988

Operating conditions during test

Test under load

Corresponding to ISO 6395:1988, Annex B

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

ISO 6395:1988, Annex B

## 24. GRASS TRIMMERS/GRASS EDGE TRIMMERS

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See No 2

The trimmer shall be positioned by a suitable device in such a way that its cutting device is above the centre of the hemisphere. For grass trimmers, the centre of the cutting device shall be held at a distance of about 50 mm above the surface. In order to accommodate the cutting blades, grass edge trimmers should be positioned as close as possible to the test surface

## 25. HEDGE TRIMMERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

In case of dispute, measurements shall be carried out in the open air on the artificial surface (point 4.1.2 of ISO 11094:1991)

Environmental correction  $K_{2A}$

Measurement in the open air

$$K_{2A} = 0$$

Measurements indoors

The value of the constant  $K_{2A}$ , determined without the artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded

Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Mounting of equipment

The hedge trimmer shall be held in the natural manner for normal use either by a person or by a suitable device in such a way that its cutting device is above the centre of the hemisphere

Test under load

The hedge clipper shall be operated at its nominal speed with the cutting device working

Period of observation

The period of observation shall at least be 15 seconds

## 26. HIGH PRESSURE FLUSHERS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The high pressure flusher shall be tested in a stationary position. The engine and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment; the high pressure pump(s) is (are) operating at its (their) maximum speed and operating pressure provided by the manufacturer. Using an adapted nozzle the pressure reduction valve shall be just on the point of reacting. The flow noise of the nozzle shall not have any influence on the results of the measurements

Period of observation

The period of observation shall at least be 30 seconds

## 27. HIGH PRESSURE WATER JET MACHINES

### Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

Parallelepiped/according to EN ISO 3744:1995 with measurement distance  $d = 1$  m

Operating conditions during test

Mounting of equipment

The high pressure water jet machine shall be installed on the reflecting plane; skid-mounted machines shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation

Test under load

The high-pressure cleaning machine shall be brought to its steady-state within the range specified by the manufacturer. During testing the nozzle shall be coupled to the high-pressure cleaning machine that causes the highest pressure if used according to the manufacturer's instructions

Period of observation

The period of observation shall at least be 15 seconds

## 28. HYDRAULIC HAMMERS

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

Hemisphere/six microphone positions according to Part A, item  $5/r = 10$  m

Operating conditions during tests

Mounting of the equipment

For the test the hammer is attached to a carrier and a special test block structure shall be used. Figure 28.1 gives the characteristics of this structure and Figure 28.2 shows the position of the carrier

Carrier

The carrier for the test hammer shall meet the requirements of the test hammer's technical specifications especially in weight range, hydraulic output power, supply oil flow and return line back pressure

Mounting

Mechanical mounting as well as connections (hoses, pipes ...) must correspond to specifications given in the hammer's technical data. All significant noise caused by pipes and various mechanical components needed for installation, ought to be eliminated. All component connections have to be well tightened

Hammer stability and static hold force

The hammer shall be firmly held down by the carrier in order to give the same stability as that existing under normal operating conditions. The hammer must be operated in an upright position

Tool

A blunt tool shall be used in the measurements. The length of the tool must meet the requirements given in Figure 28.1 (test block)

Test under load

Hydraulic input power and oil flow

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Operating conditions of the hydraulic hammer shall be appropriately adjusted, measured and reported along with the corresponding technical specification values. The hammer under test must be used in such way that 90 % or more of the maximum hydraulic input power and oil flow of the hammer can be reached

Care shall be taken that the total uncertainty of the measurement chains of  $p_s$  and  $Q$  is kept within  $\pm 5$  %. This assures the hydraulic input power determination within  $\pm 10$  % accuracy. Assuming linear correlation between hydraulic input power and emitted sound power this would mean variation of less than  $\pm 0,4$  dB in the determination of the sound power level  
Adjustable components having effect on the hammer power

Pre-settings of all accumulators, pressure central valves and other possible adjustable components must meet the values given in technical data. If more than one fixed impact rate is optional, measurements have to be made using all settings. Minimum and maximum values are presented

Quantities to be measured

$p_s$	The mean value of the hydraulic supply line pressure during the hammer's operation including at least 10 blows
$Q$	The mean value of the breaker inlet oil flow measured simultaneously with $p_s$
$T$	The oil temperature must lie between $+ 40/ + 60$ °C during measurements. The temperature of the hydraulic breaker body must have been stabilised to normal operating temperature before starting the measurements
$P_a$	The prefill gas pressures of all accumulators must be measured in static situation (breaker not operating) at stable ambient temperature of $+ 15/ + 25$ °C. The measured ambient temperature shall be recorded with the measured accumulator prefill gas pressure

Parameters to be evaluated from the measured operating parameters:

$P_{IN}$  Hydraulic input power of the breaker  $P_{IN} = p_s \cdot Q$

Hydraulic supply line pressure measurement,  $p_s$

- $p_s$  must be measured as close to the breaker IN-port as possible
- $p_s$  shall be measured with a pressure gauge (minimum diameter: 100 mm; accuracy class  $\pm 1,0$  % FSO)

Breaker inlet oil flow,  $Q$

- $Q$  must be measured from the supply pressure line as close to the breaker IN-port as possible
- $Q$  must be measured with an electric flowmeter (accuracy class  $\pm 2,5$  % of the flow reading)

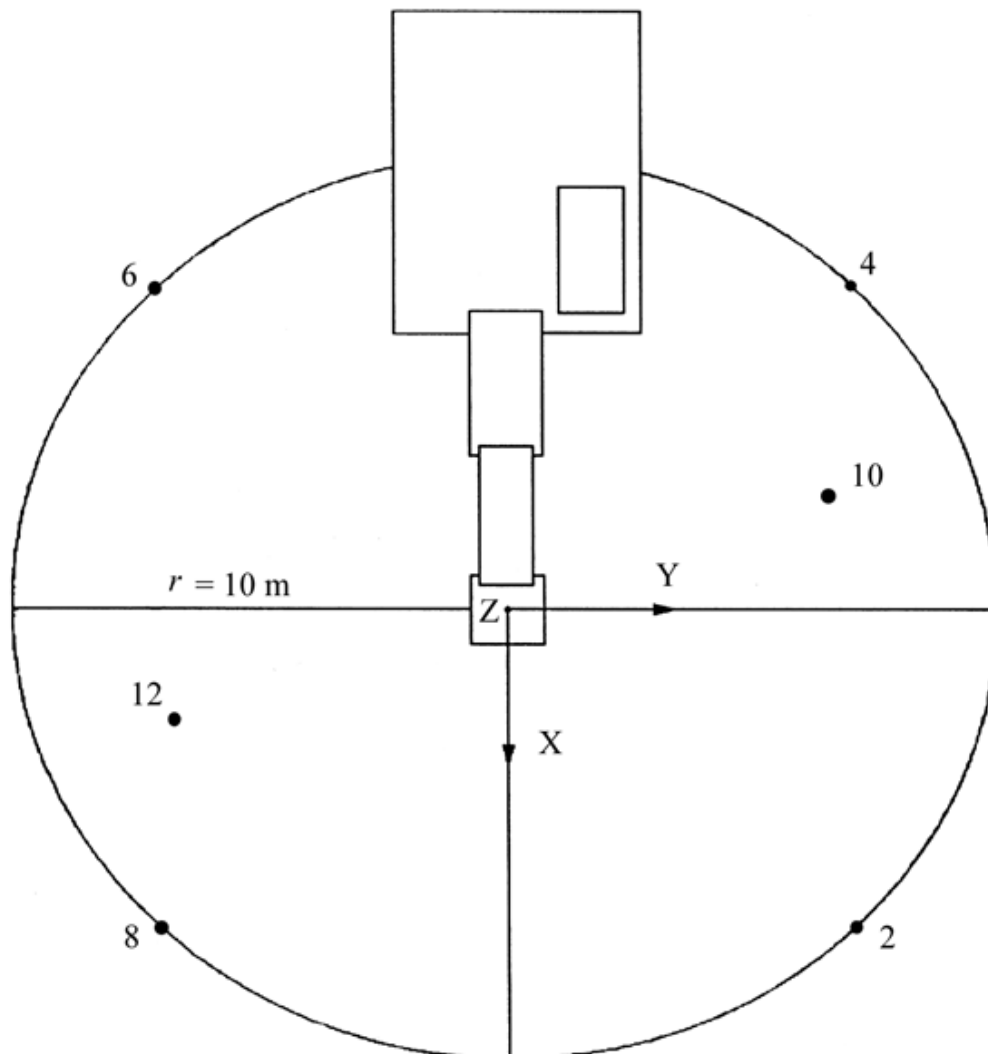
Measuring point of the oil temperature,  $T$

- $T$  must be measured from the oil tank of the carrier or from the hydraulic line connected to hammer. Measuring point shall be specified in the report

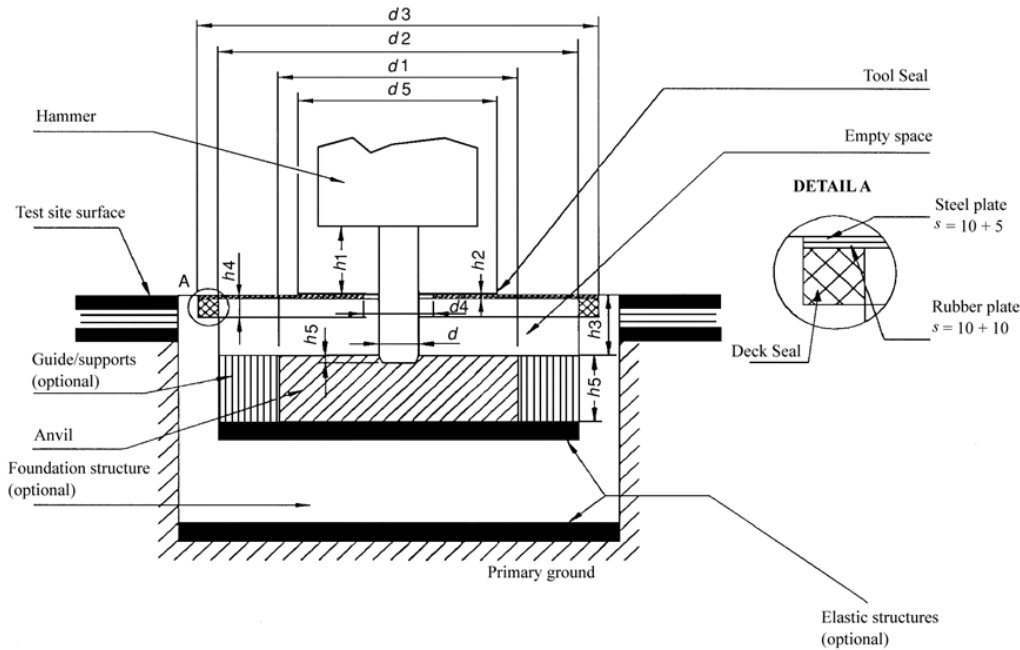
— accuracy of the temperature reading must lie within  $\pm 2$  °C of the actual value  
Period of observation/determination of resulting sound power level

The period of observation shall be at least 15 seconds

The measurements are repeated three times, or more if necessary. The final result is calculated as the arithmetic mean of the two highest values that do not differ by more than 1dB



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## Definitions

$d$	Tool diameter (mm)
$d_1$	Anvil diameter, $1\ 200 \pm 100$ mm
$d_2$	Inner diameter of the anvil support structure, $\leq 1\ 800$ mm
$d_3$	Diameter of the test block deck, $\leq 2\ 200$ mm
$d_4$	Diameter of the tool opening in the deck, $\leq 350$ mm
$d_5$	Diameter of the tool seal, $\leq 1\ 000$ mm
$h_1$	Visible tool length between the lowest part of the housing and tool seal upper surface (mm), $h_1 = d \pm d/2$
$h_2$	Tool seal thickness above the deck, $\leq 20$ mm (if the tool seal is located below the deck, its thickness is not limited; it may be made of foam rubber)
$h_3$	Distance between deck upper surface and anvil upper surface, $250 \pm 50$ mm
$h_4$	Isolating foam rubber deck seal thickness, $\leq 30$ mm
$h_5$	Anvil thickness, $350 \pm 50$ mm
$h_6$	Tool penetration, $\leq 50$ mm



If the quadratic shape of the test block structure is used, the maximum length dimension equals 0,89 x corresponding diameter

The empty space between the deck and the anvil can be filled with elastic foam rubber or other absorption material, density < 220 kg/m<sup>3</sup>

## 29. HYDRAULIC POWER PACKS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Mounting of equipment

The hydraulic power pack shall be installed on the reflecting plane; skid-mounted hydraulic power packs shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation

Test under load

During testing, no tools shall be coupled to the hydraulic power pack

The hydraulic power pack shall be brought to its steady state within the range specified by the manufacturer. It shall operate at its nominal speed and its nominal pressure. The nominal speed and pressure are those appearing in the instructions supplied to the purchaser

Period of observation

The period of observation shall at least be 15 seconds

## 30. JOINT CUTTERS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The joint cutter shall be equipped with the largest possible blade foreseen by the manufacturer in the instructions supplied to the purchaser. The engine shall operate at its maximum speed with the blade idling

Period of observation

The period of observation shall be at least 15 seconds

## 31. LANDFILL COMPACTORS

See No 37

## 32. LAWNMOWERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

In case of dispute, measurements shall be carried out in the open air on the artificial surface (point 4.1.2 of ISO 11094:1991)

Environmental correction  $K_{2A}$

Measurement in the open air

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$$K_{2A} = 0$$

Measurements indoors

The value of the constant  $K_{2A}$ , determined without the artificial surface and in accordance with Annex A to EN ISO 3744:1995 shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded  
Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Mounting of equipment

If the wheels of the lawnmower could cause a compression of the artificial surface of more than 1 cm, the wheels shall be placed on supports so that they are level with the artificial surface before compression. If the cutting device cannot be separated from the driving wheels of the lawnmower, the mower shall be tested on supports with the cutting device operating at its maximum speed laid down by the manufacturer. The supports shall be made in such a way that they do not influence the measurement results

Test free of load

ISO 11094:1991

Period of observation

ISO 11094:1991

### 33. LAWN TRIMMERS/LAWN EDGE TRIMMERS

See No 32

The trimmer shall be positioned by a suitable device in such a way that its cutting device is above the centre of the hemisphere. For lawn trimmers, the centre of the cutting device shall be held at a distance of about 50 mm above the surface. In order to accommodate the cutting blades, lawn edge trimmers should be positioned as close as possible to the test surface

### 34. LEAF BLOWERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

In case of dispute, measurements shall be carried out in the open air on the artificial surface (point 4.1.2 of ISO 11094: 1991)

Environmental correction  $K_{2A}$

Measurement in the open air

$$K_{2A} = 0$$

Measurements indoors

The value of the constant  $K_{2A}$ , determined without artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB in which case  $K_{2A}$  shall be disregarded  
Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Mounting of equipment

The leaf blower shall be positioned in the natural manner for normal use in such a way that the outlet of its blowing device is situated ( $50 \pm 25$  mm) above the centre of the hemisphere; if the leaf blower is hand-held it shall be held either by a person or by a suitable device

Test under load

The leaf blower shall be operated at its nominal speed and the nominal air flow stated by the manufacturer

Period of observation

The period of observation shall at least be 15 seconds

Note:

If a leaf blower can be also used as a leaf collector it shall be tested in both configurations, in which case the higher value shall be used

### 35. LEAF COLLECTORS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

In case of dispute, measurements shall be carried out in the open air on the artificial surface (point 4.1.2 of ISO 11094:1991)

Environmental correction  $K_{2A}$

Measurement in the open air

$K_{2A} = 0$

Measurements indoors

The value of the constant  $K_{2A}$ , determined without artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB in which case  $K_{2A}$  shall be disregarded

Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Mounting of equipment

The leaf collector shall be positioned in the natural manner for normal use in such a way that the inlet of the collecting device is situated ( $50 \pm 25$ ) mm above the centre of the hemisphere; if the leaf collector is hand-held it shall be held either by a person or by a suitable device

Test under load

The leaf collector shall be operated at its nominal speed with the nominal air flow in the collecting device stated by the manufacturer

Period of observation

The period of observation shall be at least 15 seconds

Note:

If a leaf collector can be also used as a leaf blower it shall be tested in both configurations, in which case the higher value shall be used

### 36. LIFT TRUCKS

Basic noise emission standard

EN ISO 3744:1995

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## Operating conditions during test

Safety requirements and the manufacturer's information shall be observed

### Lifting condition

With the truck stationary the load (non-sound absorbent material, e.g. steel or concrete; at least 70 % of the actual capacity stated in the manufacturer's instruction) shall be lifted, from the lowered position, at maximum speed to the standardised lift height applicable to that type of industrial truck in accordance with the relevant European Standard in the series 'Safety of Industrial Trucks'. If the actual maximum lift height is less, it may be used in individual measurements. The lift height shall be listed in the test report

### Drive condition

Drive the truck, without load, at full acceleration from standstill over a distance of three times its length to reach line A-A (line connecting microphone positions 4 and 6), continue driving the truck at maximum acceleration to line B-B (line connecting microphone positions 2 and 8). When the rear of the truck has crossed line B-B, the accelerator may be released

If the truck has a multi-gear transmission, select the gear that ensures the highest possible speed over the measurement distance

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

The periods of observation are:

- for lifting condition: the whole lift cycle;
- for drive condition: the time period starting when the truck's centre crosses the line A-A and ends when its centre reaches the line B-B

The resulting sound power level for all types of lift trucks, however, is calculated by

$$L_{WA} = 10 \log(0,7 \times 10^{0,1 L_{WA^c}} + 0,3 \times 10^{0,1 L_{WA^a}})$$

where subscript 'a' indicates 'lifting mode' and subscript 'c' indicates 'driving mode'

## 37. LOADERS

### Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Measurement surface/number of microphone positions/measuring distance

ISO 6395:1988

Operating conditions during test

Mounting of equipment

Crawler loaders shall be tested on the test site corresponding to point 6.3.3 of ISO 6395:1988

Test under load

ISO 6395:1988, Annex C

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

ISO 6395:1988, Annex C

## 38. MOBILE CRANES

### Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Mounting of equipment

If the crane is equipped with outriggers, they shall be fully extended and the crane shall be levelled on its pads in mid position of possible support height

Test under load

The mobile crane to be tested shall be presented in its standard version as described by the manufacturer. The engine power considered for determination noise limit is the nominal power of the engine used for crane motion. The crane shall be equipped with its maximum permitted counterweight mounted on the slewing structure

Before carrying out any measurement, the engine and the hydraulic system of the mobile crane shall be brought to their normal working temperature following the instruction of the manufacturer and all relevant safety-related procedures given in the instruction handbook shall be carried out

If the mobile crane is equipped with several engines, the engine used for the crane's function shall be run. The carrier engine shall be turned off

If the engine of the mobile crane is fitted with a ventilator, it shall run during the test. If the ventilator can be operated at several speeds, the test shall be carried out with the ventilator running at the highest speed

The mobile crane shall be measured under the following three ((a) to (c)) or four ((a) to (d)) conditions:

For all working conditions the following shall apply:

- engine speed at  $\frac{3}{4}$  of maximum speed specified for crane operation mode with a tolerance of  $\pm 2\%$
- acceleration and deceleration at the maximum value without dangerous movements of the load or the hook block
- motions at maximum possible speed as given in the instruction manual under the conditions given

(a) *Hoisting*

The mobile crane shall be loaded with a load which creates 50 % of the maximum rope force. The test consists of hoisting of the load and the immediately following lowering to the starting position. The length of the boom shall be chosen so that the full test lasts 15 to 20 seconds

(b) *Slewing*

With the boom adjusted to an angle of 40° to 50° to the horizontal and without load the upper carriage shall be slewed 90° to the left immediately followed by slewing back to the starting position. The jib shall be at its minimum length. The observation period shall be the time needed to carry out the working cycle

(c) *Derricking*

The test starts with raising the short jib from the lowest working position immediately followed by the lowering of the jib to its original position. The movement shall be executed without load. The duration of the test shall be at least 20 seconds

(d) *Telescoping (if applicable)*

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With the jib adjusted to an angle of 40° to 50° to the horizontal without load and the jib fully retracted, the telescoping cylinder for the first section only shall be extended together with the first section to its full length and immediately retracted together with the first section

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

The resulting sound power level is calculated by:

i) if telescoping is applicable

$$L_{WA} = 10 \log(0,4 \times 10^{0,1L_{WAa}} + 0,25 \times 10^{0,1L_{WAb}} + 0,25 \times 10^{0,1L_{WAc}} + 0,1 \times 10^{0,1L_{WAd}})$$

ii) if telescoping is not applicable

$$L_{WA} = 10 \log(0,4 \times 10^{0,1L_{WAa}} + 0,3 \times 10^{0,1L_{WAb}} + 0,3 \times 10^{0,1L_{WAc}})$$

where

$L_{WAa}$  is the sound power level for the hoisting cycle

$L_{WAb}$  is the sound power level for the slewing cycle

$L_{WAc}$  is the sound power level for the derricking cycle

$L_{WAd}$  is the sound power level for the telescoping cycle (if applicable)

### 39. MOBILE WASTE CONTAINERS

Basic noise emission standard

EN ISO 3744:1995

Test area

- Reflecting surface of concrete or non-porous asphalt
- Laboratory room which provides a free field over a reflecting plane

Environmental correction  $K_{2A}$

Measurement in the open air

$$K_{2A} = 0$$

Measurement indoors

The value of the constant  $K_{2A}$ , determined in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded

Measurement surface/number of microphone positions/measuring distance

Hemisphere/six microphone positions according to Part A item 5/r = 3 m

Operating conditions during test

All the measurements shall be carried out with an empty container

Test No 1: Free shutting down of the lid along the container body

To minimise his influence on the measurements, the operator shall stand at the back side of the container (hinge side). The lid shall be released by its middle, to prevent warping during its fall

The measurement is carried out during the following cycle, repeated 20 times:

- initially, the lid is raised vertically
- the lid is released forward, if possible without giving an impulse, with the operator at the back of the container, unmoving until the lid is shut

— after complete shutting, the lid is raised to its initial position

Note:

If necessary the operator can move temporarily to raise the lid.

Test No 2: Complete opening of the lid

To minimise his influence on the measurements, the operator shall stand at the back side of the container (hinge side) for the four-wheel containers, or on the right side of the container (between microphone position 10 and microphone position 12) for the two-wheel containers. The lid shall be released by its middle or as near as possible to its middle

To prevent any moving of the container, wheels shall be locked during the test. For the two-wheel containers, and to prevent any bounce of the container, the operator can maintain it by placing his hand on the top rim

The measurement is carried out during the following cycle:

- initially, the lid is opened horizontally
- the lid is released without giving an impulse
- after complete opening, and before a possible rebound, the lid is raised to its initial position

Test No 3: Rolling of the container over an artificial irregular track

For this test, an artificial test track, simulating irregular ground is used. This test track consists of two parallel strips of steel mesh (6 m long and 400 mm wide), fastened in the reflecting plane approximately every 20 cm. The distance between the two strips is adapted according to the type of container, in order to allow the wheels to roll all over the whole length of the track. The mounting conditions shall ensure a flat surface. If necessary, the track is fastened on the ground with resilient material to avoid emission of parasitic noise

Note:

Every strip can be composed of several 400 mm wide elements fitted together

An example of adequate track is given in Figures 39.1 and 39.2

The operator is situated at the lid hinge side

The measurement is carried out while the operator draws the container along the artificial track, with a constant speed of approximately 1 m/s, between points A and B (4,24 m distance — see Figure 39.3) when the wheel axle, for a 2-wheel container, or the first wheel axle for a 4-wheel container, reaches point A or point B. This procedure is repeated three times in each direction

During the test, for a 2-wheel container, the angle between the container and the track shall be 45°. For a 4-wheel container, the operator shall ensure an appropriate contact of all the wheels with the track.

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

.....  
Test Nos 1 and 2: Free shutting down of the lid along the container body and complete opening of the lid

If possible, the measurements are carried out simultaneously at the six microphone positions. Otherwise, the sound levels measured at each microphone position will be classified in increasing order and the sound power levels are calculated by associating the values at each microphone position according to their row

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The A-weighted single-event sound pressure level is measured for each of the 20 shuttings and the 20 openings of the lid at each measurement point. The sound power levels  $L_{WAshutting}$  and  $L_{WAopening}$  are calculated from the quadratic mean of the five highest values among those obtained

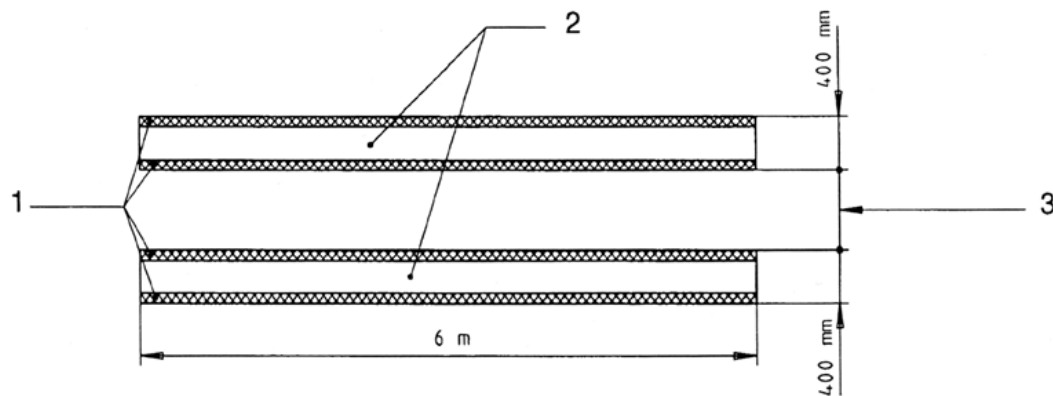
Test No 3: Rolling the container over an artificial irregular track

The period of observation  $T$  shall be equal to the duration necessary to cover the distance between point A and point B on the track.

The sound power level  $L_{WArolling}$  is equal to the mean of six values differing by less than 2 dB. If this criterion is not fulfilled with six measurements, the cycle is repeated as far as necessary

The resulting sound power level is calculated by:

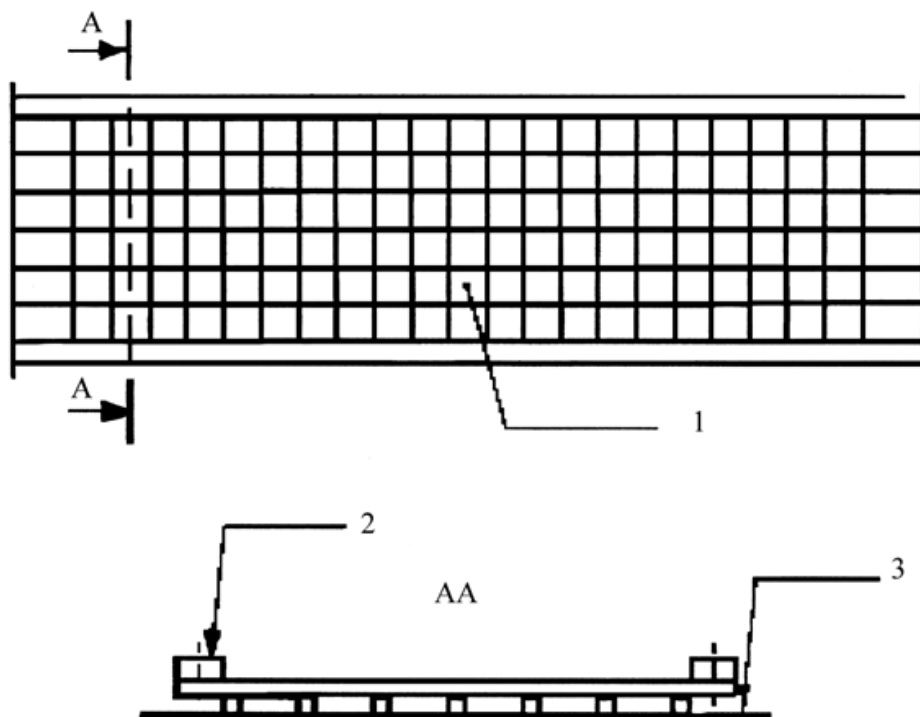
$$L_{WA} = 10 \log_{\frac{1}{3}} (10^{0,1 L_{WAshutting}} + 10^{0,1 L_{WAopening}} + 10^{0,1 L_{WArolling}})$$



- 1 Wooden wire mesh cleat
- 2 Rolling parts
- 3 Adapted to the container

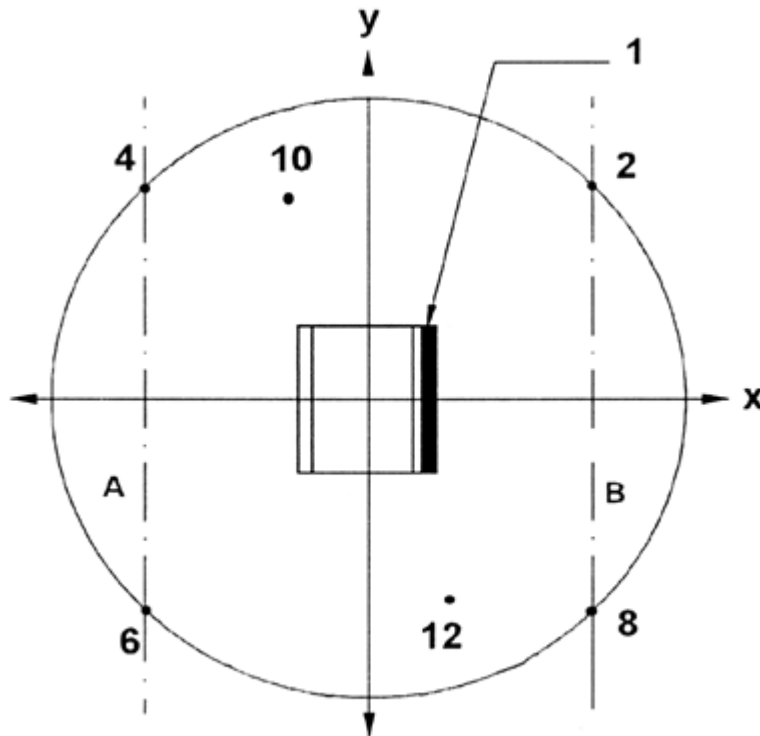


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- |                                |   |
|--------------------------------|---|
| 1. — Rigid steel thread (4 mm) | 2. Wooden wire mesh cleat (20 mm x 25 mm) |
| — Mesh of net: (50 mm x 50 mm) | 3. Reflecting plane                       |

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### 1 Hinge

#### 40. MOTOR HOES

See No 32

The tool shall be disconnected during measurement

#### 41. PAVER-FINISHERS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The engine of the machine shall operate at the nominal speed indicated by the manufacturer. All working units shall be activated and operate at the following speeds:

conveying system	at least 10 % of maximum value
spreading system	at least 40 % of maximum value
tamper (speed, stroke)	at least 50 % of maximum value
vibrators (speed, unbalance moment)	at least 50 % of maximum value
pressure bars (frequency, pressure)	at least 50 % of maximum value

Period of observation

The period of observation shall at least be 15 seconds

#### 42. PILING EQUIPMENT

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 6395:1988

Operating conditions during test

Test under load

The piling equipment is installed at the top of a pile which has sufficient resistance in the ground to allow the equipment to work at a steady speed. In the case of impact hammers, the cap must be supplied with a new, wooden filling. The head of the pile is 0,50 m above the test area

Period of observation

The period of observation shall at least be 15 seconds

#### 43. PIPELAYERS

See No 0

#### 44. PISTE CATERPILLARS

See No 0

#### 45. POWER GENERATORS

Basic noise emission standard

EN ISO 3744:1995

Environmental correction  $K_{2A}$

Measurement in the open air

$K_{2A} = 0$

Measurement indoors

The value of the constant  $K_{2A}$ , determined without artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded

Measurement surface/number of microphone positions/measuring distance

Hemisphere/6 microphone positions according to Part A item 5/according to Part A item 5. If  $l > 2$  m: a parallelepiped according to EN ISO 3744:1995 may be used with measuring distance  $d = 1$  m.

Operating conditions during test

Mounting of equipment

The power generators shall be installed on the reflecting plane; skid-mounted power generators shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation

Test under load

ISO 8528-10:1998, point 9

Period of observation

The period of observation shall at least be 15 seconds

#### 46. POWER SWEEPERS

Basic noise emission standard

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EN ISO 3744:1995

Operating conditions during test

Test under load

The power sweeper shall be tested in a stationary position. The engine and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment; the broom operates at its highest speed, it is not in contact with the ground; the suction system shall work at its maximum suction power with the distance between ground and mouth of the suction system not exceeding 25 mm

Period of observation

The period of observation shall at least be 15 seconds

#### 47. REFUSE COLLECTION VEHICLES

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The refuse collection vehicle shall be tested in a stationary position for the following operating conditions.

1. The engine is running at maximum speed provided by the manufacturer. The equipment shall not be running. This test is not carried out for vehicles with electrical supply only
2. The compaction system is running

The refuse collection vehicle and the hopper receiving the waste are empty

If the engine speed is automatically accelerated when the compaction system is running, this value shall be measured. If the measured value is lower than the speed provided by the manufacturer by more than 5 % the test is carried out with the engine accelerated by the cab accelerator, to ensure the engine speed provided by the manufacturer

If the engine speed for the compaction system is not provided by the manufacturer or if the vehicle is not provided with an automatic accelerator, then the engine speed, issued by the cab accelerator shall be 1 200 rpm

3. The lifting device is running up and down, without load and without container. The engine speed is obtained and controlled as for the compaction system running (point 2)
4. Material is falling into the refuse collection vehicle

Materials are emptied in bulk with the lifting device into the hopper (initially empty). A two-wheeled container with a 240 l capacity, complying with EN 840-1:1997 shall be used for this operation. If the lifting device is not able to pick up such a container, a container with a capacity close to 240 l shall be used. The material shall consist of 30 tubes of PVC, each with a 0,4 kg approximate mass and with the following dimensions:

- length: 150 mm ± 0,5 mm
- nominal external diameter: 90 mm + 0,3/- 0 mm
- nominal depth: 6,7 mm + 0,9/- 0 mm

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used

The period of observation shall be:

1. at least 15 seconds. The resulting sound power level shall be  $L_{WA1}$
2. at least three complete cycles, if the compaction system is running automatically. If the compaction system is not running automatically, but cycle by cycle, measurements are carried out at least during three cycles. The resulting sound power level ( $L_{WA2}$ ) shall be the root mean square value of the three (or more) measurements
3. at least three continuous complete work-cycles, including the entirety of lifting device up and lifting device down. The resulting sound power level ( $L_{WA3}$ ) shall be the root mean square value of the three (or more) measurements
4. at least three complete work-cycles, each including the falling of 30 tubes into the hopper. Each cycle shall not exceed 5 seconds. For these measurements  $L_{pAeq,T}$  is replaced by  $L_{pA,1s}$ . The resulting sound power level ( $L_{WA4}$ ) shall be the root mean square value of the three (or more) measurements.

The resulting sound power level is calculated by:

$$L_{WA} = 10 \log(0,06 \times 10^{0,1L_{WA1}} + 0,53 \times 10^{0,1L_{WA2}} + 0,4 \times 10^{0,1L_{WA3}} + 0,01 \times 10^{0,1L_{WA4}})$$

Note:

In the case of a refuse collection vehicle only electrically supplied, the coefficient associated to  $L_{WA1}$  is assumed to be equal to 0.

#### 48. ROAD MILLING MACHINES

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Mounting of equipment

The longitudinal axis of the road milling machine shall be parallel to the y-axis

Test under load

The road milling machine shall be brought to its steady state within the range specified in the instructions supplied to the purchaser. The engine and all attachments shall be running at their respective rated speeds in the idling mode

Period of observation

The period of observation shall at least be 15 seconds

#### 49. SCARIFIERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

In case of dispute, measurements shall be carried out in the open air on the artificial surface (Point 4.1.2 of ISO 11094:1991)

Environmental correction  $K_{2A}$

Measurement in the open air

$$K_{2A} = 0$$

Measurements indoors

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The value of the constant  $K_{2A}$ , determined without artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded  
Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Test under load

The scarifier shall be operated with the engine at its nominal speed and its working device idling (operating, but not ripping)

Period of observation

The period of observation shall at least be 15 seconds

## 50. SHREDDERS/CHIPPERS

Basic noise emission standard

EN ISO 3744:1995

Test area

ISO 11094:1991

Environmental correction  $K_{2A}$

Measurement in the open air

$K_{2A} = 0$

Measurements indoors

The value of the constant  $K_{2A}$ , determined without artificial surface and in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded.

Measurement surface/number of microphone positions/measuring distance

ISO 11094:1991

Operating conditions during test

Test under load

The shredder/chipper shall be tested chipping one or more pieces of wood

The work-cycle consists of chipping a round piece of wood (dry pine or plywood) of at least 1,5 m length, that is sharpened at one end and has a diameter approximately equal to the maximum that the shredder/chipper is designed to accept specified in the instructions supplied to the purchaser

Period of observation/determination of resulting sound power level

The period of observation shall end when there is no more material in the chipping area, but it shall not exceed 20 seconds. If both operation conditions are possible, the higher sound power level has to be given

## 51. SNOW REMOVING MACHINES WITH ROTATING TOOLS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The snow blower shall be tested in a stationary position. The snow blower shall, according to the manufacturer's recommendations, operate with the working equipment at its maximum speed and the engine at the corresponding speed

### Period of observation

The period of observation shall at least be 15 seconds

## 52. SUCTION VEHICLES

### Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

Test under load

The suction vehicle shall be tested in a stationary position. The engine and auxiliary units operate at the speed provided by the manufacturer for the operation of the working equipment; the vacuum pump(s) is (are) operating at its (their) maximum speed provided by the manufacturer. The suction equipment is operated in such a way that the internal pressure is equal to atmospheric pressure (0 % vacuum). The flow noise of the suction nozzle shall not have any influence on the results of the measurements

### Period of observation

The period of observation shall at least be 15 seconds

## 53. TOWER CRANES

### Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

Measurements at ground-level

Hemisphere/6 microphone positions according to Part A paragraph 5/according to Part A paragraph 5.

Measurements carried out at jib-height

Where the lifting mechanism is located at the jib-height, the measurement surface shall be a sphere of 4 m radius, the centre of which shall coincide with the geometrical centre of the winch

Where the measurement is carried out with the lifting mechanism on the jib stay of the crane, the area of measurement surface is a sphere;  $S$  is equal to 200 m<sup>2</sup>

The microphone positions shall be as follows (see figure 53.1):

Four microphone positions on a horizontal plane passing through the geometric centre of the mechanism ( $H = h/2$ )

with  $L = 2,80$  m

and  $d = 2,80 - l/2$

$L$  = half-distance between two consecutive microphone positions

$l$  = 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 microphone positions shall be located at the points of intersection of the sphere and the vertical line passing through the geometric centre of the mechanism

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Operating conditions during test

Mounting of equipment

Measurement of lifting mechanism

The lifting mechanism during the test shall be mounted in one of the following ways. The position 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 reflecting surface of concrete or non-porous asphalt

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 mounted on a flat reflecting surface of concrete or non-porous asphalt

Where the lifting mechanism is situated on the jib stay, the noise measurement 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 measurement shall refer to the whole assembly

During the test the lifting mechanism and the energy generator shall be installed and used in accordance with the manufacturer's instructions

Test free of load

The energy generator incorporated in the crane shall operate at the full power rating indicated by the manufacturer

The lifting mechanism shall operate free of load, with its drum turning at the rotation speed corresponding to the maximum hook-displacement speed, in the raising and lowering modes. This speed shall be specified by the manufacturer. The greater of the two sound power levels (raising or lowering) shall be used for the results of the test

Test under load

The energy generator incorporated in the crane shall operate at the full power rating indicated by the manufacturer. 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

Period(s) of observation/determination of resulting sound power level if more than one operating condition is used



For the measurement of the sound pressure level 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 above. For the purpose of the test  $t_r = 3$  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

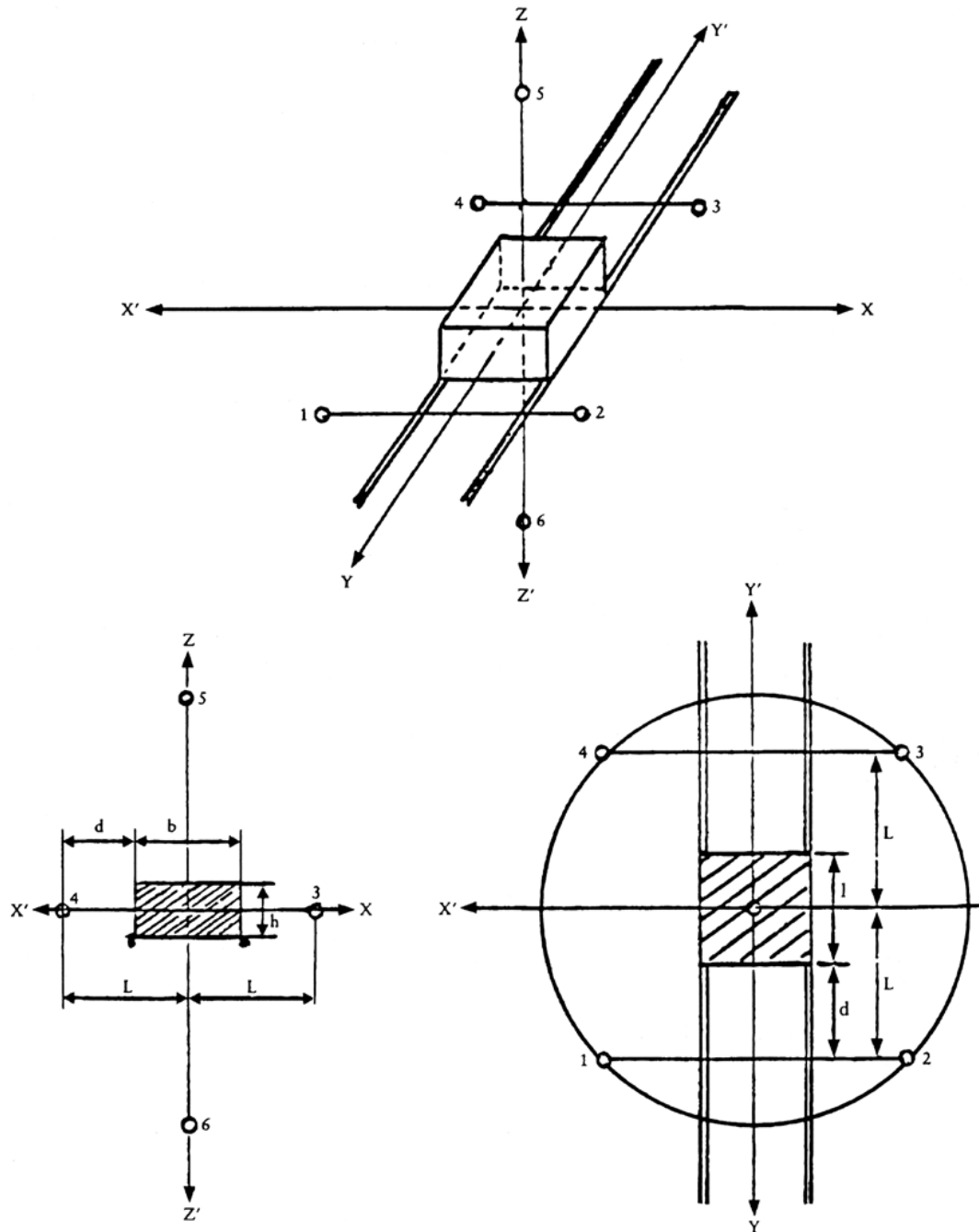
If an integrator is used, the integration period shall be equal to  $(t_r + t_f)$  seconds

The root mean square value at a microphone position  $i$  shall be given by:

$$L_{pi} = 10 \lg \left[ \frac{(t_r 10^{0,1L_{ri}} + t_f 10^{0,1L_{fi}})}{(t_r + t_f)} \right]$$

- $L_{ri}$  being the sound pressure level at microphone position  $i$  during period  $t_r$
- $L_{fi}$  being the sound pressure level at microphone position  $i$  during breaking period  $t_f$

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#### 54. TRENCHERS

See No 0

#### 55. TRUCK MIXERS

Basic noise emission standard

EN ISO 3744:1995

Operating conditions during test

### Test under load

The truck mixer shall be tested in a stationary position. The drum is filled with concrete of medium consistency (propagation measure 42 to 47 cm) complying to the rated capacity. The engine driving the drum shall operate at the speed that causes the maximum speed of the drum specified in the instructions supplied to the purchaser

Period of observation

The period of observation shall at least be 15 seconds

### 56. WATER PUMP UNITS

Basic noise emission standard

EN ISO 3744:1995

Measurement surface/number of microphone positions/measuring distance

Parallelepiped/according to EN ISO 3744:1995 with measurement distance  $d = 1$  m

Operating conditions during test

Mounting of equipment

The water pump unit shall be installed on the reflecting plane; skid-mounted water pump units shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation

Test under load

The engine must operate at the point of best efficiency given in the manufacturer's instructions

Period of observation

The period of observation shall at least be 15 seconds

### 57. WELDING GENERATORS

Basic noise emission standard

EN ISO 3744:1995

Environmental correction  $K_{2A}$

Measurement in the open air

$K_{2A} = 0$

Measurement indoors

The value of the constant  $K_{2A}$ , determined in accordance with Annex A to EN ISO 3744:1995, shall be  $\leq 2,0$  dB, in which case  $K_{2A}$  shall be disregarded

Measurement surface/number of microphone positions/measuring distance

Hemisphere/6 microphone positions according to Part A item 5/according to Part A item 5

If  $l > 2$  m: a parallelepiped according to EN ISO 3744:1995 may be used with measuring distance  $d = 1$  m

Operating conditions during test

Mounting of equipment

The welding generators shall be installed on the reflecting plane; skid-mounted welding generators shall be placed on a support 0,40 m high, unless otherwise required by the manufacturer's conditions of installation

Test under load

ISO 8528-10:1998, point 9

Period of observation

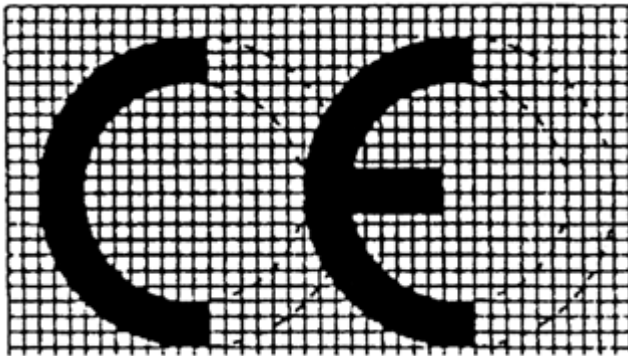
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The period of observation shall at least be 15 seconds

#### ANNEX IV

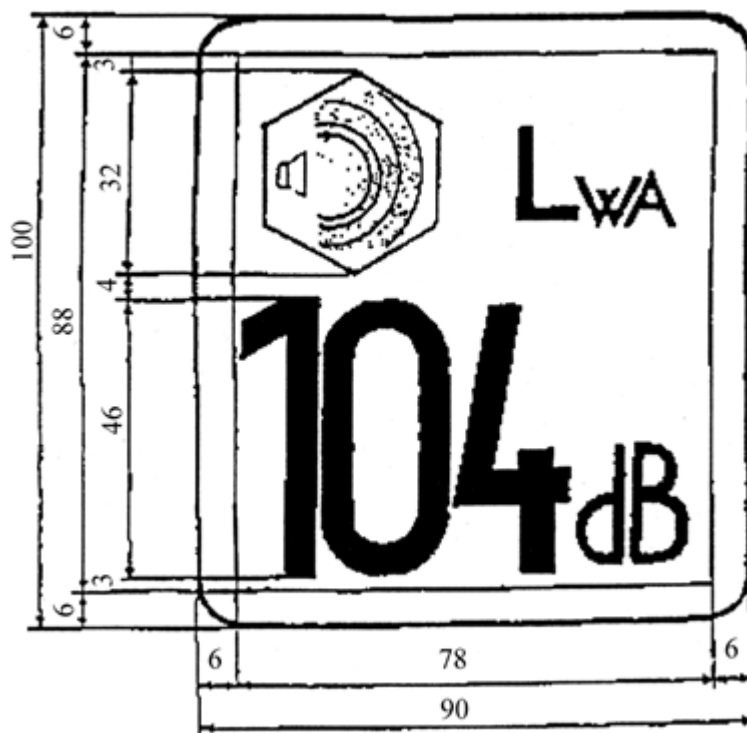
#### MODELS OF THE CE MARKING OF CONFORMITY AND OF THE INDICATION OF THE GUARANTEED SOUND POWER LEVEL

The CE conformity marking must consist of the initials 'CE' taking the following form:



If the CE marking is reduced or enlarged according to the size of the equipment the proportions given in the above drawing must be respected. The various components of the CE marking must have substantially the same vertical dimension which may not be less than 5 mm.

The indication of the guaranteed sound power level must consist of the single-number of the guaranteed sound power in dB, the sign  $L_{WA}$  and a pictogram taking the following form:



If the indication is reduced or enlarged according to the size of the equipment the proportions given in the above drawing must be respected. However, the vertical dimension of the indication should, if possible, not be less than 40 mm.

## ANNEX V

### INTERNAL CONTROL OF PRODUCTION

1. This Annex describes the procedure whereby the manufacturer, or his authorised representative established within the Community, who carries out the obligations laid down in point 2, ensures and declares that the equipment concerned satisfies the requirements of this Directive. The manufacturer, or his authorised representative established in the Community, must affix the CE marking of conformity and the indication of the guaranteed sound power level as required in Article 11 to each piece of equipment and draw up a written EC declaration of conformity as required in Article 8.
2. The manufacturer, or his authorised representative established in the Community, must draw up the technical documentation described in point 3 and he must keep it for a period ending at least 10 years after the last product has been manufactured at the disposal of the relevant national authorities for inspection purposes. The manufacturer, or his authorised representative established in the Community, may entrust another person to keep the technical documentation. In this case he has to include the name and address of this person in the EC declaration of conformity.
3. The technical documentation must enable the conformity of the equipment with the requirements of this Directive to be assessed. It must contain at least the following information:
  - name and address of the manufacturer or his authorised representative established in the Community
  - a description of the equipment
  - make
  - trade name
  - type, series and numbers
  - the technical data relevant for the identification of the equipment and the assessment of its noise emission, including, if appropriate, schematic drawings and any description and explanation necessary for their understanding
  - the reference to this Directive
  - the technical report of noise measurements carried out in accordance with the provisions of this Directive
  - the technical instruments applied and the results of the evaluation of the uncertainties due to production variation and their relation to the guaranteed sound power level.
4. The manufacturer must take all measures necessary in order that the manufacturing process ensures continuing compliance of the manufactured equipment with the technical documentation referred to in points 2 and 3 and with the requirements of this Directive.

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## ANNEX VI

### INTERNAL CONTROL OF PRODUCTION WITH ASSESSMENT OF TECHNICAL DOCUMENTATION AND PERIODICAL CHECKING

1. This Annex describes the procedure whereby the manufacturer, or his authorised representative established in the Community, who carries out the obligations laid down in points 2, 5 and 6 ensures and declares that the equipment concerned satisfies the requirements of this Directive. The manufacturer, or his authorised representative established in the Community, must affix the CE marking of conformity and the indication of the guaranteed sound power level as required in Article 11 to each piece of equipment and draw up a written EC declaration of conformity as required in Article 8.
2. The manufacturer, or his authorised representative established in the Community, must draw up the technical documentation described in point 3 and he must keep it for a period ending at least 10 years after the last product has been manufactured at the disposal of the relevant national authorities for inspection purposes. The manufacturer, or his authorised representative established in the Community, may entrust another person to keep the technical documentation. In this case he has to include the name and address of this person in the EC declaration of conformity.
3. The technical documentation must enable the conformity of the equipment with the requirements of this Directive to be assessed. It must contain at least the following information:
  - name and address of the manufacturer or his authorised representative established in the Community
  - a description of the equipment
  - make
  - trade name
  - type, series and numbers
  - the technical data relevant for the identification of the equipment and the assessment of its noise emission, including, if appropriate, schematic drawings and any description and explanation necessary for their understanding
  - the reference to this Directive
  - the technical report of noise measurements carried out in accordance with the provisions of this Directive
  - the technical instruments applied and the results of the evaluation of the uncertainties due to production variation and their relation to the guaranteed sound power level.
4. The manufacturer must take all measures necessary in order that the manufacturing process ensures compliance of the manufactured equipment with the technical documentation referred to in points 2 and 3 and with the requirements of this Directive.
5. Evaluation by the notified body prior to placing on the market

The manufacturer, or his authorised representative established in the Community, shall present a copy of his technical documentation to a notified body of his choice before the first item of equipment is placed on the market or put into service.

If there are doubts about the plausibility of the technical documentation, the notified body shall inform accordingly the manufacturer or his authorised representative established in the Community, and, if need be, carry out, or have carried out modifications to the technical documentation, or possibly, tests deemed necessary.

After the notified body has issued a report confirming that the technical documentation satisfies the provisions of this Directive, the manufacturer or his authorised representative established within the Community may affix the CE marking to the equipment and issue an EC declaration of conformity in accordance with Articles 11 and 8, for which he will bear complete responsibility.

#### 6. Evaluation by the notified body during production

The manufacturer, or his authorised representative established in the Community, shall further involve the notified body in the production phase according to one of the following procedures to be chosen by the manufacturer or his authorised representative established within the Community:

- the notified body shall carry out periodical checks in order to verify continuing compliance of the manufactured equipment with the technical documentation and with the requirements of this Directive; in particular the notified body shall concentrate on:
  - the correct and complete marking of the equipment according to Article 11,
  - issuing of the EC declaration of conformity according to Article 8,
  - the technical instruments applied and the results of the evaluation of the uncertainties due to production variation and their relation to the guaranteed sound power level,

The manufacturer, or his authorised representative established in the Community, shall give the notified body free access to all the internal documentation supporting these procedures, the actual results of the internal audits and the corrective actions which have been taken, if any.

Only if the above checks give unsatisfactory results shall the notified body carry out noise tests, which, on its own judgement and experience, may be simplified or completely carried out according to the provisions laid down in Annex III for the relevant type of equipment,

- the notified body shall carry out or have carried out product checks at random intervals. An adequate sample of the final equipment, chosen by the notified body, must be examined and appropriate noise tests as set out in Annex III, or equivalent tests, must be carried out to check the conformity of the product with the relevant requirements of the Directive. The product checking must include the following aspects:
  - the correct and complete marking of the equipment according to Article 11,
  - issuing of the EC declaration of conformity according to Article 8.

In both procedures, the frequency of the checks shall be defined by the notified body according to the results of previous evaluations, the need to monitor corrective actions and further guidance for the frequency of the checks that may be given by the yearly production and the general reliability of the manufacturer to maintain the guaranteed values; however a check shall be carried out at least once every three years.

If there are doubts about the plausibility of the technical documentation or the adherence during production, the notified body shall inform accordingly the manufacturer, or his authorised representative established in the Community.

In those cases where equipment checked does not conform to the provisions of this Directive, the notified body must inform the notifying Member State.

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## ANNEX VII

### UNIT VERIFICATION

1. This Annex describes the procedure whereby the manufacturer, or his authorised representative established in the Community, ensures and declares that the equipment which has been issued with the certificate referred to in point 4 conforms to the requirements of this Directive. The manufacturer, or his authorised representative established in the Community, must affix the CE marking supplemented by the information as required in Article 11 to the equipment and draw up the EC declaration of conformity referred to in Article 8.
2. The application for a unit verification must be lodged by the manufacturer or his authorised representative established in the Community with a notified body chosen by him.

This application must include:

- the name and address of the manufacturer and, if the application is lodged by the authorised representative, his name and address in addition
  - a written declaration that the same application has not been lodged with any other notified body
  - a technical documentation conforming to the requirements set below:
    - a description of the equipment
    - trade name
    - type, series and numbers
    - the technical data relevant for the identification of the equipment and the assessment of its noise emission, including, if appropriate, schematic drawings and any description and explanation necessary for their understanding
    - the reference to this Directive.
3. The notified body must:
    - examine whether the equipment has been manufactured in conformity with the technical documentation
    - agree with the applicant the location where, in accordance with this Directive, the noise tests will be carried out
    - in accordance with this Directive, carry out or have carried out the necessary noise tests.
  4. Where the equipment meets the provisions of this Directive, the notified body must issue a certificate of conformity to the applicant as described in Annex X.

If the notified body refuses to issue a certificate of conformity, it must state the detailed grounds for the refusal.

5. The manufacturer, or his authorised representative established in the Community, must keep with the technical documentation copies of the certificate of conformity for a period of 10 years from the date on which the equipment is placed on the market.



## ANNEX VIII

## FULL QUALITY ASSURANCE

1. This Annex describes the procedure whereby the manufacturer who satisfies the obligations of point 2 ensures and declares that the equipment concerned satisfies the requirements of this Directive. The manufacturer, or his authorised representative established in the Community, must affix the CE marking supplemented by the information as required in Article 11 to each product and draw up the written EC declaration of conformity referred to in Article 8.
2. The manufacturer must operate an approved quality assurance system for design, manufacture and final product inspection and testing as specified in point 3 and shall be subject to surveillance as specified in point 4.
3. Quality assurance system
- 3.1. The manufacturer must lodge an application for assessment of his quality assurance system with a notified body of his choice.

The application must include:

- all relevant information for the product category envisaged, including technical documentation of all equipment already in phase of design or production that must contain at least the following information:
  - name and address of the manufacturer or his authorised representative established in the Community
  - a description of the equipment
  - make
  - trade name
  - type, series and numbers
  - the technical data relevant for the identification of the equipment and the assessment of its noise emission, including, if appropriate, schematic drawings and any description and explanation necessary for their understanding
  - the reference to this Directive
  - the technical report of noise measurements carried out in accordance with the provisions of this Directive
  - the technical instruments applied and the results of the evaluation of the uncertainties due to production variation and their relation to the guaranteed sound power level
  - a copy of the EC declaration of conformity
- the documentation concerning the quality assurance system.
- 3.2. The quality assurance system must ensure compliance of the product with the requirements of the Directives that apply to it.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions. The quality assurance system documentation must permit a common understanding of the quality policies and procedures such as quality programmes, plans, manuals and records.

- 3.3. It must contain in particular an adequate description of:

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- the quality objectives and the organisational structure, responsibilities and powers of the management with regard to design and product quality
- the technical documentation to be drawn up for each product, containing at least the information indicated in point 3.1 for the technical documentations mentioned there
- the design control and design verification techniques, processes and systematic actions that will be used when designing the products pertaining to the equipment category covered
- the corresponding manufacturing, quality control and quality assurance techniques, processes and systematic actions that will be used
- the examinations and test that will be carried out before, during and after manufacture, and the frequency with which they will be carried out
- the quality records, such as inspection reports and test data, calibration data, qualification reports of the personnel concerned, etc.
- the means to monitor the achievement of the required design and product quality and the effective operation of the quality assurance system.

The notified body must assess the quality assurance system to determine whether it satisfies the requirements referred to in point 3.2. It shall presume conformity with these requirements in respect of quality assurance systems that implement EN ISO 9001.

The auditing team must have at least one member with experience as an assessor in the equipment technology concerned. The assessment procedure must include an assessment visit to the manufacturer's premises.

The decision must be notified to the manufacturer. The notification must contain the conclusion of the examination and the reasoned assessment decision.

- 3.4. The manufacturer must undertake to fulfil the obligations arising out of the quality assurance system as approved and to maintain it in an adequate and efficient manner.

The manufacturer or his authorised representative established within the Community shall keep the notified body that has approved the quality assurance system informed of any intended updating of the quality assurance system.

The notified body must evaluate the modifications proposed and decide whether the modified quality assurance system will still satisfy the requirements referred to in point 3.2 or whether a reassessment is required.

It must notify its decision to the manufacturer. The notification must contain the conclusions of the examination and the reasoned assessment decision.

4. Surveillance under the responsibility of the notified body
- 4.1. The purpose of surveillance is to make sure that the manufacturer duly fulfils the obligations arising out of the approved quality assurance system.
- 4.2. The manufacturer must allow the notified body entrance for inspection purposes to the locations of design, manufacture, inspection and testing, and storage and must provide it with all necessary information, in particular:
- the quality assurance system documentation
  - the quality records as foreseen by the design part of the quality assurance system, such as results of analyses, calculations, tests, etc.
  - the quality records as foreseen by the manufacturing part of the quality assurance system, such as inspection reports and test data, calibration data, qualification reports of the personnel concerned, etc.

- 4.3. The notified body shall periodically carry out audits to make sure that the manufacturer maintains and applies the quality assurance system and must provide an audit report to the manufacturer.
- 4.4. Additionally the notified body may pay unexpected visits to the manufacturer. During such visits the notified body may carry out, or cause to be carried out, tests to verify that the quality assurance system is functioning correctly, if necessary. The notified body must provide the manufacturer with a visit report and, if a test has taken place, with a test report.
5. The manufacturer must, for a period ending at least 10 years after the last equipment has been manufactured, keep at the disposal of the national authorities:
  - the documentation referred to in the second indent of point 3.1 of this Annex
  - the updating referred to in the second paragraph of point 3.4
  - the decisions and reports from the notified body which are referred to in the final paragraph of point 3.4, points 4.3 and 4.4.
6. Each notified body must give the other notified bodies the relevant information concerning the quality assurance system approvals issued and withdrawn.

## ANNEX IX

### MINIMUM CRITERIA TO BE TAKEN INTO ACCOUNT BY MEMBER STATES FOR THE NOTIFICATION OF BODIES

1. The body, its director and its staff responsible for carrying out verification operations may be neither the designer, builder, supplier or installer of the equipment nor the authorised representative of any of those parties. They may become involved neither directly nor as authorised representatives in the design, construction, marketing or maintenance of such equipment nor represent the parties engaged in these activities. This does not preclude the possibility of exchange of technical information between the manufacturer and the body.
2. The body and its staff must carry out the assessments and verifications with the highest degree of professional integrity and technical competence and must be free from all pressures and inducements, particularly financial, which might influence their judgement or the results of their work, especially from persons or groups of persons with an interest in the results of verification.
3. The body must have at its disposal the necessary staff and possess the necessary facilities to enable it to perform properly the technical and administrative tasks connected with inspection and surveillance operations; it must also have access to the equipment required for any special verification.
4. The staff responsible for inspection must have;
  - sound technical and professional training
  - satisfactory knowledge of the requirements for the assessment of technical documentation
  - satisfactory knowledge of the requirements for the tests they carry out and adequate practical experience of such tests

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- the ability to draw up the certificates, records and reports required to authenticate the performance of the tests.
- 5. The impartiality of inspection staff must be guaranteed. Their remuneration must not depend on the number of tests carried out or the results of such tests.
- 6. The body must take out liability insurance unless its liability is assumed by the State in accordance with national law, or the Member State itself is directly responsible for the tests.
- 7. The staff of the body must observe professional secrecy with regard to all information gained in carrying out its tests (except *vis-à-vis* the competent administrative authorities of the State in which its activities are carried out) under this Directive or any provisions of national law giving effect to it.



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- (1) Net power means the power in 'EC kW' obtained on the test bench at the end of the crankshaft, or its equivalent, measured in accordance with the EC method of measuring the power of internal combustion engines for road vehicles, except that the power of the engine cooling fan is excluded.