Brussels, 18 June 2009

CECE position on the future of the noise emission in the environment by equipment for use outdoors (Directive 2000/14/EC) for the following product categories:

Equipment nr 8: Compaction machines
Equipment nr 13: Conveying and spraying machines for concrete and mortar
Equipment nr 16c: Steel tracked dozers
Equipment nr 17: Drill rigs
Equipment nr 18: Dumpers
Equipment nr 28: Hydraulic hammers
Equipment nr 42: Piling equipments
Equipment nr 48: Road milling machines
Equipment nr 55. Truck mixers
Equipment nr 102/103: Mobile sieve installations & Mobile waste breakers

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Introduction

As a result of the first phase of the current revision process of directive 2000/14/EC, WG7 has published the 5th December 2007 a position paper indicating a list of equipments considered as candidates for improvements through different possible scenarios.
For CECE the following equipments are proposed for changes accordingly WG7 position papers:

Equipment nr 8: Compaction machines
Equipment nr 13: Conveying and spraying machines for concrete and mortar
Equipment nr 16c: Steel tracked dozers
Equipment nr 17: Drill rigs
Equipment nr 18: Dumpers
Equipment nr 28: Hydraulic hammers
Equipment nr 42: Piling equipments
Equipment nr 48: Road milling machines
Equipment nr 55. Truck mixers
Equipment nr 102/103: Mobile sieve installations & Mobile waste breakers

To structure industry activity and evaluate the various scenario's, CECE set up since the beginning of 2008, 11 dedicated task groups, representing about 50 different construction equipment companies. The main focus are to determine if the proposed scenario's are viable for the industry, or propose any necessary modifications to take into account the current state of the art of the equipment, and if appropriate by considering additional technical constraints from other regulations such as the engine exhaust emission directive, new machinery safety directive, ….

In addition to the continuous communication established by CECE with the stakeholders all along the Impact assessment Study, each Sub-task group has, formelly developed the following major industry positions:

- A position paper on Arcadis industry questionnaire, produced the 20th August 2008,
- Complementary information report to support contractor in analysis for the Environmental, Economical and Technical study to Arcadis and Commission, produced the 21th November 2008
- CECE comment on Arcadis final report, produced the 5th may 2009

At this stage of the revision period, the aimed of this CECE position paper is to present for some CECE industry sectors an overall and documented argumentation, which includes relevant technical, environmental, economical information reflecting industry state of the art.

Major challenges identified by CECE.

Since the application of directive 2000/14/EC, CECE is supporting the improvement of the environment by developing technologies, both for machines under Art. 13 and Art. 12, to reduce machine noise when technically feasible.

Nevertheless, industries are challenged more and more by the state-of-the-art limitations, and are facing real technical barriers in case of revised limits (more stringent or for the first time).

Another concern is related to machines for which the process noise is much higher than the noise generated from this equipment.
Also, the identification and allocation of the different noise sources for complex machines which are a combination of various pieces of equipment like for example drill rigs, piling equipment and truck mixers, represents another big challenge.

In the time frame 2009-2014 industry will be faced to major challenges by the integration of Stages IIIB and IV engines into the machines as requested by the directive on exhaust emissions from non road mobile machinery 97/68/EC and the new requirements of the machinery safety directive 2006/42/EC.

On top of that, for construction equipment, the market in Europe dropped sharply in the 4th quarter of 2008 and is continuing to decline since then. The sales over the year 2009 are expected to drop by at least 25% in units, depending on the market segment there are decreases up to 60%. In this difficult period with unexpected strong decreases in sales manufacturers concentrate on cutting costs to adapt to the change in income and managing cash-flow challenges, caused by the very restrictive supply with money through the European banking systems. Also R & D budgets will be restricted for the next coming years.

1. Equipment nr. 8: Compaction machines

1.1 Introduction to Compaction machines:

A machine which compacts materials, e.g. rock fills, soil or asphalt surfacing, through a rolling, tamping or vibrating action of the working tool.

Rollers are suitable for most types of road construction, airfields, dam construction, harbor projects and industrial constructions.

Vibratory plates are used to compact soil in confined areas, such as in trenches and parking lots, among other areas. Vibratory plates are also suitable for special applications, such as block paving and they are also a compliment to rollers that may not be able to operate effectively in confined spaces. Some vibratory plates are specially designed for compacting asphalt. They are ideal and most economical for small repair and maintenance work, such as driveways, pathways and parking lots.

Rammers are suitable for applications on both granular and cohesive soils, where strict requirements are imposed for compaction in confined areas, trenches and repair work.

As described above compaction machines consist of a diverse range and types of machines for different applications. They are insufficiently divided and described in the current directive 2000/14/EC, amended by directive 2005/88/EC.

In the following paragraphs it is explained why these machines are insufficient classified in the current directives and we also give a proposal for a new more appropriate classification.

1.2 Current situation

Due to introduction of the amendment directive 2005/88/EC and technical progress the classification of Compaction machines has become confusing and insufficient.

Today the same type of a roller has different test codes and limit values depending on the fact if it is ride-on or remote controlled and also these types of rollers having a different test code when intended for ride-on operation on the one hand and intended for operation by a pedestrian on the other hand, are obliged to comply with different limit values as well.

Nomeval doesn’t propose any changes in classification.

Nomeval proposes the following changes in limit values:

- Pedestrian controlled vibrating rollers / tighten by 1 dB(A)
- Rammers / tighten by 3 dB(A)
- Vibratory plates > 3kW / tighten by 1 dB(A)

1.3 Industry position

1.3.1 Technical aspects

Nomeval proposal: - Pedestrian controlled vibrating rollers / tighten by 1 dB(A)

CECE propose that all vibrating rollers should be treated in the same way irrespective they are intended for ride-on operation, pedestrian- or remote-controlled. Pedestrian controlled vibrating rollers will then have the same test code as the ride-on vibrating rollers. Nomeval proposal for this category will then be obsolete.

Nomeval proposal: - Rammers / tighten by 3 dB(A)

The proposal to reduce limit value by 3 dB is not justified because:

- The representation of rammers in the Commission's noise database is statistically inconsistent and insignificant and as such evaluations on this kind of machinery are not representative.
- Rammers in the higher power range (> 50 kg operating-mass) are close to the limit value and there is a market need for high power, high performance rammers.
- There is no known technology today to reduce 3 dB for rammers, which would be necessary for the rammers in the higher power range (> 50 kg operating-mass).
- Noise reduction by adding more hoods or covers on a rammer would increase the weight, make the rammer more vulnerable (robustness of the system in handling and operating) and limit the manoeuvrability of the machine operating in confined areas and is therefore not a realistic neither viable solution.
- Rammers are normally used during a very short time in an application and therefore noise-disturbing time is limited.

Nomeval proposal: - Vibratory plates > 3kW / tighten by 1 dB(A)

The proposal to reduce limit value by 1 dB is not justified because:

- The representation of vibratory plates in the Commission's noise database is statistically inconsistent and insignificant and as such evaluations on this kind of machinery are not representative.

- 1 dB noise reduction cannot be physically perceived, but for some machine models a reduction of 1 dB can allocate extensive engineering resources and costs or result in less performance of the machine increasing operational time for the same compaction result. For many companies a great part of the engineers will the coming years be focused on complying with the engine emission regulations around the world.

- Vibratory plates are normally used during a limited time in an application and therefore noise-disturbing time is marginal.

For those machines where no changes in limit values are proposed by Nomeval, CECE agrees insofar, with the conclusions of Nomeval, as these conclusions refer to machines already classified appropriate. For those machines with deficient classification, CECE proposes the classification accordingly.

REVIEW AND PROPOSAL OF NEW CLASSIFICATION

Equipment group 8 is today split into 9 categories as mentioned by WG7. Every category itself is again subdivided into 2 or 3 subcategories, providing classes according to the net-power of the installed engine. (See reference table inserted hereafter)

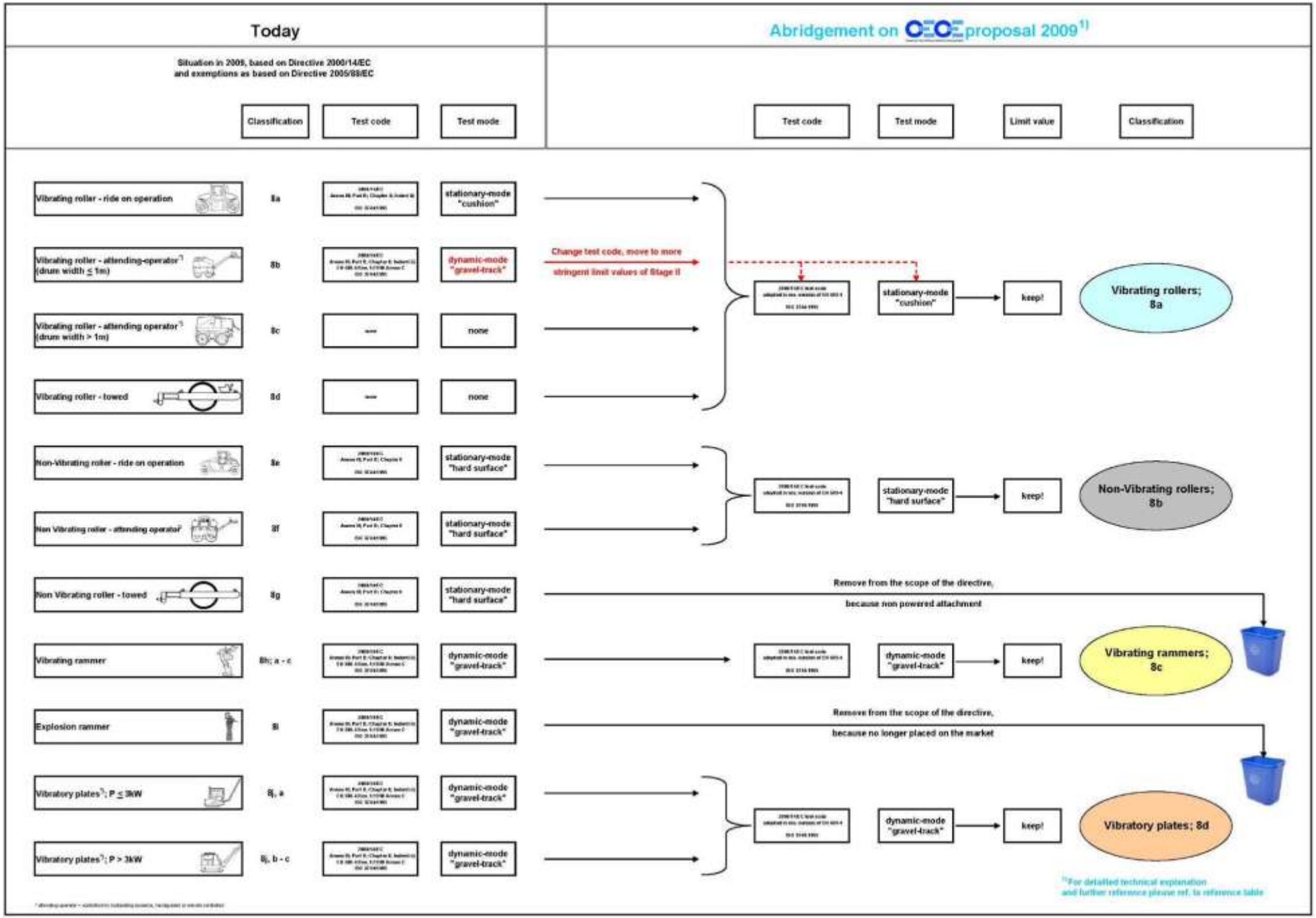
Therefore CECE proposes to follow the WG7 scenario dated 2007-12-05 and simplify the proposed classification from 9 categories to 4 categories:

- **Vibrating rollers** (irrespective whether they are intended for ride-on operation, pedestrian- or remote-controlled)
- **Non-vibrating rollers** (irrespective whether they are intended for ride-on operation, pedestrian- or remote-controlled)
- **Vibratory plates**
- **Vibratory rammers**

due to the working principles of the machines as known nowadays:

a) Longitudinal work strike with at least mainly sinusoidal path trajectory - Rammer
b) Sinusoidal work-strike with at least sinusoidal/chaotic path trajectory – Plate
c) Sinusoidal work-strike with at least plane-parallel path trajectory – Vibrating roller
d) Plane-parallel application and path trajectory of a static load – Non Vibrating roller

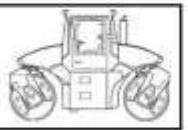
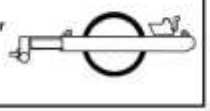
As a consequence this new classification of equipment 8 has to be implemented into the relevant standard EN 500-4 respectively by revision
At least the reference to this revised standard should be given in the directive to enforce this re-arrangement as law
Accordingly Annex I of the directive 2000/14/EC and its amendments has to be updated with this new proposed classification and definitions.


Today
Situation in 2009, based on Directive 2000/14/EC
and exemptions as based on Directive 2005/88/EC
Classification
Test code
Test mode
Abridgement on CECE proposal 2009 1)
Test code
Test mode
Limit value
Classification
Vibrating roller - ride on operation
8a
stationary-mode "cushion"
Vibrating roller - attending-operator 3) (drum width ≤ 1m)
8b
dynamic-mode "gravel-track"
Change test code, move to more
stringent limit values of Stage II
Vibrating roller - attending operator 3) (drum width > 1m)
8c
none
Vibrating roller - towed
8d
none
stationary-mode "cushion"
keep!
Vibrating rollers; 8a
Non-Vibrating roller - ride on operation
8e
stationary-mode "hard surface"
Non Vibrating roller - attending operator 3)
8f
stationary-mode "hard surface"
stationary-mode "hard surface"
keep!
Non-Vibrating rollers; 8b
Non Vibrating roller - towed
8g
stationary-mode "hard surface"
Remove from the scope of the directive,
because non powered attachment
Vibrating rammer
8h; a - c
dynamic-mode "gravel-track"
dynamic-mode "gravel-track"
keep!
Vibrating rammers; 8c
Explosion rammer
8i
dynamic-mode "gravel-track"
Remove from the scope of the directive,
because no longer placed on the market
Vibratory plates 3); P ≤ 3kW
8j, a
dynamic-mode "gravel-track"
Vibratory plates 3); P > 3kW
8j, b - c
dynamic-mode "gravel-track"
dynamic-mode "gravel-track"
keep!
Vibratory plates; 8d
1) For detailed technical explanation
and further reference please ref. to reference table

Today

Situation in 2009, based on Directive 2000/14/EC and exemptions as based on Directive 2005/88/EC

Abridgement on CECE proposal 2009 for vibrating rollers[1)]

Today: Classification	Today: Test code	Today: Test mode	Abridgement: Test code	Abridgement: Test mode	Abridgement: Limit value	Abridgement: Classification
Vibrating roller ride on operation 	8a	2000/14/EC Annex III; Part B; Chapter 8; Indent ii) ISO 3744:1996	stationary-mode "cushion"			
Vibrating roller attending-operator* (drum width ≤ 1m) 	8b	2000/14/EC Annex III; Part B; Chapter 8; Indent iii) EN 500-4 Rev. 1:1998 Annex C ISO 3744:1996	dynamic-mode "gravel-track"	Change test code, move to more stringent limit values of Stage II		
Vibrating roller attending operator* (drum width > 1m) 	8c	none	none			
Vibrating roller towed 	8d	none	none			
			2000/14/EC test code adopted in rev. version of EN 500-4 ISO 3744:1995	stationary-mode "cushion"	keep!	Vibrating Roller; 8a

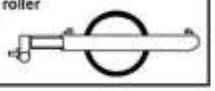
1) For detailled technical explanation and further reference please ref. to reference table

* attending operator = controlled by accompanying operator, handguided or remote controlled

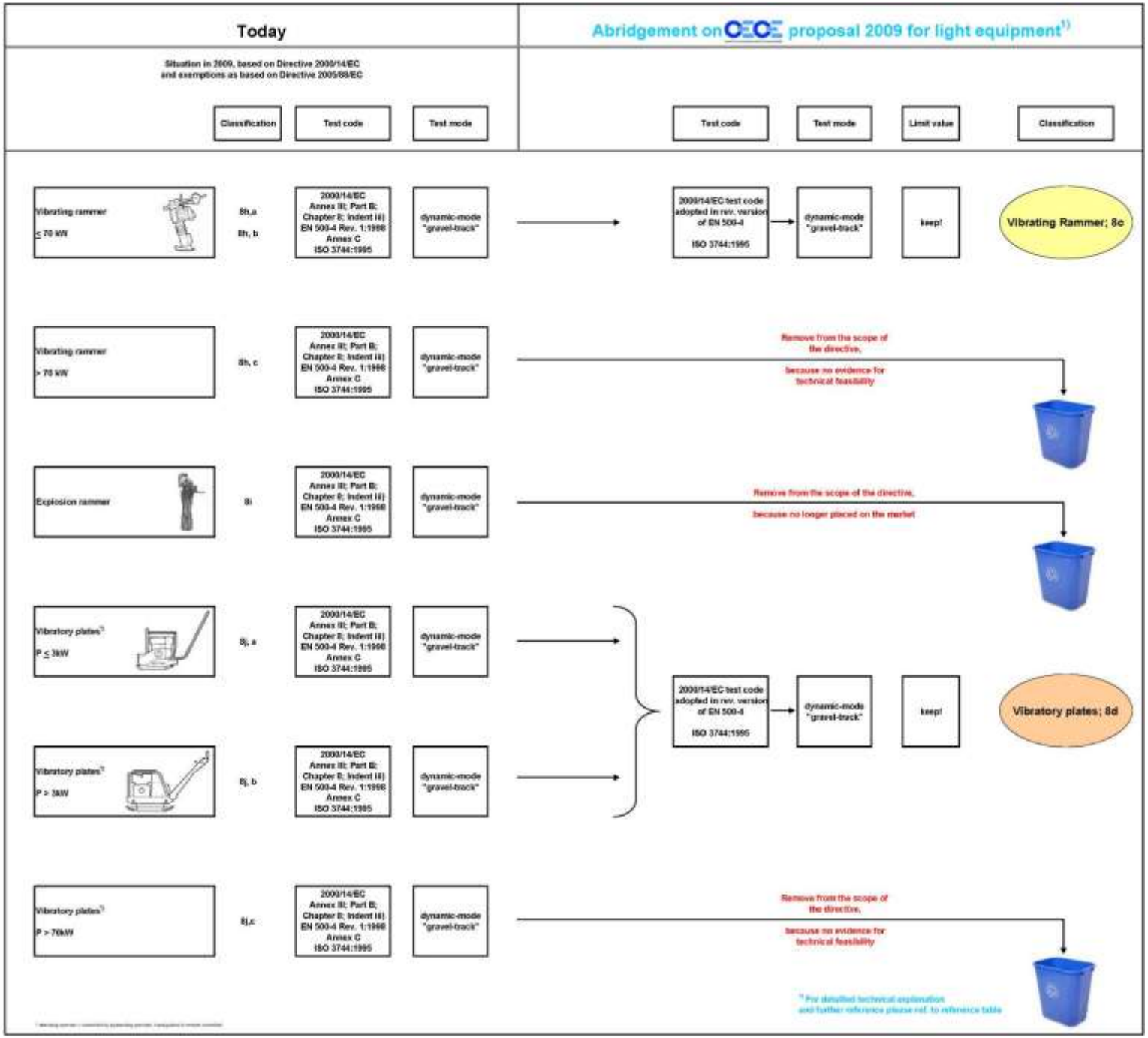
Today

Situation in 2009, based on Directive 2000/14/EC
and exemptions as based on Directive 2005/88/EC

Abridgement on CECE proposal 2009 for non-vibrating rollers [1)]

Classification	Test code	Test mode	Test code	Test mode	Limit value	Classification
Non-Vibrating roller ride on operation 	8e	2000/14/EC Annex III; Part B; Chapter 0 ISO 3744:1995	stationary-mode "hard surface"	2000/14/EC test code adopted in rev. version of EN 500-4 ISO 3744:1995	stationary-mode "hard surface"	keep!	Non-Vibrating Roller; 8b
Non Vibrating roller attending operator* 	8f	2000/14/EC Annex III; Part B; Chapter 0 ISO 3744:1995	stationary-mode "hard surface"				
Non Vibrating roller towed 	8g	2000/14/EC Annex III; Part B; Chapter 0 ISO 3744:1995	stationary-mode "hard surface"	Remove from the scope of the directive, because non powered attachment 			

1) For detailled technical explanation and further reference please ref. to reference table


Today
Abridgement on CECE proposal 2009 for light equipment1)
Situation in 2009, based on Directive 2000/14/EC and exemptions as based on Directive 2005/88/EC
Classification
Test code
Test mode
Test code
Test mode
Limit value
Classification
Vibrating rammer
≤ 70 kW
8h,a
8h, b
2000/14/EC Annex III; Part B; Chapter II; Indent iii) EN 500-4 Rev. 1:1998 Annex C ISO 3744:1995
dynamic-mode "gravel-track"
2000/14/EC test code adopted in rev. version of EN 500-4 ISO 3744:1995
dynamic-mode "gravel-track"
keep!
Vibrating Rammer; 8c
Vibrating rammer
> 70 kW
8h, c
Remove from the scope of the directive, because no evidence for technical feasibility
Explosion rammer
8i
Remove from the scope of the directive, because no longer placed on the market
Vibratory plates2)
P ≤ 3kW
8j, a
Vibratory plates2)
P > 3kW
8j, b
Vibratory plates; 8d
Vibratory plates2)
P > 70kW
8j,c
Remove from the scope of the directive, because no evidence for technical feasibility
2) For detailed technical explanation and further reference please ref. to reference table

		CECE - Proposal		Reference table		
New Equipment No.:	New Equipment name/definition:	Proposed limit CECE Scenario "Merge groups"		Remarks	Base standard for measurement	Additional requirement for measurement
		Power Cat. [kW]	[db(A)]	CECE: "Merge groups"		
8a	Compaction machines: Vibrating roller	P ≤ 8	105	Treat Vibratory rollers in the same manner and use same test-code for all vibrating rollers (ride-on, controlled by bystanding operator, handguided, remote controlled, ...) e.g. by measuring on a cushion Limit values for hand guided vibratory-rollers then de jure are changed Proposal for definition of operating modus acc. to ISO 6165 and ISO 8811 to:"Direct controlled machines"; "Remote controlled machines"; "pedestrian controlled machines"	EN ISO 3744:1995	2000/14/EC Annex III; Part B; Chapter 8; Indent ii)
		8 < P ≤ 70	106			
		P > 70	86 + 11 x log P			
8b	Compaction machines: Non-vibrating roller	P ≤ 55	101	Treat Non-vibratory rollers in the same manner and use same test-code for all non-vibrating rollers (ride-on, controlled by bystanding operator, handguided, remote controlled, ...) e.g. by measuring on a reverberant surface in stationary condition. Proposal for definition of operating modus acc. to ISO 6165 and ISO 8811 to:"Direct controlled machines"; "Remote controlled machines"; "pedestrian controlled machines"	EN ISO 3744:1995	2000/14/EC Annex III; Part B; Chapter 8
		P > 55	82 + 11 x log P			
8c	Compaction machines: Vibrating rammers	P ≤ 8	108	According the CECE-proposal limit values for rammers exceeding 70 kW become obsolete	EN ISO 3744:1995	2000/14/EC Annex III; Part B; Chapter 8; Indent iii) New reference should be given in the directive to: EN 500-4:revised version applying the re-grouping of category 8-equipment as proposed by CECE and measuring rammers on the gravel-track.
		P > 8	109			
8d	Compaction machines: Vibratory plates	P ≤ 3	105	According the CECE-proposal limit values for vibratory plates exceeding 70 kW become obsolete	EN ISO 3744:1995	2000/14/EC Annex III; Part B; Chapter 8; Indent iii) New reference should be given in the directive to: EN 500-4:revised version applying the re-grouping of category 8-equipment as proposed by CECE and measuring vibratory-plates on the gravel-track.
		3 < P ≤ 8	108			
		8 < P ≤ 70	109			
	Compaction machines: Explosion rammers			Remove from the scope of the directive, because none placed on the market		
	Compaction machines: Non-vibrating roller - towed/mounted			Remove from the scope of the directive, because machinery represents non-powered attachment		

		Today		Proposal WG 7	Proposal Nomeval	
Eulpment No.:	Equipment name/definition:	Limit value: (Status: 2006/88/EC)		Proposed limit acc. p 5	Proposed limit acc. Table 9.1	Further remarks
acc. 2000/14/EC		Power Cat. [kW]	[db(A)]	WG7/20071205	Nomeval/TNO	Nomeval/TNO/WG7
8a	Compaction machines / Vibrating roller - ride on operation	P ≤ 8	105	105	105	
		8 < P ≤ 70	106	106	105	
		P > 70	86 + 11 x log P	86 + 11 x log P	86 + 11 x log P	
8b	Compaction machines / Vibrating roller - pedestrian controlled	P ≤ 8	108	108	107	Indicate, that remote controlled machinery belongs to this category.
		8 < P ≤ 70	109	109	108	
		P > 70	89 + 11 x log P	89 + 11 x log P	88 + 11 x log P	
8c	Compaction machines / Vibrating roller - towed/mounted	P ≤ 8	105	105	-	No test-code described in the directive.
		8 < P ≤ 70	106	106	-	
		P > 70	86 + 11 x log P	86 + 11 x log P	-	
8d	Compaction machines / Non-vibrating roller - ride on operation	P ≤ 55	101	101	-	
		P > 55	82 + 11 x log P	82 + 11 x log P	-	
8e	Compaction machines / Non-vibrating roller - pedestrian controlled	P ≤ 55	101	101	-	
		P > 55	82 + 11 x log P	82 + 11 x log P	-	
8f	Compaction machines / Non-vibrating roller - towed/mounted	P ≤ 55	101	101	-	Remove from the scope of the directive
		P > 55	82 + 11 x log P	82 + 11 x log P	-	
8g	Compaction machines / Rammers	P ≤ 8	108	108	105	
		8 < P ≤ 70	109	109	106	
		P > 70	89 + 11 x log P	89 + 11 x log P	86 + 11 x log P	
8h	Compaction machines / Explosion rammers	-	-	Remove from the scope of the directive	-	Remove from the scope of the directive
8i	Compaction machines / Vibratory plates	P ≤ 3	105	105	-	
		3 < P ≤ 8	108	108	107	
		8 < P ≤ 70	109	109	108	
		P > 70	89 + 11 x log P	89 + 11 x log P	88 + 11 x log P	
	1) Limit values					
	2) Marking only					

Current definition:

Equipment nr. 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

Proposed new definition:

Equipment nr 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, ride-on, remote controlled, walk-behind or an attachment to a carrying machine. Compaction machines are subdivided as follows:

- vibrating rollers: self-propelled or towed compaction machines with one or more metallic cylindrical bodies (drums) or rubber tyres. The compaction of materials is performed through a rolling and vibrating action of the working tool.
- non-vibrating rollers: self-propelled compaction machines with one or more metallic cylindrical bodies (drums) or rubber tyres. The compaction of materials is performed through a rolling action of the working tool.
- vibratory plates: compactions machines with mainly flat base plates which are made to vibrate.
- vibratory rammers: compaction machines with mainly a flat foot-plate (shoe) as the compacting tool which is made to move in a predominantly vertical direction by displacement. The compaction of materials is performed through a tamping action of the working tool.

1.3.2 Environmental & Economical

According to the NOMEVAL-report the Environmental Impact already has been identified as “low” (ref. to Annex I) and as such the influence of the re-grouping of hand-guided vibratory rollers only, which reflects moreover a marginal part of compaction equipment, is estimated to have also marginal impact.

This CECE industry position has been established by 10 companies which are representing more than 90% of the global market for compaction machine.
Mainly all affected products are duplicate parts. Hence any proposal for a change of the limit values has to be carefully evaluated and improved with respect to the economical situation of manufacturers and customers either.

Since most machines affected by more stricter emission limit values as proposed by Nomeval are hand guided, as explained above:

- the technical possibilities to take appropriate technical measures of noise reduction are limited
- the efforts for those measures are almost short-lived due to the rough application conditions of the machines
- the additional costs for noise reduction measure penalise manufacturers of those machines excessively, because the percentage increase of cost for these measures are, compared to the overall-cost of those machines imminent
- the environmental effects due to the relatively short time of operation may not be quantified
- a distinguished disparity for EU-manufacturers will occur when competing with Non-EU-manufactures on markets outside the EU, because it is for EU-manufacturers financially unbearable to invest into two product lines, one for the EU-market and one for Export
- thus EU-Manufacturers will depreciate significantly their exports outside EU accounting of about 60 %

Thus it has to be based on R&D efforts and taking into consideration other European legislation, such as the regulation of NRMM engine-emissions and machinery safety. These regulations and their requirements can result in antipodal effects with respect to sound emission and as such these regulation has to be implemented into the evaluation mentioned above too.

Therefore at the present stage any change of limit values is unjustified. Any proposal in future has to be based on carefully executed evaluations, which as such can only result from R&D effort. Affected industry is pro-actively contributing to the development of the directive by own R&D efforts, but at least any additional financial contribution of the EU further expanding R&D possibilities would encourage this process significantly.

1.4 Final industry sector (task group) conclusion and position

- Keep the exemptions as laid down in Directive 2005/88/EC
- Simplify classification from 9 to 4 categories according to their primary operation.
- EN 500-4 (under revision) should be referenced in the future amendment of Directive 2000/14/EC

2. Equipment nr. 13: Conveying and spraying machines for concrete and mortar

2.1 WG7 position paper proposal

Eq nr	Equipment	Current Article/Perm. Level	Scenario 1 *"Do nothing" option*	**Scenario 2 *WG7 elaboration***	Scenario 3 *TNO proposal*	Further remarks
13	Conveying and spraying machines for concrete and mortar	Art. 13	Art. 13	**Art. 13 Simplification of the test code**	Art. 13 Simplification of the test code	

2.2 Final industry sector (task group) conclusion and position

CECE industry agrees that Conveying and spraying machines for concrete and mortar must be kept in Art. 13 of Directive 2000/14/EC.

2000/14/EC Annex III Part B, No. 13 describes a test method which is unpractical and unsafe. The operation conditions are limited in a not future-oriented way and the current testing procedure leads to a reduction in value of the equipment:

- In Annex III Part B, No. 13 of 2000/14/EC the following Operating conditions during test are described: *"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"*

  At the top of the placing boom an end hose ("pipe") is installed. The maximum allowed length is 4m (EN 12001:2003, 5.3.3.4). With a 52 m placing boom the length of the end hose will be approximately 60 m to lead it back in the filler, which is not allowed. If the end hose will be lead back in the filler, there is the danger of overloading the machine.
- A machine ready for delivery cannot be tested with “concrete” as the customer has ordered a new machine and not a used one. Replacing the cement by an admixture, e.g. finest ash as recommended in 2000/14/EC is not reasonable, because fly ash is a reactive cement substitute. So the concrete also could start to solidify. Also a medium similar to concrete causes severe wear at the new machine.
- In 2000/14/EC, there is a difference between the English and the German version. In the English version, the machine shall operate at its maximum output, that means the volume flow of concrete [m^3 / h]. In the German version of the directive is written: The machine shall operate at its maximum power (“Höchstleistung”) [kW]. This difference will lead to different noise values.

In the meantime there is a new noise test code in the EN 12001:2003/prA1:2009. CECE industry strongly recommends that the text section “operating conditions during test” of Annex III, part B, item 13 of Directive 2000/14/EC should be replaced by reference to EN 12001:2003/A1:2009 in order to avoid the problems described above.

For additional information prepared by the CECE Task force for conveying and spraying machines for concrete and mortar on these issues, see annex 1.

3. Equipment nr 16c: Steel tracked Dozers

3.1- Introduction

Steel Tracked Dozers are dedicated to perform 'landscaping' which consists of the preparation of the ground basement for new highways, railways, airports, large industrial zones etc. The majority of these machines (95%) operate away from built up areas and, due to the nature of their work, there are no other workers in close proximity.
The number of Steel Tracked Dozers is a very small portion of the total EU Earthmoving Machines population. The estimated EU population of Earthmoving Machines is 800,000 units whereas the Steel Tracked Dozers population is just 14,000 units (this represents 1.9 % of the EU market).

3.2- Current situation

The customer demand for lower noise steel tracked dozers are essentially motivated in case of noise sensitive work site. For small machines, there has been some interest only for a few specific work sites and noise sensitive work sites (but with noise level needs still above the Stage II limits).
In general, CECE has not seen a lower noise demand for the medium sized machines. For large machines, there has been some interest only for a few mine sites. In summary, only a very small percentage of CECE customers have expressed the desire for machines with noise levels below the Stage I limit.
In the future, CECE do not see a general customer demand for lower noise levels on all machine sizes and work sites, except probably only for the customers working in noise sensitive sites.

3.3- Industry position

CECE supports the effort of the Commission to have a complete impact assessment to re-evaluate the current legislated noise levels for steel tracked dozers. It is the position of CECE that these machines have a small population, they work away from population centres and therefore have a small impact on the environment.

Noise control remains an important element in new product development; nevertheless the research investments need to be balanced with both the environmental and economic benefits (taking into account technology, reliability and customer value).

The total efforts for reducing noise levels in line with Stage 2 legislation are estimated to be 7% of the total engineering cost. Additionally, currently the industry is struggling in the design stage to re-coup ground lost due to noise increases brought about by Stage IV gaseous emissions engine strategy changes. Industry is investing large amounts of resource to restablish the Stage 1 noise levels. If Stage II becomes mandatory after engine emissions Stage IV, the design efforts has to be made twice. With an average price of 150000€ for a steel tracked dozer the total cost for reduction is estimated 2*19 million €= 38 million€. To reduce the noise for the engines and for new limits in one step will lead to much higher costs.

In summary, to change to Stage 2 levels (in Scenario III from WG7) would be economically expensive, and would bring miniscule/ imperceptible, environmental and social benefits.
The same statements have been established by Nomeval and Arcadis contractors after the respective Technical- Environmental- Economical and Social Impact assessments studies.

3.4- Final industry sector (task group) conclusion and position

CECE supports the effort of COM to have a complete impact assessment to re-evaluate what are now the indicative permissible levels for steel tracked dozers.
Given the evidence produced by Arcadis, Nomeval and the experience of our industry and Customers, CECE considers that the group 16cb, Steel Track Dozers, has no need to change. It should remain at Stage 1 levels as stated in Scenario I.

4. Equipment nr 17: Drill rigs

4.1 Introduction to drill rigs

Equipment category 17, drill rigs, is a wide group of machines. This category consists of various types of products utilizing different technologies for different applications and ground conditions. The noise emission is strongly impacted by this fact.

Drill rigs are being used in for example civil engineering, construction sites, road building, tunnelling, energy, water well and geothermal drilling, foundation work, anchoring, mining and quarrying. Examples and definitions of different drill rigs can be found in Appendix 2 of this document.

Currently drill rigs are in Article 13 and in the DG Enterprise Database they have been treated as one equipment category. However, there are two "sub-categories" already in directive 2000/14/EC, since the test code is different for percussive and non-percussive drill rigs. Moreover, the noise limits proposed for equipment category 17 are based on a combined database consisting of noise values for both sub-categories of drill rigs.

The EU-market for drill rigs is in the order of magnitude 1100 units per year for percussive and 600 units per year for non-percussive. These machines are spread over the different types mentioned in Appendix A. They are also divided between many manufacturing companies were each company have a wide range of products to cover the market needs.

Size of companies employment in EU	Percussive	Non-Percussive
< 50	6	25
50-500	1	15
>500	2	3

4.2 Current situation

A- Categories

In the NOMEVAL-report drill rigs have been handled as one homogenous type of equipment and this is a mistake.

The products in Category 17 are divided in two sub-categories, as defined in harmonized C-type standard EN 791, "Drill Rigs Safety". This division is based on different drilling technologies and are as follows:

- Percussive: "Percussive drilling" including "Rotary percussive drilling"
- Non-Percussive: "Rotary drilling"

Most of the products reported in the DG Enterprise database for category 17 are using the non-percussive principle and the remaining the rotary percussive principle.

B- Database

1- Handling drill rigs as one equipment category is an incorrect simplification due to the diverse nature of the two different types of operation. The percussive principle of drilling, ground conditions (i.e. soil or hard rock), as well as other parameters related to the drilling process, must be taken into consideration, as process noise normally is dominating.

2-For this equipment category it must be noted, that for any statistical analysis there is too little data available in the DG Enterprise database and too many of these records have been incorrectly filed.

3-Explanations of the variance of sound power between non-percussive products
Some of the variation in sound power levels for non-percussive drill rigs can be explained by the dimensions of small drill rigs which, in many cases, are related to allowed transportation dimensions. Technical possibilities for application of noise control methods are strongly reduced by the maximum allowed transportation width.

4- According to the above situation, CECE drill rigs industries propose to provide their own data collected among drill rig manufacturers in 2008 to correct these problems, using re-classification into sub-categories 17A Percussive and 17B Non-Percussive, as described in EN791 and also proposed by WG7.

C- Nomeval/WG7 proposed limits

1- The gap of up to 20dB between the noise emission of the percussive drill rigs and the NOMEVAL proposed limit is technically impossible for OEM to achieve

For non percussive Drill rigs, the NOMEVAL report of setting the limit to 30% pass rate is a very high challenge for OEM's.

D-Noise Values

Currently drill rigs are in article 13.
The WG7 proposal is suitable for percussive drill rigs, but if it would be a limit for non-percussive, the NOMEVAL proposed limit have to be revised. The pass rate of 30% will be extremely hard for OEM's, because very many (50%) machines have to be completely re-designed

4.3 Industry position

4.3.1 Technical aspects

A- Review of Sub classification

As mentioned in the introduction the industry proposes the following sub classification following the standard EN791 to reduce further confusion:
17 A Percussive (Percussive and Rotary-Percussive)
17 B Non-Percussive (Rotary and Horizontal Directional Drilling)

Differences between non-percussive and percussive principles
These different drilling principles can be used in various ground conditions; however, non-percussive (rotary) is more used in soft (soil) whilst percussive is more commonly used in hard (rock). More energy is needed to create a hole in hard formations compared to soft, and that is why (rotary-) percussive is used for hard rock. The combination of non-percussive drilling and soft formation has a much lower noise emission than percussive drilling in hard formations - and therefore it is not feasible to use the same test conditions or to have the same emission limits for the whole equipment category.

What also affects the drilling principle to be used is the size of the hole to be drilled.
In rock formation it basically is possible to use non-percussive as the principal drilling method, but below ø250 mm hole sizes it becomes uneconomical. For example, using percussive drilling for a ø127 mm hole is more than 5 times more efficient than using non-percussive for the same hole size.
For smaller than ø100 mm hole size it is not feasible to use non-percussive drilling in rock conditions. In construction worksites the major part of blast hole drilling is with holes sizes less than ø100 mm, and therefore percussive drilling principle is the only option.

By these facts it is not feasible to demand using only non-percussive principle for products in category 17 in order to reduce the noise, i.e. these two drilling principles are not replaceable with each other.

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B- Proposed CECE data base

The noise data with 236 confirmed records has been split in the two different drill rig categories and this clearly brings out the difference between Percussive and Non-Percussive drill rigs.

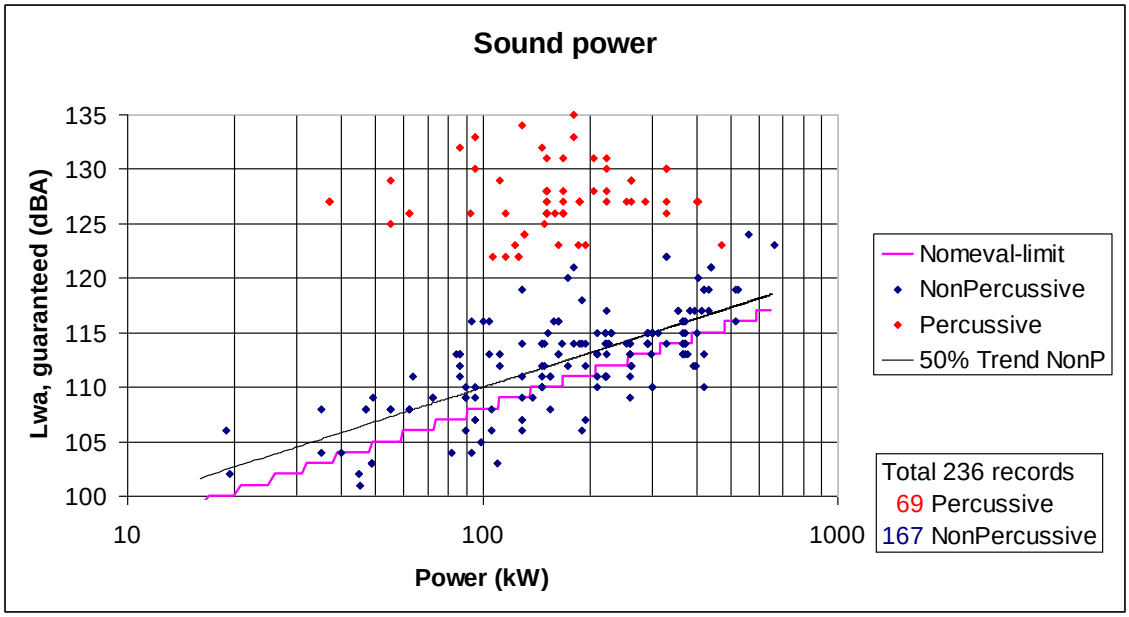

Figure 1: CECE database for percussive and non-percussive drill rigs

In Figure 1 it is also possible to see that the sound power of percussive drill rigs does not relate to the engine power. For example there are two top hammer drill rigs with engine power difference of about 10 times (37 kW and 328 kW) and still they have same sound power levels. Percussive data include the process noise as defined in the test code and are therefore for percussive drill rigs the process NOISE is more than 10-20 dB higher compared to the non-percussive data, (which does not contain process noise). Machine NOISE for percussive drill rigs is by this fact negligible.

Variation of sound power level in database

For **percussive** noise data the variations in noise level are dependant upon several parameters of the drilling process - the relation between these parameters is unknown. Some of the parameters involved in the drilling process are size of drill steel, drill bit, impact power, and settings for hard rock, soft rock or soil, ground conditions, mechanical and physical properties and feed force

The variations in sound power levels of the **non-percussive** drill rigs are due to the differences in machine noise reduction designs, and this is mainly due to size limitations and the component selection available for the power pack (engine, pumps and compressor).

C- Test code

Regarding the noise test code in EN 791 (Currently under revision by CEN/TC151/WG3) there are only some small changes proposed:
- Fans speed to be according to the recommendations in 2000/14/EC example 70% for temperature controlled fans.
- Clarify that dust collectors have to be operated at normal operational speed.

These changes would lead to more comparable values between product groups.

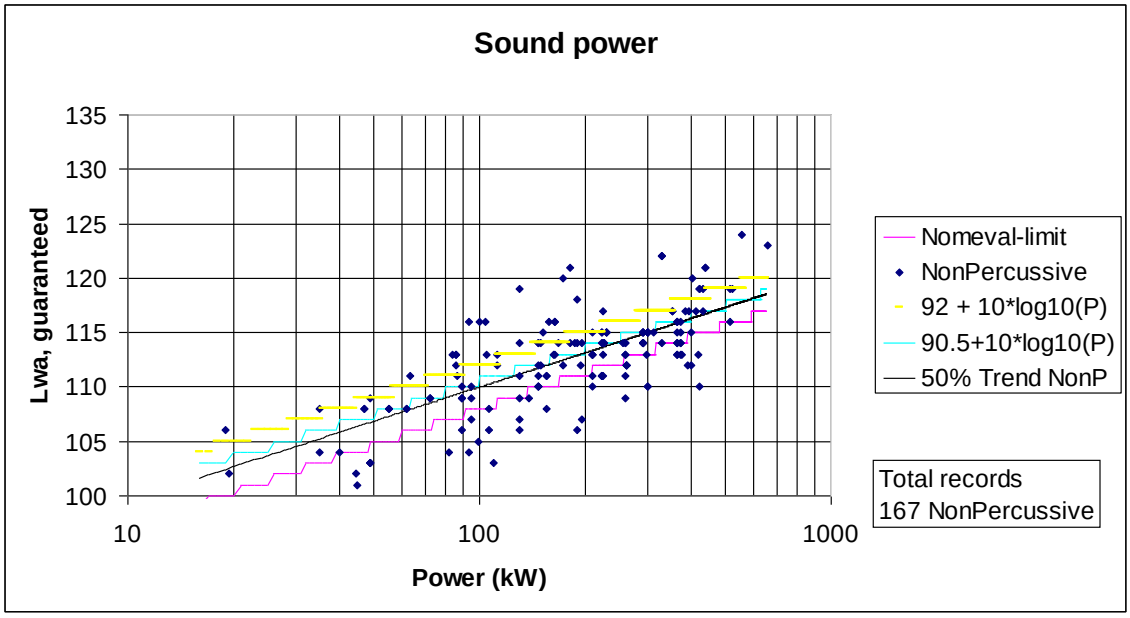

Figure 2: Formulas for Non-percussive Sound power, based on CECE db

D- CECE proposed Limit for Non percussive drill rigs

If the values of non-percussive drill rigs are curve-fitted to the CECE-Database and the noise limit is based on the 70% pass rate the result will be the following:
*92 + 10*log(P).*
This is the formula the industry is recommending as a proposed limit, if the non-percussive drill rigs are to be moved into article 12.
The 70% pass rate is needed due to that many machines have to be totally restructured to fit the noise treatments, and this requires significant efforts of design and development work for the manufactures.

The justification for this is, that since the data is widely spread many manufactures will not be able to keep up with the large step in reduction up to 10dB. It is therefore preferable to narrow spread by smaller steps of about 3dB in order to make it technically feasible and to make the technical change manageable.
Setting a tighter pass rate as proposed by NOMEVAL could lead to an uneven competition on the market.

E- Technology barriers for percussive drill rigs

Major manufactures of drill rigs are using state of the art technology and are investing heavily in R&D; also in order achieve noise reduction. There is also a future market demand for that. However, there is currently not any technology available, which enables reduction of sound radiation from the drilling process as such, in an operationally and economically feasible way. More research is therefore needed in order to be able to take new technological steps for percussive drilling and new technology to reduce noise at the source. Quite a lot of research has been performed earlier with little conclusive results. Patents have also been filed in this area since the 70t's, but still no solution has been applicable to real working conditions. Intensive research would be needed over a long period (probably 10-20 years) to find technology to reduce process noise. It also takes time to make any new technology commercially available and implemented on drill rigs.

The assumption in the Nomeval report is that moving equipment from article 13 to 12 shall not have any technical impact is wrong for many of the products within category 17. For percussive drill rigs there is no technology available.

4.3.2 Environmental & Economical aspects

A- Environmental

The equipment is mostly used in non-urban areas where the noise emissions only affect the operator and a minor number of people

Noise emission is also intermittent in normal operation. For example, a drill rig working in a small road construction application, is in place for 2 days, working 4 hours per day where of only 35-45 % is drilling (remaining is positioning, adding rods, moving between drilling positions etc). By this kind of operation the total impact over time is much lower than the measured peak values.
It must be noted that according to the NOMEVAL report there are **no complaints** about drill rigs.

The EU-market for drill rigs is in the order of magnitude 1100 units per year for percussive and 600 units per year for non-percussive. These machines are spread over the different types mentioned in Appendix A. They are also divided between many manufacturing companies were each company have a wide range of products to cover the market needs.

Size of companies employment in EU	Percussive	Non-Percussive
Small < 50	6	25
Medium 50-500	1	15
Large >500	2	3

It can be noticed that this means about 14 non-percussive drill rigs per year for each company.

The group of products concerned are produced in majority by small SME's companies for which a complete designed machines and subsystems would be very challenging/critical

The cost / benefit ratio for drill rigs is therefore questionable based on the facts stated previously.

Drill rigs operating close to residential areas and on construction sites are usually used under shorter periods, as already mentioned above, and then moved on to the next work site.
If there are permanent industries using drill rigs, the local permits and regulation driven by Directive 2002/49/EC (the assessment and management of environmental noise) regulating the noise levels emitted to other areas (residential and environmentally sensitive areas).

Redesign and transition request
Since there is a limitation in transport dimensions for many drill rigs and a certain sound power limit would force more noise reduction solutions to be fitted in the product, many drill rigs would have to undergo a complete redesign of the rig layout to meet the new noise limits. This will have a major impact on OEM's total business development. One proposal thus is, if it could be possible to apply for transition periods for certain machines up to five years from legislation coming into force.

Dependence on other industry
The drill rigs are usually modular systems, using components from other manufacturers. Drill rig manufacturers have little or no possibility to influence the noise design of these components, including engines, exhaust/after treatment systems, compressors, pumps, cooling fans. The parts that are core technology for drilling manufactures are the rotary unit, the percussive drill and the control systems.

B- Economical

1- Non-EU market problem for OEM's

In the market there are demands for special drill rig designs, because the design requirements very often vary due to for example difficult construction site conditions. SME's are specialized in designing small series and highly customized drill rigs, while large manufacturers produce more standardized products.
For European-manufactures to compete on the world market they need different products, and in many cases also production lines, to meet the needs and requirements for EU and non-EU markets and this will be an added cost.
On the other hand, SME's have commented that they are not able to develop/produce different "design lines" for example for the "third world" and for the "high-tech EU market". This is related to the market demand for very short delivery time. Short delivery time means that drill rigs must be prefabricated at a reasonable standard. A short-notice change for an ordered product in manufacturing, from a low standard to a high-tech standard or vice versa, can not be managed by OEM's without extending delivery time, which again is not acceptable by the construction industry.
Moreover, a significant amount of additional parts need to be kept in stocks, which has a negative impact on material costs for all manufacturers.

As a consequence, EU-OEM's design the drill rigs appropriate to the highest standards, which of course are mainly related to European market. This leads to increasing difficulty in competing in non-EU markets, where the EU-OEM's have to face manufacturers which can produce at low design level and thus for lower costs.
If the Standards in the Outdoor Noise directive are to be set higher than th current levels, there is a risk, that EU-OEM's will loose market shares in countries with lower requirements which naturally will strengthen competitive non-EU manufacturers. This can affect the employment situation in the EU-OEM's negatively.

2- Potential economical impact

The assumption in the NOMEVAL report with moving equipment from article 13 to 12 as not having any major technical impact is based on a reduction by 2-3 dB.
However, this is definitely not the fact for many of the products within category 17.
For example, for percussive drilling rigs the requested reduction shall for many products be more than 20 dBA. That is not currently technically feasible nor achievable, not even in the mid or long term perspective.
The result can be severe economical impact for concerned stakeholders, especially for percussive drill rig manufacturers.

- Only a few of the largest manufacturers can invest in needed R&D efforts (mid and long term perspective) giving an unbalanced market situation. The proposed limits will result that all percussive drill rigs will be removed from the European market, which stands as the main market for many companies.
- Operators will not be able to perform their operations on work sites as there are no existing replaceable drilling methods. To move their business outside EU is only feasible for a few large companies, as the majority are smaller and locally based companies and the economical impact will be both on company and employee level
- There will be a general economical impact in the European region related to that percussive drilling rigs are used in infrastructure activities, construction (roads, railway, buildings) and mining, quarries for limestone, cement, etc. The effect will be for all business directly linked to these applications, but also for the industry and society which were supposed to be receiver and user.

4.4 Final industry sector (task group) conclusion and position

4.4.1 - 17 A Percussive drill rigs

Keep in Article 13 as WG7 proposes, due to the following facts:

- Small environmental impact
    - Low number of machines
    - Short time on each location
    - Mostly outside residential zones
    - No complains have been received according to NOMEVAL (Page 38 NOMEVAL Report)
- Currently there is no technology to reduce noise at source

- Percussive drilling is not replaceable with other technology with reasonable efficiency and productivity
- Unrealistic gap of 20dB to the proposed NOMEVAL –limit
- Process noise is not correlated to any single parameter like engine power
- Non justified cost/benefit ratio

4.4.2 - 17 B Non-Percussive drill rigs

+ Industry position: Keep in Article 13 due to the following facts:
  - Small environmental impact
    - Low number of machines
    - Short time on each location
    - No complains have been received according to NOMEVAL
  - Non justified cost/benefit ratio

But if to be moved to Article 12, a limit of 70% pass rate should be set for the drill rigs. Curve fit to the CECE noise data gives a proposed limit with 92+10 *log(P).

Propose the possibility to request transition period of 5 years for machines which need complete redesign of layout of machine.

Update noise test code (EN791) with small changes to clarify, for example, dust collector operation condition and fan speed setting.

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5. Equipment nr 18: Dumpers

CECE wants to complete the general definition taking into consideration the various types of dumpers in order to have a more accurate data collection.

rigid frame dumper
dumper with a rigid frame and wheel or crawler steering

articulated frame dumper
dumper with an articulated frame for steering

seated operator compact dumper
articulated or rigid dumper having an operating mass (see ISO 6016) of 4500 kg or less, the operator being seated on the dumper

pedestrian controlled or standing operator compact dumper
rigid dumper having an operating mass (see ISO 6016) of 4500 kg or less, the operator being standing on the dumper or walking behind.

Note: this definition is in line with ISO 6165

6. Equipment nr 28: Hydraulic hammers

6.1 Introduction:

Hydraulic hammers are attachments, mainly used on mini-, wheeled- or crawler excavators and backhoe- or skidsteer loaders. They are used when a bucket alone is not able to remove the material or where drilling and blasting is not suitable. Main applications of hydraulic hammers are:

- demolition and recycling of buildings (ca. 1/3 of units)
- trenching, quarrying and tunneling in soft rock (ca. 1/3 of units)
- breaking of oversized boulders in quarries or road construction sites (ca. 1/3 of units)
- metallurgical and mining applications (1-2 % of units).

Demolition and trenching sites are generally of limited duration1-2 weeks, up to 2 months in extreme situations. Jobs in urban areas which exceed this time period require approval from authorities. This ensures a minimum environmental impact. Consequently demolition sites which are frequently located in urban areas may cause short term annoyance. However in other applications, the duration may be longer, but generally these applications are outside urban areas.

The world market is estimated at about 70 000 units in 2008. Out of this approx. 50% is sold in Europe. Half of the worldwide production is also manufactured in Europe.

6.2 Current situation

Hydraulic hammers are under article 13 in the noise directive, which also includes the test code and instructions on reporting responsibility. The test code was created by the manufacturers and increased awareness has created a steady market demand in Europe to implement silencing of hydraulic hammers over the last 15 years.

State of art technology
Since the early 1990:ies industry has increasingly adapted a “box-type housing”. This prevents noise from escaping from the internal parts of the hammer. The design is now state of art, and it is estimated that 75% of the hammers on the market have this design. For such hammers, which are not state of art design, the primary buying decision factor is price, which is 10 – 20% lower. Only very few other considerations such as high temperature applications may justify non-silenced breaker usage.

EU hammer noise database
On June 6.th 2008 the hammer noise database included 396 entries. After filtering out non-related and incomplete data, 258 relevant data points remain. These represent a total of 6 manufacturers and a total of 13 brands.

It is estimated, that there are about 20…30 manufacturers of hydraulic hammers in Europe and about 100 different brands marketed in Europe. All brands are marketing approx. 1000 different hammer models in Europe.

Approximately half of all units sold in Europe appear in the database with reasonable values.

Directive 2000/14/EC
The noise directive includes a noise measurement method, which is generally accepted among hammer manufacturers. This method facilitates comparison of measurement results.

Drawbacks with this method are the costs due to measurement site requirements, instrumentation cost and the need for a comprehensive excavator fleet. For large hammers the reliability of the anvil is an issue. Measurement also requires expertise on installation and operation, which external measuring institutes do not necessarily have.

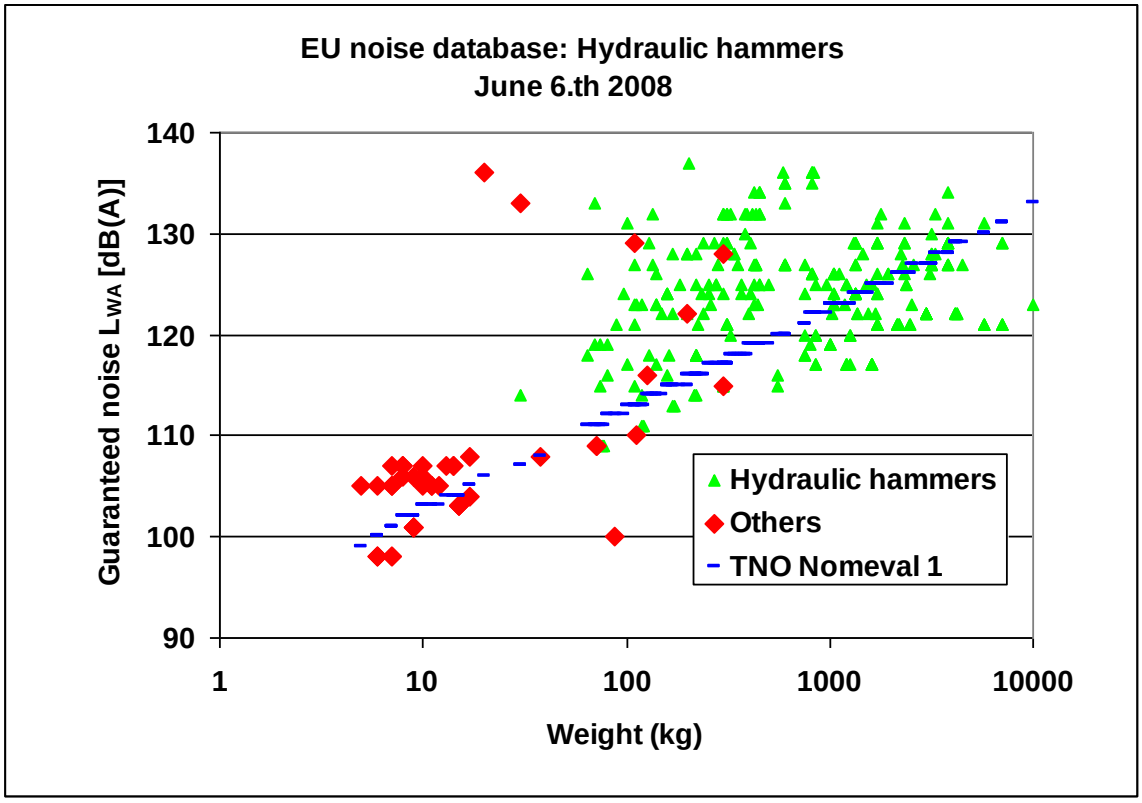
The directive also includes a definition of hydraulic hammer, according to which electric-/pneumatic handheld hammers, piling equipment and others are not classified as hydraulic hammers, even though some of these appear in the EU noise database for hydraulic hammers.

6.3 Industry position:

6.3.1 Technical aspects

In the review of the directive 2000/14/EC, Nomeval proposed a transfer of hydraulic hammers under article 12. The suggested limits 1.) 93 +10log(m) dB(A) and 2.) 90 + 10log(m) dB(A) is based on the guaranteed noise values in the European Union noise database.

This database includes non-related equipment, especially at the light end of the range, as shown in the graph below. Out of 258 relevant data points 83 (= 32%) are below the suggested Nomeval initial limit and only 49 (=18,9 %) below the second phase limit (-3dB(A)). Most hammers heavier than 2000 kg can match the Nomeval limit, while most hammers lighter than 1000 kg would be eliminated.



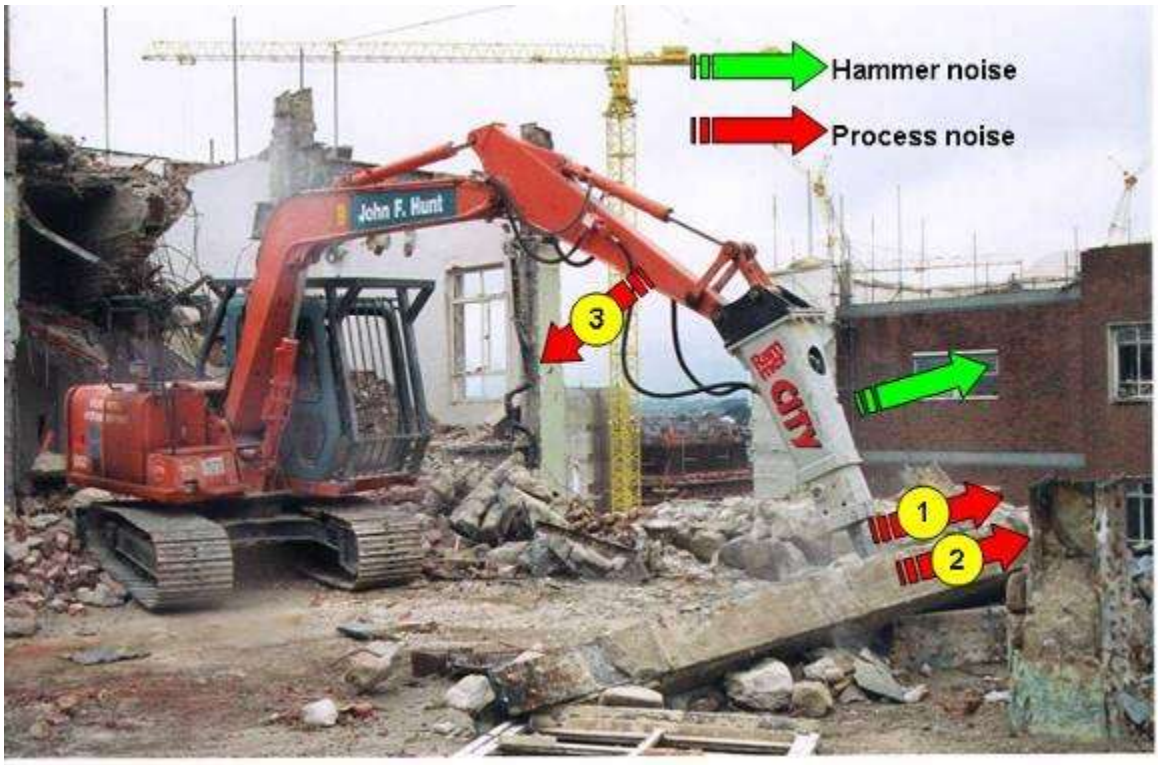
The EU noise database is an excellent tool, as it gives the prerequisite for market surveilance. It contains though too much faulty data, which needs to be removed.

Input power should be used as the primary technical reference value since it has the best correlation with the measured noise emission. The measurement code also requires that 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.

If mass is adapted as a parameter for noise limits, then a definition of the term “mass” is required: Is it the operating mass including tool and mounting bracket or only the hammer mass? An imposed mass limit could change hydraulics to a less effective design. This means the non eco-friendly usage of raw material, fuel and thus increases operating cost.

Process noise

Silencing the hammer itself will not be able to reduce total noise emission significantly when state of the art technology is applied. Up to 2/3 of total noise is process noise generated from breaking the material.



The process noise is emitted from tool (1), ground (2) and excavator boom (3). “Silencing” this noise may only be handled by the contractor (fences, tents, etc.).

6.3.2 Environmental & Economical aspects

Environmental impact indicator

The utilized input data for the TNO Nomeval environmental impact index is disputable:

1) Usage time : 200h/year instead of 400h/year

In urban application (mainly demolition) hammers are used 100 - 200 h/year rather than 400h/year as estimated in Nomeval report.

2) Population of equipment : 250 000 breakers instead of 400 000 units

When considering life span, sales / year, second hand breakers sold out of EU, etc, then the active population is rather 250 000 units

3) % of use in urban situations : 33% of overall population of equipment instead of 75%
4) Copcon: not to add 3dB(A)

The test code in the directive 2000/14/CE gives a guaranteed noise value, which is not exceeded in standard applications (no steel anvil). Due to limitations of excavator hydraulics, hammers generally do not work at the maximum possible input power level, at which the guaranteed noise value is determined.

A recalculation of the environmental impact indicator with the above estimates will yield a significantly lower value.

The TNO/Nomeval quotes a Dutch study on annoyance of different noise sources. There it is shown, that annoyance of noise from construction equipment is perceived considerably lower, than that from noise of other sources, such as stereo/TV, traffic, airports etc.

Cost and benefit

The hydraulic hammer world market of 70 000 – 80 000 units is estimated at a value of approx. 1 billion Euro in 2008. Out of this approx. 50% is sold in Europe. Half of the worldwide production is manufactured in Europe, mainly by SME:s, employing 4 000 people directly and 20 000 people indirectly.

The price difference between non-silenced and silenced breakers is currently ca. 10 – 20 % where non-silenced hammers are available. A majority of hydraulic hammers already utilize this state of art silenced design.

A technical solution to further reduce the noise level of hydraulic hammers from state of art-design is currently not available. The cost of this lower noise technology may thus be estimated to be at least 100 to 200 million Euro/year for the EU market. This is a considerably higher level, than the 12,6 million Euro estimated by TNO/Nomeval.

Most of the hammers are used outside urban areas, where they are less likely to cause annoyance. Those hammers, which are used in urban areas are generally in short term use (less than 1 month). For these sites authorities already use limited utilization times and other restrictions to reduce annoyance.

Making a monetary estimate on the annoyance caused by hydraulic hammers is difficult. Considering the above it is questionable, that the cost is really 5 733 million Euro as estimated by TNO/Nomeval.

Fair competition and market surveillance

The success of any action within the noise legislation stands and falls with the efficiency of market surveillance in Europe. Suppliers from low cost countries (LCC), product pirates or their customers (= the end users, which buy price only) do currently not observe any real risk of sanctions for non-compliance.

Hydraulic hammers are especially exposed to non-compliance by LCC-manufacturers, as a random CECE test at Intermat 2009 showed: 2/3 of all grossly non-compliant cases

(= not even CE-marking) were LCC manufactured hydraulic hammers, making non-compliancy of hammers rather the rule than the exception. In all other construction equipment classes non-compliance was rather ‘accidential’.

In 2009 the European hammer manufacturers are in survival mode, and there is no guarantee, that the previous high volumes will be seen again during the next few years. In this time it will be extremely difficult to transfer incurred additional product development costs to the end users. LCC manufacturers have usually not been in the forefront of product development. Stricter legislation is thus likely to favor LCC manufacturers further, especially under the current state of market surveillance.

6.4 Final industry sector conclusion and position

It is our view, that the economic and environmental benefits of the suggested noise limits do not justify the required effort:

- Process noise is significant and can not be controlled through product development of hydraulic hammers.
- The suggested limits will eliminate a majority of the equipment in the market, rather than the noisiest only.
- Further reductions in noise level will require a tremendous effort, time and cost, as proper technical solutions are not yet available.
- Most applications of hydraulic hammers are outside urban area (> 2/3) and cause very limited annoyance.
- Urban applications are generally of short duration and cause limited annoyance.
- Where annoyance may be caused, authorities already have the tools for limitation.
- State of art technology for noise reduction is widely utilized.

We also recommend a review of the EU database for noise of hydraulic hammers:

- Removal of inappropriate equipment
- Correction of the classification label (mass vs. power)
- Development and correction to the input tools for data

If a noise limit is deemed necessary, then a review of the EU noise database for hydraulic hammers is urgently and mandatory needed. Under no circumstances should the levels suggested by Nomeval / WG7 be implemented, as these were based on the faulty information in the EU database.

7. Equipment nr. 42: Piling equipments

7.1 Introduction

Pile installation equipment is used within the construction industry usually on open sites, at an early stage of a project installing bearing piles for supporting structures or interlocking profiles for retaining walls required by industrial and port development. The majority of piles, especially in noise sensitive residential areas are formed using foundation drilling machines.
Within the scope of equipment covered by the Directive, piling equipment is almost unique in that by intention, process noise is introduced into the system in the form of impact or vibratory stresses which are induced into the pile to cause it to displace the soil and allow penetration. The piles being long and slender resonate under such conditions radiating noise energy.

The equipment is divided into 3 subgroups which are often used in a complementary way to reduce the noise emitted into the environment and yet, still install piles in the most difficult of soil conditions:-

Static pile pushers; the quietest of equipment available, their application is restricted to installing retaining walls in the most favourable of soil conditions, their noise emission is dominated by the power source..

Vibrators; themselves have noise emission of the same order as their power source, however, they generate process noise in the form of resonance within the piles being installed, but because of speed of installation the duration of this disturbance is minimal. Their application is less restricted by soil conditions than static pushers.

Impact hammers; even though the noisiest of the piling equipment, this is substantially related to the resonance of the driven pile, however, they are able to install piles in the most difficult soil conditions.

The equipment can be either part of a piling rig which may also provide their power, or, be manoeuvred from pile to pile by a lift crane, in which case its power is derived from a dedicated, remote, power source. Examples of configurations are shown in annex A.

7.2 Current situation

General considerations

The situation for piling equipment is very confusion as depending on the document the noise emission to be measured and affixed on the machine is not the same:

According to the directive and the definition given in annex 1, piling equipment includes

- the carrier,
- the impact hammers, extractors, vibrators or static pile pushing/pulling devices, and
- accessories in particular the power packs/generators

According to the guidelines, the carrier and accessories except power packs/generators shall not be submitted to the test.

The European EN996 A2 indicates in G.2.1.2 that the noise from power packs/generators shall be minimised.

As a consequence, manufacturers may have different approaches for the declaration of noise emission.

Definitions

The terms of the definition and scope of the equipment to be tested, as defined in the Directive need to be clarified.

To avoid any disparity in noise emission the noise test code should consider

- the power source (from the carrier or from a power pack/generator) and
- the impact hammers, extractors, vibrators or static pile pushing/pulling devices,

Categorisation

The Directive makes no attempt to categorise the equipment.
Industry is of the opinion that 3 categories could be introduced to consider the various types of pilling equipment

Static pile pushers
Vibrators
Impact hammers

It will bring a better picture for future and more precise general information through the data base.

Test procedure

Early in the application of the Directive it was accepted that it was not sufficiently prescriptive in establishing a test procedure which would provide reproducible and representative data. It failed to recognise the influence of pile resonance and in the case of impact hammers, specified the use of wooden drive cap dolley material even when in most cases this does not represent the actual hammer configuration. As a consequence piling equipment manufacturers, through CEN TC151 initiated an amendment to EN996 which elaborated a testing regime which could be voluntarily applied to provide more rational data.

Manufacturers generally are using EN996 as a basis for carrying out their noise tests.

Relevance to piling practice

For the 3 categories mentioned above the process noise is very variable and is mainly due to the friction between sheet piles and the resonance of sheet piles wall when vibrated or impacted

The noise data generated using EN996 cannot be valid within a site context. For vibrators the process noise is higher than the noise of the equipment itself when for the hammer it may be the contrary as the operator can, at the beginning of the piling process, with the pile substantially exposed above ground level, select lower impact energy on impact hammers , additionally, the lower soil resistance reduces the proportion of energy transmitted as radiated noise and greatly influences the noise emission.

7.3 Industry position

7.3.1 Technical Issues

7.3.1.1 Existing test codes

Current test codes used in the industry for measurement of noise emission from piling equipment are the EC Directive on Outdoor Noise and, the noise Annex of EN-996(A2).

In addition to the consideration given in clause 2.1 above additional short comings on the existing test codes are:

Noise Directive

- Tests can be carried on any type of pile – steel concrete or timber – all of which will resonate differently greatly influencing the process dominated noise
- The procedure does not require the pile to be at refusal conditions where it cannot be installed further into the soil
- For impact hammers, the requirement to “fit new pile head packing” for each test is only appropriate to the configuration of hammers for driving concrete piles
- No requirements are made for the recording and declaration of any parameters that are influential in the emission of noise from the equipment during test. these may be:
    - Equipment performance related eg operating speed and characteristics of dynamic parts of either the impact hammer or vibrator
    - Test facility related eg pile type and size, soil characteristics, exposed pile length, penetration rate of pile

EN996(A2)

This is generally preferred to the procedure within the Directive, in that it attempts to rationalise the testing regime so that results from tests carried out in different facilities and with different equipments of the same subtype are comparable, reducing the uncertainties as far as practicable, however, as a consequence

- Noise data generated is not be valid within a site context
- The scope of the standard’s test code is restricted to hammers <250 kNm and vibrators /pile pushers <1000kW, which is not applicable to the Directive

7.3.1.2 Transfer of equipment from Article 13 to Article 12 compliance

The Nomeval report recommends that the subdivision of vibrators and pile pushers should be reallocated as Article 12 equipment, and subject to compliance with single value noise limits.
Industry supports the subdivision but is not in favour to have the various type of equipment in different articles as it would lead to unfair competition. The equipment in article 12 would have an important increase cost due to the necessary R&D to comply the requirement, the modification of the design and manufacturing plus the registration/certification cost.

On many jobsites for piling work, vibrators and hammers are two different alternatives in competition. It is already well established that vibrators are quieter than hammers, as recognized in the TNO report.
As new constraints on vibrators will increase the price as explain here above, there is a risk that the choice will go to the hammer with finally a negative impact on the environment.

In future if the piling equipment should be transferred to Art 12 then more investigation is necessary to determine the parameter(s) to take into account for the following reasons:

Vibrators can vary in size from 3kgm eccentric moment through to 260kgm, similarly in the case of pile pushers. The associate power pack/generator depend on the size and characteristics of the vibrator and vary from 50kW to 2000kW. As consequence it is not possible to have a single limit for the full range of machines. The determination of the parameter to take into account needs investigation.

For hammers, Nomeval report recognises only one, single, variable related to noise output within the performance, namely, - energy. - This is a gross over simplification and does not reflect the experience of manufacturer's tests
For a range of hammers from 20 to 200 KN m rated energy, measurements of Lpcpeak at the same impact velocity are similar, however, the smaller machines deliver more impacts per minute and in spite of their size have a higher level of noise emission than units 10 x the energy

7.3.1.3 Technical feasibility of noise reduction by design

Considering the three product types individually:

1. **Pile pushers** As described earlier noise emission is characterised by that from the power source. Technical improvements applicable to other article 12 equipment comprising diesel / hydraulic systems are appropriate in reducing emissions from this type of equipment
2. **Vibrators** Considered in isolation from the process noise from the resonant pile, the simple construction of the vibrator comprising hydraulic motor driving rotating eccentric weights through simple transfer gearing offers little scope for noise reduction. Only in the quality of the gear meshing and stiffness of the

gearbox casing is there a potential for improvement. Even this would require sophisticated analysis for every machine type, which is beyond the resources of the SME manufacturers involved, who are only able to recover the costs from the limited sales within the EU. Considered in the context of the process noise these technical measures will have little effect.

The noise limits recommended in the Nomeval report could only potentially be achieved by shrouding of the resonant pile, which is impractical as the majority of vibrators are used free hanging, installing interlocking piles.

For many applications there is no alternative installation method available, since vibrators have a high production rate and are able to not only install steel sheet piles, but also to extract the piles from the soil in the case of temporary retaining walls.

3. **Impact hammers** there are three areas of construction influential in noise emission
   - **Drive cap cushion** the choice of softer material will reduce noise but the greater resultant internal strain energy will cause the material to degenerate faster. Fluid type cushions have been used in the past with good effect, but the rounding and attenuation of the impact stress wave through the pile undermines the ability of the impact hammer to install piles in adverse soil conditions
   - **Ram construction**: by selecting a material with higher internal damping, it is possible to reduce the radiated noise energy from the ram. These materials are of reduced strength and do not have the necessary durability under impact conditions. their use would require a reduction in the allowable impact velocity again making the equipment less effective in installing the piles at best prolonging the duration of piling operations and negating any benefit of sound reduction
   - **Shrouding of the pile**: As mentioned in the case of vibrators, above, to retain the superior driveability of the impact hammer and yet reduce the process noise an effective solution is to enclose the pile itself. Shrouding of the pile is only possible in the case of single bearing piles, which can be enveloped by a hinged or telescopic enclosure, but this is at a cost of reduced pile length, which, together with the extra mass of the shroud will require substantially heavier and taller piling rigsto be used on sites. Shrouds are not applicable to the installation of the many interlocking sheet piles to form a retaining walls, which cannot be effectively sealed to prevent the escape of radiated noise energy

   Operating the equipment within an enclosure reduces the access for maintenance, this is exacerbated where drive cap cushion materials are used which require more frequent replacement because of their higher operating temperature, through reduced cooling air circulation, together with less durable, softer materials for reduced transmission of the impact noise

7.3.2 Environmental & Economic Aspects

7.3.2.1 Environmental impact calculations

The Nomeval report concluded that piling equipment should be divided into 3 subgroups - Impact, vibrating and static.

The case for moving the equipment from article 13 to 12 is based substantially on the environmental impact assessment, this however considers piling equipment as one

single product group with a declared Lwa of 125 db and a EU25 product population of 20,000 unit, the effect of this is twofold:-

- It attributes all equipments with the highest noise emission, which is not the case for vibrators and pile pushers moreover in the NOVEMAL's study an addition of 5dB(A) is made for impulsive noise which is completely unjustified for the vibrator and pile pusher sound characteristic.
- In the case of impact hammers, theEU25 population is distorted by the inclusion of the greater numbers of vibrators and pile pushers. In all cases if the Environmental Impact calculations were repeated for the 3 three equipment types individually, then this would result in lower rankings within the EI chart.

A survey amongst EU piling equipment manufacturers, suggests that they produce no more than 100 vibrators and 50 hammers per annum over the past 10 yrs for use in the EU, which result to a population of 2000 unit[1] when Nomeval estimate of EU25 population 20000 units

The perception of the disruptive noise emission from piling equipment is largely derived from experience in the Netherlands, which is the single country with the highest density of impact hammers in Europe and does not represent the situation in other countries within the EU.

The performance and productive output of equipment which would be designed with any of the sound reduction measures mentioned above would be reduced. As a consequence, the users will need larger equipment requiring more expensive carriers, higher operating costs and slower production rates which have a negative impact on the environment

7.3.2.1 Costs to meet more stringent requirements

The group of equipment manufacturers, currently submitting this report, represent >95% of the total European industry.. The average size of each manufacturer is about 50 employees.
The increased cost of the research and development in relation to the volume of single machine types they produce, is disproportionate, especially if the equipment is to satisfy additional noise limits because of transfer from article 13 to article 12. These additional costs will be passed on to users globally and will divert investment from other areas of product development and thereby put European manufacturer's products at a competitive long-term disadvantage outside the EU
Global competing companies are located in Asia and North America, where there exists greater market potential for this equipment. EU manufacturers manufacturing two standards of equipment for inside EU and outside EU, once again put us a commercial disadvantage.

Extra costs will be incurred by both the companies manufacturing the equipment and their users

[1] Vibrator have a lifetime of 10 years when hammer have a longer timelife.

- **Manufacturer's costs**:

If piling equipment is moved to article 12, the cost detailed here after will be very stringent for the manufacturers who are mainly SME, with a catalogue showing between 10 to 50 different models of vibrators and hammers plus a range between 5 to 20 power pack/generators.

For those equipment adapted to suit customer's specific needs. they would be subject individual test by a NoBos which is another over cost.

- The test facilities for the equipment must be prepared to a higher standard to ensure compliance with more exacting test procedures.
- R&D costs for research, prototype design and testing.
- Registration certification
- Additional costs of producing EU and non EU market equipment

User costs:

The performance and productive output of equipment which has been designed with any of the sound reduction measures mentioned above will be reduced

- Equipment to fulfil contracts would be larger requiring more expensive carriers, higher operating costs and slower production rates
- Increased maintenance time because of reduced accessibility and for more frequent servicing to replace less durable parts increasing down time
- Increased cost of parts with reduced life
- To redress the reduced output more and heavier machines will be needed to fulfil the contracts within a fixed timescale. The increased plant activity will cancel out any reduction in the noise emitted into the environment from the jobsite but will increase other environmentally undesirable emissions eg exhaust gases

7.4 Conclusions to the current proposal

The inconsistency of the current directive does not allow to have a clear picture of the piling equipment noise level as the manufacturers does not apply it in the same way. .
It is first necessary to clarify which parts of the piling equipment shall be considered in the determination of the noise emission. Industry is in favour to include power source and vibrator or hammer.

The division in 3 categories is acceptable but the transfer from article 13 to Article 12 is much too earlier.

Piling equipment manufacturers recognise the need to move forward to reduce noise emission for the benefit of the environment. Before any discussion on potential limit values, investigation is necessary as explain here above.

7.5 Proposal for improved measurements

The piling manufacturers are in favor to revise the annex of EN996 to ensure a comprehensive test codes with a good reproducibility and recommend that the directive will refer to that standard.

8. Equipment nr 48: Road Milling Machines

8.1 Introduction

Road milling machines have been in use since the 1970s for maintaining and repairing roads and highways. They conserve natural resources by producing recyclable material. The milled material (asphalt to be recycled) is loaded with an integrated conveyor system directly on dump trucks.
There are two classes of road milling machines: Small machines and the so-called half-lane machines. Currently, approximately 3.300 small milling machines and 1.700 half-lane machines are operating all over Europe.

- The small milling machines, usually with a lower engine power and milling widths from 30 cm to 1 m, are typically used for smaller areas and patchwork, like road intersections.
- Half-lane machines with milling widths between 1 m and 2.2 m are typically used for heavy duty work on large surfaces, usually repair and maintenance of highways and rural roads.

While in operation, milling machines move with typical speeds between 25 and 40 m/min. Roads and highways need to be repaired approximately every 15 to 20 years which means that a milling event occurs at a given location in this time frame only.

8.2 Current situation

In December 2007 NOMEVAL provided a report on revision of 2000/14/EC. The report suggests to move road milling machines to Article 12 of the directive and the separation into two categories, < 55 kW and ≥ 55 kW.
Below is the synthetic table provided by the Commission's noise expert group (WG7) drafted position paper, amended by the manufacturer's proposal and presenting the current possible scenarios for category 48, road milling machines:

Scenario 1 "Do nothing" option	**Scenario 2** WG7 elaboration	**Scenario 3** TNO proposal: Art. 12 with limits:	Further remarks (by WG7)
Art. 13	Art. 13	< 55 kW: 105 dB(A) ≥ 55 kW: 86+11lgP	Operation noise dominant

For Industry the suggested proposal in scenario 3 is not realistic and not justified for the following reasons:

- achieving the suggested noise level for road milling machines will be useless effort and cost
- and, most important, for this product specification the operation noise is largely dominant.

8.3 Industry position

8.3.1 Technical aspects

A: TNO refers to the possibilities to reduce the process noise through new milling procedures. This is not a realistic approach. The current procedure (a rotating milling drum with cutting tools, mixing and homogenizing, and loading) will not be replaced in the foreseeable future.
B: The EU noise database as used as a basis for the NOMEVAL report does not contain correct data. Only one manufacturer, some models are listed up to three times, some entries (slipform pavers) are not milling machines, they even do not fall under the scope of the Directive.
Diagram 1 represents all existing reference data of the noise database used as reference for TNO analysis.

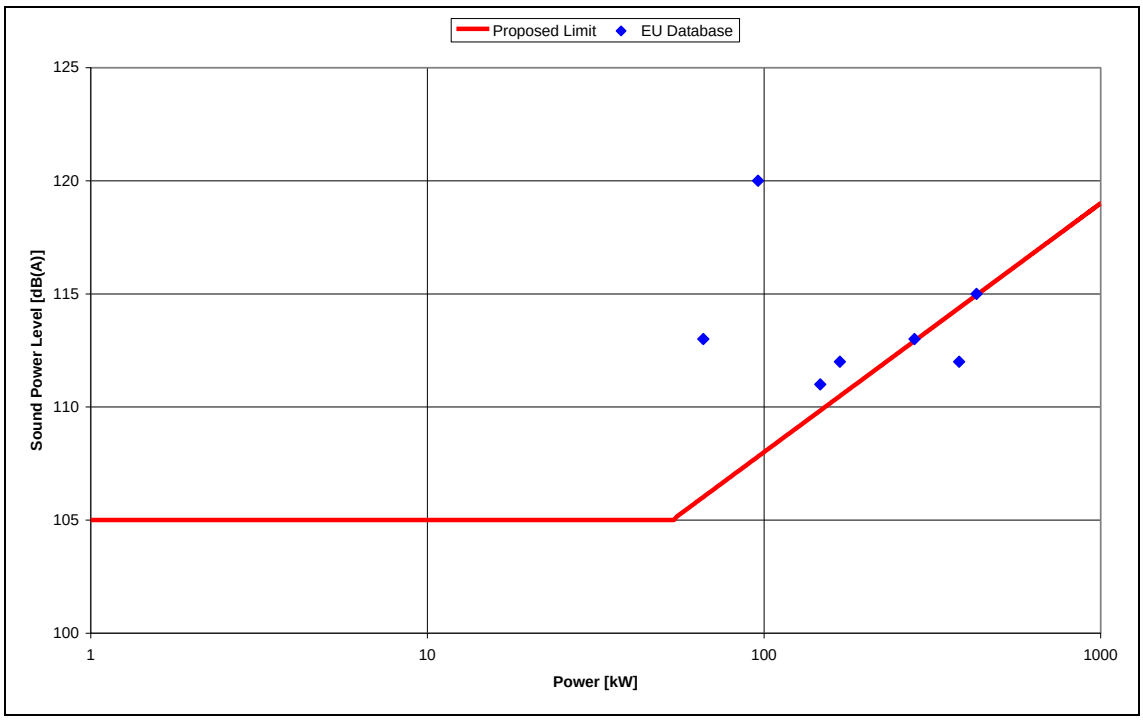


Diagram 1

The industry is willing to actively contribute in updating the noise database so that a realistic image of the market situation can be achieved.
In connection with the next step of the exhaust emission directive the efforts to comply with the proposed limits cannot be foreseen, if possible at all.
As already stated in a previous paragraph of CECE position paper, engines, which will fulfill the future requirements of the Exhaust Directive, need more cooling. The overall installed engine power will be higher than required by the machine functions itself. Aside from unnecessary high fuel consumption, this alone will require more space for the

engine and cooler installation. Since especially half-lane machines are already today close to the limits (dimensions and weight) of being transported on public roads, this will be a real technology barrier in the future if, in addition to the exhaust requirements, more sound proofing should be required due to the proposed noise limits.
The industry suggests that a research project should be set up to investigate in the real environmental impact of road milling machines in process, and in possibilities (and limits) of reducing the noise on road milling machines operation noise emission. This would include process noise as well as machine-generated noise.
C: Process Noise
For Industry the suggested noise limits are not realistic since the proposed values could not be technically achieved, and, most important, for this product specification the operation noise is largely predominant.
As noise experts group correctly states, the operation noise is dominant. The cutting tools cut through the asphalt with a speed of approximately 5 to 6 m/s. The milled material is cut by the tools and is broken and homogenized by a revolving and mixing process within the milling drum chamber. Afterwards the material is transferred to the conveyor system in a continuous flow and loaded to a dump truck.
These different steps during the milling process, i.e. cutting, breaking and homogenizing, and loading, create a process noise which is created over the whole machine length and is dominant compared to the pure engine/cooler/hydraulics noise.
Diagram 2 illustrates, based on current industry data (state of the art of CECE industry), clearly the predominance of the process noise (for example in the blue lines) compared to the current level of machine noise.

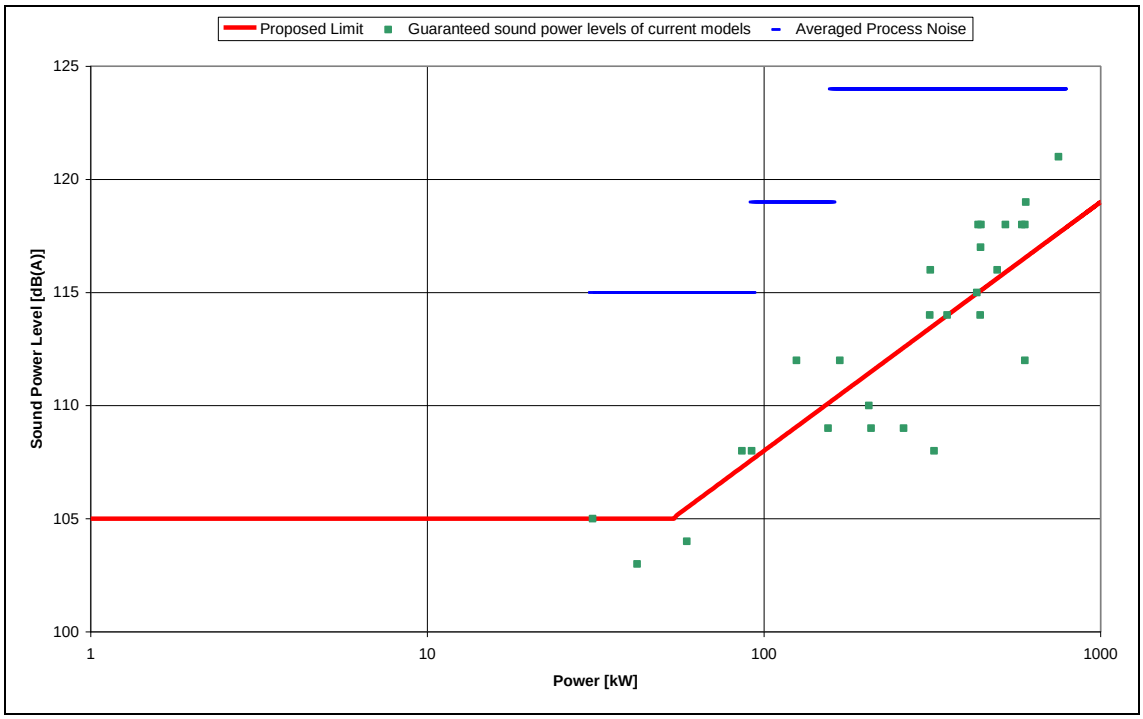


Diagram 2

It is important to take into account that the noise test code for road milling machines masks the process noise. The shown “Guaranteed sound power levels of current models” in diagram 2 reflect the pure machine noise emissions. As can be seen the difference between process noise and machine noise is in most cases significantly higher than 7 dB
Assumed that in the future all machines would fulfil the proposed limits according to the current noise test code, the environmental benefit still would be insignificant. Even if it would be possible to reduce the pure machine-generated noise, the process noise would still be largely dominant, so no reduction of the sound power level during operation would be achieved.

8.3.2 Environmental &Economical aspects (to use as support of argumentation)

8.3.2.1 Environmental aspects

The real environmental impact of road milling machines can be disregarded because the population of approximately 5.000 road milling machines is negligible.
The majority of road milling machines, especially the noisier (because of the higher engine power) half lane machines, are operated mostly in surrounding situation category E or in surroundings with even less population (e.g. rural roads and highways), i.e. category F.
Additionally, NOMEVAL does not take into account that road milling machines are moving with a speed of up to 40 m/min during operation, therefore a single person is disturbed for only a few minutes.
NOMEVAL consider the machine population and the time in use but does not take into account that road milling machines are operated with a moving process only every 15 to 20 years in a specific location. On the other hand different machines, e.g. lawn mowers, are always used in the same location, others, like power generators, are used stationary, often over a longer period.
Pipe laying machines (category 43) are classified with an EI of “50, medium, but seldom reoccurring at each location” and a $L_{WA,rated,yeareq\ of}$ 106,6 dB(A). These machines shall be removed from the directive due to a lack of environmental relevance, according to the NOMEVAL report.
Road milling machines, also seldom reoccurring at each location, and with an even lower EI and a comparable $L_{WA,rated,yeareq}$ must be not be subject to new limits and must be kept in Article 13.

8.3.2.2 Economical aspects

About 40% of all small milling machines and 60% of all half lane machines are sold to markets outside the Community. Thus, the efforts for additional R&D and engineering will be caused by only a fragment of the global market.
At economical state point, and due to the large predominance of the process noise during service application, the value or benefit of such R&D effort (and cost), on environment would be globally imperceptible.

In addition, the required machine noise reduction would be a clear advantage for all manufacturers outside the EU which produce machines for non-EU markets and a disadvantage on foreign markets for all European manufacturers.
Not only the manufacturers (some SMEs, some larger enterprises) will have to carry the burden of higher demand for R&D and engineering, but also the buyers of such machines will be involved. The European road milling business is structured by a huge number of small and very small contractors. It is a clear fact that road milling machines would be much more expensive than today should the NOMEVAL proposal become fact. For a small contractor this will mean that instead of keeping his road milling machine for 4 to 6 years, he will keep it at least one year longer. Such the introduction of new regulations like exhaust emissions into the market would be delayed.

8.4 Final industry sector (task group) conclusion and position

The industry is willing to take additional burden in order to improve the environmental conditions in the Community. But this is only useful if there will be a result which really and not only in theory has an effect.
The NOMEVAL proposal to move road milling machines to Article 12 is not a realistic way to improve the environmental conditions. On the one hand the process noise is largely dominant, on the other hand the environmental impact for road milling machines lacks relevance.
For that reason the industry suggests to follow the suggestions of the noise expert group WG7 and keep milling machines in Article 13.
Instead the industry suggests to set up a research project to investigate in the real environmental impact of road milling machines, and in possibilities (and limits) of reducing the noise on road milling machines in operation. This would include process noise. The industry is more than willing to actively participate in such a research project by providing human and machine/job site resources.
To support all these argumentation, Industry kindly invites all stakeholders involved in the current revision process of the 2000/14/EC Directive to visit a road milling job site in order to get an impression of the reality.

9. Equipment nr 55: Truck mixers

9.1 Introduction

Truck mixers are transporting vehicles for concrete. The definition for equipment no. 55 in 2000/14 EC is “A vehicle which is equipped with a drum to transport ready-mixed concrete form the concrete mixing plant to a job side”. In Europe there are big manufacturers like Stetter, Liebherr, Cifa or Baryval – which are partly also global players- and some smaller companies like Intermix, Karrena, Saraka, Fumecar etc.
All of them use the same technology to drive the drum. A variable displacement hydraulic pump is driving a hydraulic motor. This motor drives a gearbox with a fix ratio. The gearbox is directly connected with the drum of the truck mixer.
As there are three suppliers for the hydraulics and a hand full for the gearboxes, you will find the same brands of drive components in truck mixers of different manufacturers. So the chief difference between the products of different truck mixer manufacturers is the steel structure of their units.
There are two possible ways to supply the power for the hydraulic pump:

- PTO (Power Take Off) of the truck engine 95% market share
- auxiliary engine 5 % market share

Power range:

- truck engines ca. 220- 360 kW
- auxiliary engines ca. 45-90 kW

The different power supply systems are shown in *annex 4***.**

9.2 Current situation

Currently truck mixers are in article 13 of 2000/14 EC.

The Nomeval report (TNO) proposes to move truck mixers form article 13 to article 12. A limit of 101dB; 85+11 lg P is named.
This demand bases on the database of the European commission where “truck mixers” are divided in “Net installed power categories”.
(http://ec.europa.eu/enterprise/mechan_equipment/noise/citizen/app/).
This base for all calculations, comments and recommendation done by TNO is defective.

Issues:

- The list includes machinery, that has nothing to do with truck mixers:
  - dumpers (Caterpillar)
  - concrete pumps (some datas from CIFA)
  - truck mixer concrete pumps (some datas from SERMAC, Putzmeister and CIFA). According the current definition of a truck mixer it's impossible to associate truck mixer pumps to the same class.
  - concrete and mortar mixers (LISPRENE)
  - concrete mixers for mixing plants (Winget)

All these machines don't meet the definition of a truck mixer according 2000/14/EG annex 1.

- Net Installed Power Category:
  To run a 6m³-drum you need ca. 45 kW, for a 12m³-drum round about 80-85 kW are necessary. All machines in categories <=12 kW eihter can't be truck mixers or are in the wrong category.
- Wrong figures:
  There is a guaranteed sound level of 155 (!) for a mixer of C&B - that's impossible.
- Missing technical parameters
  All datas, were the power category is missing, can't be used.

According these points, just find one (1!) truck mixer could be found classified correctly.

See *annex 4*.

9.3 Industry position

9.3.1 Technical aspects

The noise of a truck mixer has several sources:

- Truck (main source)
  - Engine
  - Fan(s)
  - Air intake
  - Exhaust
  - Air pressure system
- Mixture (fix)
- Mixer
  - Drive kit (hydraulic and gearbox)
  - Fan

Truck

Just covering of the engine could reduce the noise of a truck. But covering means influence on the heat balance of the truck engine. The technology and the knowledge and the about the heat balance and the cooling system is at the truck manufacturer. The truck manufacturers would put any responsibility for the truck engine on the bodybuilder, if additional sound insulation done by them is detected to be the reason for heat accumulation and damages of the engine.

The task of a reduction of the noise level of truck engine has to be assigned to the truck manufacturer.
The mixer manufacturer is not able to exercise control on that source of noise.

Annex 4 shows the share of the truck noise as an example.

Mixture

Fix value for sound emission.

Mixer

Normally the power-take-off (PTO) of the truck engine drives the hydraulic pump. Theoretically a reduction of noise could be achieved by reducing the speed level of the drive components. Using hydraulic pumps with bigger displacement volumes would decrease the speed and the noise level of the truck engines. But to keep the same power level which is required by the drum, the requested torque is increasing inversely proportional.
Most of the truck producers only provide one or two suitable PTO's for mixer bodies, which are already on it's torque limit when combined with today's pumps. Examples: Mercedes, MAN.

Moreover the PTO's are generally provided with just one ratio. Depending on type and manufacturer of a truck the ratio is rather low, so that a high speed level of the truck engine is necessary to reach nominal speed of the drum.

9.3.2 Environmental and Economical aspects

The truck is chosen and bought by the customer. Truck mixer industry can just publish recommendations and name the basic requirements for trucks like PTO or electrical equipment.

The bodybuilder (mixer manufacturer) has no influence on type of the truck, power of the engine, emission standard, air intake, wheelbase, version of exhaust, cabin etc. Reachable noise level of truck mixers depends basically on truck industry technologies.

Big truck manufacturers produce round about 2000 - 3500 mixer/year. But in view of the huge number of possible truck execusion they production can be named to be customized.

9.4 Final industry sector conclusion

1. Truck mixers (Eq. No. 55) must be kept in Art. 13 of 2000/14 as the noise level is considerably affected by the truck. The mixer manufacturer has no impact on this main sound source.

2. Truck mixers have to be devided in the categories because of the installed power level:
   - mixers driven by truck engine (PTO)
   - mixers driven by auxiliary engine

3. The current database of the TNO-report is basically defective. The given datas are no base to develop any reasonable and justifiable limitation.

10. Equipment nr 102/103: Mobile sieve instal. & Mobile waste breakers

10.1 Introduction:

Crushers and screens have been used for more than 100 years in the Mining and Quarrying industry. During the last 20 years there has been an increased use of these machines to recycle building material like concrete and bricks. While originally, the machines was used in stationary plants they are often now used on mobile units that can be moved within a quarry or mine or for smaller units between different sites.
The industry is fragmented with a very few large global manufacturers. There are a large number of regional or local companies active. Some of them are very small with only some few million Euros in turnover.
All quarry or mining locations are due to the nature of the operations located away from populated areas. The recycling business is more complex as the operations depend very much on local circumstances.
Crushers can be divided into machines that crush by pressure or by impact.
Jaw crushers and Cone crushers both crush the material by applying pressure between two surfaces but from noise generating and application field they are different. Impact crushers crush the material by hammers attached to a rotor hit the material with a high speed (30 to 50 m/s).
Breakers for handling wood are quite different machines from rock crushers.
Screens that are used to sort out different size fractions can be divided into vibrating and trommel screens.
(See Appendix 3 for a more detailed explanation of the different machine types.)

10.2 Current situation:

General:
Equipment (stationary and mobile) used in Quarries and Mines are located away from populated areas and causes no noise impact on the population. The operators need to meet environmental demands to get permits for their operations securing that the operation is meeting the regulations.

The recycling business is more complex as the operations depend very much on local circumstances. The very large majority of recycling is made by Mobile units. The use of these units makes it possible to process waste into a useable product. On the same time, most often, considerable heavy transports through populated areas are eliminated. The environmental savings are very high. Three typical applications are:

1. Recycling plants placed on permanent sites outside populated areas. These need to follow strict environmental regulations to get permit for operation. The plant is normally operating on the same site for many years (+10 years). Material for processing is moved to the plant from different demolition sites. The plant typically consists of both Crusher and Screen units.

2. Recycling plants placed on prepared sites to handle a substantial amount of demolition material. These plants also need to meet environmental requirements to get permit for operation. They are normally in operation for 2 to 3 months processing 20.000 to 30.000 tons of material. Sometimes the amounts can be 5 to 10 times larger. The plant typically consists of both Crusher and Screen units.
3. Recycling plants placed on smaller demolition sites close to populated houses. They are normally in operation for 1 to 2 weeks processing 1.000 to 5.000 tons of material. There are normally restrictions for the operating hours. The plants are normally one unit only, crusher (or screen unit).

See Annex 5 for pictures of typical installations

1. Recycling plants placed on permanent sites outside populated areas.

These plants have to operate following regulations on emissions as noise and dust. Without this they will not get any operating permit. To meet these demands the operating company may need to install encapsulation, filters and noise protection. The use of the equipment is environmentally friendly as waste is processed into useable product saving natural resources.

2. Recycling plants placed on prepared sites to handle a substantial amount of demolition material.

Also these plants have to operate following regulations on emissions as noise and dust. Without this they will not get any operating permit. To meet these demands the operating company may need to install encapsulation and noise protection. The use of the equipment is environmentally friendly as waste is processed into useable product that can be used directly close to the site saving natural resources and reducing heavy transports.
The location is generally selected to be as close as possible to the demolition site(s) as possible but on the same time should meet environmental and logistic requirements. The closer to locations there people are living the stricter the demands.

The environmental gains are very high. For example if 30.000 tons is processed it represents more than 1.100 heavy truck transports with a total weight of 43 tons (pay load of 26,5 tons) that must be carried out through populated areas often more than 30 km. Then the same amount of building material need to be brought back for construction purpose. Total saving will be more than 2.200 heavy loaded trucks through populated areas. Logistically it is almost impossible to combine the transports so that the outbound truck with waste can carry new materials back. This adds a lot of driving with empty trucks.

The demand for permits to put up the plant secures minimal impact on the environment. If needed the noise damping devises can be put up around the plant.

3. Recycling plants placed on smaller demolition sites close to populated houses.

These units are normally in operation for 1 to 2 weeks processing a limited amount of material, 1.000 to 5.000 tons. The units are relative small (below 40 tons weight) as capacity demand is low and quick set up time is needed with a minimum of assembly. Approximate 10 % of the Mobile units in EU are used in this type of application. Typically

these small units operate around 800 hours annually. There are normally restrictions for the operating hours and as the job is carried out in a short time the disturbance is small.

Noise impact on urban population:
People are generally only exposed to noise from Mobile Crushers and Screens in case 3 described above. The total estimated number of machines is 20.000. Of these we estimate 10% of units below 40 tons weight is used in this close to population applications. These estimates give:

- It is estimated that Crushers is 1/3 and below 40 tons is 80% together with an estimate of operating units in urban areas are 10% an “urban population” of 500 units.
- Screens are the remaining 2/3 with 80% below 30 tons and 10%in urban areas give 1.000 units.

Units with a weight above 40 or 30 tons respectively are used in Quarries and Mines or in large Recycling operations there the environmental impact is controlled by permits. The borderline 40 & 30tons, is due to big crushers and screens need a lot of space, produce a lot of material, and also big trucks to transport the material. Set up time is also higher that further increase the disadvantages.

The short time and the way the units are operated in urban areas reduce the annoyance. The environmental benefits are high by reducing noise and pollution from heave truck transports in the cities. It is also important that raw material can be saved by processing waste material to a useable product.

We see the benefits of adding Mobile Crushers and Screens to the Noise Directive over stated in the Nomeval report. In addition it will be negative for the environment if rules are applied that limit the use of mobile units to recycle demolition waste.

Standard for measuring noise level:
The DIN standard suggested by Nomeval is not applicable. It is complex, available only in German language and is not commonly used. Further investigations are needed to establish a suitable method, preferable an existing ISO standard like the ISO3744 or ISO 6395.
The lack of an approved standard measuring method eliminates the possibility to evaluate the Nomeval suggested noise level. The Process noise level is depending on how the machines are operated. There are a vast number of different operating parameters influencing the noise level. Therefore it is only possible to make regulations on emitted Machine noise. The Process noise is in most cases very dominating. Difference between Machine and Process noise is typical 10 to 12 dB, this question the feasibility of adding the machines to the Directive.

Few large but many mid and small size manufacturers:
There are only four companies that are active world wide. A large number of mid size and small companies SME’s act regionally or locally. To have 5 to 10 or more of different models to offer (even if turnover is less than 10 M€) is common. The small and medium size companies can face problems with increased demands. They have limited technical capacity and will have larger difficulties to absorb additional costs. See also appendix 2 that is a copy of a market survey carried out by the KHL’s D&R magazine.

The technology to recycle material is continuously improving. Many of the SME's is characterized as "niche" players. They offer customers with special demands unique solutions. These machines are made in few numbers. With regulations difficult to meet for those SME's this type of products will be difficult to manufacture. This will give a negative impact on the environment as the recycling process will be less efficient for the users with special demands.

The Nomeval suggestion is based on questionable environmental benefit of adding these products to the Noise Directive. A large number of small and medium size companies risk problems if the proposal is approved. As there are no current standard to measure the noise level it is not possible to evaluate the actual impact of the proposal.

10.3 Industry position:

Primarily, we would like to re-evaluate the benefits of adding the products to the Noise Directive. It is difficult to see that the benefits if any will be justified.

We also see other weak points in the proposal that is explained below:

6.3.1 Product Group103, Mobile waste breakers (wood, concrete)

A better definition on what is included:

1. Only crawler or wheeled units with self-contained power source.
2. Only units that are used primarily in urban areas to be included (for recycling)
3. Break up the category in jaw and impact crushers
4. Cone crushers are typical quarry machines and are not used in urban areas. There fore such units should not be included in the directive. The cost will not be justified by any environmental savings
5. Units above a weight of 40 tons should not be included in the Directive as a large percentage of the population is not used in urban areas. Size and capacity of those units make them un-feasible to be used on urban area work sites. They are typically used in quarries.
6. Wood can damage a Crusher. Machines handling wood have different working principle and should be included in a special product group.
7. The Environmental Impact assessment indicates a high impact of these machines. We find the result questionable.

10.3.2 Product Group 102, Mobile screens

A better definition on what is included.

1. Only crawler or wheeled units with self-contained power source.
2. Only units that are used primarily in urban areas to be included (for recycling)
3. Break up the category in vibrating and trommel screens
4. Units above a weight of 30 MT should not be included in the Directive as a large percentage of the population is not used in urban areas. Size and capacity of those units make them un-feasible to be used on urban area work sites. They are typically used in quarries.

5. The Environmental Impact assessment indicates a high impact of these machines. We find the result questionable.

10.4 Final industry sector conclusion and position

CECE is affected by the Nomeval proposal to consider the addition in Art 13 (and 12) of mobile sieve Mobile installations (102) and mobile waste breakers crushers (103).

CECE recommends **not** to add to the Directive these two equipments due to lack environmental relevance and due to the fact that process noise is largely predominant in term of duration in operation and in term of sound power emission. This statement is reflecting industry's state of the art, and process noise can not be significantly reduced. The usage of these machines is of great benefit to the environment. Both from noise level and emissions in our cities and by processing waste to a useable product, saving natural resources.

Annex 1 – Equipment nr 13 Conveying and spraying machines for concrete and mortar

Additional Information on the Position on the noise test code given in Directive 2000/14/EC, Annex III Part B, item 13

Abstract

2000/14/EC Annex III Part B, item 13 describes a test method for conveying and spraying machines for concrete and mortar (Definition: Annex I, item 13) that is unpractical and unsafe.

The operation conditions are limited in a not future-oriented way. The current testing values leads to a reduction in value of the equipment. Definition of operating point of measurement is not precise and different between German and English version of the Directive.
The Directive does not take into consideration the differences in scope of design between truck-mounted and trailer-mounted equipment.

Therefore, CECE proposes that EN 12001:2003/A1:2009, where a new noise test code was included during adaptation to Directive 2006/42/EC, should be referenced in Annex III of Directive 2000/14/EC.

1. Comment of Annex III, Part B, item 13

Extract from: **2000/14/EC, Annex III, Part B, item 13**	
Text from the directive *„black – italic – bold“* **Comment „blue“ (sometimes red)**	
13. CONVEYING AND SPRAYING MACHINES FOR CONCRETE AND MORTAR ***Basic noise emission standard*** ***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*** The boom upright and the pipe shall be lead back to the filler funnel pipe → at the top of the placing boom an end hose is installed (DN 125mm maximum allowed length 4m). lead back to the filler funnel → with a 52 m placing boom the length of the end hose will be approximately 60 m. **Not allowed! Overloading of the machine!** ***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.***	EN 12001:2003, N° 5.3.3.4

The cement being replaced by an admixture, e.g. finest ash cement being replaced → in the bad shot that the concrete with a cement substitute not start to solidify**?** finest ash → Fly ash is an **reactive** cement substitute Fly ash is with a "k-Factor" to add to the cement content of the concrete for the calculation of the water-cement-ratio. This water-cement-ratio is the so called "equivalent water-cement-ratio w/z_{eq}" The "k-Factor" for fly ash is $k_f = 0,4$ The maximum allowed fly ash content as an cement substitute is $f_{max} = 0,33 * z$ (z ⇒ Zement ⇒ cement) The equivalent water-cement-ratio is $w/z_{eq} = w / (z + k_f * f)$ ***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).*** Maximum **output** → that means the volume flow of concrete → **[m^3 / h]** In the German version of the directive is written: The machine shall operate at its maximum **power** ("Höchstleistung") → **[kW]** The noise related value of a concrete pump is the maximum power [kW]. Hydraulic pumps for the drive of concrete pumps are power controlled. That means the maximum power [kW] is reached when the product of hydraulic oil volume flow [dm^3/min] and hydraulic oil pressure [bar] is located on any point of the hyperbola of power [kW]. Working cycle not more than 5 seconds → If a manufacturer develops a concrete pump with a long	Literature Fly ash: DIN EN 450 Data of concrete technology Schwenk-Zement KG, 2002 DIN 1045-2:2001 5.2.5.2.2, k-Factor for Fly ash in accordance to DIN EN 450 Difference between the English and the German version of the Directive**!** See example of power calculation of a concrete pump: Clause 3 of this script

pumping stroke and a working cycle of e.g. 8 sec. it is not allowed to put such a machine into service? **Note** A medium similar to concrete is not the right substance to generate the maximum or required pressure of the concrete pump. The length of the pipeline installed at the placing boom is not long enough for the required flow resistance. For trailer mounted concrete pumps, the "horizontal pipe of at least 30 m" is also to short. With "**H**igh **P**erformance **C**oncrete **P**umps", the necessary pipeline length to come into the range of power control (max. power) of the concrete pump is measured in **km!** The test should be conducted with water. With an adjustable throttle valve, it is very simple to adjust the maximum or required pressure in the delivery pipeline, regardless of the delivery pipeline length. It is not possible to throttle a medium like concrete or similar to concrete, the result will be a blockage of the pipeline. **If the test is carried out with water, there is no waste material to depollute.**	Long time working cycle ⇒ low flow speed of concrete ⇒ to reduce the wear of the delivery pipeline for e.g. long term construction projects with stationary concrete pumps A machine ready for delivery cannot be tested with "concrete" the customer has ordered a new machine not a used one.

2. Proposal for a modification of Annex III, Part B, N° 13 of the Directive 2000/14/EC

13. CONVEYING AND SPRAYING MACHINES FOR CONCRETE AND MORTAR **Basic noise emission standard** EN ISO 3744 :1995 **Operating conditions during test** *Test under load* *EN 12001/A1 :2009* Observation period EN 12001/A1 :2009	 See chapter 6 of this position paper

3. Example of calculation to define the maximum power of a hydraulic drive of a concrete pump

The following calculation can be transferred to every type of concrete pump

3.1 Data for the hydraulic pump

3.1.1 The hydraulic pump will be driven by an electric motor

Voltage U = 400 V
Frequency f = 50 Hz
Power P = 37 kW
Revolutions $n = 1450\ min^{-1}$

3.1.2 Hydraulic pump, (power controlled)

Max. geometrical displacement $V_{g\,max} = 93{,}8\ cm^3/1$

Volumetric efficiency $\eta_{vol} = 0{,}97$

Mechanical-hydraulically efficiency $\eta_{mh} = 0{,}95$

For axial piston pumps usual factors of efficiency

Total efficiency $\eta_{ges} = 0{,}92$

Maximum working pressure $p_{max} = 300\ bar$

By design

3.1.3 Calculation of maximum volume flow

$Q_{max} = V_{g\,max} * n * \eta_{vol}$
$Q_{max} = 132\ dm^3 / min$

3.1.4 Beginning of power control

$$p_{RB} = \frac{P \cdot \eta_{ges}}{Q_{max}} \qquad p_{RB} = 154{,}81\ bar$$

3.1.5 End of power control

$$p_{RE} = p_{max} \qquad p_{RE} = 300\ bar$$

3.1.6 Ratio between power control end and beginning

$$i_{Reg} = \frac{p_{RE}}{p_{RB}} \qquad i_{Reg} = 1.938$$

3.1.7 Volume flow and geometrical displacement at the end of power control

$$Q_{RE} = \frac{P \cdot \eta_{ges}}{p_{Re}} \qquad Q_{RE} = 68.08\ dm^3 \cdot min^{-1}$$

3.1.8 Volume flow and geometrical displacement at the beginning of power control

$$Vg_{RE} = \frac{Q_{RE}}{n \cdot \eta_{vol}} \qquad Vg_{RE} = 48.404\,cm^3$$

$$Q_{RB} = Q_{max} \qquad Q_{RB} = 132\,dm^3 \cdot min^{-1}$$

$$V_{gRB} = V_{gmax} \qquad V_{gRB} = 93,8 \cdot cm^3$$

3.1.9 Calculation of the effective hydrauli cally power

$$P_{hydr} = P \cdot \eta_{ges} \qquad P_{hydr} = 34.04 \cdot kW$$

3.1.10 Calculation of „loss of power“ of the hydraulic pump

$$P_v = P - P_{hydr} \qquad P_v = 2.96 \cdot kW$$

3.1.11 Calculation of torque

$$M_{RB} = \frac{Vg_{RB}\, p_{RB}}{2 \cdot \pi \cdot \eta_{mh}} \qquad M_{RB} = 243,3 \cdot N \cdot m$$

$$M_{RE} = \frac{Vg_{RE}\, p_{RE}}{2 \cdot \pi \cdot \eta_{mh}} \qquad M_{RE} = 243,3 \cdot N \cdot m$$

$M_{RB} = M_{RE}$ = const.

3.1.12 Hyperbola of power

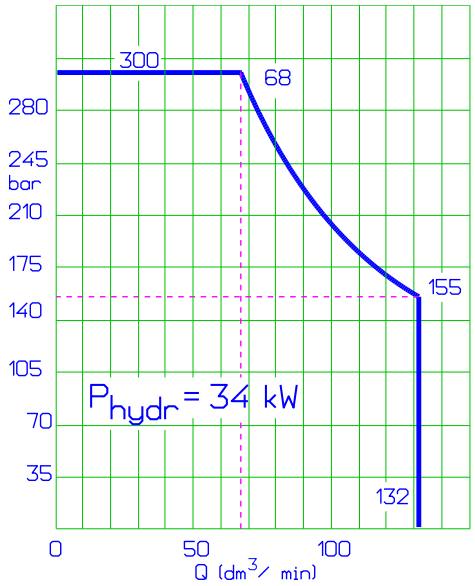
Drive power	$P := 37 \cdot kW$
Total efficiency	$\eta_{ges} := 0.92$

Pressure range	$p := 155\,bar, 165\,bar .. 305\,bar$
Volume flow depending on pressure	$Q(p) := \frac{P \cdot \eta_{ges}}{p}$

Q(p) – Equation of iterative calculation

Iteration steps 10 bar

p bar	Q(p) $dm^3 \cdot min^{-1}$
155	131.768
165	123.782
175	116.709
185	110.4
195	104.738
205	99.629
215	94.995
225	90.773
235	86.911
245	83.363
255	80.094
265	77.072
275	74.269
285	71.663
295	69.234
305	66.964



4. Description of power (Maximum Power) of concrete pumps

4.1 The noise related value is the power „P“ [kW]

4.2 Which power ?

4.2.1 Truck mounted concrete pump

The maximum power of the truck engine is only required for driving on the road. Not for concrete pumping.
The maximum power of the truck engine is **up to customer's choice.**

Required power for concrete pumping depends on the adjustment of the power control of the hydraulic pump plus the required power for auxiliary equipment e.g. agitator. This is the noise related value of a truck mounted concrete pump.

4.2.2 Trailer mounted concrete pump

The dimensioning of the diesel engine **would be done by the concrete pump manufacturer.**

Trailer mounted concrete pumps don't have "over dimensioned" engines like truck mounted concrete pumps.

4.2.3 Difference between truck pumps and trailer pumps

If a truck pump is equipped with a diesel engine of e.g. 350 kW, from which for pumping only 250 kW will be used, the noise level of this machine will be definitely lower than the noise level of a trailer pump with a diesel engine of the required 250 kW for concrete pumping.

Therefore it is necessary to make a difference of noise declaration between the two types of machines.

4.3 To the subject „Power“ in the guideline (Position paper) is written:

Table of limit values
Net installed power: this directive does not offer any definition of net installed power.
In the description of the test of powered equipment free of load (Annex III, Part A, Clause 2.2), the net power is described in a note as follows:

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

Extract from:

Position paper on guidelines for the application of the Directive 2000/14/EC

Pages 41, 42

A report produced for the European Commission

Luxembourg:

vehicles, except that the power of the engine cooling fan is excluded.

Office for Official Publications of the European Communities, 2002 ISBN 92-828-6706-4

The definition is the same as the one given in Directive 97/68/EC for the power definition in view of exhaust emission values of diesel engines. This same definition is used for the amendment of the same directive to include some kinds of spark ignition reciprocating internal combustion engines.

Note: The EC method of measuring power for all types of reciprocating internal combustion engines is given in Directive 80/1269/EEC as amended. This directive is referred to in 97/68/EC.

This power definition is different from the ones used in the directives repealed by Article 21 of this directive and in various harmonised standards for the machinery directive.

A specific regulation is under discussion at the United Nations Economic Commission for Europe (Geneva) with the purpose of bringing harmonisation where the proliferation of incoherent power standards has caused multiple power declarations on the same model of equipment.

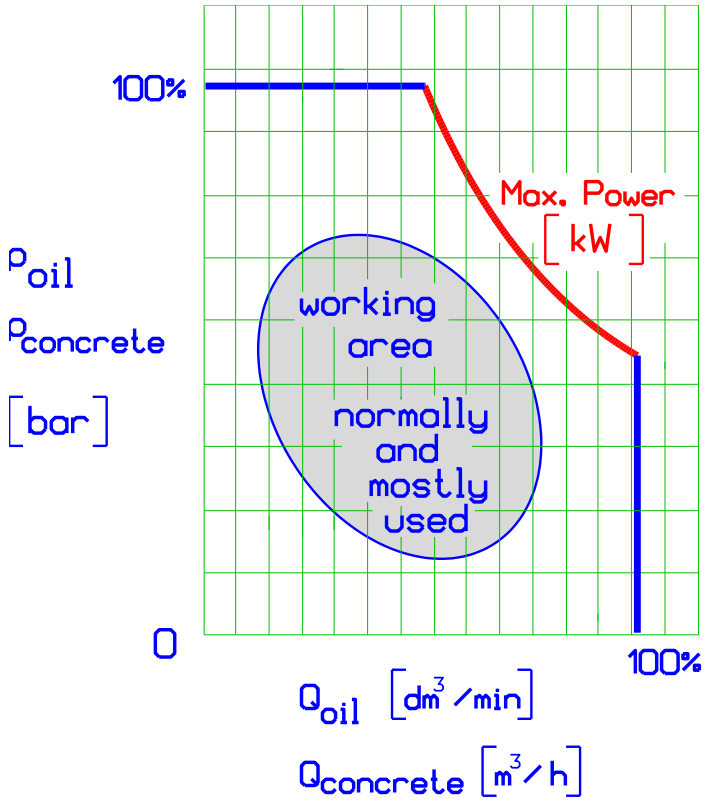
So it is recommended to adopt the definition from Directive 97/68/EC.

Further guidance on the list of accessories to be installed on the engine for net power determination can be found in ISO TR 14396 (that technical report will be transferred in ISO 14396 under publication).

That is applicable for concrete pumps with power controlled hydraulic pump drive

For equipment with variable power ratings, only use the equipment highest net power rating to determine the applicable sound power level limit value.

Example of variable power rating of a concrete pump
A concrete pump operates normally and mostly below the hyperbola of maximum power



95% of the working time of a concrete pump would be done in the "working area" below the hyperbola of maximum power

5. Summary

Definition of noise related value

The definitions of the noise related value in the directive (German version / English version) are different.
From this it follows ⇒ different law in D and GB !!!

A European directive is law in the member states of the European Community and should be a precise instruction.

That is at this time not the case.

An amendment/correction of the directive is necessary before the manufacturers start the measurement again.

Operating conditions during the test

The description of the operating of a concrete pump with placing boom will be contradictory to EN 12001:2003, leading to overloading of the machine.

The description of the test medium “similar to concrete” is not a precise instruction. We have hundreds of concrete recipes with different sizes of aggregates, different grain-size distributing curves, different cement content, different spread/slump, ….....and so on.

The time for a pumping stroke (min. or max.) belongs to the purpose for that the machine designed is.

Precise basic parameters to get <u>comparable</u> noise values

1. First of all the definition of the noise related value must be the same in the member states. $P_{Hydraulic}$ [kW]
2. During the test, the concrete placing boom is unfolded conveyance back to the hopper.
3. The test medium must be water to avoid unclear admixture design ⇒ no waste material to disposed of.
4. The time for a pumping stroke is not a noise related value.

Starting measurements

Until now with unequal interpretation of noise related values, unclear test medium, no difference between truck pumps and

again

trailer pumps, etc. ascertained data are not comparable.

With well-defined, practice oriented basic parameter it is possible to start the data collection again.

6. Annex C (Noise-test code) of EN 12001:2003/prA1:2009

EN 12001:2003/prA1:2009 is at the stage of the UAP enquiry now. The following dates apply:

Closure of UAP:	2009-09-16
DOR/Ratification:	2009-10-16
DAV/Definitive text available:	2009-12-16

Annex C
(normative)
Noise-test code for machines and equipment for conveying, spraying and placing concrete and mortar

C.1 Scope

This noise-test code defines all necessary information for efficient and under standardised conditions the determination, declaration and verification of the noise-emission characteristics of machines and equipment for conveying, spraying and placing concrete and mortar. Noise-emission characteristics include the emission sound power level.

The determination of those quantities is necessary for:
- manufacturers to declare the noise emitted;
- purposes of noise control at the source at the design stage.

The use of this noise-test code ensures reproducibility of the determination of the noise-emission characteristics within specified limits determined by the grade of accuracy of the basic noise-measurement method used. Noise-measurement methods allowed by this standard are engineering methods (grade 2).

C.2 Determination of the A-weighted sound-power level

C.2.1 General

This clause specifies additional requirements for the determination of the A-weighted sound-power level according to EN ISO 3744.

C.2.2 Measurement surface and microphone positions

Measurement surface and microphone positions shall be in accordance with EN ISO 3744:1995.

NOTE Hemispherical or parallel-piped measurement surface can be used. Stabilisers and concrete-placing booms
can penetrate the measurement surface.

C.2.3 Test procedure

C.2.3.1 Operation conditions during test

The machine shall be set up and operated according to the manufacturer's instruction handbook.

C.2.3.2 Test under load

The medium pump shall be operated under maximum power (maximum retrievable pumping power). The conveying system shall be operated with water. Noise test of spiral pumps will be also with water, but the drive unit of the dosing equipment for dry material shall be switched off.
NOTE Operating pressure with water is created by using an adjustable throttle valve in the delivery line. To avoid the influence of additional noise from the throttle valve, the valve shall be located outside the measurement surface.

C.2.3.4 Period of observation

The period of observation shall at least be 15 s.

C.2.4 Operator’s positions

C.2.4.1 Remote-controlled machines

Where the machine is remote-controlled, the A-weighted sound pressure levels shall be measured at a distance of 1,00 m from the surface of the machinery and at a height of 1,60 m from the floor or access platform.

C.2.4.2 Machines with defined workstations

Where the machine has defined workstations, the measurement points shall be at a height of 1,60 m
above the ground plane in a distance of 1,00 m from the surface of the machine at the workstations.

C.3 Determination of the A-weighted emission sound pressure level at workstations

The A-weighted emission sound pressure levels shall be determined in accordance to EN ISO 11201:1995 or EN ISO 11204:1995.

Annex 2 – Equipment nr 17: Drill Rigs Categories

A Non-percussive

Non-percussive i.e. Rotary drilling is a method in which the drilling tool at the bottom of the borehole is rotated and at the same time, a feed force is applied by a feed system or drill collar. The ground or rock at the bottom of the borehole is crushed or cut by pressure, shear or tensile stress produced by the different drilling tools. The cuttings are periodically or continuously removed out of the borehole.

A.1. Rock Drilling

Drilling in solid formations like granite, limestone, concrete…
This method is using very high feed force and rotation to crush the formation. To generate the great feed force the drill rigs are very heavy.

A.2 Overburden Drill Rig

Overburden non-percussive drilling (anchor drilling) is characterized by simultaneous drilling with drill pipe and drill casing. The casing protects from collapsing of the unstable borehole in soft overburden layers. After retracting the drill pipe, a product (strand anchor, self-drilling anchor, rebar installation) can be installed via the casing into the borehole.
Drill rigs are mounted on crawlers and they are able to position the drill mast in various directions.
Drill pipe and drill casing are driven by a top hammer (top drifter).
Main application is special foundation construction.

A.3 HDD

Horizontal Directional Drilling technique (HDD)

Operating principle
Drilling starts in an entrance pit which allows easy bore head penetration into the ground. Additionally, a starting pit, an intermediary pit or a target pit may be prepared on the construction.

It is supplied with energy via an integrated drive unit. The drill rig hydraulically pushes the drill stems through the ground to the target pit, starting with the bore head. This is how a pilot bore is produced between the entrance pit and the target pit. The drill stem guidance prevents the drill stems getting bent between the sub-saver and the entrance point in harder ground.

Once the bore head has arrived at the target pit, the operator demounts the bore head and mounts the back–reamer as well as the long pipe to the stem.
The drill rig pulls the drill stem along with the back-reamer and long pipe back through the bore hole with hydraulic pressure

A.4 Piling Drill Rig

Three systems are mainly used for piled drill riggs:

a. Drilling with Kelly
Classic bored pile system which transfers torque and vertical crowd force to drilling tools via a telescopic kelly bar.
• Borehole wall is supported either by excess hydrostatic pressure or by drill casings.
• Installation of drill casings by rotary drive or by casing oscillators attached to rig.
• By using different drilling tools the system can be employed in all types of soil (including bedrock).

b. Drilling with Continuous Flight Auger (CFA)
Significant increase of drilling performance can be reached when using a continuous flight auger which is installed in one continuous pass:
• The soil which is loosened at the auger tip is conveyed to the surface by the auger flight.
• Borehole wall is supported by the auger filled with drill spoil.
• Use of a crowd winch facilitates penetration into hard soil formations.
• Attaching a kelly extension increases the drilling depth by 6 - 8 m.
Pile is concreted through hollow stem by means of concrete pump.
• Concrete is pumped by a concrete pump through the hollow stem of the auger while extracting the auger. Concrete feed pressure can be measured at the tip of the continuous flight auger.

c. Twin Rotary Drive Drilling System for small diameters (FoW)
Drill casing and auger are drilled into the ground simultaneously by two rotary drives rotating in opposite directions.
• The soil which is loosened at the auger tip is conveyed to the surface by the auger flight inside of the casing and discharged through a gate underneath the rotary drive.
• Concrete is placed through hollow stem auger as drill casing and auger are simultaneously withdrawn.
• A special design of the rotary drives allows the construction of piled walls directly in **f**ront **o**f existing **w**alls of adjacent buildings (=> FoW system). The usable excavation pit area is maximized.

A.5 Vibrating Drill Rig

Vibratory drilling is a technique that advances the drill string and drill casing by vibration rotation. A special drill head directs sinusoidal vibrations (50 to 150 hertz) down the drill string. A slow rotation is added when necessary.

Drill rig can be mounted on truck or on a crawler type carrier. Application is mainly exploration drilling, since relatively undisturbed core samples of almost any overburden formation can be gained without the use of air, fluid or other additives.

A.6 Core Exploration Drill Rigs

Drill rigs using high speed (500 -3000 rpm) spindle and diamond bit.
This type of drill rig is used to extract core samples of rock.

A.7 (Truck Based) Water Well Drill Riggs

Drill rigs used for the installation of (deep) wells, ground water control or exploration holes. The hydromechanic drive can be powered by a PTO (Power Take Off) or an additional deck engine (diesel or electrical power pack)

B Percussive (including rotary-percussive)

Percussive drilling is a method by which the hole is produced by crushing the ground or rock at the bottom of the drill hole by striking it with the drilling tool and removing the cuttings out of the bore hole.

Rotary percussive drilling is performed by a piston striking directly on the bit (down the hole hammer drills) or by percussive energy transmitted via a drill string to the bit. The piston is powered by either hydraulic fluid or compressed air"

B.1 Rock Drilling Top Hammer System Coprod

For the principle, see the overview picture below

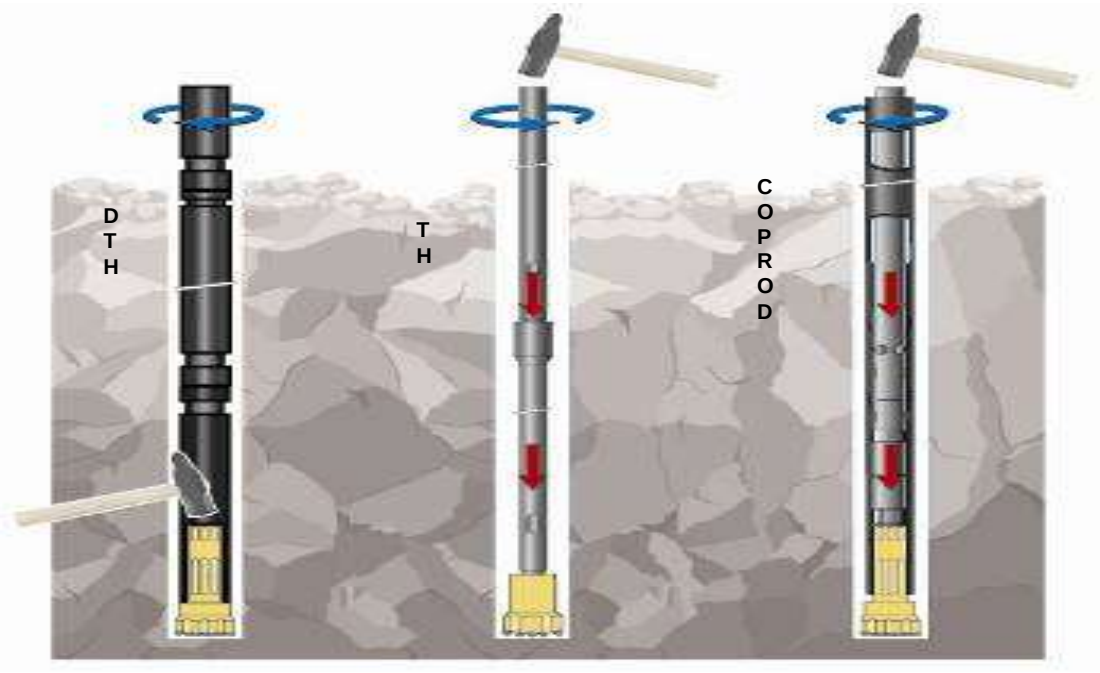
B.2 Rock Drilling Top Hammer (TH)

For the principle, see the overview picture below

B.3 Rock Drilling Down The Hole (DTH)

For the principle, see the overview picture below

Overview Coprod, DTH, TH



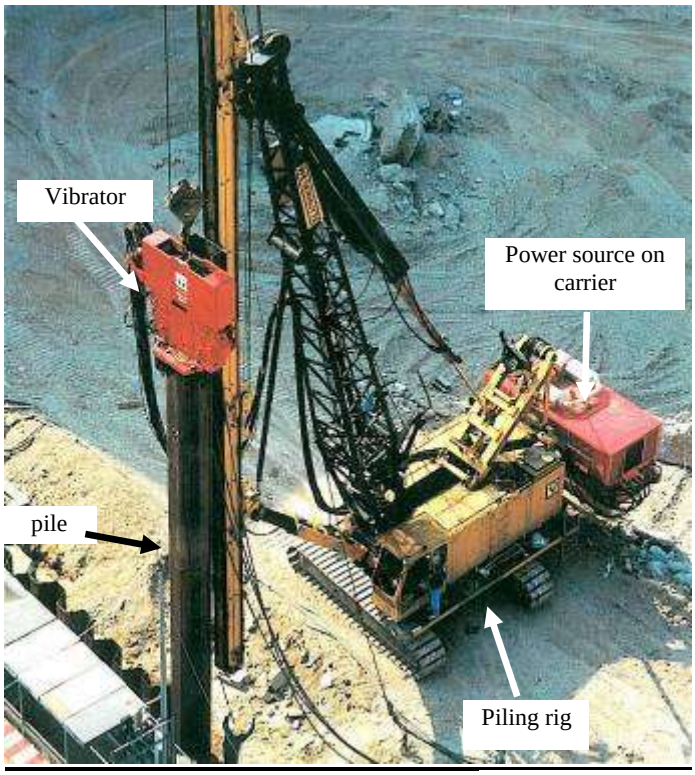
B.4 Overburden Drill Rig

Overburden percussive drilling (anchor drilling) is characterized by simultaneous drilling with drill pipe and drill casing. The casing protects from collapsing of the unstable borehole in soft overburden layers. After retracting the drill pipe, a product (strand anchor, self-drilling anchor, rebar installation) can be installed via the casing into the borehole.
Drill rigs are mounted on crawlers and they are able to position the drill mast in various directions. Drill pipe and drill casing can be driven by a single rotary head or by two separate powered rotary heads (so called double-head method).
Main application is special foundation construction.

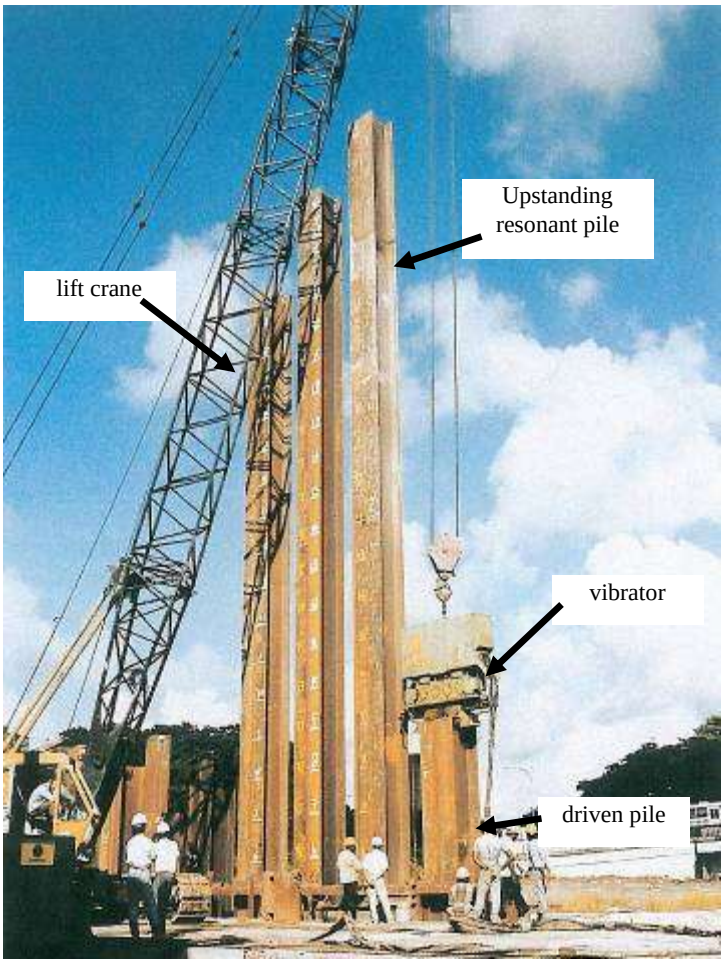
B.5 HDD

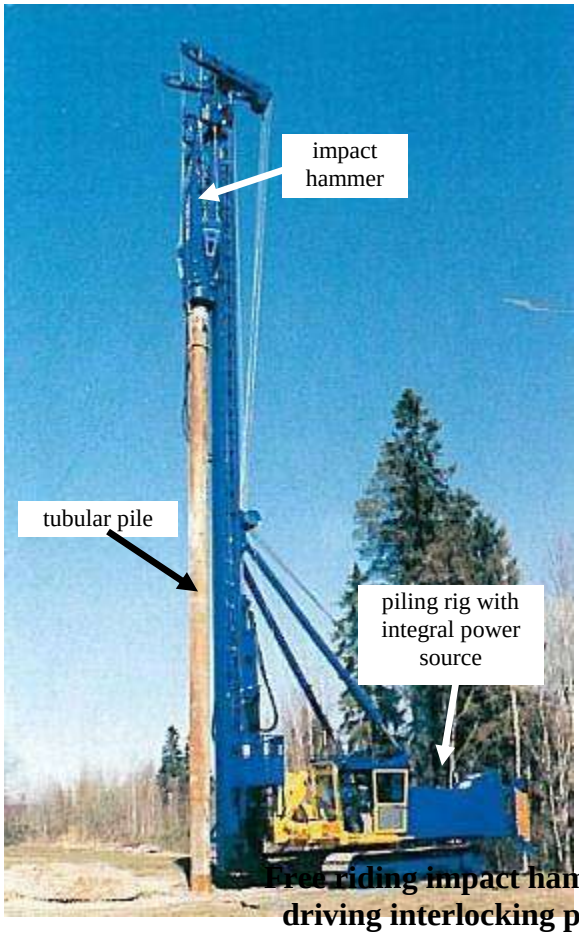
Horizontal Directional Drilling technique (HDD) idem as non-percussive but with an additional impact unit providing additional impact for areas with harder ground conditions.

Annex 3 – Equipment nr 42: piling equipment configurations



Leader mounted vibrator driving bearing piles





Impact hammer on piling rig driving tubular bearing piles

Free riding impact hammer driving interlocking piles following a vibrator

Annex 4: Equipment nr 55: Truck Mixers – Overview + Wrong data

Current definiton of a Truck mixer according directive:
„A vehicle which is equipped with a drum to transport ready-mixed concrete from the concrete mixing plant to the job side“

The power do drive the drum is supplied by:

- PTO (**P**ower **T**ake **O**ff) of the truck (95 %)
- Separate engine (5%)

Problem: Database for the decision of TNO

http://ec.europa.eu/enterprise/mechan_equipment/noise/citizen/app/

Net installed Power Category

„Not given“:	24 machines
362	2 machines
360	2 machines
285	1 machine
150	1 machine
120	4 machines
12	9 machines
10	8 machines
9	5 machines
7	3 machines
6	1 machine
4	2 machines
3	1 machine
2	1 machine
	64 machines (11.02.08)

A machine listed in a category of 12 kW and lower can‘t be a truck mixer…

Machines listed in the database (examples):

www.fiorigroup.com

- **Vehicle with equipment for selfloading**
- **mixing of the concrete inside the drum - not in the mixing plant**
- **not suitable for transportation on roads; working just on the jobside**

No Truck mixer according definition of directive

www.putzmeister.it

- **Truck mixer with concrete pump and placing boom model TMP 31.89**
- **Machine is not just for transportation but also for pumping concrete**

No Truck mixer according definition of directive

www.winget.co.uk

- **Not suitable for transportation of concrete**
- **Small machines for mixing concrete**

No Truck mixer according definition of directive

www.usedcat.com

- **Dumper**

No Truck mixer according definition of directive

CIFA concrete pump(s)

SERMAC concrete mixer pumps

METALGALANTE: concrete mixers with self loading system

Terexlift: concrete mixers with self loading system

No Truck mixer according definition of directive

Some extracts of the database:

	Certificate Date	Certificate Number	Equipment Model Name	Permissible Sound Power Level	Guaranteed Sound Level	Measured Sound Power Level
LISPRENE Projectos Mecanicos e Fabris, S.A. Estrada Nacional n 1, km32 / 2580-491 Carregado PT	9/1/2003	2744	140 l a 300 l		87	84

Size (l = liter) ???

???

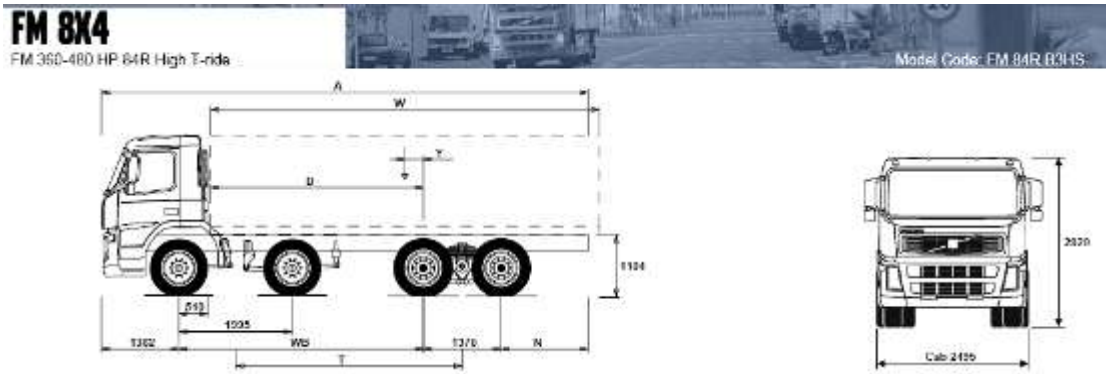
	Certificate Date	Certificate Number	Equipment Model Name	Permissible Sound Power Level	Guaranteed Sound Level	Measured Sound Power Level
C&B DUE srl Fraz. S. Bernardo 130 / 12041 BENEVAGIENNA (CN) ITALY IT	3/20/2007	16227	AD 85 XC.480/E3-1R		155	113

Possible ?

	Certificate Date	Certificate Number	Equipment Model Name	Permissible Sound Power Level	Guaranteed Sound Level	Measured Sound Power Level
C&B DUE srl Fraz. S. Bernardo 130 / 12041 BENEVAGIENNA (CN) ITALY IT	7/13/2007	16228	FM 84R		116	114

???

It‘s the model code of a truck, not of a truck mixer

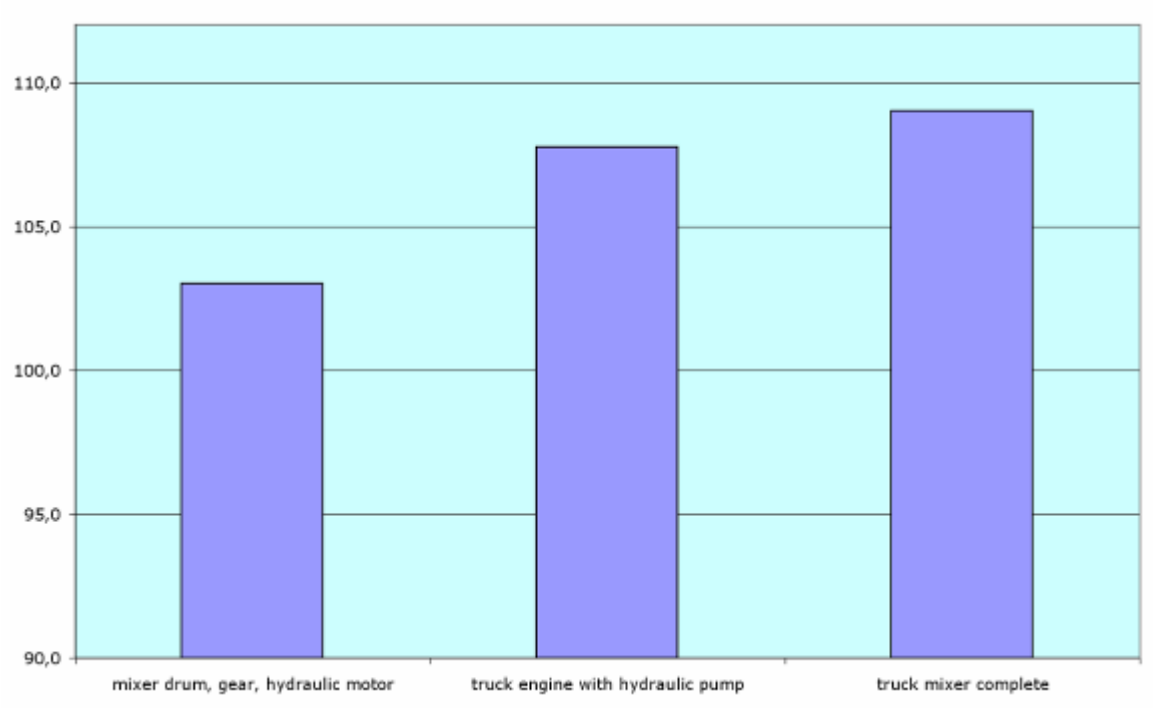


Summary:

- **Database contains a lot of machines belonging to other categories**
- **Some datas are impossible / incorrect**
- **A lot of the machines are in the wrong „Net Installed Power Category“**

The current database is not suitable for any assessment and regarding noise of truck mixers. It can‘t be the base for changing truck mixers from Art. 13 to Art. 12.

Annex 10 b



Truck mixer: HTM 1004, hydraulic/mixer gear Rexroth/ZF
truck: MB ACTROS 4031, 6x4

Annex 5 – Equipment nr 102/103: Overview Mobile sieve inst. & Mobile waste breakers

Quarry applications

Recycling plants placed on permanent sites outside populated areas

Recycling plants placed on prepared sites to handle a substantial amount of demolition material

Recycling plants placed on smaller demolition sites close to populated houses

Moving a 25 ton unit on road

Quarries

The different stages in a crushing process with a focus on Quarries

Engineers have yet to succeed in designing and building a crusher which can accept boulders of a cubic meter in size and reduce them in just an instant to sand. In most cases several crushers are needed, operating in stages. The crushers follow each other and each is designed to excel at a more limited crushing duty. Examples of crushing duties are primary, intermediate and fine crushing. In each of these cases it is a matter of size reduction — crushing material into smaller particles. When cubicizing is mentioned, the purpose is to improve particle shape.
Customers' interest is usually focused mostly on primary crushing and fine crushing, the sections of the crushing plant in which an incorrect machine selection causes the greatest problems.

Primary crushing

The duty of the primary crusher is above all to make it possible to transport the material on a conveyor belt. In most crushing plants producing aggregates, primary crushing is carried out in a jaw crusher, although plants with very high capacities generally use a gyratory primary crusher (mainly Mining applications). If the material is easily crushed and not excessively abrasive, an impact breaker can be the best choice as primary crusher.
The most important characteristics of a primary crusher are the capacity and the ability to accept the raw material without blockages.
A large primary crusher is of course more expensive to purchase than a smaller machine. For this reason, investment cost calculations for primary crushers are weighed against the costs of blasting or ripping the raw material to a smaller size.

In most cases the raw material is transported by trucks or dumpers to a fixed primary. This can be an expensive solution! The costs of amortization, fuel, tires and maintenance can be considerable when the vehicles have to work so hard. In modern plants it is often economically advantageous to use a movable primary crusher so that it can follow the movement of the face where the raw material is extracted. The primary crusher can be made movable with the help of crawler tracks, for example. A tracked primary crusher can be an economically sound solution in cases where the customer needs to move the machine frequently in the quarry. The most common field of use for movable primary crushers is in plants intended for short-term contracts.

Intermediate crushing

The purpose of intermediate crushing is to produce various coarser fractions — base course, for example — or to prepare the material for final crushing. If the intermediate crusher is used to make railway ballast, product quality is important. In other cases, there are normally no quality requirements, although the product must of course be suitable for fine crushing. In most cases the aim is to obtain the greatest possible reduction at the lowest possible cost.
Thanks to their high capacity and low operating costs, secondary gyratory crushers and cone crushers are often used for intermediate crushing.

Stone and gravel - ten times larger volume than ore

Stone and gravel are used to build up the infrastructure of society. The production of stone and gravel throughout the world is about ten times greater than the production of ore. In other words, it is a question of gigantic volumes.
Base course material has to have a high bearing strength, beneath the visible concrete or asphalt wearing surface of a road, for example. The base course gets its high stability through a proper distribution of the particle sizes.

Aggregates are the stone content of concrete and asphalt. Cubical aggregates consist of correctly graded particles shaped like sugar cubes which improve the carrying capacity, the life and the pouring or laying characteristics of the concrete or asphalt. Flaky aggregate material is prone to fracture when subjected to point loads — an important factor when specifying aggregates for asphalt wearing courses, for example. In many countries, the national Roads Administration sets standards for the cubicity of asphalt aggregates.
For some of our customers it is essential to produce high-quality aggregates in order to sell anything at all. For other customers the possibility of getting a higher price for "Edelsplitt" is sufficient reason for an investment.
In most cases the fine crushing and cubicizing functions are combined into a single crushing stage. The selection of a crusher for such a duty calls for both practical experience and theoretical know-how.

Two main types of crushers for fine crushing and cubicizing

The customer has to choose between two main types of machine for fine crushing and cubicizing, namely cone crushers and impact breakers. The decisive factors in the choice of the most suitable machine type are the abrasion and crushability characteristics of the raw material and the desired product size distribution curve.

Crusher selection chart

Crushers for production of 0-25 mm (0-1") material or similar							
Two crushing stages	**<----------> **						
Three crushing stages			**<----------> **				
Four or more crushing stages				**<----------> **			
Primary crusher	Jaw or Impactor	Jaw or Impactor	Jaw or Impactor	Jaw or Impactor	Jaw or Impactor	Jaw or Impactor	Primary gyratory or impactor
Secondary crusher	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor	Secondary gyratory, cone or Impactor
Tertiary / Quaternary crusher			Cone or Impactor	Cone or Impactor	Cone or Impactor	Cone or Impactor	Cone or Impactor
The chart is of course only a preliminary guide and should therefore be used accordingly.							

Crushers and how they operate

All crushers can be put into one of two main types:

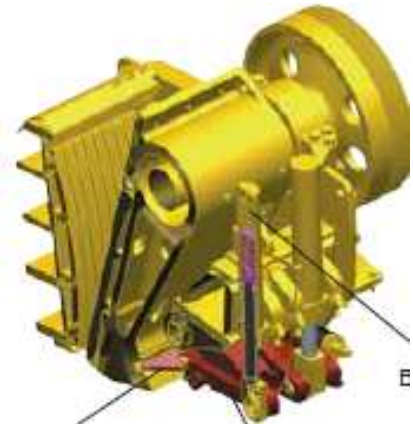
- ***Compressive crushers*** - which *squeeze* the material until it breaks
- ***Impact crushers*** - which use the principle of a rapid impact to *shatter* the material

Jaw crushers, cone crushers, gyratory crushers and roll crushers all operate on the *compression* principle. Impact breakers and hammermills utilize the *impact* principle.

Compression crushers

Jaw crushers

Jaw crushers are often used as primary crushers where the main duty is to produce a material which can be transported by belt conveyor to the subsequent stages of the plant.
Crushing takes place between a fixed and a moving jaw plate. The moving jaw plate is mounted on the moving jaw which is given a reciprocating motion. This can be imagined as a steel wall, hanging from a hinge at the top, which you set in motion by kicking the wall with your feet. Crushing only takes place when the moving jaw is moving towards the fixed jaw.
The jaw crusher is a reliable and robust machine. It is therefore very popular with many customers.



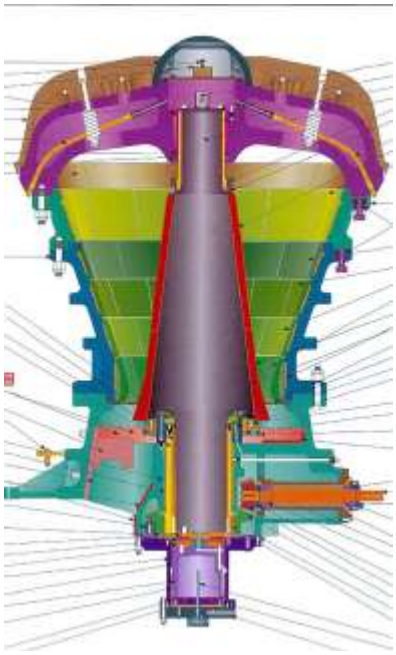
Cone and gyratory crushers

Cone and gyratory crushers are in fact both gyrating shaft machines. They both have a main shaft which gyrates and provides the crushing motion. This gyrating motion is more like the hip movement of a hula-hula dancer than the action of a paper mill. Crushing takes place between a fixed outer crushing member (the concave ring) and a moving inner crushing member (the mantle), mounted on the gyrating shaft assembly.
The gyrating motion of the main shaft is generated by an eccentric which is rotated by a gear transmission. Crushing is continuous and in fine crushers to a high degree by inter particle crushing — stone against stone. This is the reason for the gyrating crusher's favorable wear costs and operating economics.

For optimum operating economics and product shape it is generally recommended that cone crushers are operated with the crushing chamber full, i.e. "choke fed". This is most easily accomplished by using a surge pile or a surge bin to even out the inevitable fluctuations in the flow of raw material. Level monitors which sense maximum and minimum material levels control the starting and stopping of the feed to the crusher.

Gyratory crushers

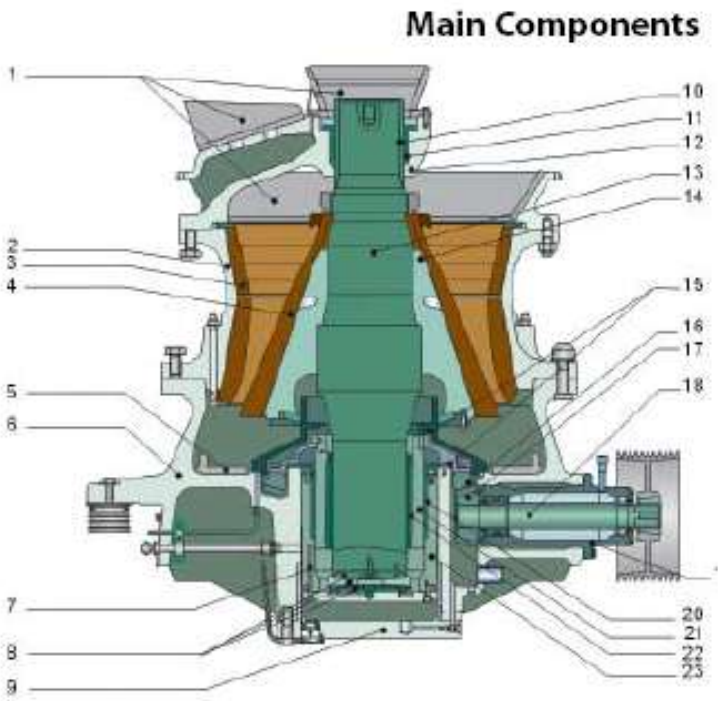
As the name suggests, the primary gyratory crusher is intended for the primary crushing stage. The secondary gyratory crusher is normally used in the second crushing stage but in some cases it can be used for primary crushing if the raw material is small enough to enter the feed opening. Compared with a cone crusher, the gyratory crusher has a crushing chamber designed to accept a feed material which is relatively large in relation to the mantle diameter. The head angle is therefore smaller than on a cone crusher.



Cone crushers

Cone crushers are used as intermediate or fine crushers or as cubicizing crushers. The feed material has thus been precrushed in previous crushing stages. In the case of gravel the primary crushing has already been taken care of by Mother Nature so a cone crusher can sometimes do the entire crushing job.

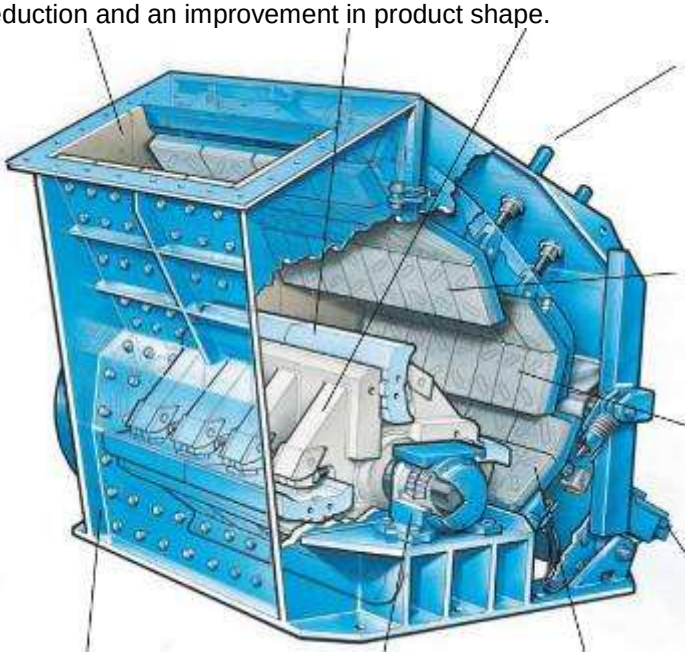
The key to the performance of a cone crusher lies in the design of the crushing chamber. For this reason there is generally a range of standard chambers for each crusher so that a suitable chamber can be fitted to match the feed material in question.



Impact crushers

Both of the main types (with horizontal rotor and with vertical rotor) are characterized by a high reduction ratio and by their suitability for cubicizing. Impact breakers can also be used for selective crushing, a crushing method which liberates strong minerals from weak material.
An impact breaker is built as a shell of steel plate around a shaft and rotor assembly. The number of moving parts is very small.

Impact crushers with horizontal rotor (HSI)
The material fed into the machine is subjected to a very high impact when it is hit by the rapidly moving impeller bars mounted on the rotor. The resulting particles are then subjected to further violent treatment inside the machine. They collide with parts of the crusher and with each other, resulting in further reduction and an improvement in product shape.



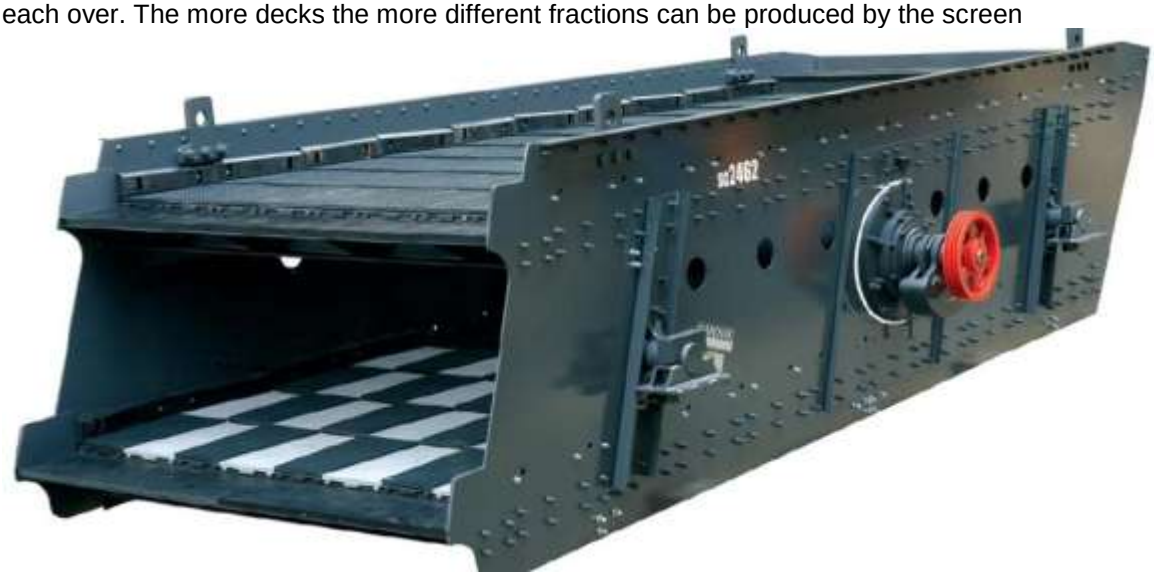
Vertical shaft impactors (VSI)

A centrifugal crusher can be regarded as a "stone pump" which operates in the same way as a centrifugal pump. Material is fed into the center of the rotor, accelerated to a high velocity and leaves the rotor through openings on the periphery. Crushing takes place when the material moving at high speed hits the lining of the stationary outer shell and also when the particles collide with each other.

Screens.

The crushed material contain different sizes of material, from dust to large pices. To sort this into different size fractions screens are used.

Vibrating screens
The screens are vibrating normally by a rotating unbalance weight. Different designs are used due to the application. The screen can be build with several different screen decks put above each over. The more decks the more different fractions can be produced by the screen



Screen with two decks

Trommel screens
For handling material like soil Trommel screens are popular. A Trommel screen can be described as a large barrel that is perforated. The Trommel rotates, material is fed inside it and fine material can pass through the openings in the surface.

A Trommel screen used for recycling soil