PP 11-09
Brussels, 12 August 2011

CECED preliminary comments on Commission staff working documents for possible regulations on energy labelling and ecodesign for vacuum cleaners

CECED calls for a sound and quick implementation of energy labelling and ecodesign measures for vacuum cleaners, as they may contribute significantly to Europe's energy efficiency goals. However, CECED is very concerned about the approach suggested in the Commission staff working documents of July 2011:

- it does not consider the main functionality of vacuum cleaners – the cleaning performance – adequately when assessing energy performance;
- if it were implemented it may drive the market towards products with bad cleaning performance, because vacuum cleaners with a (very) good energy performance indication may deliver poor cleaning results;
- the suggested measurements based on two double strokes are not reliable, accurate and reproducible.

Such an approach would be a risk for the credibility of ecodesign and energy labelling policies towards end-users and manufacturers.

As a first reaction to the suggestions in the working documents, the second part of this paper focuses on several important aspects related to the general approach for assessing the energy and the cleaning performance of vacuum cleaners, including suggestions for reference documents to be used for conformity assessment.

CECED has made suggestions for energy labelling and ecodesign for vacuum cleaners, which were circulated by Commission staff to the Ecodesign Consultation Forum on 8 December 2010. The approach is based on energy efficiency, as minimum cleaning performance levels of 95% dust removal for hard floor and 65% for carpet have to be achieved when determining the annual energy consumption. All parameters would be established by reliable, accurate and reproducible methods, which were developed under Commission Mandate M/353 of 2004. This approach would save energy, while maintaining/improving cleaning performance. For completeness the suggestions for energy labelling are attached as Annex I, and the suggestions for ecodesign are attached as Annex II. The latter foresees a cap on input power.

Inadequate consideration of dust removal performance

General approach

The working documents suggest a calculation method for the annual energy consumption, which is used for setting ecodesign requirements and the ranking for energy labelling. It takes into account the dust removal on hard floor and on carpet by a correction factor that becomes applicable when the dust removal falls below a certain level[1]. No minimum dust removal requirement is foreseen.

In the absence of a minimum dust removal requirement the approach suggested in the working document results de-facto in an energy ranking tracking the input power only: given the proportional nature of the correction factor, the lower the energy consumption (input power) of the vacuum cleaner is, the lower will be the "penalty" for low dust removal for the calculation of the annual energy consumption.

If this suggestion were implemented, the "best" energy rating class could be achieved by products with low dust removal even for hard floor. This is illustrated in the following table:

	Input power (W)	Motion resistance on carpet (N)	Motion resistance on hard floor (N)	Annual Energy Consumption (kWh)	Energy Efficiency Class	Dust removal on carpet (%)	Dust removal on carpet (class)	Dust removal on hard floor (%)	Dust removal on hard floor (class)
Vacuum Cleaner 1	150	25	24	17.96	A+	20	G	20	G
Vacuum Cleaner 2	20	25	24	9.278	A+++	5	G	5	G

The result could be a confusing message for end-users, because a "top" energy rating can be achieved despite bad (or practically non-existing) cleaning performance, as the energy ranking – the most important element of the energy label – becomes un-comparable across products with possibly widely varying cleaning performance, thereby putting in question the added value for purchasing decisions and marketing. This may affect negatively the credibility of further energy labelling schemes, which rank the energy performance against a guaranteed/default "good" service performance[2].

Values for dust removal

The "threshold" value for the correction factor on dust removal on carpet is suggested to be 55% after two double strokes. This means that a carpet containing 45% of the "original" dust is considered to be a "clean" carpet as no correction/penalty would apply. The value should be higher, as better dust removal increases the hygiene of the carpet considerably, which is the main motivation for using a vacuum cleaner.

[1] The correction factor applies when the dust removal falls below 85% and 55% on hard floor and on carpet, respectively

[2] As an example, the default "minimum" cleaning performance of washing machines and dishwashers set out in ecodesign regulations corresponds to class "A" as defined in the "old" energy labelling directives

In summary, the suggested approach may mislead end-users and discredit ecodesign and energy labelling. It may be in conflict with the provisions of the Ecodesign Directive 2009/125/EC, as the functionality of vacuum cleaners could be negatively affected from the perspective of the user.

Movement Resistance correction factor

The suggested calculation of the annual energy consumption includes a correction factor for movement resistance[3], without giving a rationale why there would be any relation between movement resistance and energy consumption. While movement resistance information could be useful information for end-users, it should not be included as a factor which affects the calculation of the annual energy consumption.

Measurement methods

The general conditions for the measurement methods set out in Annexes II of the working document require that *"measurements and calculations shall be made using a reliable, accurate and reproducible method…"*. However, no further indications on envisaged reference documents/standards are given.

In 2004 the Commission has given Mandate M/353 to CEN and CENELEC to adopt measurement standards related to energy labelling for vacuum cleaners. The corresponding standard prEN 60312-1 establishes a minimum of five double strokes to ensure reproducibility and repeatability, and the approach was validated in a round robin test. On the other hand, the working documents suggest that measurements should be based on two double strokes. Such an approach, to CECED's knowledge, was not subject to a round robin test. Therefore any measurements should be based on this new standard.

Definitions/scope

The definition of "wet and dry vacuum cleaners" should be in accordance with IEC 60335-2-2.

Power setting of the vacuum cleaner

The power setting of the vacuum cleaner in test must be clear in order to prevent loopholes in the method. The present working document is not clear in this respect.

[3] The working documents do not contain a definition for "movement resistance", and it is assumed that the term corresponds to "motion resistance" as defined in prEN 60312-1

Annex I

Working Document on a possible

COMMISSION DELEGATED REGULATION

implementing Directive 2010/../EU of the European Parliament and of the Council with regard to energy labelling of vacuum cleaners

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2010/../EU of the European Parliament and of the Council on the indication by labelling and standard product information of the consumption of energy and other resources by energy related products[4], and in particular Article 11 thereof,

Whereas:

(1) Directive 2010/../EU requires the Commission to adopt delegated acts for the labelling of energy related products representing significant potential for energy savings and presenting a wide disparity in performance levels with equivalent functionality.

(2) The energy used by vacuum cleaners accounts for a significant part of total energy demand in the European Union. In addition to the energy efficiency improvements already achieved, the scope for further reducing the energy consumption of vacuum cleaners is substantial.

(5) Wet vacuum cleaners have particular characteristics and should therefore be exempted from the scope of this delegated Regulation. However, considering that they offer similar functionalities as other vacuum cleaners, they should be addressed as soon as possible in another implementing measure of Directive 2010/…/EU.

(6) The information provided on the label should be obtained through reliable, accurate and reproducible measurement procedures, which take into account the recognised state of the art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services[5].

(7) This delegated Regulation should specify a uniform design and content for the label for vacuum cleaners.

(8) In addition, this delegated Regulation should specify requirements as to the technical documentation and the fiche for vacuum cleaners.

(9) Moreover, this delegated Regulation should specify requirements as to the information to be provided for any form of distance selling, advertisements and technical promotional materials of vacuum cleaners.

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4 [NOTE: Directive number and OJ L reference to be inserted as soon as it is known, i.e. after the final adoption and publication of the recast of Directive 1992/75/EEC –expected around May/June 2010]

5 OJ L 204, 21.7.1998, p. 37.

(10) It is appropriate to provide for a review of the provisions of this delegated Regulation taking into account technological progress.

(11) In order to facilitate the transition from Directive 95/13/EC to this delegated Regulation, provisions should be made that vacuum cleaners labelled in accordance with this delegated Regulation should be considered as compliant with Directive 95/13/EC.

(12) Directive 95/13/EC should therefore be repealed.

HAS ADOPTED THIS DELEGATED REGULATION:

Article 1
Subject matter and scope

1. This Regulation establishes requirements for the labelling and the provision of supplementary product information for electric mains-operated vacuum cleaners that are placed on the market after 12 months after entry into force of the delegated Regulation.

2. This Regulation shall not apply to

- Wet,
- Wet and dry,
- Battery operated,
- Robotic,
- Industrial, or
- Central

vacuum cleaners

- Or to floor polishers.

Article 2
Definitions

In addition to the definitions set out in Article 2 of Directive 2009/125/EC, the following definitions shall apply for the purpose of this Regulation:

(1) "vacuum cleaner" means an appliance that removes dry material (dust, fibre, threads) from the surface to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and the cleaned suction air is returned;

(2) "wet and dry vacuum cleaner" means an electrically operated appliance that removes dry and/or wet material (soil or more than 2.5 litres of liquid) from the surface by use of water-based detergent or steam to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and cleaned suction air is returned to the ambient;

(2a) “wet vacuum cleaner” means a vacuum cleaner designed to remove a significant volume, of more than 2.5 litres of liquid

(3) “water filter vacuum cleaners” means a vacuum cleaner that uses water as main means of filtration; the suction air is forced through the water entrapping the removed dry material as it passes through.

(4) “robotic vacuum cleaner” means a battery operated automatic floor cleaner that can be operated without (or with) human control within a defined perimeter. The robotic vacuum cleaner consists of the mobile part and may have a docking station and/or other accessories to assist its operation.

(5) “household vacuum cleaner” means a vacuum cleaner (including hybrid products that can be both mains and/or battery powered) used primarily in household or domestic situations; the manufacturer declares the product's compliance to the Low Voltage Directive (LVD) in the Declaration of Conformity (DoC).

(5a) “hybrid vacuum cleaner” means a vacuum cleaner that can be both mains and/or battery operated (Comment: need to clarify that when the appliance is tested on mains there is some *possible* extra energy consumption due to the presence of the battery) => CENELEC will come up with a proposal on how to test hybrid vacuum cleaner (whether the battery should be empty or full)

(6) “commercial vacuum cleaner” means a vacuum cleaner for professional housekeeping purposes and intended to be used by laymen, cleaning staff or contracting cleaners in office, shop, hospital and hotel environments; the manufacturer declares the product's compliance to the Machinery Directive (MD) in the Declaration of Conformity (DoC).

(6a) “industrial vacuum cleaner” means a mobile or stationary vacuum cleaner designed to be part of a production process (A definition is needed, because it is listed in the exclusion clauses. It is not CECED role to define it).

(7) “double stroke” means one forward and one return strokes to be carried out at a specified stroke speed over the test area according to the appropriate stroke pattern;

(7a) “cleaning cycle” means a sequence of five double strokes;

(7b) “cleaning task” means cleaning the reference house surface up to a reference level of dust removal;

(8) “dust removal ability” means the capacity of removing dust from specific surface(s) during the cleaning cycle;

(9) “fractional filtration efficiency” is the value of the percentage of the retained dust with a specific amount and particle size which is fed to the suction inlet while the vacuum cleaner is operating at its maximum power setting. The value is the ratio of the difference between the dust concentration measured at the vacuum cleaner inlet and the concentration at the vacuum cleaner outlet with respect to the concentration at the vacuum cleaner inlet;

(9a) "rated input power” means input power at "normal operation"

(9b) “normal operation” operation of the appliance under the conditions outlined in Annex I, Point 4

(10) “specific energy consumption” is the energy necessary to reach a specified reference level of dust removal on specific surface(s);

(11) “equivalent vacuum cleaner” means a model of vacuum cleaner placed on the market with the same technical and performance characteristics, energy consumption and airborne acoustical noise as another model of vacuum cleaner placed on the market under a different commercial code number by the same manufacturer;

(12) “battery operated vacuum cleaner” means a vacuum cleaner powered only by batteries;

(13) “central vacuum cleaner” means a vacuum cleaner with a fixed (not movable) vacuum source location. The hose connections are located at fixed positions in the building.

(14) “battery operated active nozzle” means a cleaning head provided with an agitation device powered by batteries to assist dirt removal.

(15) “floor polisher” means an electrical appliance that creates a shiny effect on certain kind of floor. The process usually needs to put a polish mean on the floor and remove, by the polisher, part of the material. Floor polisher, as accessory function, usually removes the excessive material from the floor by an air-flow created by a vacuum developed within the appliance.

Article 2
Responsibilities of suppliers

1. Suppliers shall ensure that:

   (1) each vacuum cleaner is supplied with a label, stating:

      (a) the energy efficiency class as set out in point 1 of Annex I, and

      (b) the separate performance classes of the dust removal on a carpet and on hard floor with crevice as set out in point 2 of Annex I,

      (d) the filtration efficiency as set out in point 3 of Annex I, and

      (e) the average annual energy consumption calculated in accordance with Annex II, and

      (f) the airborne acoustical noise emissions;

   (2) a product fiche, as set out in Annex III, is made available;

   (3) the technical documentation as set out in Annex IV is made available on request to the authorities of the Member States and to the Commission;

   (4) from 12 months after entry into force of the delegated Regulation:

      (a) any advertisement for a specific model of vacuum cleaner contains the energy efficiency class, if the advertisement discloses energy-related or price information; and

      (b) any technical promotional material concerning a specific model of vacuum cleaner which describes its specific technical parameters includes the energy efficiency class of that model.

2. The energy efficiency classes shall be based on the Energy Efficiency calculated in accordance with Annex II. The dust removal performance classes shall be based on the dust removal ability calculated in accordance with Annex II.

3. The format of the label shall be as set out in Annex V.

4 However, the obligations in point (1) above shall only apply to water filter vacuum cleaners from 40 months after entry into force of the delegated Regulation: ???

Article 4
Responsibilities of dealers

Dealers shall ensure that:

(1) each vacuum cleaner, at the point of sale, bears the label provided by suppliers in accordance with Article 3(1) on the outside of the front or top of the vacuum cleaner, in such a way as to be clearly visible;

(2) from 16 months after entry into force of the delegated Regulation:

(a) vacuum cleaners offered for sale, hire or hire-purchase where the end-user cannot be expected to see the product displayed, are marketed with the information provided by suppliers in accordance with Article 3(1)-(2) in the format specified in Annex VI;

(b) any advertisement for a specific model of vacuum cleaner contains a reference to the energy efficiency class, if the advertisement discloses energy-related or price information; and

(c) any technical promotional material concerning a specific model of vacuum cleaner which describes its specific technical parameters includes a reference to the energy efficiency class of the model.

(3) However, the obligations in point (2) above shall only apply to water filter vacuum cleaners from 40 months after entry into force of the delegated Regulation

Article 5
Measurement methods

The information to be provided under Articles 3 and 4 shall be obtained by reliable, accurate and reproducible measurement procedures, which take into account the recognised state of the art measurement methods.

Article 6
Verification procedure for market surveillance purposes

When Member States assess the conformity of the declared energy efficiency class, performance class of the dust removal on a carpet, performance class of the dust removal on a hard floor with crevice, fractional filtration efficiency, annual energy consumption, and airborne acoustical noise emissions, they shall apply the procedure laid down in Annex VII.

Article 7
Revision

The Commission shall review this delegated Regulation in light of technological progress no later than five years after its entry into force.

Article 8

Transitional provision

Articles 3(1) point 4 and 4(2) shall not apply to printed advertisement and printed technical promotional material published before 16 months after the entry into force of the delegated Regulation.

Article 10

Entry into force

This delegated Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This delegated Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, […]

For the Commission

The President

ANNEX I
Energy efficiency classes

1. ENERGY EFFICIENCY CLASSES

The energy efficiency class of a vacuum cleaner shall be determined in accordance with its Annual Energy Consumption as set out in Table 1.

The Annual Energy Consumption of a vacuum cleaner shall be determined in accordance with point 1 of Annex II.

Table 1: Energy efficiency classes

energy efficiency class	Annual Energy Consumption	
	min	max
	kWh/yr	kWh/yr
A (most efficient)	0	34
B	>34	56
C	>56	91
D	>91	130
E	>130	178
F	>178	243
G (least efficient)	>243	∞

2. DUST REMOVAL PERFORMANCE CLASSES

The dust removal performance class of a vacuum cleaner shall be determined in accordance with the dust removal ability after one cleaning cycle on a test carpet (D_c) and on a test hard floor with crevice (D_{hf}) as set out in Table 2.

The dust removal ability of a vacuum cleaner on a test carpet (D_c) and on a test hard floor with crevice (D_{hf}) shall be determined in accordance with Annex II, point 2.

Table 2: Dust removal performance classes

Dust removal performance class	**Dust removal ability on a carpet** (D_c)	**Dust removal ability on a hard floor with crevices** (D_{hf})
A (most efficient)	>1.308	>1.042
B	>1.154	>1
C	>1	>0.947
D	>0.846	>0.895
E	>0.692	>0.842
F	>0.538	>0.789
G (least efficient)	≤0.538	≤0.789

The calculation of this ratio is done

- For carpet D_c is dust pick up/65
- For hard floor D_{hf} is dust pick up/95

3. FRACTIONAL FILTRATION EFFICIENCY

The fractional filtration efficiency of a vacuum cleaner (0.4-4 μ) shall be declared as absolute value in percentage rounded at the second digit after the comma.

ANNEX II

Method for calculating the average Annual Energy Consumption, Energy Efficiency, Dust removal ability and Fractional Filtration Efficiency

...as done for Ecodesign

ANNEX III
Fiche

1. The information in the product fiche of the vacuum cleaners shall be given in the order specified in points (a) to (n).

   (a) Supplier's name or trade mark.

   (b) Supplier's model identifier which means the code, usually alphanumeric, which distinguishes a specific vacuum cleaner model from other models with the same trade mark or supplier's name.

   (c) Energy efficiency class

   (d) average Annual Energy Consumption (AE_C) in kWh/year, rounded to the one decimal place, as defined in Annex II; it shall be described as: 'Indicative annual energy consumption 'Y' kWh per year, based on 50 cleaning tasks. Actual annual energy consumption will depend on how the appliance is used.'

   (e) dust removal performance classes of a vacuum cleaner and individual classes and individual dust removal ability (%) on a test carpet and on a test hard floor with crevice, as defined in Annex I, table 2

   (f) Filtration efficiency and %, as defined in Annex I

   (g) Where the vacuum cleaner has been granted an 'EU Eco-label award' under Regulation (EC) No 66/2010[6] of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel, this information may be included

   (h) Rated input power, as defined in Annex I, point 4

   (j) Airborne acoustical noise emissions expressed in dB(A) re 1 pW and rounded to the nearest integer

2. One fiche may cover a number of vacuum cleaner models supplied by the same supplier.

3. The information contained in the fiche may be given in the form of a copy of the label, either in colour or in black and white. Where this is the case, the information listed in point 1 not already displayed on the label shall also be provided.

[6] OJ L ...

Annex IV
Technical documentation

1. The technical documentation referred to in Article 3 (3) shall include:

   (a) the name and address of the supplier;

   (b) a general description of the vacuum cleaner type and/or model and/or commercial code , sufficient for it to be unequivocally and easily identified;

   (c) where appropriate, the references of the harmonised standards applied;

   (d) where appropriate, the other technical standards and specifications used;

   (e) identification and signature of the person empowered to bind the supplier;

   (f) technical parameters for measurements as follows (after 1,2,3,5,7 and 10 double strokes):

      (i) specific energy consumption on test carpet,

      (ii) specific energy consumption on test hard floor with crevice,

      (iii) dust removal ability from a carpet,

      (iv) dust removal ability from a hard floor with crevice,

      (v) fractional filtration efficiency,

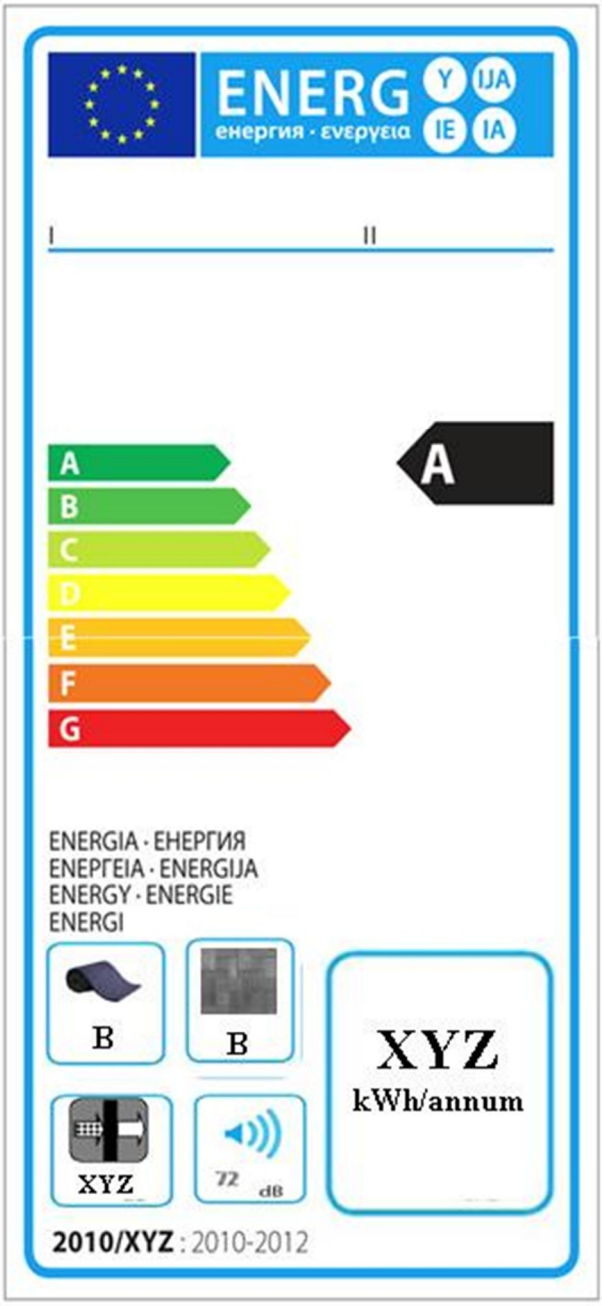
      (vi) airborne acoustical noise,

   (g) the results of calculations performed in accordance with Annex II.

2. Where the information included in the technical documentation file for a particular vacuum cleaner model has been obtained by calculation on the basis of design, or extrapolation from other equivalent vacuum cleaner or both, the documentation shall include details of such calculations or extrapolations or both, and of tests undertaken by suppliers to verify the accuracy of the calculations undertaken. The information shall also include a list of all other equivalent vacuum cleaner models where the information was obtained on the same basis.

ANNEX V
Label

1. LABEL



(1) The following information shall be included in the label:

I. supplier's name or trade mark;

II. supplier's model identifier, where 'model identifier' means the code, usually alphanumeric, which distinguishes a specific vacuum cleaner model from other models with the same trade mark or supplier's name;

III. the energy efficiency class as defined in Annex I; the head of the arrow containing the energy efficiency class of the vacuum cleaner shall be placed at the same height as the head of the arrow of the relevant energy efficiency class;

IV, dust removal performance class on a test carpet as defined in Annex I;

V. dust removal performance class on a test hard floor with crevice, as defined in Annex I;

VI. fractional filtration efficiency;

VII average Annual Energy Consumption as defined in Annex I;

VII airborne acoustical noise emissions, expressed in dB (A) re 1 pW, rounded to the nearest integer.

(2) The design of the label shall be in accordance with point 2. By way of derogation, where a model has been granted an 'EU eco-label' under Regulation (EC) No 66/2010[7] of the European Parliament and of the Council, a copy of the EU eco-label may be added. (Comment: Details of the size of the label will be introduced in point 2 of this Annex)

[7] OJ L … .

ANNEX VI

Distance selling and other forms of selling where end-users cannot be expected to see the product displayed

1. The information referred to in Article 4(2) shall be provided in the following order:

   (a) the energy efficiency class as defined in Annex I;

   (b) dust removal performance class of a vacuum cleaner on a test carpet, as defined in Annex I

   (c) dust removal performance class of a vacuum cleaner on a test hard floor with crevice, as defined in Annex I;

   (d) the average Annual Energy Consumption (AE_C) in accordance with Annex II

   (e) Fractional filtration efficiency

   (f) Rated input power, as defined in Annex I, point 4

   (h) airborne acoustical noise emissions expressed in dB(A) re 1 pW and rounded to the nearest integer;

2. Where other information contained in the product information fiche is also provided, it shall be in the form and order specified in Annex III.

3. The size and font, in which all the information referred in this Annex is printed or shown, shall be legible (minimum height 3 mm).

ANNEX VII
Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Articles 3 and 4, Member State authorities shall test a single vacuum cleaner. If the measured parameters do not meet the values declared by the supplier within the ranges set out in Table 1, the measurements shall be carried out on three more vacuum cleaners. The arithmetic mean of the measured values of these three vacuum cleaners shall meet the values declared by the supplier within the range defined in Table 1.

Otherwise, the model and all other equivalent vacuum cleaner models shall be considered not to comply with the requirements laid down in Articles 3 and 4.

Member States authorities shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

Table 1

Measured parameter	Verification tolerances
average Annual Energy Consumption	The measured value shall not be greater than the rated value* of AE_C by more than 10 %.
dust removal ability from test carpet	The measured value shall not be less than the rated value of D_c by more than [X] %. be identified by CENELEC).
dust removal ability from test hard floor with crevice	The measured value shall not be less than the rated value of D_{hf} by more than [X] %. be identified by CENELEC).
Filtration efficiency	The measured value shall not be greater than the rated value by more than X (no percentage but points to be identified by CENELEC).
Rated input power	The tolerances of the measured value shall be in the range of ±10 %.
Airborne acoustical noise	The measured value shall meet the rated value.

* ‘rated value’ means a value that is declared by the supplier.

Annex II

Working Document on a possible

COMMISSION REGULATION

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for vacuum cleaners

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products[8] , and in particular Article 15(1) thereof,

After consulting the Ecodesign Consultation Forum,

Whereas:

(1) Under Directive 2009/125/EC ecodesign requirements should be set by the Commission for energy-related products representing significant volumes of sales and trade, having significant environmental impact and presenting significant potential for improvement in terms of their environmental impact without entailing excessive costs.

(2) Article 16(2), first indent, of Directive 2009/125/EC provides that in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15(2), and after consulting the Ecodesign Consultation Forum, the Commission shall, as appropriate, introduce an implementing measure for domestic appliances, including vacuum cleaners.

(3) The Commission has carried out a preparatory study to analyse the technical, environmental and economic aspects of vacuum cleaners typically used in households and commercial premises. The study has been developed together with stakeholders and interested parties from the Community and third countries, and the results have been made publicly available.

(4) Wet vacuum cleaners have particular characteristics and should therefore be exempted from the scope of this Regulation. However, considering that they offer similar functionalities as other vacuum cleaners, they should be addressed as soon as possible in another implementing measure of Directive 2009/125/EC.

(5) The environmental aspect of the products covered, identified as significant for the purposes of this Regulation, is energy consumption in the use phase. The annual electricity consumption of products subject to this Regulation was estimated to have been XX TWh in the Community in 20XX. Unless specific measures are taken, annual electricity consumption is predicted to be XXX TWh in 2020. The preparatory study shows that the energy consumption of products subject to this Regulation can be significantly reduced.

(6) The preparatory study shows that requirements regarding other ecodesign parameters referred to in Annex I, Part 1, of Directive 2009/125/EC are not necessary as energy

[8] OJ L 285, 31.10.2009, p. 10–35

consumption of vacuum cleaners in the use phase are by far the most important environmental aspect.

(7) The energy consumption of products subject to this Regulation should be made more efficient by applying existing non-proprietary cost-effective technologies that can reduce the combined costs of purchasing and operating these products.

(8) The ecodesign requirements should not affect functionality from the end-user's perspective and should not negatively affect health, safety or the environment. In particular, the benefits of reducing energy consumption during the use phase should more than offset any additional environmental impacts during the production phase and the disposal.

(9) The ecodesign requirements should be introduced gradually in order to provide a sufficient timeframe for manufacturers to re-design products subject to this Regulation. The timing should be such as to avoid negative impacts on the functionalities of equipment on the market, and to take into account cost impacts for end-users and manufacturers, in particular small and medium-sized enterprises, while ensuring timely achievement of the objectives of this Regulation.

(10) Measurements of the relevant product parameters should be performed through reliable, accurate and reproducible measurement methods, which take into account the recognised state of the art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services[9].

(11) In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.

(12) In order to facilitate compliance checks, manufacturers should provide information in the technical documentation referred to in Annexes V and VI of Directive 2009/125/EC insofar as this information relates to the requirements laid down in this Regulation.

(13) In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to ensure the wide availability and easy accessibility of information on the life-cycle environmental performance of products subject to this Regulation.

(14) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC,

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation establishes eco-design requirements for the placing on the market of electric mains-operated vacuum cleaners that are placed on the market following the time schedule outlined in Annex I (as referred to in Art 8).

2. This Regulation shall not apply to

   - Wet,

[9] OJ L 204, 21.7.1998, p. 37.

- Wet and dry
- Battery operated,
- Robotic
- Industrial, or
- Central

vacuum cleaners.

- Or to floor polishers

Article 2
Definitions

In addition to the definitions set out in Article 2 of Directive 2009/125/EC, the following definitions shall apply for the purpose of this Regulation:

(1) "vacuum cleaner" means an appliance that removes dry material (dust, fibre, threads) from the surface to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and the cleaned suction air is returned;

(2) "wet and dry vacuum cleaner" means an electrically operated appliance that removes dry and/or wet material (soil or more than 2.5 litres of liquid) from the surface by use of water-based detergent or steam to be cleaned by an airflow created by a vacuum developed within the unit. The material thus removed is separated in the appliance and cleaned suction air is returned to the ambient;

(2a) "wet vacuum cleaner" means a vacuum cleaner designed to remove a significant volume, of more than 2.5 litres of liquid

(3) "water filter vacuum cleaners" means a vacuum cleaner that uses water as the main means of filtration; the suction air is forced through the water entrapping the removed dry material as it passes through.

(4) "robotic vacuum cleaner" means a battery powered automatic floor cleaner that can be operated without (or with) human control within a defined perimeter. The robotic vacuum cleaner consists of the mobile part and may have a docking station and /or other accessories to assist its operation.

(5) "household vacuum cleaner" means a vacuum cleaner (including hybrid products that can be both mains and/or battery powered) used primarily in household or domestic situations; the manufacturer declares the product's compliance with the Low Voltage Directive (LVD) in the Declaration of Conformity (DoC).

(5a) "hybrid vacuum cleaner" means a vacuum cleaner that can be both mains and/or battery operated (Comment: need to clarify that when the appliance is tested on mains there is some *possible* extra energy consumption due to the presence of the battery) => CENELEC will come up with a proposal on how to test hybrid vacuum cleaner (whether the battery should be empty or full)

(6) "commercial vacuum cleaner" means a vacuum cleaner for professional housekeeping purposes and intended to be used by laymen, cleaning staff or contracting cleaners in office, shop, hospital and hotel environments; the manufacturer declares the product's compliance with the Machinery Directive (MD) in the Declaration of Conformity (DoC).

(6a) “industrial vacuum cleaner”: means a mobile or stationary vacuum cleaner designed to be part of a production process (A definition is needed, because it is listed in the exclusion clauses. It is not CECED role to define it.)

(7) “double stroke” means one forward and one return strokes to be carried out at a specified stroke speed over the test area according to the appropriate stroke pattern;

(7a) “cleaning cycle” means a sequence of five double strokes;

(7b) “cleaning task” means cleaning the reference house surface up to a reference level of dust removal;

(8) “dust removal ability” means the capacity of removing dust from specific surface(s) during the cleaning cycle;

(9) “fractional filtration efficiency” is the value of the percentage of the retained dust with a specific amount and particle size which is fed to the suction inlet while the vacuum cleaner is operating at its maximum power setting. The value is the ratio of the difference between the dust concentration measured at the vacuum cleaner inlet and the concentration at the vacuum cleaner outlet with respect to the concentration at the vacuum cleaner inlet.

(9a) "rated input power” means input power at "normal operation"

(9b) “normal operation” operation of the appliance under the conditions outlined in Annex II, Point 4

(10) “specific energy consumption” is the energy necessary to reach a specified reference level of dust removal on specific surface(s);

(11) “equivalent vacuum cleaner” means a model of vacuum cleaner placed on the market with the same technical and performance characteristics, energy consumption and airborne acoustical noise as another model of vacuum cleaner placed on the market under a different commercial code number by the same manufacturer.

(12) “battery operated vacuum cleaner” means a vacuum cleaner powered only by batteries.

(13) “central vacuum cleaner” means a vacuum cleaner with a fixed (not movable) vacuum source location. The hose connections are located at fixed positions in the building.

(14) “battery operated active nozzle” means a cleaning head provided with an agitation device powered by batteries to assist dirt removal.

(15) “floor polisher” means an electrical appliance that creates a shiny effect on certain kind of floor. The process usually needs to put a polish mean on the floor and remove, by the polisher, part of the material. Floor polisher, as accessory function, usually removes the excessive material from the floor by an air-flow created by a vacuum developed within the appliance**.**

Article 3
Ecodesign requirements

The specific ecodesign requirements for vacuum cleaners are set out in point 1 of Annex I.

Article 4

Conformity assessment

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.

2. For the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation file shall contain a copy of the calculation set out in Annex II to this Regulation.

Where the information included in the technical documentation for a particular vacuum cleaner model has been obtained by calculation on the basis of design, or extrapolation from other equivalent vacuum cleaners, or both, the technical documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by manufacturers to verify the accuracy of the calculations undertaken. In such cases, the technical documentation shall also include a list of all other equivalent vacuum cleaner models where the information included in the technical documentation was obtained on the same basis.

Article 5

Verification procedure for market surveillance purposes

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC for compliance with requirements set out in Annex I to this Regulation, the Member States authorities shall apply the verification procedure described in Annex III to this Regulation.

Article 6

Benchmarks

The indicative benchmarks for best-performing vacuum cleaners available on the market at the time of entry into force of this Regulation are set out in Annex IV.

Article 7

Revision

The Commission shall review this Regulation in the light of technological progress no later than five years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the verification tolerances set out in Annex III.

Article 8

Entry into force

1. This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

2. The specific ecodesign requirements set out in point 1(1) of Annex I shall apply from 2 years after the entry into force of this Regulation.

   The specific ecodesign requirements set out in point 1(2) of Annex I shall apply from 5 years after the entry into force of this Regulation.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission

The President

ANNEX I
Ecodesign requirements

For the calculation of the Energy Efficiency, the dust removal ability on a test carpet and on a test hard floor with crevice shall be determined in several steps.

1. Specific ecodesign requirements

vacuum cleaners shall comply with the following requirements:

(1) From 2 years after the entry into force of this Regulation:

Phase out vacuum cleaners having Annual Energy Consumption AE_C higher than 243 kWh/y

The rated input power shall be less than 1600W

(2) From 5 years after the entry into force of this Regulation:

Phase out vacuum cleaners having Annual Energy Consumption AE_C higher than 91 kWh/y

The rated input power shall be less than 1200W

Fractional filtration efficiency shall be no less than [98%].

ANNEX II
Calculation Methods

1. CALCULATION OF THE ANNUAL ENERGY CONSUMPTION

(a) The average Annual Energy Consumption (AE_C) is calculated, in kWh/year and rounded to one decimal place, as follows:

$$AE_C = \frac{SE_a}{10} \times A \times 50 + NP + \left(t_i \times P_{eff}\right) \textbf{ kWh}$$

where

- SE_a = average Specific Energy Consumption on 10m² of test carpet and test hard floor with crevice (kWh/10 m²)
- A = average floor area to be cleaned (m²)
- 50 is the standard number of cleaning tasks per year
- NP =energy power consumption of the battery driven active nozzle during the 25 carpet cleaning tasks per year (kWh) (Comment: For the moment there is no agreed method but CENELEC will develop one shortly.)
- t_i = annual time in idle mode (h)
- P_{eff}= average effective power intake (kW).

(b) The average household floor area to be cleaned is , A= 87 m²

(c) The average time in idle mode (*t*i) is $t_i = 5$ h

(d) The average Specific Energy Consumption (SE_a) calculated in kWh per 10 square meter (kWh/10m^2), rounded to the first decimal place as:

SEa = 10m² x P_{eff} x Nds x 100x2/(HW x Vel x60x60)

where

P_{eff} is the average power consumption during the test. [kW]

Nds = (Nds_{carpet} + Nds $_{hard\ floor}$)/2

Nds_{carpet} is the number of double strokes required to necessary to reach the reference level of dust removal ability on test carpet and

Nds $_{hard\ floor}$ is the number of double strokes required to necessary to reach the reference level of dust removal ability on test hard floor with crevice

Vel is 0.5m/s (the required velocity of the head in the test)

HW is the width of the vacuum cleaner head in cm (Comment: the width of the nozzle should be chosen according to the type of floor. The formula will be adapted and transferred to the Commission on a short notice. However, it should not have significant effects on the result of the specific energy consumption)

The reference level of dust removal ability on test carpet is 65% checked and corrected by using the reference cleaner. The correction, rounded to the third decimal place is done as follows:

corrected Reference level =

(65 %) x (measured D_C reference cleaner)/(calibrated D_C reference cleaner)

where

- calibrated D_C reference cleaner = the dust removal ability (dust pick up) in % as given by the manufacturer (SLG) for that specific cleaner.
- measured D_C reference cleaner = the dust removal ability (dust pick up) in % as measured in a specific testing condition (laboratory, carpet, …).

Example:

calibrated D_C reference cleaner = 76 %

measured D_C reference cleaner = 72 %

corrected Reference level = 65 x 72/76 = 61.579%

The reference level of dust removal ability on test hard floor with crevice is 95%. It doesn't need any correction.

Hybrid vacuum cleaners should be tested with the plug in the socket and the batteries made inoperative.

2. CALCULATION OF THE DUST REMOVAL ABILITY

Dust removal ability of a vacuum cleaner is the ratio, in percent, of the quantity of dust removed from a test carpet or from a test hard floor with crevice during a cleaning cycle to the quantity of dust distributed on the test area and that can be potentially suctioned by the cleaning head.

On test carpet the cleaning cycle is repeated at least three times (*n*) and the average number of dust removal ability is taken.

(b) The dust removal ability from a test carpet (D_c) of a vacuum cleaner is calculated, in percentage and rounded to the nearest whole percent, as:

$$D_c = \frac{1}{n}\sum_{j=1}^{n}\left(\frac{D_r}{D_d}\times 100\right)$$

Where

n is the number of cleaning cycles, ≥ 3

j is the number of the current cleaning cycle

D_r is the amount of dust removed from the carpet, in gram

D_d is the amount of dust distributed on the carpet, in gram, rounded to the second decimal place

(c) The amount (D_r) of dust removed from the carpet for each cleaning cycle is calculated, in gram and rounded to the second decimal place as:

$$D_r = W_f - W_i$$

where

Wf is the weight of the dust receptacle after one cleaning cycle, in gram

Wi is the weight of the initially empty dust receptacle, in gram.

(d) The dust removal ability from a hard floor with crevice (D_{hf}) of a vacuum cleaner is calculated, in percentage and rounded to the nearest whole percent, as:

$$D_{hf} = \frac{M_d - M_r}{M_d} \times \frac{L}{B} \cos 45^\circ \times 100$$

where

B is the outside width of the cleaning head, in mm

L is the length of the crevice, in mm

M_r is the amount of dust remaining in the crevice after 5 cleaning cycles, in gram, rounded to the second decimal place

M_d is the amount of dust in the crevice before cleaning, in gram , rounded to the second decimal place

Hybrid vacuum cleaners should be tested with the plug in the socket and the batteries made inoperative.

3. CALCULATION OF FRACTIONAL FILTRATION EFFICIENCY

The aim of this test is to determine the ability of a vacuum cleaner to retain dust, depending on particle size, from the intake aerosol containing a predefined concentration of test dust.

In preparation of the test, the vacuum cleaner should be equipped with a new dust receptacle and new filters according to specifications. It is to be set to operate at maximum airflow.

The vacuum cleaner is placed centrally under the test hood in its normal operation condition.

Dust will be fed:

to vacuum cleaners with a suction hose, through this hose,

to vacuum cleaners without a suction hose (for instance Uprights) through a suitable auxiliary hose which is connected and sealed tightly to the suction nozzle by use of a nozzle adaptor.

For the entire duration of dust being fed, the dust concentration c shall be 0.1 g/m³ in the intake aerosol channel. Therefore, the maximum airflow q for the vacuum cleaner with the given filter equipment shall be determined.

The quantity m of dust to be fed for duration t_{DUST} is calculated consequently as:

$m = c * t_{DUST} * q$.

Test procedure

The test proceeds as follows:

the vacuum cleaner is operated without dust being fed until acceptable and stable conditions are achieved (minimum 10 minutes),

particle counts are taken for 30 sec from the aerosol intake channel and from the exhaust channel in order to determine backgrounds,

dust is fed for 10 min while the particle concentration in the aerosol intake channel is monitored,

meanwhile 5 measurement cycles are carried out, each consisting of:

- particle registration from aerosol intake channel for 30 sec (upstream measurement),
- if a single particle counter is used: flushing of particle analyzing system for 15 sec,
- particle registration from exhaust channel for 30 sec (downstream measurement),
- flushing of particle analyzing system for 15 sec

Particle registration is by optical particle counter which can be operated with a suitable aerosol dilution system to adapt count rate capacity and the particle concentration of aerosol intake and of exhaust channel, respectively.

Evaluation

Based on the particle counts obtained in the 5 measurement cycles, for aerosol intake channel and exhaust channel, the fractional filtration efficiency is derived for each particle class.

The individual measurements are considered to be samples of a full distribution, and a statistical analysis is performed accordingly.

(Comment: To assess whether we need to add any relevant section of the current draft standard Par. 2.10 EN 60312:200X/prAA:2008)

Filtration Efficiency of the vacuum cleaner

The aim of this test is to determine the ability of a vacuum cleaner to retain dust, depending on particle size, from the intake aerosol containing a predefined concentration of test dust.

This test is not suitable for determining permeability of filters or filter materials.

Test conditions

Note: A relative humidity of 45-55 % RH is recommended for control of static. It is also recommended that in a single test series, the humidity for each filter be within 10 % of the other samples tested

Measuring equipment required for the test is specified in

In preparation of the test, the vacuum cleaner should be equipped with a new dust receptacle and new filters according to specifications. It is to be set to operate at maximum airflow.

The vacuum cleaner is placed centrally under the test hood in its normal operation condition.

Dust will be fed:

to vacuum cleaners with a suction hose, through this hose,

to vacuum cleaners without a suction hose (for instance Uprights) through a suitable auxiliary hose which is connected and sealed tightly to the suction nozzle by use of a nozzle adaptor.

Determining the test dust quantity

For the entire duration of dust, according to, being fed, the dust concentration c shall be 0.1 g/m³ in the intake aerosol channel. Therefore, the maximum airflow q for the vacuum cleaner with the given filter equipment shall be determined.

The quantity m of dust to be fed for duration t_{DUST} is calculated consequently as:

$$m = c * t_{DUST} * q .$$

Test procedure

With the vacuum cleaner prepared according to 5.11.1, the test proceeds as follows:

the vacuum cleaner is operated without dust being fed until acceptable and stable conditions are achieved (minimum 10 minutes),

particle counts are taken for 30 sec from the aerosol intake channel and from the exhaust channel in order to determine backgrounds,

dust is fed for 10 min while the particle concentration in the aerosol intake channel is monitored,

meanwhile 5 measurement cycles are carried out, each consisting of:

- particle registration from aerosol intake channel for 30 sec (upstream measurement),
- if a single particle counter is used: flushing of particle analyzing system for 15 sec,

- particle registration from exhaust channel for 30 sec (downstream measurement),
- flushing of particle analyzing system for 15 sec
- if two particle counters, adjusted to provide comparable values, are used: continuous measurement is allowed.

Particle registration is by optical particle counter which can be operated with a suitable aerosol dilution system to adapt count rate capacity and the particle concentration of aerosol intake and of exhaust channel, respectively. The results of these measurement cycles shall be recorded as follows:

Counter events / class; i.e. the number of events recorded by the particle counter, separately for each range of particle size,

Sample air volumes, VA_D (downstream) and VA_U (upstream); i.e. the volumes of the aerosol samples analyzed by the particle counter combined in the course of the test,

Applicable dilution factors k_{VA} (upstream or downstream) of the particle analysis system; i.e. the ratio between the volume of the air sample extracted from the channel and the sample air volume analyzed by the particle counter.

The test procedure shall be repeated with at least 3 vacuum cleaners of identical type.

Based on the particle counts obtained in the 5 measurement cycles, for aerosol intake channel and exhaust channel, the fractional filtration efficiency is derived for each particle class.

The individual measurements are considered to be samples of a full distribution, and a statistical analysis is performed accordingly.

Given the particle counts $z(k,l)_U$ of the aerosol intake channel (upstream) for particle class k obtained from each individual measurement cycle l, the corresponding lower limits of the 95 % -confidence range, $\underline{Z(k)}_U$, are obtained as follows:

- Summation of particle counts obtained for particle class k in 5 individual measurements upstream

$$Z(k)_U = \sum_{l=1}^{5} z(k,l)_U$$

Where:

k index of particle class,
l Running index of individual measurement cycles,
$z(k,l)_U$ Particle count upstream in class k from individual measurement cycle *l*,
$Z(k)_U$ Particle sum upstream in class k from all 5 measurement cycles,

- Determination of the 95 % lower - confidence limits $\underline{Z(k)_{U\_95}}$ for the particle sums $Z(k)_U$:

If $Z(k)_U > 50$: $\quad \underline{Z(k)}_{U\_0,95} = Z(k)_U - 1{,}96 * \left(Z(k)_U\right)^{\frac{1}{2}}$

If $Z(k)_U \le 50$: $\quad \underline{Z(k)}_{U\_0,95}$ from Table 1.

Given the particle counts $z(k,l)_D$ of the exhaust channel (downstream) for particle

class *k* obtained from each individual measurement cycle *l*, the corresponding upper limits of the 95 % - confidence range, $\overline{Z(k)}_{D\_0.95}$ are similarly derived by:

- Summation of particle counts obtained for particle class I in 5 individual measurements downstream

$$Z(k)_D = \sum_{l=1}^{5} z(k,l)_D$$

Where:

k Index of particle class,
l Running index of individual measurement cycles,
$z(k,l)_D$ Particle count downstream in class k from individual measurement cycle *l*
$Z(k)_D$ Particle sum downstream in class k from all 5 measurement cycles,

- Determination of corresponding upper limits of the 95 % - confidence range $\overline{Z(k)}_{D\_0.95}$ from particle sums $Z(k)_D$:

If $Z(k)_D > 50$: $\overline{Z(k)}_{D\_0,95} = Z(k)_D + 1{,}96 * \left(Z(k)_D\right)^{\frac{1}{2}}_{ink}$

If $Z(k)_D \le 50$: $\overline{Z(k)}_{D\_0,95}$ from Table 2 in 7.2.8.4 .

From the statistical limits calculated above, the lower limit of the 95 % - confidence range of the fractional filtration efficiency, $\underline{E(k)}_{0,95}$, is obtained for each particle class *k* :

$$\underline{E(k)}_{0,95} = 1 - \left(\frac{\overline{Z(k)}_{D\_0,95} * k_{VA\_D} * \left(\frac{VA_U}{VA_D}\right)}{\underline{Z(k)}_{U\_0,95} * k_{VA\_U}} \right)$$

where

k Index of particle class,
$E(k)_{0,95}$ Lower limit of confidence for filtration efficiency of particle class *k*
k_{VA_D} Downstream dilution factor of particle analysis system
k_{VA_U} Upstream dilution factor of particle analysis system
VA_D Downstream sample air volume analyzed
VA_U Upstream sample air volume analyzed
$Z(k)_{D\_0,95}$ Upper limit of confidence for partial sum class k from downstream measurements
$Z(k)_{U\ 0,95}$ Lower limit of confidence for particle sum class *k* from upstream measurements

This evaluation shall be carried out in every test.

Hybrid VC should be tested with the plug in the socket.

z	$\underline{Z}_{0,95}$	$\overline{Z}_{0,95}$	z	$\underline{Z}_{0,95}$	$\overline{Z}_{0,95}$	z	$\underline{Z}_{0,95}$	$\overline{Z}_{0,95}$	z	$\underline{Z}_{0,95}$	$\overline{Z}_{0,95}$	z	$\underline{Z}_{0,95}$	$\overline{Z}_{0,95}$
0	0,0	3,7	10	4,7	18,4	20	12,2	30,8	30	20,2	42,8	40	28,6	54,5
1	0,1	5,6	11	5,4	19,7	21	13,0	32,0	31	21,0	44,0	41	29,4	55,6
2	0,2	7,2	12	6,2	21,0	22	13,8	33,2	32	21,8	45,1	42	30,3	56,8
3	0,6	8,8	13	6,9	22,3	23	14,6	34,4	33	22,7	46,3	43	31,1	57,9
4	1,0	10,2	14	7,7	23,5	24	15,4	35,6	34	23,5	47,5	44	32,0	59,0
5	1,6	11,7	15	8,4	24,8	25	16,2	36,8	35	24,3	48,7	45	32,8	60,2
6	2,2	13,1	16	9,2	26,0	26	17,0	38,0	36	25,1	49,8	46	33,6	61,3
7	2,8	14,4	17	9,9	27,2	27	17,8	39,2	37	26,0	51,0	47	34,5	62,5
8	3,4	15,8	18	10,7	28,4	28	18,6	40,4	38	26,8	52,2	48	35,3	63,6
9	4,0	17,1	19	11,5	29,6	29	19,4	41,6	39	27,7	53,3	49	36,1	64,8
10	4,7	18,4	20	12,2	30,8	30	20,2	42,8	40	28,6	54,5	50	37,0	65,9

Table 1: Confidence limits of a Poisson distribution for 95 % - confidence range.

Particle Concentration and Dilution

For flawless particle registration and analysis it has to be monitored and maintained that the particle concentration at the counter is within its specified range of proper operation and that each individual particle count z_{SAMPLE} is well below the maximum count $z_{COUNTER\_MAX}$, such that

$z_{SAMPLE} < 0.2\ z_{COUNTER\_MAX.}$

To verify not over-concentrated, increase the dilution a known amount, and verify that the counts are decreased by the same ratio.

To verify not over diluted, decrease the dilution and verify that the counts increase by this same change in dilution ratio.

Record keeping

A record with the following information must be kept for each test of fractional filtration efficiency:

electrical and air-technical data of the type of at least 3 devices being tested

information on its dust receptacle and filter system

quantity of test dust being fed in the procedure

information on the particle analysis system:

- particle counter and size ranges of analyzed particle classes
- dilution factors upstream and downstream

for each particle count:

- dilution factor

sample air volume analyzed in the particle counter

particle counts in each class registered by the particle counter

filtration efficiency (lower limit of 95 % - confidence range) of each particle class

sheath air if applicable

vacuum cleaner air flow rate if applicable

4. CALCULATION OF NORMAL OPERATION

The appliance is supplied at rated voltage and operated continuously with the air inlet adjusted to give a power input Pm after 20 s. Three minutes later a final adjustment of the air inlet is made, if necessary. Pm is calculated from the formula

$Pm = 0,5 (Pf + Pi)$

where

Pf is the power input in watts, after 3 min of operation with the air inlet unobstructed. Any device that ensures a flow of air to cool the motor in the event of a blockage of the main air inlet is allowed to operate;

Pi is the power input in watts, after a further 20 s of operation with the air inlet blocked.

Any device that is adjustable without the aid of a tool, and which ensures a flow of air to cool the motor in the event of a blockage of a main air inlet, is rendered in operative.

Rotating brushes and similar devices are in operation but not in contact with any surface. Motorized cleaning heads are connected by means of the hose or tube and are in operation but not in contact with any surface.

Appliance outlets for other accessories are loaded with a resistive load in accordance with the marking.

ANNEX III
Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Annex I, Member State authorities shall test a single vacuum cleaner. If the measured parameters do not meet the declared values within the meaning of Article 4(2) of the manufacturer within the ranges set out in Table 1, the measurements shall be carried out on three more vacuum cleaners. The arithmetic mean of the measured values of these three vacuum cleaners shall meet the requirements within the ranges set out in Table 1.

Otherwise, the model and all other equivalent vacuum cleaner models shall be considered not to comply with the requirements laid down in Annex I.

Member States authorities shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

Table 1

Measured parameter	Verification tolerances
average Annual Energy Consumption	The measured value shall not be greater than the rated value* of AE_C by more than [10]%.
rated input power	The tolerances of the measured value shall be in the range of ±10 %.
dust removal ability from a test carpet	The measured value shall not be less than the rated value of D_c by more than [X] %. be identified by CENELEC).
dust removal ability from a test hard floor with crevice	The measured value shall not be less than the rated value of D_{hf} by more than [X] %. be identified by CENELEC).
Filtration efficiency	The measured value shall not be greater than the rated value by more than X (no percentage but points to be identified by CENELEC).

ANNEX IV
Benchmarks

At the time of entry into force of this Regulation, the best available technology on the market for vacuum cleaners, in terms of their energy consumptions, dust removal, fractional filtration efficiency and airborne acoustical noise