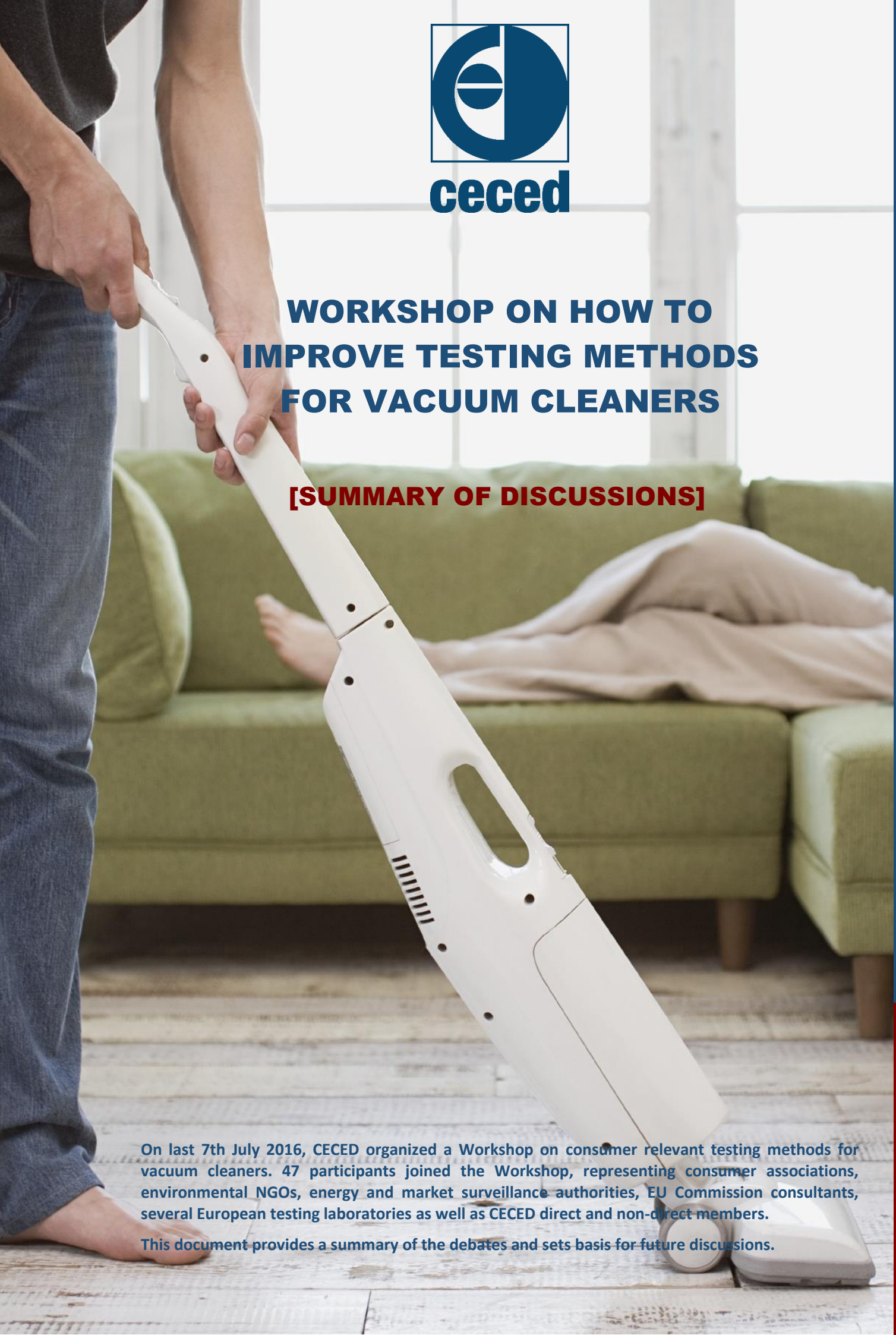


WORKSHOP ON HOW TO IMPROVE TESTING METHODS FOR VACUUM CLEANERS

[SUMMARY OF DISCUSSIONS]

On last 7th July 2016, CECED organized a Workshop on consumer relevant testing methods for vacuum cleaners. 47 participants joined the Workshop, representing consumer associations, environmental NGOs, energy and market surveillance authorities, EU Commission consultants, several European testing laboratories as well as CECED direct and non-direct members.

This document provides a summary of the debates and sets basis for future discussions.

INTRODUCTION

Last 16th December 2015, CECED organized a one-afternoon workshop, inviting several stakeholders to discuss and reflect on meaningful and consumer relevant test methods simulating real-life use of vacuum cleaners.

NGOs, Consumer associations, Member States representatives, members of standardization committees as well as Market Surveillance Authorities and manufacturers discussed how to make tests closer to real-life conditions and to develop regulations that would allow an effective enforcement from Market Surveillance Authorities.

At the end of the meeting, participants concluded that the discussion had been very fruitful but that one afternoon was definitely not enough to tackle all these issues. A second workshop was therefore organized on 7th July 2016.

CECED decided to organize the workshop at VDE laboratory to allow participants to witness how the tests are conducted.

I. IMPACT AND RELEVANCE OF REPEATABILITY, REPRODUCIBILITY, MEASUREMENT UNCERTAINTIES AND TOLERANCES

At the beginning of the workshop, participants were given a short introduction on a few concepts, crucial in standardization discussion

The objective of a standard is to provide reliable, accurate and reproducible measurements results in order, for example, to verify the compliance of a product with the requirements set by a regulation.

In order to understand how to fulfil these objectives, it is important to understand the difference between repeatability and reproducibility but also between measurement uncertainties and tolerances. Mr Scheuren (convenor of CENELEC TC59X WG 6) started the discussions. Presentation available here attached.

Repeatability refers to the fact that the test results should be equivalent if the same appliance is tested several times, with the same procedure, by the same operator, with same test equipment, in the same location and over a short period of time.

Repeatability should not be mixed up with reproducibility, which refers to the fact that the test results should be equivalent if the same appliance is tested several times with the same procedure but by different operators, with different test equipment and at different locations. There is no time restriction when talking about reproducibility.

Measurement uncertainties are defined as any uncontrollable factor that affects the results of a measurement.

Tolerances are defined as the permitted difference between the measured value (for instance by surveillance authorities) and the declared one (by suppliers). Tolerances exist in order to make sure that companies complying with the requirements are not sanctioned because of the margin of error existing in the measurement when the Market Surveillance Authorities verify the compliance of a product. During his presentation, Mr Scheuren made clear that verification tolerances shall be used only by Market Surveillance Authorities when conducting verifications, not by manufacturers when making declarations. Also, it was made clear that the setting of the level of verification tolerances is a political decision and defined by regulators in the legislation, not by standards, but should ideally be based on the results of round robin test (RRT) which gives an indication of the needed tolerance levels. Tolerances should normally be close to the expanded measurement uncertainty.

In relation to the discussions on tolerances and testing, Mr Bell (Which?) asked whether companies are testing many times an appliance and simply take the best result of the tests in order to get the best ranking. Mr Scheuren answered that if companies take the best test result to make their declaration, they run the risk of

overrating their appliances and being sanctioned by Market Surveillance Authorities. This is also the reason why standardization should aim at having the best possible reproducibility to avoid variations and limit the risk of non-intentional wrong declarations.

II. UPDATE ON THE CURRENT STANDARDIZATION ACTIVITIES

Mr Scheuren provided the participants with an update on the work ongoing at the standardization level – the full presentation is available for reference here attached.

Mr Scheuren started by clarifying that a standard cannot define the content of the regulations but is used to implement the legislation.

When talking about standards and standardization, "standardizers" often face a certain number of **criticisms**: (1) standards are too complex, (2) standards are perceived as not really meaningful and consumer relevant, (3) standards are depicted as not simulating enough real-life conditions of use, (4) standards are mainly written by manufacturers and therefore favouring their interests.

Several answers can be provided: concerning the complexity of the standards (1), complexity is often to fulfil the need of good repeatability and reproducibility. Standardization bodies are willing to make the tests as simple as possible; nevertheless, to be effective, a standard has to satisfy these essential requirements – which often make it more complex.

Concerning (2) and (3) and the necessity to be consumer relevant – all agree that tests should be as close as possible to the real-conditions of use. However, very often, the reason why tests differ from real user behaviour is again the necessity to have repeatable and reproducible results. Besides, it is often very hard to define a real-life condition of use as each consumer has different behaviour when using an appliance.

Finally, concerning the last point (4), manufacturers are indeed well represented at standardization level but they would welcome other stakeholders to join the discussions as well. It is indeed preferable to discuss together how to improve test standard directly at the standardization level rather than when the standard has been already developed. Mr Scheuren, in his role of convenor of TC59X WG 6, invited all stakeholders present to get more involved in the standardization process and to contribute to the development of future testing methods.

III. PRESENTATION OF CURRENT ISSUES

Review of the Ecodesign regulation

A preparatory study started this year to review the durability requirements of Regulation 666/2013 on Ecodesign requirements for vacuum cleaners. Namely 40000 oscillations of the hose and 500 hours operational motor life. A second, broader review of both the existing Ecodesign and Energy Label Regulations is due to take place by 2018.

Mr Kemna (VHK) – consultant for the European Commission in charge of the special review study on durability – provided an update:

(1) **Durability test of hose** – The test to assess the durability of the hoses is well defined and accepted by all stakeholders; therefore, there is no need to revise it in short term. The open issue is which hose to test, especially for upright vacuum cleaners that have a primary and a secondary hose. During a recent stakeholder meeting, the preference from stakeholders went quite clearly to test only the primary hose of cylinder type vacuum cleaners. Many stakeholders also recommended developing tests for the secondary hose of upright VC in view of the full review that will take place by 2018.

(2) **Durability test of motor** – in the current regulation, it is stated that the test shall be conducted with half-filled receptacles. However, during the last stakeholder meeting, there was a general agreement that testing with half-loaded receptacles will increase complexity as well as measurement uncertainties considerably. Therefore, it was agreed to include testing with both empty and half-loaded receptacles in the standard and to link both methods by increasing the number of hours that the motor should withstand when testing at empty conditions. The current proposal is therefore: 500 hours with partly loaded and 550 hours with empty dust receptacles.

It was also reported that during the stakeholder meeting some participants identified some critical issues to be considered during the next review study, for example motion resistance. Some stakeholders have highlighted that, in order to show better performances in the energy label, the motion resistance of appliances is increasing.

Other concerns brought up concerned the load to be tested or what nozzle and what settings should be used for the testing. Also, what should the dust look like to reflect at maximum real-life conditions of use, while keeping high reproducibility and repeatability.

Other issues that stakeholders believe are important

During the workshop, participants were given the opportunity to present to other stakeholders some issues that they believe to be important in the context of the future standardisation and legislative work. Representatives of Which? EUnited Cleaning and Stiftung Warentest explained how they believe the current regulations could be improved.

Which?

Which?'s main concern was to improve the comparability of the appliances. The outcome of the tests they have carried out on 38 VCs "suggest that a model with an A for cleaning performances in the label is not necessarily any better at cleaning than models with lower rating". He also underlined the increase of motion resistance in recent models – even higher than 70 Newtons. Furthermore, he mentioned that, sometimes, appliances are delivered with an array of nozzles, some of them designed to achieve the best label results. Many of the nozzles are not used in real life. He also pointed out possible cost implications for end-users: "tuning" of appliances may induce extra costs, which

sometimes are not beneficial for the end-user. The presentation displayed during the meeting is available here attached.

EUnited Cleaning

EUnited Cleaning underlined that the current EL and ED regulations cover both household and commercial vacuum cleaners, whilst the application and the time of use differ completely between these two types of appliances (e.g. surface of cleaning varies considerably, motion resistance needs are very different, the need for dust pick-up is different as well, etc.). Besides, EUnited Cleaning does not believe that the label is always in line with the real performances of the appliances.

For these reasons, EUnited Cleaning and its members are working on a new performance standard for commercial vacuum cleaners to address these issues. For them the most important point is that the need of professionals and households are different and these differences should be taken into account in the future revised regulation. The presentation displayed during the meeting is available here attached for more details.

Stiftung Warentest

The presentation from StiWa focused on the simulation of real-life conditions during the testing. More specifically, StiWa considered the old two-way-stroke test (zig-zag pattern) is more realistic than the new WG 3 test. StiWa representative presented the results of one of their investigation showing that for some models the new standard test leads to different ranking compared to the old one. For more details, the presentation displayed during the workshop is available for reference here attached.

IV. VISIT OF TESTING LABORATORIES

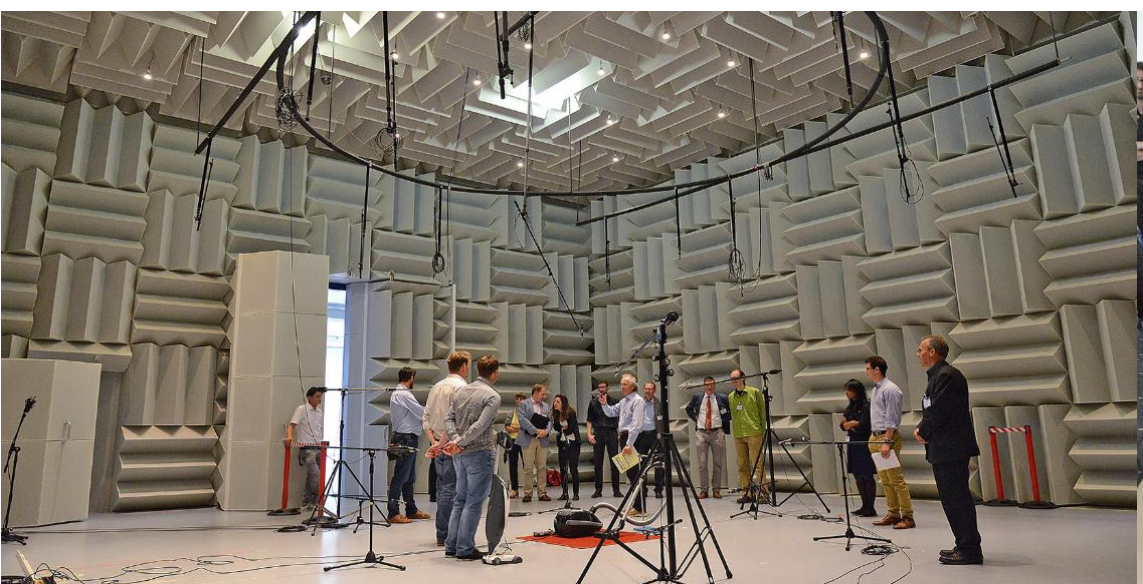
After this first round of discussions, participants were invited to start the visit of the laboratories and to witness how the testing is conducted. Three different tests were conducted:

(1) **Dust pick-up** – participants could witness the way this test is conducted on a standardized bench, with a standardized carpet, using standardized dust.

(2) M**otion resistance** – participants could feel the difference of motion resistance between different models and on different surfaces.

(3) N**oise level** – Participants could see the installations necessary to conduct a reliable testing of the sound level. VDE experts explained the difference between the concept of sound pressure and sound power.
Sound power – used in EL and ED measures – is the acoustical energy emitted by the sound source, and is an absolute value. It is not affected by the environment, nor by the distance to the sound source.
Sound pressure is a pressure disturbance in the atmosphere whose intensity is influenced not only by the strength of the source, but also by the surroundings and the distance from the source to the receiver. Sound pressure is what our ears hear, what sound meters measure.

Finally, participants could also witness the difficulty to set a clear definition of filled receptacle and consequently of half-filled receptacle.



V. INTERACTIVE DISCUSSIONS

After the visit of laboratories, participants were invited to debrief in a plenary session on how the current testing methods could be improved. Then they split in six sub-groups to have more focused discussions.

Initial plenary debriefing

The **cost of testing** was considered a key matter. Some participants asked to have an order of magnitude of the cost of testing one appliance. Based on the various experience from the people present, it appeared that a reasonable estimation would be around 20 000€ for conducting all the tests necessary for the Energy Label on one model in one laboratory. These costs are justified by the expensive equipment necessary to conduct the tests and by the need to employ skilled workers.

Ms Presutto (ENEA – Italian MS representative) said that keeping low the costs of testing is essential if we want market surveillance to happen. Costly tests will lead to less compliances, as Member States will not be able to test appliances.

The representative German authorities agreed and added that Market Surveillance Authorities have often very limited budgets. Their resources also can vary considerably from one Member State to another.

ECOS' representative said that he could understand the argument of cost. However, he stated that, it should be possible to improve the way tests are conducted to make them more similar to real-life at a reasonable cost.

Mr Siderius (NEA - Dutch representative) argued that projects like ATLETE (Appliance Testing for Energy Label Evaluation – co-financed by Industry and EU Commission) represented a good tool to promote cooperation among stakeholders and carry out market surveillances with a limited budget.

Mr Siderius also called for the setting of a European Market Surveillance Authority that would be, in his opinion, the best response to ensure a good level of compliance. Mr Rambaldi (CECED) stated that CECED had been advocating for many years in favour of the creation of such Pan-European collaboration between Market Surveillance Authorities.

Discussions within small groups

Group 1

Bernhard Scheuren (CENELEC/Vorwerk), Axel Neisser (StiWa), René Kemna (VHK), Andrea Harrer (BAM), Marie-Christin Dietz (BSH), Jens Giegerich (EUnited Cleaning), Nathalie Fuss (LGE).

Group 1 mainly debated on how the Energy Label is made and how standardization works. The main conclusion of the group was that the Energy Label is a success story, which reached the objective of reducing energy consumption. For this reason, regulators should be careful not to jeopardize such result it in future by making it **too complex**. Participants of the group also agreed that in general, the future regulations should aim at **simplifying** the Energy Label.

The group also discussed on how to improve the testing of vacuum cleaners. They argued there are three different actors with three different needs: (1) legislators, (2) Market Surveillance Authorities and (3) consumer magazines/associations.

(1) The legislators should conceive regulations with the final objective of reducing the energy consumption. This should consist in basic requirements, that could be verified via simple tests by Market Surveillance Authorities. The legislation should not be about performances but focus on the energy consumption.
(2) Market Surveillance Authorities should ensure that legislation is enforced.
(3) Finally, consumer magazines/ associations should inform consumers about the best products available on the market with regards to their performances. Some participants mentioned that it may be relevant to have different standards for this kind of testing, to allow consumers to compare appliances.

With these thoughts in mind, the group came to the conclusion that standardization work is important and should go on, but that every test result should **not necessary go into the label**.

Concerning the Ecodesign requirements, they are useful to set minimum performance requirements while the **label** should **focus on the energy** consumption only.

Group 2

Bruno Vermoesen (BSH), Thomas Bell (Which?), Karin Both (DIN Consumer Council), Laurence Howard (IBR Lab), Nihat Özkan (Arçelik), Chris Bayliss (GTECH).

Groupe 2 focused on the issue of testing real-life conditions.

On the issue of loaded receptacle, the group discussed the possibility of defining a fixed load. One could define a change in the performance of the appliance (DPU) to a certain level (e.g. 60%), which would be the consequence of the filter being clogged. Another way could be to determine a fixed amount of dust to load the bag which could be based on the average apartment size (87m²) with x grams of dust per m².

Concerning the testing on hard floor, members of Group 2 imagined several ways to change it to be more consumer relevant: these alternatives were (1) no longer use crevices, (2) use an alternative to hard floor (e.g. tiles), (3) or combine crevice and hard floor during the testing.

On the question of the **testing on carpet**, participants wondered whether it is still relevant to use the Wilton carpet. The conclusion was that with that kind of carpet, we already have a long experience available and that this issue has low priority (because of the wide variety of carpets installed in the homes). Therefore, for the moment there is no need to find a new carpet.

When discussing **motion resistance**, Group 2 recommended not to set any maximum limit but rather include this parameter in the label (e.g. 85%/32N=> class A and 85%/70N => class D). Another possibility would be to carry out the label test with a defined motion resistance but that there is no absolute limit for an appliance. However, one problem could be that there is a high variation of the motion resistance depending on the carpet types.

Concerning the **number of nozzles**, Group 2 had a preference to do the label tests with one nozzle: *universal* for carpet and hard floor testing, *carpet nozzle* for carpet testing and *hard floor nozzle* for hard floor testing.

On the **standardized dust** used for testing, the Group brought up the idea of having a combination of standardized dust with larger particles such as rice or lentils.

On **noise**, Group 2 said that they would welcome a way that allows consumer to visualize what the number of decibels represents. Generally, consumer does not know what e.g. 80 dB represents.

Group 2 also tackled the issue of **dust re-emission**. They considered this topic as very important and recommended to set a cap or at least to leave it on the label.

Regarding the **EEI calculation**, Group 2 discussed the possibility to go for a simpler calculation without additional parameter related to performances. The group discussed the controversial idea of not having a label anymore but only Ecodesign requirements.

Group 2 also had a few other considerations such as introduce pet hair or fiber in the testing, move away from the double-stroke-test to "zig-zag" test. Or the fact that the bags used for the tests should be the same than the ones recommended for use.

As a conclusion, the group said that all test methods should aim at reflecting at maximum real-life conditions of use but that it is imperative that they are reproducible.

Group 3

Aline Maigret (ANEC/BEUC), Tamara Janke (Ministry Env. Baden Würt.), Morris Rollo (Candy Hoover), Robert Gosling (Dyson), Eric Marchal (Groupe SEB), Barany Sothirajah (AMDEA), Félix Mailleux (CECED).

Group 3 focused mostly on **market surveillance**. Participants said that in order for Market Surveillance Authorities to monitor the market effectively, the tests should not be too costly and therefore should remain simple – the more parameters we have on the label, the more costly the testing becomes.

Some argued that the primary purpose of the energy label was to **reduce energy consumption**. There we should have a **simple** test in order to quickly check if an appliance fulfils energy efficiency requirements or not.

Participants also said that in order to avoid problems with the enforcement of a regulation, calculations and uncertainties should be looked at before a regulation is adopted. Round Robin Tests should also be regularly carried out.

On the durability requirements, Market Surveillance representative said it is often very hard to set such requirements due to the time and cost required to verify them.

Regarding the testing closer to **real-life conditions** of use, BEUC representative said that real-life conditions are important but so is **comparability** among products. Participants discussed the reasons why the tests cannot be always so closer to reality. Due to the need to have reproducible tests, standardizers had to go for alternative solutions (e.g. it has been necessary to create a standardized dust with powder, containing small and bigger parts). Usually, standardizers think about the best testing solution to represent real-life conditions, taking into account the need to reproduce the test accurately.

Main conclusion of Groupe 3 was that it is all about **trades off**: having many parameters tested VS simplicity, keeping close to real-life with costly testing VS keep the test simple with high reproducibility enabling efficient market surveillance, etc.

Group 4

Paul van Wolferen (CECED/Philips), Peter Van der Wilt (Consumentenbond), Hans-Paul Siderius (NEA), Albrecht Liskowsky (SLG Lab.), Alessandro Tome' (De'Longhi), Charalambos Freed (EUnited Cleaning), Colin Noble (Vax).

Group 4 chose to discuss each specific issues in more details.

Concerning the **testing of hard floor dust pick-up with crevices**, the group agreed to say that at the moment, the test is fast and quite reproducible. It works well enough to compare vacuum cleaners. However, there could be some improvement regarding the classes. Indeed, it may be that the current classes are too small (7 classes from 95% to 111%).

Concerning the **nozzle selection**, normally there should not be any real problem with that since the user manual must make clear which nozzle to use. The label should therefore be based on this. However, an alternative solution could be to use the nozzle that is the most used, although this may differ from one consumer to another.

On **motion resistance**, Group 4 discussed whether the future regulation should include a cap or not. Group 4 estimated that this would be difficult since all carpets behave differently. One could possibly think about defining a maximum level (e.g. 70N on all released Wilton carpets).

Regarding the issue of testing with **half-filled or empty receptacles**, participants discussed the difficulty to define what filled and therefore what half-filled is. Mr Liskowsky (SLG) informed that he was working on a proposal to define what is full and that he would be available to share this proposal.

Concerning the **Energy Label**, Group 4 proposed to leave out the DPU from the future label and to set realistic ED limits instead. The advantage of this approach is that it brings simplicity to the label; however, consumers would not be able to see the performance of the appliance and therefore compare them. This approach is adopted for products categories where almost all products perform at A level.

About the fact that test should be **closer to reality**, the group concluded saying that indeed, tests and regulations should reflect real-life as much as possible but more important than that, they should be consumer relevant.

Group 5

Christoforos Spiliotopoulos (ECOS), Milena Presutto (ENEA), Santiago Miner-Guedan (CTTN), Ludwig Kopp (De'Longhi), Yohann Boileau (Groupe SEB), Hartmut Kraus (Samsung), Matteo Rambaldi (CECED).

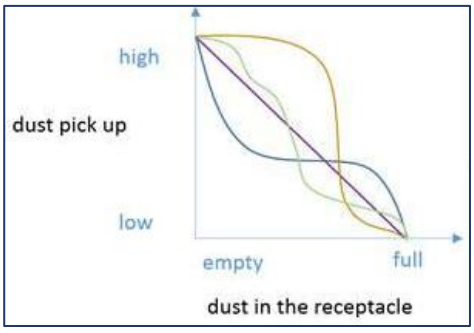
Group 5 mainly talked about the measurement with a half-filled receptacle.

Mr Spiliotopoulos (ECOS) was rather in favour of **testing with half-filled receptacles**. He said that his organization was very keen to measure the DPU also when the receptacle is ½ full, although it would be challenging to develop a standardized test. To have a more representative test, the reduction in performances when the receptacle fills up should be taken into consideration.

Although the idea was considered interesting in principle, in practice some members of the group expressed some concerns. Their arguments were the following:

Testing with half-filled receptacle would only represent one single moment of the use of appliance – just as the empty receptacle. This would therefore not be representative for the decrease in DPU of a product while the container is filling up.

Some stated that each model behaves differently when the receptacle is filling up. Unlikely it will be a straight line but there will be as many lines as appliances in the market. See the figure where each line represents a different appliance.



The way consumers use the appliance – some mostly with receptacle almost empty or almost full – would have great impact on the results and it depends on each consumer's habit. For this reason, testing with filled receptacle would not be more relevant than with an empty one, whilst it would definitely lead to complexity in standardization. One of the main problem would be the definition of the capacity of the receptacle. Receptacles are very different in each appliance and there would not be a scientifically correct way to define the capacity that would allow identifying when the receptacle is ½ full.

ECOS argued that the issue of defining the half-filled receptacle could be solved by defining the amount of dust that represents the full load of a specific model. The volume of the receptacle could be indicated on the receptacle itself or calculated.

Some argued that manufacturers would therefore be free to declare the capacity representing the full load and therefore the ½ load. Therefore, circumvention would be possible by declaring that the receptacle is half-full also when there is a little amount of dust inside, reaching in this case high performance also at ½ load.

Some argued that it would be difficult to develop a test with half-filled receptacle keeping high repeatability and reproducibility. Besides, the number of tests would increase making more complex and expensive the testing.

Group 6

Michael Agethen (Miele), Roy van den Boorn (VHK), Andreas Halatsch (FEA Germany), Lionel Bidaut (CTTN), Thomas Strehler (BSH), Theofilaktos Alexandros Kantsadis (LGE).

This group discussed in detail what “real-life” really means.

Some members of the group said that in case the legislator would like to go for **partly filled receptacle**, partly loaded with a fixed amount of dust (e.g. 200 g) could be a reasonable approach – this fixed amount of dust is based on 87 m² surface. Members of the group said that in the future half loaded should be included in the test. Nevertheless, first it is necessary to clarify what full load means.

Concerning **motion resistance**, Group 6 came out with an idea to avoid the increase of motion resistance to achieve high performances on the EL. The idea is that a real-life-mode or real-life power setting could be implemented to all vacuum cleaners and that this mode would be used to measure all data for the Energy Label. The motion resistance would be limited in this mode. However, higher power modes with higher motion resistance could be added. The real-life mode would be only with one nozzle, as most of consumers do not change it.

On **testing on hard floor**, the group suggested adding some coarse dust to the crevice test for it to be closer to reality.

VI. CONCLUSIONS

During the workshop, a large number of issues were tackled, each of them having a high degree of complexity. It appeared that for all issues, it does not exist a simple black or white solution, but it is always a matter of trade off. Should we have tests that are more complex – to be closer to real user behaviour – or make tests simpler to enable an effective market surveillance?

Should we adopt a very simple Energy Label that is easy to control but provide only few information or should we include more parameters to better inform the consumers, running the risk of lower market surveillance.

During that full day meeting, all stakeholders present could discuss in details the various possibilities to improve the existing standards and regulations. Even if there were still different opinions, participants concluded that the workshop allowed a better understanding of a number of open issues and the different arguments in favour or against specific solutions. In particular, it helped participants to better understand how the test are actually conducted and to appreciate the constraints linked to the development of new standards.

After these two successful workshops – the first one to introduce the issue, the second to better understand the reality of laboratory and constraints – the next logical step is to discuss some concrete proposals to address the concerns emerged during the discussion. This will be the objective of a future workshop.

Following the request of a number of participants, CECED committed to assess the possibility to organise similar workshops also on other appliances.