

# Updating the European performance standard for washing machines

*Gundula Czyzewski*

**BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH**  
**Member of CENELEC TC59X WG1**

## **Abstract**

CENELEC TC59X WG1 has started its work for the next edition of the European standard EN60456. Modifications will be introduced to the next edition of the international standard IEC60456 to make it more globally applicable. To open up for all clothes washer designs means to allow more options for testing but it also gives room for improvement and new ideas too.

A sub-working group of WG1 was set up to check the impact of the changes for EN60456. The review includes adjusting the standard to be more in line with today's usage of washing machines. The following issues, amongst others, are under discussion: lower temperature (testing at 40°C), tests for different load sizes, new or altered soil swatches also the introduction of the new reference machine and improved test methods for rinsing efficiency. There is more emphasis put on repeatability and reproducibility. Discussions have just started and a lot of work has to be done within the next 2-3 years in order to be prepared for the next step.

## **Introduction – CENELEC standard EN60456 in relation to IEC standard IEC60456 and to EU directive**

The European Energy Label indicates the efficiency of electrical household appliances to consumers. The Energy Label for washing machines informs the consumer about energy consumption and related performance criteria: washing and spinning performance are shown as well as the resources used – water and energy.

The declaration is based on the European Norm EN 60456: „Clothes washing machines for household use. Methods for measuring the performance“. This CENELEC standard gives detailed instruction concerning the testing of all mentioned parameters.

CENELEC prepares electrotechnical standards. Regulations and standards in Europe are connected – there is a principle of reference to European standards within the relevant European regulatory work (Directives, e.g. see Council Directive 92/75/EEC and Commission's Directive 95/12/EC). The European Energy Label requires testing according to EN60456.

The CENELEC standard EN60456 corresponds to the international test method IEC 60456. Modifications will be introduced to the next edition of the international standard IEC60456 to make it more globally applicable. CENELEC TC59X WG1 has started its work for the next edition of the European standard EN60456. According to the Dresden Agreement it is mandatory for CENELEC to deal with new editions of the corresponding IEC standard. Therefore a sub-working group was set up to check the impact of the changes for EN60456.

## **Current status of EN60456**

At the 3rd EEDAL-Conference 2003 it was reported about “Recent Improvements of the Measurement Standard for Washing Machines“. At this time it was stated, that the test methods described in this standard in general were improved, especially the reproducibility of the test method for the determination of the washing efficiency.

Based on a round robin test in 2002 it was concluded that the washing performance of a household machine (high class) has a measured standard deviation of 0.022 and a range of 0.06 (equals to 2 classes in the labelling scheme). The standard deviation of measuring results for the reference

machine was higher than for the tested household machine. Further investigations of the reference machine were needed.

In the meantime further effort was undertaken to improve the accuracy of the reference machine. Maintenance procedures were developed. In 2004 the next Round Robin Test was started with 25 European labs involved. Tests were based on a draft of EN60456 standard. This document is now published as EN60456:2005. One of the main issues of this Round Robin Test was to approve the new reference machine – the CLS Wascator. The “old” MP type is no longer produced.

The final report of RRT 2004 was distributed in January 2006. Wascator CLS is approved, the Corrigendum to IEC 60456 is published, and CENELEC prepares an amendment for EN60456. Results show further progress, calculated repeatability and reproducibility numbers are better than RRT 2002. Ring test comparison (2002 – 2004) appears to indicate reduced uncertainty of results for wash performance, water / energy consumption, spin speed and RMC.

### **Need for an update of EN60456**

IEC will revise its standard IEC60456 and add new elements – CENELEC will review the changes and publish this standard together with common modifications as EN60456.

If the European Labelling system for washing machines needs an update the necessary standardization work could be done during the next period of work, while preparing the next edition of EN60456.

CENELEC TC 59X WG1 is ready to work. New sub-groups were set up and started work last year already.

SWG 1.6 Future standard

SWG 1.7 Spinning efficiency accuracy

SWG 1.8 Rinsing performance

### **Relevant items of IEC60456 revision**

The following key elements of IEC60456 related to EN60456 are under discussion:

Stains strip: The new stain sebum is added to the strip and red wine is additionally aged to improve both customer relevance and discrimination.

Reference machine: The new reference machine Wascator CLS is introduced.

Detergent / dosage / water hardness: Current standard detergent A\* is confirmed for next edition. But there are ongoing discussions about dosage reduction and soft water option.

Loading and folding method: The method is reworked (now rule based and suitable for various wash systems). The changes will have some impact on the loading sequence for horizontal axis machines.

Rinsing: The alkalinity method with is step by step refined. The work is not yet finished.

### **Input from EU workshop**

A Workshop was organized by EU Commission and CECED on June 30th 2005 in Brussels. [1] It was stated by Luigi Meli, CECED Director General: “We are in time for a new EN and a new label.” Many issues for further work were included in 12 presentations. The speakers stressed differences between test profiles today and consumers’ habits on one side and new machine developments on the other side. There is a need to define new areas of consumer relevant criteria which should be covered in a standard.

- Cleaning performance and energy consumption for the 40°C and the 60°C cotton programme: Cotton 60°C and Cotton 40°C are mostly used programmes
- Consumption values for lower load sizes than rated capacity: How effective the appliance is at reducing energy consumption when the load size is reduced

- Rinsing performance: Test method is needed for both water-soluble substances and particles insoluble in water.

## Work programme of CENELEC TC 59X WG1 / Sub WG

All issues mentioned above are included in current work of CENELEC.

### Tests at Cotton 40°C and Cotton 60°C

IEC60456 does not limit testing to Cotton 60°C. The last RRT included tests at Cotton 40°C and 60°C. The results were checked and all faulty results were deleted from the data base. Results represent an estimation of the uncertainty of the measuring system. Comparing results at both temperatures it is obvious that the range of results is different for energy consumption. That means average values are lower but standard deviation remains the same. The relative error is increasing. Figures for Repeatability and Reproducibility must be taken into account before including Cotton 40°C into any label figures.

### Energy Consumption [kWh] of machine A and B (RRT 2004)

Machine / Cycle	Mean	Min	Max	s_r	s_R
A 60	0,952	0,888	1,008	0,029	0,042
A 40	0,654	0,612	0,722	0,021	0,036
B 60	0,998	0,927	1,079	0,030	0,051
B 40	0,638	0,584	0,671	0,014	0,034

Final Report of RRT 2004 [2]

Further work is needed to identify main parameters and find out whether further improvement is possible.

### Tests for different load sizes

A general trend on the European market seems to be growing machine capacity. Today's washing machines provide a wide variety of functions. Machines are able to adjust to lower load sizes. Target is to achieve good performance at maximum load and adjusted consumption values at lower loads. Nevertheless it is recommended to wash full loads to avoid wasting water and energy.

EN60456 does not provide means for testing at different load sizes. It defines that tests have to be done with the highest declared amount of cotton textiles.

The discussion about testing energy and water consumption for several loads sizes was started. A definition can be included for the next edition of EN60456.

### Stain strip

The current standard defines the 4 stains/soils used for testing the washing performance: carbon black/mineral oil; blood; chocolate and milk; red wine.

5th edition of IEC60456 will add a fifth stain: sebum. Red wine is additionally aged.

There is an impact on test results and also on evaluation of washing performance. Even if the new stain sebum is not included for evaluation of ratios the numbers measured will change due to altered red wine. This is one of the items of EN60456 which will affect the Energy labelling scheme for washing machines.

## **Introduction of the new reference machine**

Wascator CLS is approved, the Corrigendum to IEC 60456 is published, and CENELEC prepares an amendment for EN60456.

For IEC60456 there are now two reference machines available. Adjustments for all reference cycles are needed to bring results of both machines in line. But there will be always a difference between the results – the impact on results needs to be checked very carefully. The uncertainty of the system increases.

The question is on the table: Is it better to limit tests according to the Commission Directive on energy labelling to one reference machine only?

## **Test method for rinsing efficiency**

The current standard defines already a specification for a test using the residual alkalinity of the detergent solution in a base load after spin extraction as a measure of the rinsing performance. Several round robin tests have shown that repeatability within one lab is at a level to allow some differentiation between machines but reproducibility is limited.

The alkalinity method with is step by step refined. The work is not yet finished.

The final report of RRT 2004 which was already based on a partly improved test procedure summarizes the current status as follows:

“The range of results is high but the tendency in one lab is in the expected order. The lab-to-lab comparison shows deviations. That means the reproducibility needs still improvement to give better differentiation in inter-laboratory tests. The repeatability seems to be much better in some laboratories than the reproducibility.

CENELEC WG1 SWG1.8 rinsing is preparing further tests to analyze more in detail how to improve the rinsing procedure.”

## **Summary**

The update for EN60456 will include all necessary changes to stay in line with IEC60456. Additional effort is needed to define and limit the impact for the European Energy Label. Changes of the labelling system are expected. To get the revision of EN in time and coordinated with IEC schedule it is necessary to base further work on a detailed work plan.

## **References**

- [1] Brussels, June 30th, 2005 - Workshop organized by EU Commission and CECED:  
PERFORMANCE MEASUREMENT - HOW TO BUILD ON SUCCESS OF ENERGY LABELLING AND INDUSTRY SELF COMMITMENT  
Minutes and presentations available at [www.ceed.org](http://www.ceed.org)
- [2] Final report of Round Robin Test 2004  
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Distributed within IEC and CENELEC working groups