



**COMMISSION REGULATION (EU) No 1015/2010****of 10 November 2010****implementing Directive 2009/125/EC of the European Parliament  
and of the Council with regard to ecodesign requirements for  
household washing machines****(Text with EEA relevance)***Article 1***Subject matter and scope**

1. This Regulation establishes ecodesign requirements for the placing on the market of electric mains-operated household washing machines and electric mains-operated household washing machines that can also be powered by batteries, including those sold for non-household use and built-in household washing machines.
2. This Regulation shall not apply to household combined washer-driers.

*Article 2***Definitions**

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

- (1) ‘household washing machine’ means an automatic washing machine which cleans and rinses textiles using water which also has a spin extraction function and which is designed to be used principally for non-professional purposes;
- (2) ‘built-in household washing machine’ means a household washing machine intended to be installed in a cabinet, a prepared recess in a wall or a similar location, requiring furniture finishing;
- (3) ‘automatic washing machine’ means a washing machine where the load is fully treated by the machine without the need for user intervention at any point during the programme;
- (4) ‘household combined washer-drier’ means a household washing machine which includes both a spin extraction function and also a means for drying the textiles, usually by heating and tumbling;
- (5) ‘programme’ means a series of operations that are pre-defined and are declared by the manufacturer as suitable for washing certain types of textile;
- (6) ‘cycle’ means a complete washing, rinsing and spinning process, as defined for the selected programme;
- (7) ‘programme time’ means the time that elapses from the initiation of the programme until the completion of the programme excluding any end-user programmed delay;

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- (8) ‘rated capacity’ means the maximum mass in kilograms stated by the manufacturer at 0,5 kg intervals kg of dry textiles of a particular type, which can be treated in a household washing machine on the selected programme, when loaded in accordance with the manufacturer’s instructions;
- (9) ‘partial load’ means half of the rated capacity of a household washing machine for a given programme;
- (10) ‘remaining moisture content’ means the amount of moisture contained in the load at the end of the spinning phase;
- (11) ‘off-mode’ means a condition where the household washing machine is switched off using appliance controls or switches accessible to and intended for operation by the end-user during normal use to attain the lowest power consumption that may persist for an indefinite time while the household washing machine is connected to a power source and used in accordance with the manufacturer’s instructions; where there is no control or switch accessible to the end-user, ‘off-mode’ means the condition reached after the household washing machine reverts to a steady-state power consumption on its own;
- (12) ‘left-on mode’ means the lowest power consumption mode that may persist for an indefinite time after completion of the programme without any further intervention by the end-user besides unloading of the household washing machine;
- (13) ‘equivalent washing machine’ means a model of household washing machine placed on the market with the same rated capacity, technical and performance characteristics, energy and water consumption and airborne acoustical noise emissions during washing and spinning as another model of household washing machine placed on the market under a different commercial code number by the same manufacturer.

*Article 3***Ecodesign requirements**

The generic ecodesign requirements for household washing machines are set out in point 1 of Annex I.

The specific ecodesign requirements for household washing machines are set out in point 2 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.

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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 household washing machine model has been obtained by calculation on the basis of design, or extrapolation from other equivalent washing machines, 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 household washing machine models where the information included in the technical documentation was obtained on the same basis.

*Article 5***Verification procedure for market surveillance purposes**

Member States shall apply the verification procedure described in Annex III to this Regulation 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.

*Article 6***Benchmarks**

The indicative benchmarks for best-performing household washing machines 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 4 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, the opportunity of setting requirements on rinsing and spin-drying efficiency and the potential for hot water inlet.

*Article 8***Entry into force and application**

1. This Regulation shall enter into force on the 20th day following its publication in the *Official Journal of the European Union*.

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2. It shall apply from 1 December 2011.

However, the ecodesign requirements listed below shall apply in accordance with the following timetable:

(a) the generic ecodesign requirements set out in point 1(1) of Annex I shall apply from 1 December 2012;

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(b) the generic ecodesign requirements set out in point 1(2) of Annex I shall apply from 1 June 2012;

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(c) the generic ecodesign requirements set out in point 1(3) of Annex I shall apply from 1 December 2013;

(d) the specific ecodesign requirements set out in point 2(2) of Annex I shall apply from 1 December 2013.

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



## ANNEX I

**Ecodesign requirements**

## 1. GENERIC ECODESIGN REQUIREMENTS

- (1) For the calculation of the energy consumption and other parameters for household washing machines, the cycles which clean normally soiled cotton laundry (hereafter standard cotton programmes) at 40 °C and 60 °C shall be used. These cycles shall be clearly identifiable on the programme selection device of the household washing machines or the household washing machines display, if any, or both, and indicated as ‘standard 60 °C cotton programme’ and ‘standard 40 °C cotton programme’.
- (2) The booklet of instructions provided by the manufacturer shall provide:
- (a) the standard 60 °C and 40 °C cotton programmes, referred to as ‘standard 60 °C cotton programme’ and ‘standard 40 °C cotton programme’, and shall specify that they are suitable to clean normally soiled cotton laundry and that they are the most efficient programmes in terms of combined energy and water consumptions for washing that type of cotton laundry; in addition, an indication that the actual water temperature may differ from the declared cycle temperature;
  - (b) the power consumption of the off-mode and of the left-on mode;
  - (c) indicative information on the programme time, remaining moisture content, energy and water consumption for the main washing programmes at full or partial load, or both;
  - (d) recommendation on the type of detergents suitable for the various washing temperatures.
- (3) Household washing machines shall offer to end-users a cycle at 20 °C. This programme shall be clearly identifiable on the programme selection device of the household washing machines or the household washing machines display, if any, or both.

## 2. SPECIFIC ECODESIGN REQUIREMENTS

Household washing machines shall comply with the following requirements:

- (1) From 1 December 2011:
- for all household washing machines, the Energy Efficiency Index (*EI*) shall be less than 68,
  - for household washing machines with a rated capacity higher than 3 kg, the Washing Efficiency Index (*I<sub>w</sub>*) shall be greater than 1,03,
  - for household washing machines with a rated capacity equal to or lower than 3 kg, the Washing Efficiency Index (*I<sub>w</sub>*) shall be greater than 1,00,
  - for all household washing machines, the Water Consumption (*W<sub>t</sub>*) shall be:

$$W_t \leq 5 \times c + 35$$

where *c* is the household washing machine’s rated capacity for the standard 60 °C cotton programme at full load or for the standard 40 °C cotton programme at full load, whichever is the lower.

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(2) From 1 December 2013:

- for household washing machines with a rated capacity equal to or higher than 4 kg, the Energy Efficiency Index (*EEI*) shall be less than 59,
- for all household washing machines, the water consumption shall be,

$$W_t \leq 5 \times c_{1/2} + 35$$

where  $c_{1/2}$  is the household washing machine's rated capacity for the standard 60 °C cotton programme at partial load or for the standard 40 °C cotton programme at partial load, whichever is the lower.

The Energy Efficiency Index (*EEI*), the Washing Efficiency Index ( $I_w$ ) and the Water Consumption ( $W_t$ ) are calculated in accordance with Annex II.

**▼ B***ANNEX II***Method for calculating the Energy Efficiency Index, Washing Efficiency Index, water consumption and remaining moisture content**

## 1. CALCULATION OF THE ENERGY EFFICIENCY INDEX

For the calculation of the Energy Efficiency Index (*EEI*) of a household washing machine model, the weighted annual energy consumption of a household washing machine for the standard 60 °C cotton programme at full and partial load and for the standard 40 °C cotton programme at partial load is compared to its standard annual energy consumption.

- (a) The Energy Efficiency Index (*EEI*) is calculated as follows and rounded to one decimal place:

$$EEI = \frac{AE_C}{SAE_C} \times 100$$

where:

$AE_C$  = weighted annual energy consumption of the household washing machine;

$SAE_C$  = standard annual energy consumption of the household washing machine.

- (b) The standard annual energy consumption ( $SAE_C$ ) is calculated in kWh/year as follows and rounded to two decimal places:

$$SAE_C = 47,0 \times c + 51,7$$

where:

$c$  = rated capacity of the household washing machine for the standard 60 °C cotton programme at full load or the standard 40 °C cotton programme at full load, whichever is the lower.

- (c) The weighted annual energy consumption ( $AE_C$ ) is calculated in kWh/year as follows and is rounded to two decimal places:

(i)

$$AE_C = E_t \times 220 + \frac{\left[ P_o \times \frac{525\,600 - (T_t \times 220)}{2} + P_l \times \frac{525\,600 - (T_t \times 220)}{2} \right]}{60 \times 1\,000}$$

where:

$E_t$  = weighted energy consumption;

$P_o$  = weighted power in 'off-mode';

$P_l$  = weighted power in the 'left-on mode';

$T_t$  = programme time;

220 = total number of standard washing cycles per year.



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- (ii) Where the household washing machine is equipped with a power management system, with the household washing machine reverting automatically to 'off-mode' after the end of the programme, the weighted annual energy consumption ( $AE_C$ ) is calculated taking into consideration the effective duration of the 'left-on mode', according to the following formula:

$$AE_C = E_t \times 220 + \frac{\{(P_l \times T_l \times 220) + P_o \times [525\,600 - (T_l \times 220) - (T_l \times 220)]\}}{60 \times 1\,000}$$

where:

$T_l$  = time in 'left-on mode'.

- (d) The weighted energy consumption ( $E_t$ ) is calculated in kWh as follows and rounded to three decimal places:

$$E_t = [3 \times E_{t,60} + 2 \times E_{t,60\frac{1}{2}} + 2 \times E_{t,40\frac{1}{2}}] / 7$$

where:

$E_{t,60}$  = energy consumption of the standard 60 °C cotton programme;

$E_{t,60\frac{1}{2}}$  = energy consumption of the standard 60 °C cotton programme at partial load;

$E_{t,40\frac{1}{2}}$  = energy consumption of the standard 40 °C cotton programme at partial load.

- (e) The weighted power in 'off-mode' ( $P_o$ ) is calculated in W as follows and rounded to two decimal places:

$$P_o = (3 \times P_{o,60} + 2 \times P_{o,60\frac{1}{2}} + 2 \times P_{o,40\frac{1}{2}}) / 7$$

where:

$P_{o,60}$  = power in 'off-mode' of the standard 60 °C cotton programme at full load;

$P_{o,60\frac{1}{2}}$  = power in 'off-mode' of the standard 60 °C cotton programme at partial load;

$P_{o,40\frac{1}{2}}$  = power in 'off-mode' of the standard 40 °C cotton programme at partial load.

- (f) The weighted power in the 'left-on mode' ( $P_l$ ) is calculated in W as follows and rounded to two decimal places:

$$P_l = (3 \times P_{l,60} + 2 \times P_{l,60\frac{1}{2}} + 2 \times P_{l,40\frac{1}{2}}) / 7$$

where:

$P_{l,60}$  = power in 'left-on mode' of the standard 60 °C cotton programme at full load;

$P_{l,60\frac{1}{2}}$  = power in 'left-on mode' of the standard 60 °C cotton programme at partial load;

$P_{l,40\frac{1}{2}}$  = power in 'left-on mode' of the standard 40 °C cotton programme at partial load.

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- (g) The weighted programme time ( $T_t$ ) is calculated in minutes as follows and rounded to the nearest minute:

$$T_t = (3 \times T_{t,60} + 2 \times T_{t,60\frac{1}{2}} + 2 \times T_{t,40\frac{1}{2}}) / 7$$

where:

$T_{t,60}$  = programme time of the standard 60 °C cotton programme at full load;

$T_{t,60\frac{1}{2}}$  = programme time of the standard 60 °C cotton programme at partial load;

$T_{t,40\frac{1}{2}}$  = programme time of the standard 40 °C cotton programme at partial load.

- (h) The weighted time in 'left-on mode' ( $T_l$ ) is calculated in minutes as follows and rounded to the nearest minute:

$$T_l = (3 \times T_{l,60} + 2 \times T_{l,60\frac{1}{2}} + 2 \times T_{l,40\frac{1}{2}}) / 7$$

where:

$T_{l,60}$  = time in 'left-on mode' of the standard 60 °C cotton programme at full load;

$T_{l,60\frac{1}{2}}$  = time in 'left-on mode' of the standard 60 °C cotton programme at partial load;

$T_{l,40\frac{1}{2}}$  = time in 'left-on mode' of the standard 40 °C cotton programme at partial load.

## 2. CALCULATION OF THE WASHING EFFICIENCY INDEX

For the calculation of the Washing Efficiency Index ( $I_w$ ), the weighted washing efficiency of the household washing machine for the standard 60 °C cotton programme at full and partial load and for the standard 40 °C cotton programme at partial load is compared to the washing efficiency of a reference washing machine, where the reference washing machine shall have the characteristics indicated in 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*.

- (a) The Washing Efficiency Index ( $I_w$ ) is calculated as follows and rounded to three decimal places

$$I_w = \frac{3 \times I_{W,60} + 2 \times I_{W,60\frac{1}{2}} + 2 \times I_{W,40\frac{1}{2}}}{7}$$

where:

$I_{W,60}$  = Washing Efficiency Index of the standard 60 °C cotton programme at full load;

$I_{W,60\frac{1}{2}}$  = Washing Efficiency Index of the standard 60 °C cotton programme at partial load;

$I_{W,40\frac{1}{2}}$  = Washing Efficiency Index of the standard 40 °C cotton programme at partial load.

- (b) The Washing Efficiency Index of one standard cotton programme ( $p$ ) is calculated as follows:

$$I_{W,p} = \frac{I}{n} \times \sum_{i=1}^n \left( \frac{W_{T,i}}{W_{R,a}} \right)$$

where:

$W_{T,i}$  = Washing Efficiency of the household washing machine under test for one test cycle ( $i$ );

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$W_{R,a}$  = Average Washing Efficiency of the reference washing machine;

$n$  = number of test cycles,  $n \geq 3$  for the standard 60 °C cotton programme at full load,  $n \geq 2$  for the standard 60 °C cotton programme at partial load and  $n \geq 2$  for the standard 40 °C cotton programme at partial load.

- (c) The Washing Efficiency ( $W$ ) is the average of the reflectance values of each test strip after completion of a test cycle.

### 3. CALCULATION OF WATER CONSUMPTION

The water consumption ( $W_t$ ) is calculated as follows and rounded to one decimal place:

$$W_t = W_{t,60}$$

where:

$W_{t,60}$  = water consumption of the standard 60 °C cotton programme at full load.

### 4. CALCULATION OF THE REMAINING MOISTURE CONTENT

The remaining moisture content ( $D$ ) of a programme is calculated in percentage and rounded to the nearest whole percent.

**▼ M1***ANNEX III***Product compliance verification by market surveillance authorities**

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

- (1) The Member State authorities shall verify one single unit of the model.
- (2) The model shall be considered to comply with the applicable requirements if:
  - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
  - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
  - (c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 1.
- (3) If the results referred to in point 2(a) or (b) are not achieved, the model and all models that have been listed as equivalent household washing machine models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation.
- (4) If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more different models that have been listed as equivalent models in the manufacturer's or importer's technical documentation.
- (5) The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 1.
- (6) If the result referred to in point 5 is not achieved, the model and all models that have been listed as equivalent household washing machine models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation.
- (7) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3 and 6.

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

The Member State authorities shall only apply the verification tolerances that are set out in Table 1 and shall only use the procedure described in points 1 to 7 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 1

**Verification tolerances**

Parameters	Verification tolerances
Annual energy consumption ( $AE_C$ )	The determined value shall not exceed the declared value of $AE_C$ by more than 10 %.
Washing efficiency index ( $I_W$ )	The determined value shall not be less than the declared value of $I_W$ by more than 4 %.
Energy consumption ( $E_t$ )	The determined value shall not exceed the declared value of $E_t$ by more than 10 %. Where three additional units need to be selected, the arithmetic mean of the determined values of these three units shall not exceed the declared value of $E_t$ by more than 6 %.
Programme time ( $T_t$ )	The determined values shall not exceed the declared values of $T_t$ by more than 10 %.
Water consumption ( $W_t$ )	The determined value shall not exceed the declared value of $W_t$ by more than 10 %.
Power consumption in off mode and left-on mode ( $P_o$ and $P_l$ )	The determined values of power consumption $P_o$ and $P_l$ of more than 1,00 W shall not exceed the declared values of $P_o$ and $P_l$ by more than 10 %. The determined values of power consumption $P_o$ and $P_l$ of less than or equal to 1,00 W shall not exceed the declared values of $P_o$ and $P_l$ by more than 0,10 W.
Duration of the left-on mode ( $T_l$ )	The determined value shall not exceed the declared value of $T_l$ by more than 10 %.



*ANNEX IV*

**Benchmarks**

At the time of entry into force of this Regulation, the best available technology on the market for household washing machines, in terms of their water and energy consumptions, washing efficiency and airborne acoustical noise emissions during washing/spinning for the standard 60 °C cotton programme at full load, is identified as follows (\*):

- (1) Household washing machines with a rated capacity of 3 kg:
  - (a) energy consumption: 0,57 kWh/cycle (or 0,19 kWh/kg), corresponding to an overall annual energy consumption of 117,84 kWh/year, of which 105,34 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 39 litres/cycle, corresponding to 8 580 litres/year for 220 cycles;
  - (c) washing efficiency index: of  $1,03 \geq I_w > 1,00$ ;
  - (d) airborne acoustical noise emissions during washing/spinning (900 rpm): not available;
- (2) Household washing machines with a rated capacity of 3,5 kg:
  - (a) energy consumption: 0,66 kWh/cycle (or 0,19 kWh/kg), corresponding to an overall annual energy consumption of 134,50 kWh/year, of which 122,00 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 39 litres/cycle, corresponding to 8 580 litres/year for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 100 rpm): not available;
- (3) Household washing machines with a rated capacity of 4,5 kg:
  - (a) energy consumption: 0,76 kWh/cycle (or 0,17 kWh/kg) corresponding to an overall annual energy consumption of 152,95 kWh/year, of which 140,45 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 40 litres/cycle, corresponding to 8 800 litres/year for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 000 rpm): 55/70 dB(A) re 1 pW;
- (4) Household washing machines with a rated capacity of 5 kg:
  - (a) energy consumption: 0,850 kWh/cycle (or 0,17 kWh/kg) corresponding to an overall annual energy consumption of 169,60 kWh/year, of which 157,08 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 39 litres/cycle, corresponding to an annual water consumption of 8 580 litres for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 200 rpm): 53/73 dB(A) re 1pW;

(\*) For evaluation of the annual energy consumption, the calculation method set out in Annex II was used for a programme time of 90 min along with an off-mode power of 1 W and a left-on mode power of 2 W.

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- (5) Household washing machines with a rated capacity of 6 kg:
- (a) energy consumption: 0,90 kWh/cycle (or 0,15 kWh/kg) corresponding to an overall annual energy consumption of 178,82 kWh/year, of which 166,32 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 37 litres/cycle, corresponding to an annual water consumption of 8 140 litres for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 600 rpm): not available;
- (6) Household washing machines with a rated capacity of 7 kg:
- (a) energy consumption: 1,05 kWh/cycle (or 0,15 kWh/kg) corresponding to an overall annual energy consumption of 201,00 kWh/year, of which 188,50 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 43 litres/cycle, corresponding to an annual water consumption of 9 460 litres for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 000 rpm): 57/73 dB(A) re 1pW;
  - (e) airborne acoustical noise emissions during washing/spinning (1 400 rpm): 59/76 dB(A) re 1pW;
  - (f) airborne acoustical noise emissions during washing/spinning (1 200 rpm): 48/62 dB(A) re 1pW (for built-in household washing machines);
- (7) Household washing machines with a rated capacity of 8 kg:
- (a) energy consumption: 1,200 kWh/cycle (or 0,15 kWh/kg) corresponding to an overall annual energy consumption of 234,26 kWh/year, of which 221,76 kWh/year for 220 cycles and 12,5 kWh/year during the low-power modes;
  - (b) water consumption: 56 litres/cycle, corresponding to an annual water consumption of 12 320 litres for 220 cycles;
  - (c) washing efficiency index:  $I_w$  of 1,03;
  - (d) airborne acoustical noise emissions during washing/spinning (1 400 rpm): 54/71 dB(A) re 1 pW;
  - (e) airborne acoustical noise emissions during washing/spinning (1 600 rpm): 54/74 dB(A) re 1 pW.