# Commission communication in the framework of the implementation of Commission Regulation (EU) No 547/2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water pumps

**(Text with EEA relevance)**

*(Publication of titles and references of transitional methods of measurement [1] for the implementation of Commission Regulation (EU) No 547/2012 and, in particular, Annex III and IV thereof)*

(2012/C 402/07)

For the purposes of verification of compliance with the requirements of Commission Regulation (EU) No 547/2012 pump efficiency tests shall be carried out as follows.

1. All measurement shall be done according to ISO EN 9906 Class 2b. The exception specified in that standard for total tolerance of pump efficiency for pump power input of 10kW and below shall not be considered.

2. The duration of the test shall be sufficient to obtain repeatable results; especially run-in effects shall be considered. Run-in effects may take up to 1 day operating time.

3. All measurements shall be made under steady state conditions.

4. The tests should be conducted under conditions where cavitation does not affect the performance of the pump.

5. Pump efficiency is measured at the head and flow corresponding to the best efficiency point (BEP), part load (PL), and over load (OL) for full (untrimmed) impeller diameter with clean cold water, as defined in Commission Regulation (EU) No 547/2012.

6. Vertical multistage water pumps are to be tested with a three stage (i = 3) version. Submersible multistage water pumps are to be tested with a nine stage (i = 9) version. If this number of stages is not offered within the specific product range, the next higher number of stages within the product range is to be chosen for verification testing.

7. A minimum of seven test points shall be taken for all verification tests within the range of 60 % to 120 % around the expected flow at the BEP. Four of these points shall be spaced between 60 % and 95 %, two between 105 % and 120 %, and one point chosen within 95 % to 105 % of the expected flow at the BEP. For the determination of the flow corresponding to BEP, PL, and OL, the flow-efficiency fitting curve must be represented by an appropriate mathematical expression. In the range of flow rates from PL to OL, the curve represented by the mathematical expression shall have only one maximum, and the second derivative of the mathematical expression must be negative. Appropriate methods for drawing the flow-efficiency fitting curve are polynomials of third order or spline functions. Alternatively, the nominal best flow value on the water pump's name plate or from the manufacturer's test reports can be chosen if provided.

8. The required minimum efficiencies shall be calculated as set out in Annex III of Commission Regulation (EU) No 547/2012. The minimum efficiency index (MEI) for product information requirements shall be derived using the same equation at BEP evaluated for the C-value and according to Table 1. The second decimal place of the MEI shall be determined by a linear interpolation of the C-values corresponding to the neighbouring MEI values in Table 1, and by rounding to the next lower MEI. If the C-value is smaller than the one corresponding to a MEI of 0,70, only 'MEI > 0,70' shall be provided as information.

[1] It is intended that these transitional methods will ultimately be replaced by harmonised standard (pr)EN 16480. When available, reference(s) to the harmonised standard will be published in the *Official Journal of the European Union* in accordance with Articles 9 and 10 of Directive 2009/125/EC.

*Table 1*

**Minimum efficiency index (MEI) and its corresponding C-value depending on the pump type and speed**

| C-value for MEI / $C_{PumpType,\ rpm}$ | MEI = 0,10 | MEI = 0,20 | MEI = 0,30 | MEI = 0,40 | MEI = 0,50 | MEI = 0,60 | MEI = 0,70 |
|---|---|---|---|---|---|---|---|
| C (ESOB, 1 450) | 132,58 | 130,68 | 129,35 | 128,07 | 126,97 | 126,10 | 124,85 |
| C (ESOB, 2 900) | 135,60 | 133,43 | 131,61 | 130,27 | 129,18 | 128,12 | 127,06 |
| C (ESCC, 1 450) | 132,74 | 131,20 | 129,77 | 128,46 | 127,38 | 126,57 | 125,46 |
| C (ESCC, 2 900) | 135,93 | 133,82 | 132,23 | 130,77 | 129,86 | 128,80 | 127,75 |
| C (ESCCI, 1 450) | 136,67 | 134,60 | 133,44 | 132,30 | 131,00 | 130,32 | 128,98 |
| C (ESCCI, 2 900) | 139,45 | 136,53 | 134,91 | 133,69 | 132,65 | 131,34 | 129,83 |
| C (MS-V, 2 900) | 138,19 | 135,41 | 134,89 | 133,95 | 133,43 | 131,87 | 130,37 |
| C (MSS, 2 900) | 134,31 | 132,43 | 130,94 | 128,79 | 127,27 | 125,22 | 123,84 |

9. The maximum permissible random uncertainty $e_{r,max}$ as a percentage of the arithmetically averaged value of the measured quantity is:

*Table 2*

**Maximum permissible random uncertainty $e_{r,max}$**

| Measured quantity | Maximum permissible random uncertainty $e_{r,max}$ |
|---|---|
| Rate of flow | ± 3 % |
| Differential pressure | ± 4 % |
| Discharge pressure | ± 3 % |
| Suction pressure | ± 3 % |
| Drive power input | ± 3 % |
| Speed of rotation | ± 1 % |
| Torque | ± 3 % |
| Temperature | ± 0,3 °C |

10. The maximum permissible measurement device uncertainty $e_{s,max}$ as a percentage of the arithmetically averaged value of the measured quantity is:

*Table 3*

**Maximum permissible measurement device uncertainty $e_{s,max}$**

| Measured quantity | Maximum permissible measurement device uncertainty $e_{s,max}$ |
|---|---|
| Rate of flow | ± 2,5 % |
| Differential pressure | ± 2,5 % |
| Discharge pressure | ± 2,5 % |
| Suction pressure | ± 2,5 % |

| Measured quantity | Maximum permissible measurement device uncertainty $e_{s,max}$ |
|---|---|
| Drive power input | ± 2,0 % |
| Speed of rotation | ± 1,4 % |
| Torque | ± 2,0 % |
| Temperature | ± 1,0 °C |

11. The maximum overall tolerance for measurements is $t_{tot}$ = 5 %. Measurement devices shall be chosen not to exceed this overall tolerance. Consequently, measured pump efficiencies for BEP, PL, and OL are not allowed to fall below the threshold value defined as follows:

$$\eta_{threshold} = (1 - t_{tot}) \cdot \eta_{min,req} = 0{,}95 \cdot \eta_{min,req}$$

12. For the purpose of conformity assessment, the manufacturer shall prepare and keep available upon request from market surveillance authorities test reports and all documentation needed to support the information declared by the manufacturer. The test reports shall contain all relevant measurement information including but not limited to:

— relevant charts and sampled value tables of the rate of flow, differential pressure, discharge pressure, suction pressure, driver power input, speed of rotation, torque, and temperature for all relevant test points;

— description of the test method(s) as applicable, laboratory space and ambient conditions, physical test rig set up specifying position of data capturing devices (e.g. sensors) and data processing equipment, as well as the operating range and measurement accuracy;

— settings of the unit being tested, description of the function of automatic switching of settings (e.g. between off mode and standby mode);

description of the test sequence followed (e.g. to arrive at equilibrium conditions as applicable).