



CABINET OF MINISTERS OF UKRAINE
RESOLUTION

No. 154 of 27 February 2019
Kyiv

**On Approval of the Technical Regulation on Ecodesign
Requirements for Water Pumps**

In accordance with [Article 5](#) of the Law of Ukraine ‘On Technical Regulations and Conformity Assessment’, the Cabinet of Ministers of Ukraine hereby **resolves**:

1. Approve the [Technical Regulation on ecodesign requirements for water pumps](#) as attached hereto.
2. The State Agency on Energy Efficiency and Energy Saving shall ensure the implementation of the Technical Regulation approved by this Resolution.
3. The attached amendment shall be introduced to [the list of types of products subject to state market surveillance by state market surveillance authorities](#), approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1069 of 28 December 2016 (Official Journal of Ukraine, 2017, No. 50, p. 1550).
4. This Resolution shall enter into force after six months following its publication.

Prime Minister of Ukraine

VOLODYMYR GROYSMAN

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APPROVED
by the Resolution of the Cabinet of Ministers of Ukraine
No. 154 of 27 February 2019

TECHNICAL REGULATION
on Ecodesign Requirements for Water Pumps

General Provisions

1. For the placing on the market of rotodynamic water pumps for pumping clean water, including where integrated in other products, this Regulation establishes ecodesign requirements to water pumps.

This Technical Regulation is based on the [Commission Regulation \(EU\) No. 547/2012 of 25 June 2012](#) implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water pumps.

2. This Technical Regulation shall not apply to:

water pumps designed specifically for pumping clean water at temperatures below -10°C or above $+120^{\circ}\text{C}$, except with regard to the information requirements of Annex 2, point 3, [subpoints 11 to 13](#);

water pumps designed only for fire-fighting applications;

displacement water pumps;

self-priming water pumps.

3. For the purposes of this Technical Regulation, the terms used herein shall have the following meanings:

1) ‘vertical multistage water pump’ (MS-V) means a rotodynamic multi stage ($i > 1$) glanded water pump in which the impellers are assembled on a vertical rotating shaft, which is designed for pressures up to 25 bar, with a nominal speed of 2 900 rpm and a maximum flow of 100 cubic meters per hour ($27,78 \cdot 10^{-3}$ cubic meters per second);

2) ‘water pump’ is the hydraulic part of a device that moves clean water by physical or mechanical action and is of one of the following designs:

end suction own bearing (ESOB);

end suction close coupled (ESCC);

end suction close coupled inline (ESCCi);

vertical multistage (MS-V);

submersible multistage (MSS);

3) ‘end suction water pump’ means a glanded single stage end suction rotodynamic pump designed for pressures up to 16 bar, with a specific speed n_s between 6 and 80 rpm, a minimum rated flow of 6 cubic meters per hour ($1,667 \cdot 10^{-3}$ cubic meters per second), a maximum shaft power of 150 kW, a maximum head of 90 m at nominal speed of 1450 rpm and a maximum head of 140 m at nominal speed of 2900 rpm;

4) 'glanded' means sealed shaft connection between the impeller in the pump body and the motor, provided that the driving motor component remains dry;

5) 'rotodynamic water pump' means a water pump that moves clean water by means of hydrodynamic forces;

6) 'submersible multistage water pump' (MSS) means a multi stage ($i > 1$) rotodynamic water pump with a nominal outer diameter of 4" (10,16 cm) or 6" (15,24 cm) designed to be operated in a borehole at nominal speed of 2900 rpm, at operating temperatures within a range of 0°C and +90°C;

7) 'end suction close coupled pump' (ESCC) is an end suction water pump of which the motor shaft is extended to become also the pump shaft;

8) 'displacement water pump' means a water pump that moves clean water by enclosing a volume of clean water and forcing this volume to the outlet of the pump;

9) 'end suction own bearing pump' (ESOB) is an end suction water pump with own bearings;

10) 'rated flow' means the head and flow that the manufacturer will guarantee under normal operating conditions;

11) 'end suction close coupled inline pump' (ESCCi) means a water pump of which the water inlet of the pump is on the same axis as the water outlet of the pump;

12) 'self-priming water pump' means a water pump that moves clean water and which can start and/or operate also when only partly filled with water;

13) 'clean water' means water with a maximum non-absorbent free solid content of 0,25 kilogram per cubic meter and with a maximum dissolved solid content of 50 kilogram per cubic meter, provided that the total gas content of the water does not exceed the saturation volume. Any additives that are needed to avoid water freezing down to -10 °C shall not be taken into account.

The definitions for the purpose of [Annexes 2 to 4](#) are set out in [Annex 1](#).

Other terms used herein shall have meanings set out in the Laws of Ukraine 'On Technical Regulations and Conformity Assessment', 'On State Market Surveillance and Control of Non-Food Products', 'On Standardization', 'On General Safety of Non-Food Products' and in the Technical Regulation Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No. 80, p. 2678).

Ecodesign Requirements

4. The minimum efficiency requirements as well as information requirements for water pumps are set out in [Annex 2](#).

5. Compliance with the ecodesign requirements shall be measured and calculated in accordance with methods set out in [Annex 3](#).

6. No ecodesign requirement referred to in [Part 1](#) of Annex 1 to the Technical Regulation establishing a framework for the setting of ecodesign requirements for energy-related products, approved by the Resolution of the Cabinet of Ministers of Ukraine No.804 of 3 October 2018, is necessary regarding any other ecodesign parameters.

Conformity Assessment

7. Conformity of water pumps with the requirements of this Technical Regulation shall be assessed applying the internal design control procedure or the management system conformity assessment procedure set out, respectively, in [Annexes 3](#) and [4](#) to the Technical Regulation establishing a framework for the setting of ecodesign requirements for energy-related products, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 804 of 3 October 2018.

State Market Surveillance

8. When performing the market surveillance checks referred to in the [points 19 to 23](#) of the Technical Regulation establishing a framework for the setting of ecodesign requirements for energy-related products, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 804 of 3 October 2018, the requirements set out in [Annex 4](#) hereto shall apply.

Indicative Benchmarks

9. The indicative benchmark for the best-performing water pumps available on the market is a minimum efficiency index (MEI) $\geq 0,7$.

Correlation Table

10. The correlation table between the provisions of the [Commission Regulation \(EU\) No. 547/2012 of 25 June 2012](#) implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water pumps, and this Technical Regulation is set out in [Annex 5](#).

DEFINITIONS
of the terms used in Annexes 2 to 4

‘Minimum Efficiency Index’ (MEI) means the dimensionless scale unit for hydraulic pump efficiency at best efficiency point, part load and overload.

‘Hydraulic pump efficiency’ (η) is the ratio between the mechanical power transferred to the liquid during its passage through the water pump and the mechanical input power transmitted to the pump at its shaft.

Over load’ (OL) means the operating mode of the water pump at 110 % of the flow at the best efficiency point.

‘Specific speed’ (n_s) means a dimensional value characterising the shape of the water pump impeller by head, flow and speed (n) calculated as follows:

$$n_s = n \cdot \frac{\sqrt{Q_{BEP}}}{\left(\frac{1}{i} H_{BEP}\right)^{\frac{3}{4}}} \left[\text{min}^{-1}\right],$$

where ‘head’ (H) means the increase in the hydraulic energy of water in meters, produced by the water pump at the specified point of operation;

‘rotational speed’ (n) means the number of revolutions per minute of the shaft;

‘flow’ (Q) means the volume flow rate of water through the water pump in cubic meters per second;

‘stage’ (i) means the number of series impellers in the water pump;

‘best efficiency point’ (BEP) means the operating point of the water pump at which it reaches the maximum hydraulic pump efficiency measured with clean cold water.

‘Full impeller diameter’ means the impeller with the maximum diameter for which performance characteristics are given for a pump size in the catalogues of a water pump manufacturer.

‘Impeller’ means the rotating component of a rotodynamic pump which transfers energy to the water.

‘C-value’ means a constant for each specific water pump type quantifying the differences in efficiency for different pump types.

‘Part load’ (PL) means the operating point of the water pump at 75% of the flow at the best efficiency point.

‘Clean cold water’ means clean water to be used for pump testing. Maximum kinematic viscosity of water is $1,5 \times 10^{-6}$ sq.m/s, maximum density is 1050 kilogram per cubic meter and maximum temperature is +40°C.

ECODESIGN REQUIREMENTS for water pumps

Efficiency factor requirements

1. No later than in one year after the **Technical Regulation on Ecodesign Requirements for Water Pumps** (hereinafter referred to as Technical Regulation) has come into force, water pumps shall have the following minimum efficiency value:

at the best efficiency point (BEP) being at least $(\eta_{\text{BEP}})_{\text{min requ}}$, when measured according to the requirements set out in **Annex 3** to the Technical Regulation, and calculated with the C-value for minimum efficiency index (MEI) of 0,4;

at part load (PL) being at least $(\eta_{\text{PL}})_{\text{min requ}}$ when measured according to the requirements set out in **Annex 3** to the Technical Regulation, and calculated with the C-value for minimum efficiency index (MEI) of 0,4;

at over load (OL) being at least $(\eta_{\text{OL}})_{\text{min requ}}$ when measured according to the requirements set out in **Annex 3** to the Technical Regulation, and calculated with the C-value for minimum efficiency index (MEI) of 0,4.

Product information requirements

2. No later than in one year after the Technical Regulation has come into force, the information on water pumps referred to in **point 1** thereof set out in this section shall be visibly displayed:

in the technical documentation of water pumps;
on websites of manufacturers of water pumps.

3. The information shall be provided in the following order to include:

1) Minimum efficiency index: $\text{MEI} \geq [x, xx]$;

2) The following information shall be indicated on the rating plate: ‘The benchmark for most efficient water pumps is $\text{MEI} \geq 0,7$ ’, or, alternatively, the indication ‘Benchmark $\text{MEI} \geq 0,7$ ’;

3) Year of manufacture;

4) Manufacturer’s name or registered trade mark (sign for goods and services) and place of manufacture;

5) Product’s type and size identifier;

6) Hydraulic pump efficiency (%) with trimmed impeller [XX, X], or, alternatively, the indication [-.-];

7) Pump performance curves for the pump, including efficiency characteristics;

8) Standard text: ‘The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.’;

9) Standard text: ‘The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system’;

10) Information relevant for disassembly, recycling or disposal at end-of-life;

11) Standard text for water pumps designed only for pumping clean water at temperatures below -10°C : ‘Designed for use at temperatures below -10°C only.’;

12) Standard text for water pumps designed only for pumping clean water at temperatures above $+120^{\circ}\text{C}$: ‘Designed for use at temperatures above $+120^{\circ}\text{C}$ only.’;

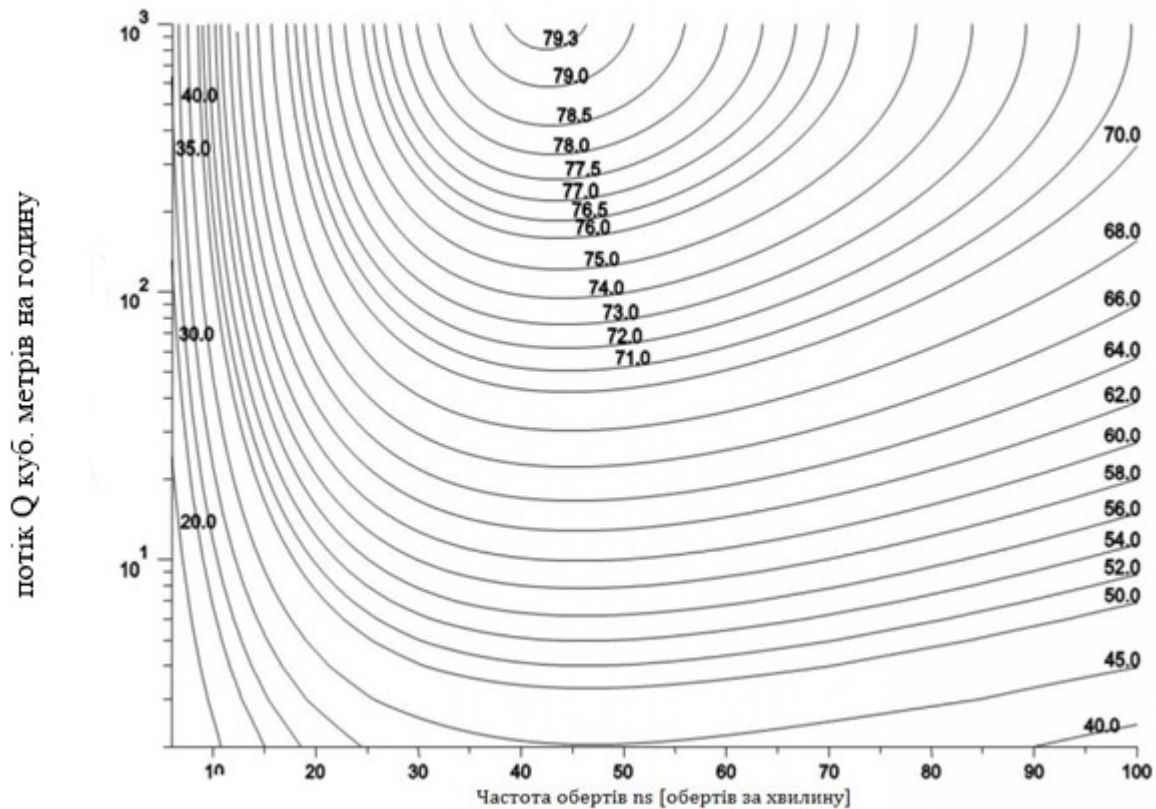
13) Description of the relevant technical parameters and characteristics for pumps designed specifically for pumping clean water at temperatures below -10°C or above $+120^{\circ}\text{C}$, which must be made by the manufacturer;

14) Standard text: ‘Information on benchmark efficiency is available at the web-site [www.xxxxxxxxxx.xxx].’;

15) Benchmark efficiency graph for $\text{MEI} = 0,7$ for the pump based on the model shown in the Figure. Similar efficiency graph shall be provided for $\text{MEI} = 0,4$.

4. The information referred to in subpoints 1 and 3 to 6 of point 3 shall be marked on or near the rating plate of the water pump.

Figure. Example of a benchmark efficiency graph for ESOB 2900



5. Further information may be added and may be complemented by graphs, figures or symbols.

Measurement and calculation METHODS

For the purposes of compliance and verification of compliance with the requirements of the **Technical Regulation on Ecodesign Requirements for Water Pumps**, measurements and calculations shall be made using standards from the list of national standards, compliance with which provides a presumption of conformity of water pumps with the requirements of the Technical Regulation on Ecodesign Requirements for Water Pumps, and using reliable, accurate and reproducible methods, which take into account the generally recognised state of the art, and produce results deemed to be of low uncertainty. The mentioned methods shall fulfil all of the following technical parameters.

The hydraulic pump efficiency, as defined in **Annex 1** to the Technical Regulation on Ecodesign Requirements for Water Pumps, is measured at the head and flow corresponding to the best efficiency point, part load (PL) and over load (OL) for full impeller diameter with clean cold water.

The formula for calculating the required minimum efficiency at best efficiency point (BEP) is as follows:

$$(\eta_{\text{BEP}})_{\text{min,requ}} = 88,59x + 13,46y - 11,48x^2 - 0,85y^2 - 0,38xy - C_{\text{PumpType,rpm}}$$

where x equals to $\ln(n_s)$;

y equals to $\ln(Q)$;

ln is the natural logarithm;

Q is flow in cubic meters per hour;

n_s is specific speed in min^{-1} ;

C is the value found in Table.

The value of C depends on the pump type and nominal speed, and also the minimum efficiency (\dot{A}^2) value.

The Minimum efficiency index (MEI) and its corresponding C-value depending on the pump type and speed is indicated in the table below.

Table

Значення C для MEI $C_{\text{Pump Type, rpm}}$	$\dot{A}^2 = 0,4$
C (ESOB, 1 450)	128,07
C (ESOB, 2 900)	130,27
C (ESCC, 1 450)	128,46
C (ESCC, 2 900)	130,77

C (ESCCi, 1 450)	132,3
C (ESCCi, 2 900)	133,69
C (MS-V, 2 900)	133,95
C (MSS, 2 900)	128,79

The requirements for part load (PL) and over load (OL) conditions are set at slightly lower values than those for 100 % flow (η_{BEP}).

$$(\eta_{\text{PL}})_{\text{min,requ}} = 0,947 \cdot (\eta_{\text{BEP}})_{\text{min,requ}}$$

$$(\eta_{\text{OL}})_{\text{min,requ}} = 0,985 \cdot (\eta_{\text{BEP}})_{\text{min,requ}}$$

All efficiencies are defined for full impeller diameter. 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 testing.

REQUIREMENTS
for verifying conformity of water pumps with the requirements of the
Technical Regulation on Ecodesign Requirements for Water Pumps during
state market surveillance

1. Allowable tolerances referred to in this Annex are only applied by state market surveillance authorities and shall not be used by the manufacturer or importer 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.

2. Conformity verification of water pumps with the requirements of the **Technical Regulation on Ecodesign Requirements for Water Pumps** (hereinafter referred to as Technical Regulation) is made by market surveillance authorities with regard for the following:

1) one water pump per model shall be tested;

2) a water pump model shall be considered to comply with the requirements of the Technical Regulation, if:

performance indicators in the technical documentation and the values used to calculate these indicators are not more favourable for the manufacturer or importer than the results of the corresponding measurements;

the declared values meet any requirements laid down in the Technical Regulation, and the product information provided by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values;

when a water pump is checked by market surveillance authorities, the readings of relevant parameters and values are within the allowable tolerances indicated in the Table;

3) if the results referred to in the second or third indent of subpoint 2 of this point are not achieved, the model shall be considered not to comply with the requirements of the Technical Regulation;

4) if the result referred to in the fourth indent of subpoint 2 of this point is not achieved, state market surveillance authorities shall select three additional water pumps of the same model for testing;

5) the model shall be considered to comply with the requirements of the Technical Regulation if the arithmetical mean for these three selected water pumps is within the allowable tolerances indicated in the Table;

6) if the result referred to in subpoint 5 of this point is not achieved, the model shall be considered not to comply with the requirements of the Technical Regulation.

3. State market surveillance authorities shall use the measurement and calculation methods set out in **Annex 3** to the Technical Regulation.

4. State market surveillance authorities shall use only allowable tolerances indicated in the Table below, taking into account the requirements set out in **subpoints 1 to 6** of point 2 of this Annex. No other tolerances, such as those set out in national standards that are identical to the European harmonised standards or in any other measurement method, shall be applied.

Table

Parameters	Allowable tolerances
Efficiency value at best efficiency point (η_{BEP})	the value shall not be lower by more than 5 % than the declared value
Efficiency value at part load (η_{PL})	the value shall not be lower by more than 5 % than the declared value
Efficiency value at over load (η_{OL})	the value shall not be lower by more than 5 % than the declared value

CORRELATION TABLE
between the provisions of the Commission Regulation (EU) No. 547/2012 of 25 June 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water pumps, and the Technical Regulation on Ecodesign Requirements for Water Pumps

Provisions of the Commission Regulation (EU)	Provisions of the Technical Regulation
Article 1, Part One	point 1
Article 1, Part Two	point 2
First indent of Article 2	first indent of point 3
Point 1 of Article 2	third indent of point 3
Point 2 of Article 2	ninth indent of point 3
Point 3 of Article 2	sixteenth indent of point 3
Point 4 of Article 2	tenth indent of point 3
Point 5 of Article 2	fifteenth indent of point 3
Point 6 of Article 2	thirteenth indent of point 3
Point 7 of Article 2	seventeenth indent of point 3
Point 8 of Article 2	second indent of point 3
Point 9 of Article 2	twelfth indent of point 3
Point 10 of Article 2	eleventh indent of point 3
Point 11 of Article 2	fourteenth indent of point 3
Point 12 of Article 2	eighteenth indent of point 3

Point 13 of Article 2	nineteenth indent of point 3
First indent of Article 3	point 4
Second indent of Article 3	
Third indent of Article 3	point 5
Fourth indent of Article 3	point 6
Article 4	point 7
Article 5	point 8
Article 6	point 9
Article 7	
Article 8	
Annex I	Annex 1
Annex II	Annex 2
Annex III	Annex 3
Annex IV	Annex 4
Annex V	point 9

APPROVED
by the Resolution of the Cabinet of Ministers of Ukraine
No. 154 of 27 February 2019

AMENDMENT
to be introduced to the list of types of products subject to state
market surveillance by state market surveillance authorities

The [list](#) shall be supplemented with point 48 to read as follows:

“48. Water pumps	Resolution by the Cabinet of Ministers of Ukraine No. 154 of 27 February 2019 ‘On Approval of the Technical Regulation on Ecodesign Requirements for Water Pumps”	State Service of Ukraine on Food Safety and Consumer Protection”.
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