Water Pumps

Summary of proposed Triple E eligibility criteria changes.

To facilitate a refinement of the eligibility criteria for water pumps it is proposed to make the following amendments:

Commission Regulation (EU) 547/2012 sets out the Ecodesign requirements for water pumps. It prescribes the methodology for testing and the required minimum performance standards for water pumps, without integral variable speed drives (VSD). The methodology and formulae prescribed are the same as currently used in the existing Triple E eligibility criteria documentation. The Triple E eligibility criteria set minimum efficiency at a higher level than that prescribed by Ecodesign. Some terminology differences also occur, especially with the symbols used. The Ecodesign terminology and symbols have been incorporated in the review proposals. Pump performance when running in an overload situation is also introduced.

One major difference is the C value applied for specific types of pumps. This value is key within the efficiency calculation. The C values in Regulation 547/2012, applicable since 1 January 2015, are less stringent than the C values already in use in the current Triple E compliance requirement. Accordingly, the existing Triple E C values have been retained in this update.

Although integrated VSD pumps are omitted from the EU Directives they are retained in this update.

- Conditions 3, 4, 5 & 6 relating to High Efficiency Water Pumps without integrated VSD's are updated to conform to EU Commission Regulation: (EU) 547/2012 regarding Ecodesign requirements for water pumps.
- Table 2: Terms and Equations for pumps without integrated VSD's is updated according to Commission Regulation (EU) 547/2012.
- A proposed change of technology name from 'Pumps to 'Water Pumps' in line with Commission Regulation (EU) 547/2012.

Note: There are no changes to the sub-technology high-efficiency pumps with an integrated variable speed drive.'

The proposed eligibility criteria document is contained on the following pages.

Please follow this link to view the currently published eligibility criteria.

Category: Process and Heating, Ventilation and Air-conditioning (HVAC) Control Systems

Technology: Water Pumps

A high-efficiency pump is defined as a machine designed for the energy-efficient on-site transfer of liquid, and which works by adding energy to the liquid by increasing its velocity and / or increasing its pressure, thus raising its kinetic (velocity) energy and/or potential (pressure) energy.

Pump equipment is considered to include the following:

High efficiency pumps not fitted with VSD but capable of being operated in conjunction with an external VSD.

High efficiency pumps that are supplied fitted with an integrated VSD.

A VSD is specifically designed to drive an AC induction motor in a manner that rotates the shaft at a variable speed dictated by an external signal.

An energy efficient pump with an integrated VSD is a pump which has a VSD integrated onto the body of the pump motor combination, thus making the pump, motor and VSD a single commodity. Integration implies that neither the VSD nor the pump can be installed and used as a separate entity.

Water Pumps Eligibility Criteria Overview:

In order to be included on the Triple E Register, the specific water pump equipment must meet all of the relevant requirements set out below.

Note: *Supporting documentation that clearly demonstrates Triple E compliance according to the conditions below will be required as part of the Triple E checking process. Detailed information on the types of documents accepted can be found in the separate Supporting Documentation guidelines.*

General Eligibility Criteria – Applicable to all Pumps

No.	Condition
1	Have a power rating greater than 1.1kW
2	All equipment and/or components must be CE marked as requested by the relevant EU Directive.

High Efficiency Pumps without integrated VSDs – specific Eligibility Criteria:
(in addition to General Eligibility Criteria)

No.	Condition
3	Must fall under one of the pump type categories as outlined in Table 1
4	Must conform to EU Commission Regulation: (EU) 547/2012 with regards to ecodesign requirements for water pumps implementing Directive: 2009/125/EC. Must be tested according to the requirements of Commission Regulation (EU) 547/2012 and must provide technical data in the manner prescribed in this Regulation.
5	Must exceed all efficiency levels as calculated using Equations 2, 3, and 4, in Table 2, using the appropriate C value specified for the specific pump type in Table 1.
6	Pump curve plots and appropriate operating and maintenance manuals must be available for the end user as standard supply with the pump, in order to optimise the achievement of any potential energy efficiency improvements.

High Efficiency Pumps with integrated VSDs – specific Eligibility Criteria:
(in addition to General Eligibility Criteria)

No.	Condition
7	Must fall under one of the pump type categories as outlined in Table 3
8	Pump curve plots and appropriate operating & maintenance manuals must be available for the end-user as part of the main contract of sale in order to optimise the achievement of any potential efficiency improvements. The information provided must include pump efficiency rating at two different operating conditions for speed (and associated head)
9	The VSD must be able to use an external control signal to vary the pump output between 50% rated flow (or less) and 100% of the rated flow of the pump with reference to real time load conditions

Table 1: Eligible categories for pumps not fitted with integrated VSD's

Type	Sub-type	Speed (rpm)	Max C value	Characteristics	Limits
Single stage end suction water pumps	End suction own bearing (ESOB)	1,450	122.94	Operating temp -10 to 120^{0}C. Single suction, single impeller. All efficiencies based on full (untrimmed) impeller	$Q_{BEP\ min}$ = 6m^3/h $n_{s\ min}$ = 6 rpm $n_{s\ max}$ = 80 rpm P_{max} = 150kW H_{max} = 90m @ 1,450 rpm H_{max} = 140m @ 2,900 rpm
		2,900	125.34		
	End suction close coupled (ESCC)	1,450	124.07		
		2,900	126054		
	End suction close coupled in-line (ESCC)	1,450	127.30		
		2,900	128.14		
Vertical multistage (MS) water pumps	All	1,450	123.93	Operating temp -10 to 120^{0}C. Vertical multistage pumps in in-line and ring section design. Efficiency is measures and judged on the basis of a 3 stage pump	$Q_{BEP} \leq$ 100 m^3/h N = 2,900 rpm
		2,900	127.75		
Submersible multistage (MSS)	All	2,900	122.05	Pumps with nominal size 4" and 6"	n/a

Table 2: Terms and equations

Eqn No.	Equation description
1	n_s: Specific pump speed (rpm) at Best Efficiency Point (BEP) $n_s = n \cdot \frac{\sqrt{Q_{BEP}}}{(1/iH_{BEP})^{\frac{3}{4}}}$
2	η_{BEP}: Minimum pump efficiency (%) at the Best Efficiency Point (BEP) **(η_{BEP})** min required = $88.59x + 13.46y - 11.48x^2 - 0.85y^2 - 0.38xy - C$
3	$\eta_{BEP\text{-}pl}$: Minimum pump efficiency (%) at part load (PL = 75%) **($\eta_{BEP\text{-}pl}$)** min required = $0.947 \cdot \eta_{BEP}$
4	$\eta_{BEP\text{-}ol}$: Minimum pump efficiency (%) at overload (OL = 110%) **($\eta_{BEP\text{-}ol}$)** min required = $0.985 \cdot \eta_{BEP}$

Where:

LN = Natural log

x = LN (n_s) y = LN (Q_{BEP})

BEP = Best Efficiency Point – means the operating point of the water pump at which it is at the maximum hydraulic efficiency measured with clean cold water, maximum temperature of 40^0C.

Q_{BEP} = Flow at Best Efficiency Point (m^3/sec)

H = Head (m)

i = Stage – means the number of series impellers in the water pump

C = A constant for each specific type of water pump (see Table 1).

Table 3: Eligible pump categories <u>with</u> integrated VSD's

Type	Description	Speed (rpm)
Single stage end suction water pumps	End suction own bearing ESOB)	1,450
		2,900
	End suction close coupled (ESCC)	1,450
		2,900
	End suction close coupled in-line (ESCCI)	1,450
		2,900
Vertical multistage water pumps (MS)	All	1,450
		2,900
Submersible multistage (MSS)	All	2,900

----------End of Triple E eligibility criteria ----------

--Please see next section for technical detail submission and supporting documentation guidance

Guidance on product details and supporting documentation

NOTE: The following information is not part of the official criteria document published within the relevant Statutory Instrument. It has been added here for guidance purposes only in order to help you to provide (a) product details and (b) the required supporting documentation.

Note: *All information contained in this guidance document is subject to change without notice.*

Technical information required in product submission

The following are the specific technical values required as part of the product submission for this technology:

Pump type

You must first select which type of pump your product comprises. Only one type can be chosen per product.

Input power rating rating (kW)

The input power rating in kW of the pump motor is required as a value for the product submission. It must be entered as whole number only (do not include kW symbol). There should also be no spaces or full stops after the number submitted. The figure must comply with the criteria requirements for minimum power rating values.

Efficiency

The efficiency of the pump product is required as a value for the product submission. It must be entered as number only (do not include units). There should also be no spaces or full stops after the number submitted. The figure must comply with the criteria requirements for minimum efficiency values.

Supporting documentation required

Described below is the list of documents that are accepted as proof of compliance for the specific condition.

Note: This information will only be requested AFTER you submit your product's basic details online

<u>Important Notes to Product Providers</u>

Please ensure that you read the "Important Notes to Product Providers" section at the end of this document prior to submitting documentation.

General Eligibility Criteria

No	Condition	Supporting Documentation Requirement
1	Have a power rating greater than or equal to 1.1kW	Official and published manufacturer's technical data sheet or brochure that demonstrates compliance with the requirements of the condition. The submitted documentation should confirm that the product is driven by an AC induction motor and that its rated output is greater than 1.1kW
2	All equipment and/or components must be CE marked as requested by the relevant EU Directive.	Official and published manufacturer's technical data sheet or brochure that demonstrates CE marking compliance. **OR** A copy of an official signed declaration on headed paper which confirms CE marking compliance. Official declarations should explicitly state the product for which CE marking is being confirmed (i.e. do not provide a letter simply stating general compliance with the relevant Triple E Condition). Where a document is used to demonstrate conformance for a number of products or range of products it should clearly specify each individual product covered by that document.

Pumps <u>without</u> integrated VSD – specific eligibility criteria

No	Condition	Supporting Documentation Requirement
3	Must fall under one of the pump type categories as outlined in Table 1	Official and published manufacturer's technical data sheet or brochure that demonstrates compliance with the requirements of the condition.

4	Must conform to Commission Regulation (EU) 547/2012 implementing Directive2009/125/EC and setting ecodesign requirements for water pumps. Must be tested according to the implementing regulation and must provide technical data in the manner prescribed in this Regulation	Accredited certification that the product has been tested in accordance with the requirements of Commission Regulation (EU) 547/2012 setting ecodesign requirements for water pumps. **OR** Evidence of official testing by manufacturer or independent test lab carried out according to the principles outlined in the named standard. Test reports should be of the format described in the 'Important notes to product providers' section of this document. See note on 'Scientific Equivalence' in the Important notes to Product Providers section of this document.
5	Must exceed all efficiency levels as calculated using Equations 2, 3, and 4, in Table 2, using the appropriate C value specified for the specific pump type in Table 1.	Values used for calculations defined in official and published manufacturer's technical data sheet or brochure. **AND** • Calculation sheet from a manufacturers test or equivalent, verifying that the unit achieves the stated minimum efficiency as calculated in Equations 2, 3 & 4, and accompanied by a signed declaration on headed paper to this effect. OR • Evidence of official testing by manufacturer or independent test lab verifying that the unit achieves the stated minimum efficiency levels. Test reports should be of the format described in the 'Important notes to product providers' section of this document.
6	Pump curve plots and appropriate operating and maintenance manuals must be available for the end user as standard supply with the pump, in order to optimise the achievement of	A copy of an official signed declaration on headed paper statement confirming that the appropriate pump curve plots, O&M operating and maintenance manuals are provided. Where applicable, information on the availability of technical documentation to download online should be given.

	any potential energy efficiency improvements.	**NB:** A signed declaration is required to comply with this condition in all cases. Submitting copies of user manuals is not sufficient and not required by this condition.

Pumps <u>with</u> integrated VSD – specific eligibility criteria

No	Condition	Supporting Documentation Requirement
7	Must fall under one of the pump type categories as outlined in Table 3	Official and published manufacturer's technical data sheet or brochure that demonstrates compliance with the requirements of the condition.
8	Pump curve plots and appropriate operating & maintenance manuals must be available for the end-user as part of the main contract of sale in order to optimise the achievement of any potential efficiency improvements. The information provided must include pump efficiency rating at two (2) different operating conditions for speed (and associated head)	A copy of an official signed declaration on headed paper statement confirming that the appropriate pump curve plots, O&M operating and maintenance manuals are provided. Where applicable, information on the availability of technical documentation to download online should be given. **NB:** A signed declaration is required to comply with this condition in all cases. Submitting copies of user manuals is not sufficient and not required by this condition.
9	The VSD must be able to use an external control signal to vary the pump output between 50% rated flow (or less) and 100% of the rated flow of the pump with reference to real time load conditions	Official and published manufacturer's technical data sheet or brochure that demonstrates compliance with the requirements of the condition.

Important Notes to Product Providers

General

There should be a clear link between all supporting documentation supplied and the product being submitted. This will typically take the form of a product code or product name that can be cross referenced between the submitted product and relevant supporting documentation. If product codes / names have been changed since publication of the supporting documentation, then official evidence of this must be provided with the supporting documentation supplied.

Any deviation from these requirements will result in the supporting documentation not being considered adequate for the purposes of demonstrating compliance with the criteria conditions. This will in turn delay the submission and/or result in the product not being considered eligible.

Where the Triple E criteria or help documentation references compliance to appropriate rather than specific standards, the onus is on the product provider to ensure that supporting documentation supplied references recognised standards that apply to the submitted product, i.e. the product must be covered under the scope of a recognised standard.

If any product submitted is later found not to meet the performance or specification criteria, then this product will cease to be considered eligible for the Triple E.

Note: When supplying the supporting documentation through the online process you must ensure that the correct page number(s) of the document is referenced when demonstrating compliance with the relevant condition. An explanatory note should also be given where more than one page number is referenced.

Test Report

A test report must include an outline of the complete test, including:

- √ Introduction
- √ Details on test conditions
- √ The specific model details of the product tested
- √ The steps taken in the test
- √ The results
- √ Graphical representations
- √ Conclusion

All documents should be on headed paper and the document should be officially signed off.

All documentation must be in English or include adequate translation.

Certification

Where certificates are provided, all tests must be carried out by an organisation that is accredited by a national accreditation body recognised via the European Cooperation for Accreditation (preferred) or the International Accreditation Forum. **All documentation must be in English** or include adequate translation.

Scientific Equivalence

Some Triple E criteria conditions allow for scientifically equivalent tests and/or standards to be used. In the event that a product has not been designed, manufactured or tested to the specific standard named, then documentation relating to an equivalent internationally recognised standard may be used (where the phrase 'Or scientific equivalent' is included in the Triple E condition or help documentation). In such applications, the onus will be on the product submitter to demonstrate satisfactory equivalence of the standards. However, submissions which reference such supporting documentation may take longer to process, and if the product provider does not provide satisfactory evidence of equivalence, then the product will not be considered eligible for the Triple E register.

All documentation must be in English or include adequate translation.

Note: Where specific standards are cited in a condition or in the Triple E help documentation, then documentation demonstrating that the relevant products have been designed, manufactured or tested to these specific standards is preferred. Scientific equivalence is considered the exception rather than the norm.