

Boiler Controls

Summary of proposed Triple E eligibility criteria changes.

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

Oxygen Trim Controls:

- Condition 5: A probe failure reading of above 16%, should be achieved to eliminate confusion between probe failure and boilers operating with low excess air.

Burner Modulating Systems:

- Condition 6: Changes to the requirements for microprocessor-based controls that are capable of continuously modulating burner output while adjusting the ration of air to fuel to the products burner.
- Condition 7: Change to the air/fuel ratio to limit Oxygen levels in exhaust gasses to the updated specifications.
- Condition 10: Burner must be fitted with an air damper or damper controls which set the damper to fully closed on burner shutdown.

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

Please follow this [link](#) to view the currently published eligibility criteria.

Triple E Eligibility Criteria

Category: Heating and Electricity Provision

Technology: Boiler/Burner Controls

Boiler/Burner Controls are defined as specifically designed equipment that maximise the energy performance and efficiency of new and/or existing boiler and burner plant fired on natural gas, liquefied petroleum gas (LPG), or oil. Liquid and gaseous biofuels fired boilers are also covered in this category.

Boiler Controls equipment is considered to include the following:

Oxygen Trim Controls

Oxygen trim controls automatically monitor the oxygen or carbon monoxide concentration in boiler flue gases. They provide feedback to adjust the damper and vary the air and fuel supply to the burner to limit excess or low oxygen concentrations in the fuel/air mix to the proper position to maintain a set point of excess air. For the most part, boilers that operate with minimal excess air are more efficient.

Burner Modulating Control Systems

Modulating control allows the amount of heat provided by the boiler to be controlled to match the varying demand signal. Boiler/burner systems are designed to provide boiler modulation and combustion control through the use of digital microprocessor based systems with the aim of optimising energy use. They include new burners with controls and retrofit burner control systems.

Sequencers

Boiler sequencer controls optimise fuel usage by managing the firing sequence of different boilers. This ensures that the most efficient boiler(s) combinations are selected matching the prevailing load conditions or preventing individual boilers from over firing and cycling on and off unnecessarily.

Metering

Energy meters track energy input, boiler output and report boiler system performance and efficiency to the user.

Boiler Controls Eligibility Criteria

In order to be included on the Triple E Register the specific Boiler Controls 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.

Oxygen Trim Controls Specific Eligibility Criteria:

No.	Condition
1.	<p>Equipment must contain the following elements:</p> <ul style="list-style-type: none"> • Electronic Oxygen (or Carbon Monoxide) sensor designed for fitting in the boiler flue near the boiler, ahead of any dampers or other sources of air leakage into the boiler or flue. The sensor is connected to a control panel. • Boiler temperature or pressure sensor • Servomotor on the air supply damper • Servomotor on fuel supply. Each servomotor must be controlled by a positional or flow-based feedback mechanism. • Control panel which takes a reading from the sensor and adjusts the air supply damper and fuel supply accordingly. Must fully close the damper on burner shutdown. • Must be capable of adjusting the ratio of air and fuel fed to the burner maintaining combustion efficiency across the required turndown range. • Must comply with the maximum permitted levels of oxygen and carbon monoxide in the burner’s exhaust gases for the fuel being combusted.
2.	Overall equipment to be accurate to minimum accuracy of $\pm 1\%$ of net excess oxygen (“overall” refers to the “sum of errors” across the system)
3.	Must permit integration with burner management systems.
4.	Capability to output to BMS or other equivalent monitoring and control system.
5.	A probe failure reading of above 16%, should be achieved to eliminate confusion between probe failure and boilers operating with low excess air.

Burner Modulating Systems Specific Eligibility Criteria:

No.	Condition
6.	Burners must have microprocessor-based controls that are capable of continuously modulating burner output while adjusting the ratio of air to fuel to the products burner in response to measured temperature or pressure values. It should maintain the combustion efficiency over a range of turn-down ratios as set out below:

	<ul style="list-style-type: none"> • Gas ($\geq 1,200\text{kW}$): ≥ 4 to 1 • Oil ($\geq 1,200\text{kW}$): ≥ 4 to 1 • Gas or dual fuel ($< 1,200\text{kW}$): ≥ 3 to 1 • Oil ($< 1,200\text{kW}$): ≥ 3 to 1 <p>Note Boiler Turndown is the ratio between a boiler's maximum and minimum output. Depending on the burner's design, it may have a turndown ratio of 4 to 1 indicates adjustment in the range 25% to 100%.</p>
7.	<p>The microprocessor must control the air/fuel ratio to limit the oxygen levels in exhaust gases to the following levels:</p> <ul style="list-style-type: none"> • 3% O₂ at 100% rated boiler output • 4% O₂ at 50% rated boiler output • 5% O₂ at 25% of rated boiler output
8.	<p>CO₂ levels in the exhaust gases must be less than:</p> <ul style="list-style-type: none"> • 20 parts per million volume (ppmv) for all boilers over all turn-down ratios
9.	All valves and dampers to be fitted with precision servomotors.
10.	Burner must be fitted with an air damper or damper controls which set the damper to fully closed on burner shutdown.
11.	All burner fans must be fitted with VSD control on the fan motor.
12.	<p>Oil fired burners must comply with the performance criteria set out in IS EN 267, or scientific equivalent.</p> <p>or</p> <p>Gas fired burners must comply with the performance criteria set out in IS EN 676, or scientific equivalent.</p>

Sequencer specific Eligibility Criteria:

No.	Condition
13.	The sequencer must be microprocessor based.
14.	It must use sensors to measure heating system flow and return temperatures /or steam pressures if appropriate.
15.	It must be able to control and isolate a minimum of two boilers.
16.	It must have the capability of storing and consulting individual control parameters for each connected boiler.

17.	It must select the appropriate boiler(s) based on the optimum efficiency of the whole system.
18.	All equipment and/or components must be CE marked as required by the specific EU directive(s).
19.	Appropriate operating & maintenance manuals must be available to the end-user in order to optimise the achievement of any potential energy efficiency gains.
20.	Training: Appropriate training must be available to the end-user, such that the end user can run the system in an energy efficient manner.

Metering specific Eligibility Criteria

No.	Condition
21.	Meter must be microprocessor/computer based.
22.	Meter must be designed to measure the appropriate boiler parameters (Flow, temperature/ pressure) and calculate the associated energy usage in kW and cumulative kWh.
23.	Equipment must be specifically for use with hot water boilers or steam systems with a view to optimising boiler efficiency and performance.
24.	Meters must be able to measure across a varying load profile (wide turndown range).
25.	Meter output to have: <ul style="list-style-type: none"> • Local display output. • Output to BEMS or equivalent system
26.	Accuracy of equipment to be minimum $\pm 2\%$.

----- End of Triple E eligibility criteria -----
Please see next section for technical detail submission and supporting documentation guidance

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 provide assistance with the submission of product details and the provision of the required supporting documentation.

Note: All information contained within 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:

Boiler control product type

- As part of the product submission you must select which type of boiler control your product is. Only one type can be chosen per submitted product.

Supporting documentation required

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

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

Important Notes to Product Providers

You must read this entire document prior to submitting products to the SEAI system, including the "Important Notes to Product Providers" section at the end of this document prior to submitting documentation.

All documentation supporting the product submission must clearly reference the correct product name and/or product code being submitted. The correct page number(s) must be detailed with each document supporting the submission.

Oxygen Trim Controls Specific Eligibility Criteria:

No.	Condition	Supporting Documentation Requirement
1.	<p>Equipment must contain the following elements:</p> <ul style="list-style-type: none"> • Electronic Oxygen (or Carbon Monoxide) sensor designed for fitting in the boiler flue near the boiler • Boiler temperature or pressure sensor • Actuated air supply control damper • Actuated valve on fuel supply • Control panel which takes a reading from the sensor and adjusts the air supply damper and fuel supply accordingly. 	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates the requirements of the condition including CE certification.</p> <p>OR</p> <p>A copy of an official signed declaration on headed paper which confirms that the equipment contains the required elements.</p> <p>Official declarations should explicitly state the product(s) for which the constituent elements are being confirmed (i.e. do not provide a letter stating compliance with Triple E Condition X).</p> <p>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.</p>
2.	<p>Overall equipment to be accurate to minimum accuracy of $\pm 1\%$ net excess oxygen (“overall” refers to the “sum of errors” across the system)</p>	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates the requirements of the condition.</p>
3.	<p>Must permit integration with burner management systems.</p>	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates the requirements of the condition.</p>

4.	Capability to output to BMS or other equivalent control and monitoring system.	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.
5	A probe failure reading of above 16%, should be achieved to eliminate confusion between probe failure and boilers operating with low excess air.	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.

Burner and Modulating Controls Systems specific Eligibility Criteria:

6.	<p>Burners must have microprocessor based controls that are capable of continuously modulating burner output in response to measured temperature or pressure values over a turn-down ratio as appropriate below:</p> <ul style="list-style-type: none"> • Gas ($\geq 1,200\text{kW}$): ≥ 4 to 1 • Oil ($\geq 1,200\text{kW}$): ≥ 4 to 1 • Gas or dual fuel ($< 1,200\text{kW}$): ≥ 3 to 1 • Oil ($< 1,200\text{kW}$): ≥ 3 to 1 	<p>Evidence of official testing by manufacturer or independent test lab carried out according to a relevant standard or stated methodology that confirms the requirements of the condition. Test reports should be of the format described in the 'Important Notes to Product Providers' section of this document.</p> <p>SEAI reserves the right to commission their own independent conformity testing to ensure listed technologies continue to meet the Triple E criteria.</p>
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<p>7.</p>	<p>Microprocessor/computer must control the air/fuel ratio to limit oxygen levels in exhaust gasses to the following levels:</p> <ul style="list-style-type: none"> • 3% O₂ at 100% rated boiler output • 4% O₂ at 50% rated boiler output • 5% at 25% of rated boiler output 	<p>Evidence of official testing by manufacturer or independent test lab carried out according to a relevant standard or stated methodology that confirms the requirements of the condition. Test reports should be of the format described in the 'Important Notes to Product Providers' section of this document.</p>
<p>8.</p>	<p>CO₂ levels in the exhaust gases must be less than: 20 ppmv for all boilers over all turn-down ratios</p>	<p>Evidence of official testing by manufacturer or independent test lab carried out according to a relevant standard or stated methodology that confirms the requirements of the condition. Test reports should be of the format described in the 'Important Notes to Product Providers' section of this document.</p> <ul style="list-style-type: none"> • EN 676:2003 (as amended), "Automatic forced draught burners for gaseous fuels". • EN 267:2009 (as amended), "Automatic forced draught burners for liquid fuels"

<p>9.</p>	<p>All valves and dampers to be fitted with precision servomotors.</p>	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates the requirements of the condition. The product provider should include a product provider note stating the page number on the document supplied where compliance with the condition is demonstrated.</p> <p>OR</p> <p>A copy of an official signed declaration on headed paper which confirms the requirements of the condition.</p> <p>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).</p> <p>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.</p>
<p>10.</p>	<p>Burner must be fitted with an air damper which is fully closed on burner shutdown.</p>	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates the requirements of the condition. The product provider should include a product manufacturer note</p> <p>OR</p> <p>A copy of an official signed declaration on headed paper which confirms the requirements of the condition.</p> <p>Official declarations should explicitly state the product name and model/type number for which the declaration is being made (i.e. do not provide a letter simply stating general compliance with the relevant Triple E Condition).</p>

		Where a document is used to demonstrate conformance for a number of products or range of products it should clearly specify each individual product name, model/type number covered by that document.
11.	All burner fans must be fitted with VSD control on the fan motor.	<p>Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.</p> <p>OR</p> <p>A copy of an official signed declaration on headed paper which confirms the requirements of the condition.</p> <p>Official declarations should explicitly state the product name, model / type number for which the declaration is being made (i.e. do not provide a letter simply stating general compliance with the relevant Triple E Condition).</p> <p>Where a document is used to demonstrate conformance for a number of products or range of products it should clearly specify each individual product model or type covered by that document.</p>
12.	<p>Oil fired burners must comply with the performance criteria set out in IS EN 267, or scientific equivalent or</p> <p>Gas fired burners must comply with the performance criteria set out in IS EN 676, or scientific equivalent.</p>	<p>Oil Fired Burners</p> <p>Accredited certification that the equipment complies with the standard below.</p> <p>OR</p> <p>Evidence of official testing by manufacturer or independent test lab carried out according to the principles outlined in the performance standard below. Test reports</p>

		<p>should be of the format described in the ‘Important Notes to Product Providers’ section of this document.</p> <p>Accepted standards are:</p> <p>EN 267. See note on ‘Scientific Equivalence’ in Important Notes to Product Providers section at end of this document.</p> <p>Gas Fired Burners</p> <p>Accredited certification that the equipment complies with the standard below.</p> <p>OR</p> <p>Evidence of official testing by manufacturer or independent test lab carried out according to the principles outlined in the performance standard below. Test reports should be of the format described in the ‘Important Notes to Product Providers’ section of this document.</p> <p>Accepted standards are:</p> <p>EN 676. See note on ‘Scientific Equivalence’ in Important Notes to Product Providers section at end of this document.</p>
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Sequencer specific Eligibility Criteria:

No.	Condition	Supporting Documentation Requirement
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12.	The sequencer must be microprocessor or computer based.	Official and published manufacturer's technical data sheet or brochure that demonstrates proof of compliance with the requirements of the condition.
13.	Must use sensors to measure heating system flow and return temperatures or in steam boilers, pressures.	Official and published manufacturer's technical data sheet or brochure that demonstrates proof of compliance with the requirements of the condition.
14.	Must be able to control and isolate a minimum of two boilers.	Official and published manufacturer's technical data sheet or brochure that demonstrates proof of compliance with the requirements of the condition.
15.	Must have the capability of storing and consulting individual control parameters for each connected boiler.	Official and published manufacturer's technical data sheet or brochure that demonstrates proof of compliance with the requirements of the condition.
16.	Must select the appropriate boiler(s) based on the optimum efficiency of the whole system for a range of load conditions being demanded.	Official and published manufacturer's technical data sheet or brochure that demonstrates proof of compliance with the requirements of the condition.

<p>17.</p>	<p>All equipment and/or components must be CE marked as required by the specific EU directive(s).</p>	<p>Official and published manufacturer’s technical data sheet or brochure that demonstrates CE marking compliance.</p> <p>OR</p> <p>A copy of an official signed declaration on headed paper which confirms CE marking compliance.</p> <p>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).</p> <p>Where a document is used to demonstrate conformance for a number of products or range of products it should clearly specify each individual product model or type covered by that document.</p>
<p>18.</p>	<p>Appropriate operating & maintenance manuals must be available to the end-user in order to optimise the achievement of any potential energy efficiency gains.</p>	<p>A copy of an official signed declaration on headed paper which confirms that the appropriate operating and maintenance manuals are provided. Where possible, information on the availability of technical documentation to download online should be given.</p> <p>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.</p>
<p>19.</p>	<p>Training: Appropriate training must be available to the end-user, such that the end user can run the system in an energy efficient manner.</p>	<p>A copy of a signed official statement on headed paper confirming that the appropriate end-user training is available is required in all cases.</p> <p>The signed declaration must explicitly state that training is available to the end-user, rather than simply stating that the system is compliant with the relevant Triple E Condition.</p>

		NB: Submitting copies of training manuals is not sufficient and not required by this condition.
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Metering specific Eligibility Criteria:

No.	Condition	Supporting Documentation Requirement
20.	Meter must be microprocessor or computer based.	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.
21.	Meter must be designed to measure the appropriate boiler parameters (Flow and return temperatures and pressure if steam) and calculate the associated energy usage in kW and kWh.	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.
22.	Equipment must be specifically for use with hot water boiler or steam boiler system with a view to optimising boiler efficiency.	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.
23.	Meters must be able to measure across a varying load profile (wide turndown range).	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.
24.	Meter output to have: <ul style="list-style-type: none"> • Local display output. • Output to BEMS or equivalent system 	Official and published manufacturer's technical data sheet or brochure that demonstrates the requirements of the condition.

25.	Accuracy of equipment to be minimum \pm 2%.	Evidence of official testing by manufacturer or independent test lab carried out according to a relevant standard or stated methodology that confirms the requirements of the condition. Test reports should be of the format described in the 'Important Notes to Product Providers' section of this document.
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<p>Component List</p>
<p>The component list contains details and part numbers of any ancillary equipment that may be supplied to a customer as an additional component to the overall submitted system. It must be formatted according to the TRIPLE E component list template.</p> <p>When components are detailed in a component list, reference must be made to official and published brochures or data sheets where these components are described. These brochures/datasheets must then be supplied in addition to the component list.</p>

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 reference 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.

SEAI reserves the right to commission their own independent conformity testing to ensure listed technologies continue to meet the Triple E criteria.

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 i. 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 or applicable standards, 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.

Representative testing

Where test information is required for a range of technically similar products (e.g. configurations of one base product) then in exceptional instances a form of representative testing may be utilised once agreed in advance with SEAI. Such testing is where only representative products are tested from a technically similar group or range of products. Provided a clear correlation can be demonstrated between the tested product and technically similar non-tested product, and that such a correlation clearly demonstrates the compliance of the non-tested product, representative testing may form an acceptable basis for supporting documentation.

Note: Where representative testing is used for a group or range of products, if the tested or representative product is removed from the list of eligible products then all related products are also removed.

In certain circumstances, to be eligible, products fitted to boilers with a thermal input greater than or equal to 1MW, and less than 50MW, then these boilers shall comply with the minimum requirements as stated in Annex II of the Medium Combustion Plant Directive (EU) 2015/2193