

Heating, Ventilation and Air Conditioning (HVAC) Zone Controls

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1. Definition of Technology

HVAC zone controls are products that are specifically designed to automatically control in an energy efficient manner, the amount of heating, cooling, ventilation or air conditioning that is applied to individual rooms or defined areas within a building, known as “zones”.

Where “HVAC” is the collective term used to refer to the combination of heating, cooling, ventilation, or air conditioning, that is specifically employed within a particular building.

2. Technology Description

HVAC zone controls are used to control the environmental conditions (i.e. temperature, ventilation rate and/or air condition) in individual zones (i.e. rooms or areas) within a building. They can be programmed to maintain these environmental conditions within preset limits in a manner that reflects occupation schedules or occupation status, weather conditions, and specific operating requirements.

A wide range of HVAC zone controls is available. The ECA scheme aims to encourage the purchase of products that automatically minimise the energy consumption of building heating, cooling, ventilation, or air conditioning equipment, and associated distribution systems.

The ECA Scheme covers four categories of products:

1. **Standalone control units** that are self-contained zone control units that are designed to control one or more zones, but not centralised HVAC plant.
2. **Centralised control units** that are self-contained central control units that are designed to control two or more zones, and centralised HVAC plant.
3. **Packaged control products** that consist of two or more control modules or units that are designed to be connected together during installation, and that are designed to control one or more zones. They may also control centralised HVAC plant, provided they are also designed to control at least two zones.
4. **‘Add-on’ control modules** that are not self-contained units, but are designed to incorporate zone control facilities into HVAC control units or equipment.

Investments in HVAC zone controls can only qualify for Enhanced Capital Allowances if the product is named on the Energy Technology Product List. To be eligible for inclusion on the Energy Technology Product List, products must meet the eligibility criteria as set out below.

3. Eligibility Criteria

To be eligible, products must:

1. Incorporate a microprocessor based controller that is pre-programmed to:
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ECA ENERGY TECHNOLOGY CRITERIA LIST 2009 - HEATING, VENTILATION AND AIR
CONDITIONING (HVAC) EQUIPMENT

- a) Automatically control the individual environmental conditions in one or more zones within a building, in an energy efficient manner that reflects the occupation status in each zone and/or predefined zone occupation schedules.
 - b) Automatically switch between pre-defined operating modes, in accordance with the predefined occupation schedule or occupation status of the zones being controlled.
2. Be able to automatically control the operation of the equipment:
- a) Heating and/or cooling the zones being controlled; and/or:
 - b) Ventilating and/or air-conditioning the zones being controlled.
3. Be designed to have at least three different zone operating modes, including:
- a) A “normal” operating mode where zone environmental conditions are maintained within predefined levels consistent with zone occupation.
 - b) An “economy” mode where zone environmental conditions are maintained at reduced levels to reflect, for example, the fact that the zone is unoccupied.
 - c) A “holiday” mode where zone heating, cooling, ventilation and air-conditioning is switched off, or operated solely for fabric, frost and equipment protection.
4. Incorporate an anti-tampering mechanism that prevents the product’s control strategy and configuration settings from being modified, and automatic control from being disabled, except during commissioning, maintenance or testing.
5. Comply with the relevant requirements for particular type of zone control and type of HVAC plant controlled, as set out in Tables 1 to 6 below, for products that:
- a) Control zone temperature (see Table 1).
 - b) Control zone ventilation rate or air condition (see Table 2).
 - c) Control based on zone occupation status (see Table 3).
 - d) Control based on zone occupation schedules (see Table 4).
 - e) Control centralised HVAC plant (see Table 5).
 - f) Control wet heating systems (see Table 6).
6. Products that are designed to control any type of heating or cooling equipment (including centralised heating or cooling plant) must control zone temperature.
7. Products that are designed to control centralised HVAC plant must be able to control zone environmental conditions based on zone occupation schedules.
8. Conform with the requirements of the EU EMC Directive 89/336/EEC (as amended) or its replacement EU EMC Directive 2004/108/EC, or be CE Marked.
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Table 1 CONTROL OF ZONE TEMPERATURE
All products that are designed to control zone temperature must:
<ol style="list-style-type: none">1. Be designed to directly measure zone temperature by means of a temperature sensor, and automatically adjust heat flow into, or out of, the zone to maintain temperature within the predefined temperature limits for the operating mode.2. Provide facilities that enable building managers to define the temperature set-points for each operating mode in each zone to within +/- 0.5 degrees centigrade, including separate set-points for zone heating and cooling.3. Limit the ability of building users to adjust the temperature set-point within individual zones, so any adjustments are restricted in terms of duration.4. Incorporate a mechanism that prevents simultaneous zone heating and cooling.
Notes
<ol style="list-style-type: none">5. Products that solely rely on an external thermostatic device (for example, a digital thermostat) to determine when additional heating or cooling is required within a zone, are not eligible.6. Products must automatically reset temperature set-point adjustments made by building users either after a pre-defined time interval (that may be fixed or defined by the building manager), or where zone control is based on occupation schedule, at the next scheduled switching time.

Table 2 CONTROL OF ZONE VENTILATION RATES OR AIR CONDITION
All products that are designed to control zone ventilation rate or air condition must:
<ol style="list-style-type: none">1. Be designed to monitor zone ventilation rate or air condition by means of a presence detector or sensor (see note 23), and automatically adjust the airflow into, or out of, the zone to maintain zone ventilation rates or air condition within the predefined limits for the operating mode.2. Incorporate a mechanism that automatically minimises ventilation rates in unoccupied zones, and in zones operating in economy or holiday modes.
Notes
<ol style="list-style-type: none">3. Products that solely rely on an electronic or mechanical 'timing out' mechanism (for example, a spring loaded button) to determine when a zone is unoccupied are not eligible.4. Products must not allow building users to adjust ventilation rate set-points, but may incorporate facilities that enable them to temporarily override ventilation rates for a limited period.

Table 3 CONTROL BASED ON ZONE OCCUPATION STATUS

All products that are designed to control zones based on occupation status must:

1. Be able to monitor zone occupation status by means of presence detector or sensor, and automatically adjust zone-operating mode to maintain environmental conditions within the predefined limits for the zone occupation status.
2. Provide facilities that enable building users to manually switch the zone into economy, holiday or other energy saving modes, without disabling automatic zone controls.

Notes

3. The product may monitor zone occupation status by means of one or more presence detectors, or sensors, which may include for example, CO₂ level monitors, heat or motion detectors, moisture sensors etc. However, manually operated devices (for example, push buttons or electronic touch buttons) are not considered to be presence detectors.

Table 4 CONTROL BASED ON ZONE OCCUPATION SCHEDULES

All products that are designed to control zones based on occupation schedules must:

1. Automatically switch zones between operating modes, in accordance with the predefined and individual weekly occupation schedule for each zone controlled.
2. Provide facilities that enable building managers to define the normal occupation times in each zone (to within five minutes) for each day of the week, including at least two periods of occupation per day (i.e. at least 14 different occupation periods a week).
3. Provide facilities that enable building users to temporarily override the predefined schedules and/or to cancel the remaining portion of a pre-defined occupation period.

In addition, products that also control zone heating and cooling must:

4. Incorporate a zone “optimum start” mechanism that monitors external and/or internal temperatures, and calculates when heating or cooling needs to begin in the zone in order to reach the pre-set temperature by the start of the next occupancy period.
5. Provide facilities that enable building managers to define different temperature set-points for each scheduled period of normal occupation throughout the day and week.

Notes

6. Products that control domestic hot water (DHW) systems must provide facilities that enable building managers to define a separate operating schedule for the operation of DHW systems.
7. Products must automatically reset overrides, either after a pre-defined time interval (which may be fixed or defined by the building manager) or at the next scheduled switching time.

Table 5 CONTROL OF CENTRALISED HVAC PLANT
<p>Where products control the operation of centralised HVAC plant, they must:</p> <ol style="list-style-type: none"> 1. Incorporate a mechanism that enables the building's HVAC systems to be easily switched into economy mode, for example, when a scheduled activity finishes early. <p>In addition, products that control central heating or cooling systems must:</p> <ol style="list-style-type: none"> 2. Monitor internal temperatures and automatically switch zone heating circuits on or cooling circuits off, to stop condensation occurring and to protect building fabric. 3. Incorporate an overall "optimum start" mechanism that monitors external or internal temperatures, and calculates when the heating or cooling system needs to be switched on in order to reach pre-set temperatures by the start of the next occupancy period, after taking account of the requirements of each zone.
Notes
<ol style="list-style-type: none"> 4. Products that control centralised HVAC plant must be designed to control at least two zones.

Table 6 CONTROL OF WET HEATING SYSTEMS
<p>Where products control the overall operation of wet heating systems, they must:</p> <ol style="list-style-type: none"> 1. Incorporate a "self-adaptive weather compensation" mechanism that automatically saves energy during milder weather conditions, by reducing the temperature set-point of the boiler water circuit as the external temperature rises, and also the temperature of, or the heat flow through, the individual heating circuits for each zone controlled. The mechanism must be able to 'learn' the thermal characteristics of the zone(s) and to automatically optimise the amount of weather compensation applied to each zone. 2. Incorporate a "frost protection" mechanism that monitors external temperatures (or pipework temperatures), and switches on boilers and heating circuits as required to prevent equipment and pipework from "freezing up". 3. Provide facilities for building managers to "temporarily override" or manually adjust the degree (or amount) of weather compensation applied to each zone controlled.
Notes
<ol style="list-style-type: none"> 4. The requirements in Table 5 also apply to products that control wet heating systems.

Where:

- Automatic control may be implemented either directly by means of an analogue or digital signal connection, or indirectly by means of another control device or network.
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- A mechanism is defined as “any sequence of pre-defined actions that performs a given function, where an action can be defined in hardware and/or software”.
- An algorithm is defined as “a mechanism that is defined in software”.
- The product’s control strategy is the combination of automatic control functions, mechanisms and facilities specified for particular type of zone control or HVAC plant controlled. In this context, products may be pre-programmed in one of the following ways:
 - a) One or more fixed control strategies that are designed to control specific type of zone, or set of equipment (or plant), and that can be selected during commissioning.
 - b) One or more flexible control strategies that can be configured to control different types of zones, and equipment, as part of a clearly defined commissioning procedure.
- Products that incorporate control strategies that are not designed to control zone heating, ventilation or air conditioning, or associated centralised HVAC plant, are not eligible.

4. Scope of Claim

Expenditure on the provision of plant and machinery can include not only the actual costs of buying the equipment, but other direct costs such as the transport of the equipment to site, and some of the direct costs of installation. Clarity on the eligibility of direct costs is available from [HMRC](#).