

## Waste Activities Capacity Calculation

### 1.0 Anaerobic Digestion Unit

The anaerobic digester has a total capacity of 270m<sup>3</sup>. The loading rates per day depend on the hydraulic retention time of the feedstock. In the case of pig slurry this is typically 10-15 days. See link here as a reference - <https://www.afbini.gov.uk/articles/2-factors-consider-anaerobic-digestion>

Therefore loading rates are theoretically 27-18m<sup>3</sup> per day.

Our experience is that these are too short and consistent gas production is not achievable. Therefore we typically operate in the range 10-20m<sup>3</sup> per day.

### 2.0 Incinerator

The Capacity of this unit is 1.539m<sup>3</sup> and is designed for whole carcass disposal.

Retention Time - 2 Seconds @ 850°C.

Temperatures are monitored in both the load chamber and the secondary chamber independently. Each temperature probe sends the temperature reading to the PLC of our Intelligent Combustion Management System (I.C.M.S.)

The ICMS displays the temperature reading directly to the touch screen HMI for the user to see as well as recording up to 8 Years of temperature, time and programme details tracked throughout each burn to a removable USB pen for submission to authorities and farm quality assurance schemes offering full traceability of the equipment and activities.

Please find Time Retention Calculator, manufacturers declaration of 50Kg or less and a process flow of the operation attached for reference.



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# Calculation of minimum chamber volumes for AIC Group EcoBurn -AGRI animal carcass incinerators

Mass balance calculations have been carried out on three low capacity EcoBurn - AGRI incinerators. These are used for safe animal carcass disposal. These incinerators must comply with DARD & DEFRA requirements of a two second residence time at greater than 850°C.

Basis of calculation:

Carcass burn rate: 50kg/hr Carcass analysis:

Component	Analysis, % w/w
Moisture	83.5
Ash	5.0
Nitrogen, N	1.0
Sulphur, S	0.0
Hydrogen, H	1.5
Carbon, C	5.0
Chlorine, Cl	0.0
Oxygen, O	4.0
TOTAL	100

Exhaust gas oxygen concentration = 6% wet basis

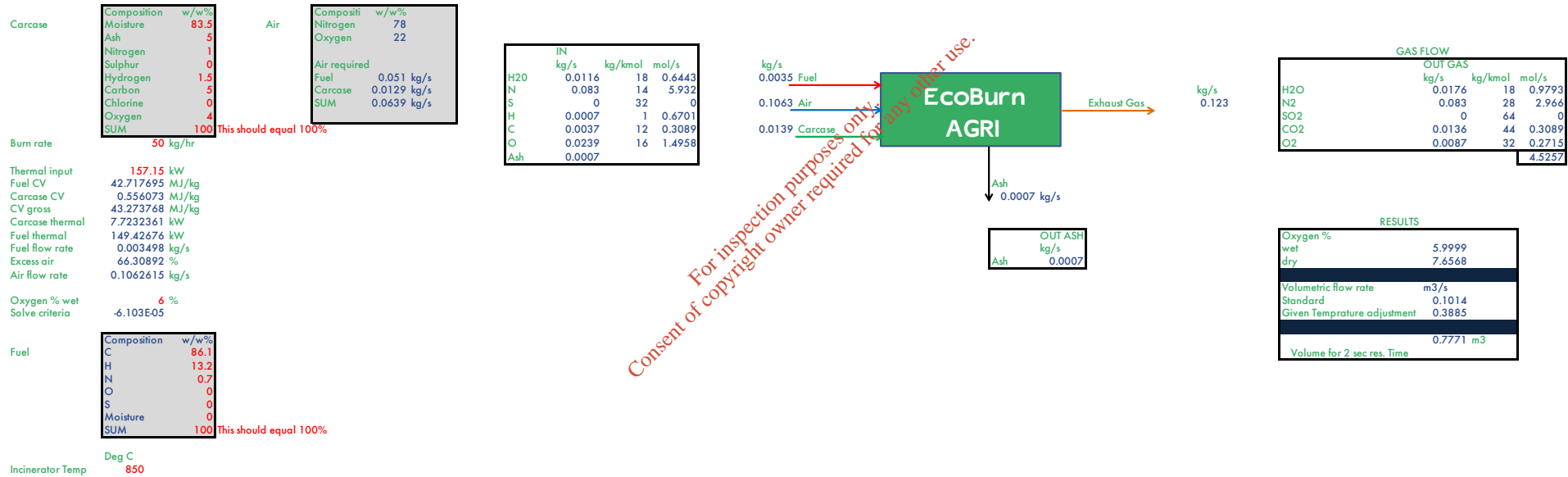
It is assumed that flow through the chamber is plug flow. Perfect plug flow is never achievable. In practice, due to the complex nature of the flow in any reactor, some material will pass through quicker and some will take longer than the mean time as calculated assuming plug flow. Gases will exhibit a 'residence time distribution curve' through the equipment. However, the relatively long flow path for combustion gases, and the location of the burners in the main and secondary combustion chambers ensure that the flow would be substantially plug flow in nature.

The minimum chamber volume is calculated based on a minimum residence time of 2 seconds at 850°C. In these calculations, the maximum firing rate is assumed based on both the main and the after-chamber burners firing. This will yield the highest 'minimum volume' required. Any reduction in firing rate will increase residence time. So, if the equipment complies at maximum firing rate, it will comply at all other (lower) firing rates.

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# Results

Calculations were then performed for fuel oil for the three incinerator models (EB150, EB250 & EB350). These were carried out using a prepared spread sheet. A sample page is shown below.



Results are tabulated below:

Results

Incinerator Model	Fuel	Rating		Calculated Necessary Volume	Declared Volume
		GAL/HR	KW gross		
EcoBurn 350	Fuel Oil	4.75	229.82	1.012	1.090
EcoBurn 250	Fuel Oil	3.75	181.32	0.855	1.007
EcoBurn 150	Fuel Oil	3.25	157.15	0.777	0.8408

In all cases, the equipment volumes exceed the minimum volumes required to meet the 2 seconds at 850°C criterion for safe incineration i.e. Actual residence times in these incinerators will exceed 2 seconds at 850°C. These are all based on both burners in each unit firing at their maximum rates. During control and turn down, the actual residence times will increase.


## **Model Declaration Regarding the Compliance of an Incinerator with Annex III of the Animal By-Products (EU) Regulation No. 142/2011**

### **Manufacturers Declaration Regarding the Compliance of an Incinerator with Annex III of The Animal By-Products Regulations (EU) No. 142/2011**

We AIC GROUP LIMITED HEREBY CERTIFY that the EcoBurn Range Of Low Capacity Incinerators meets the operating requirements set out in Annex III Section 2 of Regulation (EU) No. 142/2011 implementing Regulation (EC) No. 1069/2009 and the provisions of The Animal By-Products (Enforcement) Regulation (Northern Ireland) 2015, as a Low Capacity Incinerator compliant with the requirement to raise the temperature of the resultant gas to either 850°C for 2 seconds or 1100°C for 0.2 seconds\* provided that:

1. The incinerator is operated only with the burners specified below and set at the ratings and/or fuel flow and air settings specified and/or set by the Manufacturers.
2. No alteration is made to the Incinerator flows and inputs.
3. The Incinerator is operated at all times in accordance with the Manufacturer's Operating Instructions.
4. The Incinerator undergoes such annual servicing as specified in the Manufacturer's Operating Instructions. Servicing is to be carried out by the Manufacturer or a suitably qualified and certified Engineer.
5. The temperature measuring equipment and any temperature recording equipment fitted to the Incinerator shall be maintained in proper working order and shall be re-calibrated as specified by the manufacturer. Re-calibration shall be carried out in accordance with instructions contained in the Operating Instructions and to a recognised standard (e.g. UKAS).
6. In the event of damage to or malfunction of any part of the equipment including one or more burners or any part of the temperature monitoring equipment, the Operator shall immediately report this to the Manufacturer and follow the instructions of the Manufacturer to rectify the matter to ensure that the Incinerator operates in accordance with its design specification.

Company Name: AIC Group Limited  
 Make and model of incinerator: EcoBurn EB250 LC  
 Make and model of burner: Ecoflam MAX 15 TL CV  
 Type of burner: powered burner\*  
 Oil  
 Serial number of burner (if applicable): N/A  
 KW or BTU rating of burners: a) Main Burner: 84.62KW  
 b) Afterburner: 84.62KW  
 Jet setting of burners:  
 Fuel pressure setting (Gas only): N/A  
 Fuel and air settings of burner (powered burners only): a) Main Burner: 2.5  
 b) Afterburner: 2.5

Signed	
Print Name	Conor M B Donnelly
Position	Director
Date	24/07/2020

## EcoBurn – Process Flow

PROCESS ORDER	PROCESS DESCRIPTION
1	Waste Loaded
2	Programme Selection
3	Second Burn Chamber Ignition
4	Second Burn Chamber Heat up - 850°C
5	Load Chamber Ignition
6	Programme Running - Minimum Chamber Temperature 850°C
7	Programme Completion
8	Load Chamber Burner Poweroff
9	Second Burn Chamber Continued Running Burn Out 850°C
10	Second Burn Chamber Poweroff
11	Hydraulic Door Unlock After Time Elapsed & Cool Down
12	Manual Ash Removal

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