



## Castleton Crematorium – Cremator Design and Emissions.

### Historic Background

Cremation has increasingly become the most popular choice for funeral arrangements with the cremation rate @80% in this area.

Historic crematoria, such as Thornhill built 70 years ago, often had imposing chimney designs and were fitted with cremators which, naturally, lacked today's sophisticated filtration processes and may have impacted on local air quality.

The environmental Protection act 1990 introduced new standards and these standards have been further revised via process guidance updates issued in 1995, 2004 and 2012.

Air quality instruction issued by DEFRA in 2005 required crematoria to install filtration equipment to remove harmful emissions of mercury, dioxins and particulates alongside the introduction of computerised process controls.

Modern cremators, at a typical cost of @£750K, are designed to comfortably meet these much more stringent emission standards. Consequently, harmful emissions have been reduced to insignificant levels with new crematoria not even requiring the traditional chimney stack.

More information is provided below.

### Modern designs and Modern cremation Equipment

The cremation equipment chosen is supplied by Facultative Technologies Ltd (FT), the world leader in this field, and will use the best available technology and control techniques. The filtration equipment has been refined to exceed the latest standards and the plant is designed to be upgradable in the future as new technologies are introduced.

Modern filtration and fan assisted abatement equipment has also allowed the size of the chimney on new crematoria to be much lower, typically rising only around 1 meter from the roof line, much lower than older crematoria where the chimney could dominate the design and rise as high as 10m above the building.

Modern crematorium emissions are governed by an environmental permitting licence which is controlled and audited for compliance by the local environmental health authority. The operating constraints and permissible emissions are set out in the DEFRA process guidance note PG5/2, the current version of which was issued in 2012.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/611478/process-guidance-note-crematoria.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611478/process-guidance-note-crematoria.pdf)

The process guidance notes are currently being revised by DEFRA and it is anticipated they will come into force in 2024 to further tighten the permitted limits.

The plant at Castleton has already been designed with the latest technology and will significantly outperform the forthcoming revised limits.

<b>Substance</b>	<b>Permitted limit ( DRAFT PG5/2(23))</b>
Particulates	5mg/Nm <sup>3</sup>
Hydrogen Chloride ( HCl)	20mg/Nm <sup>3</sup>
TOC	10Mg/Nm <sup>3</sup>
Nox	200mg/Nm <sup>3</sup>
Mercury	30 µg/Nm <sup>3</sup>
Carbon monoxide	100mg/Nm <sup>3</sup>

The cremator plant at Castleton has been designed with the latest technology and will significantly outperform the forthcoming revised limits.

We have also taken the decision to include specialist equipment for the abatement of Nitrogen Oxide. (NOx) This is not a statutory requirement but is an important added protection to the environment.

We describe the process as being effectively clean to air as the activated carbon filtration process ensures that harmful emissions are removed by the equipment within the building.

The activated carbon is recycled to remove the pollutants before sensitive disposal. Metals and orthopaedic parts are also sensitively handled and recycled through a national approved scheme with the proceeds donated to local charities.

A heat exchanger is also included in the plant design to allow for energy from the heat of the process to be recovered and used within the building. This is now a common practice for new crematoria and is one way in which its environmental impact can be kept to a minimum.

## **Dispersion & Dilution assessment**

The planning process and environmental permitting regulations require us to undertake a dispersion report which analyses the effects on human health of the potential pollutants and the dispersion of them into the environment.

This modelling is undertaken on an absolute worst-case basis assuming that the plant is operating at the maximum limit of the environmental permit for each and every cremation. In reality the cremation process will be operating well within the environmental permit levels and as such the modelling presents a deliberate overstatement of the pollution. It is however important for us to understand the maximum impact.



The dispersion modelling report shows that :

- For NO<sub>2</sub>, particulates and VOCs, the maximum change in annual average concentration at all locations is less than 5% of the relevant Air Quality Assessment Level (AQAL) in each case. As the total concentration of each pollutant is less than 75% of the relevant AQAL, the change in concentration can therefore be considered Negligible.
- For mercury, the maximum change in annual average concentration at all locations is less than 0.5% of the AQAL, which is considered Negligible.
- There are no annual average AQALs for SO<sub>2</sub>, HCl or CO. However, the impact of short-term concentrations of less than 10%, as calculated for all of these pollutants, can be regarded as having an insignificant effect.
- At the sensitive receptors (nearby buildings), the maximum change in concentration for all pollutants is less than 0.5%, so is considered Negligible.
- The maximum predicted daily intake of dioxins due to inhalation is 0.5% of the Tolerable Daily Intake (TDI).

## Experience and Dedication

The Directors of Castleton Park have overseen the development of 21 new crematoria across the UK.

We understand the concerns of the public and recognise the significant responsibility that comes with ensuring compliance with environmental legislation. A failure to meet the regulations and abide by the permit would put the operation of the crematorium at risk.

Ultimately the operation will be scrutinised and the permit authorised by the local Environmental Health Officer with approved continuous monitoring equipment fitted from the outset so that the environmental performance of each cremation can be analysed. In addition to regular visits and inspections from environmental health officers, the cremator equipment is also independently tested on an annual basis to ensure Permit compliance levels are maintained.