Hot Gas Filtration - Case Study 2019

Customer Profile

Established Strawberry Farm Nursery and Non Perennial Crop Grower

Problem

Wood Chip Boiler particulate emissions over the licence emissions limit.

Challenge

Limited space within existing boiler house.

Solution Used

Tenmat Hot Gas Filters
Tenmat Candle (CS1150F)

System by HG Filtration Ltd

Result

Hot Gas Filtration elements capable of achieving atmospheric emissions of less than 3mg/m3.

A Strawberry Farm Nursery with 6,000m^2 of glasshouses is heated with a pressurised hot water system from a 4 MW wood chip boiler. The boiler was installed in 2008 and fitted with cyclones to reduce particulate emissions. When running the boiler on virgin wood chip the emissions from the stack were deemed as being acceptable by the Local Authority's EHO. However with recycled "grade A" waste wood the particulate emissions were outside of the licence emissions limit. To remain within limits meant using higher price dry virgin wood chip.

A better solution for particulates abatement was decided upon to satisfy licence conditions, and also reduce fuel costs. Options such as bag filters and electrostatic precipitators were considered but with high exhaust gas temperatures, typically around 250^{o}C, a "hot gas" filter was chosen.

Space within the existing boiler house was limited, but by using a bespoke design it was possible to locate the filter adjacent to the boiler. This entailed raising the filter higher than normal off the ground above the existing ash conveyor.

A design flow of 10,000 Am^3/h and a face velocity of 2cm/s resulted in a twin module with 600 elements being used. The filter is fitted with trace heating of the hoppers for off periods to avoid condensation problems. An automatic bypass duct with fail open / temperature controlled damper ensures safe operation under start up and transient boiler perturbations.

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Automatic delta pressure drop control is provided by a self contained controller that is interlinked with the main boiler control to enable remote monitoring. This also allows for the required pressure drop across the elements to be set during commissioning to suit the application.

The rotary valves from the old cyclones were retained for use with the new filters. This not only kept costs down but also simplified the controls modifications.

New twin walled insulated SS ducting was fitted from the boiler outlet to the exhaust fan to complete the installation.

Site work was kept to the minimum by the filters arriving completely built, only needing to be lifted into position on top of their new support frames. Site electrics were completed within a day and the new duct work was erected by the site's maintenance fitters, again keeping costs to the customer down.

Conclusions:

At this site, particulate emission levels are lower than 3mg/m3, which is better than current legislation requires. And, as recycled Woodchip can now be used alongside Virgin Woodchip, the clients ongoing costs have been reduced.

Cost Efficient . Increased lifetime . Time Saving . Tested . Approved