Enviro-Met Ltd

Rubicon Centre, Broad Ground Road,
Redditch, Worcs. B98 8YP
Tel/Fax. 01527 516579

Emissions of VOCs from Sand Reclamation Filter at Hytec Castings Ltd, Coventry

Report No EM4017

23 March 2004 → Received on inspection on 14/1/05.

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EM3370
23 March 2004

Emission of VOCs from Sand Reclamation Filter at Hytec Castings Ltd, Coventry

1. Introduction

The above site was visited on the 22nd March 2004 in order to carry out tests to quantify the level of VOC emissions from the filter serving the sand reclamation unit. The thermal reclamation unit is known to be not operating efficiently and these test were undertaken prior to a planned service visit in the very near future.

Under the conditions of authorisation of the process the results of any testing should be forwarded to the local authority within eight weeks of completion of testing.

Sampling was carried out by C A Hanks BSc (Hons), MIOSH.

2. Methods of Test

The levels of VOCs (volatile organic compounds) in the extraction ducts were measured continuously using a model 3010 Minifid Total Hydrocarbon Analyser supplied by Signal Instruments. The 3010 Minifid is a direct reading flame ionisation detector with an integral heated sample line. This detects volatile organic compounds in the airstream, including any compounds that are liquid at ambient temperatures. The instrument is calibrated against a standard methane concentration and gives a readout in ppm Methane Equivalence.
VOC levels were measured over a 30 minute period during a time of peak emissions, the concentration range and the mean concentration being reported.

All results are reported under standard conditions of 0°C, 101.3 kPa, uncorrected for water vapour. A full sampling protocol is included in the Appendix.

3. Results

VOC Emissionss

	Range.	15 minute mean	
	ppm methane	ppm methane	mg/m^3 carbon
In area just outside main rear doors	15 - 37	--	--
At final discharge	195 - 274	217	115

4. Comments

The limit for VOCs is 50mg Carbon/m^3. Emissions were around twice this level. The temperature in the bed was very low at 380°C and it is unlikely that organic compounds will be fully combusted at this temperature. The preferred bed temperature is 600°C.

→ new limit in ~~PPC~~ PG 2/4 = 30 mg/m^3.

⇒ where monitored in duct?
- straight section?
- after fan?

C A Hanks BSc (Hons), MIOSH.

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Procedures for VOC Monitoring

VOCs are prescribed substances for several processes, as defined in the Environmental Protection (Prescribed Processes and Substances) Regulations 1991. Individual Guidance Notes set out the emission concentrations that should apply to releases from contained sources, although for Part B processes the local authority under whose control the process falls, may set different limits as it sees fit.

The levels of VOCs (volatile organic compounds) in the extraction ducts are measured continuously using a Signal 3010 Mini FID Total Hydrocarbon Monitor. VOC levels are measured during a period of peak emissions; the concentration range and a 15 or 30 minute mean concentration are reported, depending on process. Sampling is normally carried out in a straight section of the final discharge duct after the fan to ensure the gases are well mixed.

The Signal 3010 Mini FID analyser is a direct reading instrument based on a flame ionisation detector, both the sample line and the instrument are heated to 190°C. The instrument has a organic filter for zeroing and the span is calibrated against a known concentration of methane (typically 500ppm). The instrument gives a readout in ppm, methane equivilent. Readings from the instrument are periodically noted throughout the measurement period. After the test and the average and maximum and minimum emission concentration are noted.

The method of reporting VOCs will depend on the actual process and the nature of the organic compounds released. Where there is a simple mixture or a single compound released, (such as from paint processes) then the emission concentration of actual compound in the discharge can also be calculated, based on the known, experimental response of the instrument. Where there is a complex mixture of organics, such as from thermal breakdown, then the results can only be quoted as the methane equivalent. In each case the concentration of VOCs is reported as carbon, as specified in the process guidance notes.

A Preparation

1. Verify that holes of at least 9mm diameter are available for sampling. Where possible, these should be positioned after the fan to ensure good mixing of the gases. Isokinetic sampling is not required for sampling gaseous emissions
2. Establish the major solvent or organic compounds used, or released during the process.
3. Establish the process operating cycle time

B On site

Preliminary

1. Verify safe access to the sample position
2. Determine that the plant is operating under normal conditions. Arrange for notification in the event of any stoppages or abnormal conditions
3. If the process is cyclic try to arrange that sampling starts at the same time as the process cycle begins.

Sampling Procedure

1. Assemble the sample lines and probe, ensure there are no leaks.
2. Switch on and allow the instrument to heat up to operational temperature (190°C)
3. Open the gas supplies and ignite the flame, allow to stabilise for a 10-15 minutes
4. Zero the instrument using a source of clean air.
5. Set the *span* against a known concentration of methane.
6. Select sample mode on the instrument.
7. Insert sample probe into centre of the duct and record the VOC concentration every 30 seconds. If a datalogger is used, start the datalogger at the same time. The datalogger will switch itself off after the sample period is complete.
8. At end of monitoring check span gas reading and zero.

C Processing

1. Interrogate the datalogger to obtain the average response and the maximum and minimum value over the sample period, or manually calculate the average from the periodic recordings.
2. Calculate the emission concentration of the specific organic compound, relative to methane, using experimentally derived relative response factors.
3. Express the results as mgC/m^3 at standard temperature and pressure

D Reporting

The report will include

- Description of plant and process operation
- Activity level during the period of testing.
- Sampling method
- Results (corrected to standard conditions of 0°C and 101.3kPa.)
- Discussion and interpretation of the results, including details of compliance with any stated emission limits, comments on the effectiveness of any abatement equipment and any appropriate recommendations

Received on inspection on 14/1/05.
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REC

Resource & Environmental Consultants Ltd.

Unit 19, Bordesley Trading Estate
Bordesley Green Road
Birmingham B8 1BZ
Telephone: 0121 326 7007
Fax: 0870 051 8783
Email: sales@recltd.demon.co.uk
Web: www.recltd.demon.co.uk

Your Ref:

Our Ref: 2c70425

26 August 2004

FAO Malcolm Clark
Hytec (Castings Manufacture) Limited
Barlow Road
Aldermans Green Industrial Estate
Coventry
West Midlands
CV2 2LD

need methodology?

Dear Malcolm,

EMISSION MONITORING

I am pleased to append a summary of the VOC concentrations determined during Lee Swanson's vist to your site on 30 June 2004. I understand that the purpose of the monitoring was to provide immediate VOC concentrations in order that your engineer could make any necessary adjustments to your process, however for completeness, I append a summary of the measurements made both 'as measured' and corrected to reference conditions of 273K, 101.3kPa and without correction for oxygen or moisture.

I hope the appended is satisfactory however you are most welcome to contact me if you have any comment or queries or if we can help you with any emissions monitoring requirements in the future.

Yours sincerely,

[redacted]

Mike Smith
Operations Manager
for **REC (Birmingham) Ltd**

Minute - averaged VOC data from Hytec Castings on 30 June 2004
Data expressed at 273K, 101.3kPa without correction for oxygen or water vapour

TIME	VOC ppm	VOC mg/m^3
12:47:00	80	43
12:48:00	84	45
12:49:00	88	48
12:50:00	80	43
12:51:00	92	50
12:52:00	92	50
12:53:00	90	49
12:54:00	94	51
12:55:00	103	56
12:56:00	74	40
12:57:00	82	44
12:58:00	72	39
12:59:00	77	42
13:00:00	79	43
13:01:00	85	46
13:02:00	89	48
13:03:00	83	45
13:04:00	91	49
13:05:00	104	56
13:06:00	111	60
13:07:00	96	52
13:08:00	75	41
13:09:00	82	44
13:10:00	90	49
13:11:00	70	38
13:12:00	90	49
13:13:00	95	51
13:14:00	90	49
13:15:00	80	43
13:16:00	82	44
13:17:00	96	52
Maximum	111	60
Minimum	70	38
Average	87	47

VOC data presented as methane (CH4)