Report for Periodic Monitoring of Emissions to Atmosphere

Part 1: **Executive Summary**

Permit Number: PPC/067 Var Ref: 002

Operator: Covrad Heat Transfer Ltd

Installation: Coventry

Emission Points: Assembly Shop Booth (LH), Assembly Shop Booth (Mid), Assembly Shop Booth (RH), Industrial Spray Booth 1 (RH), Industrial Spray Booth 1 (LH), Industrial Spray Booth 2 (LH) & Industrial Spray Booth 2 (RH)

Monitoring Dates: 12th - 17th January 2011

Contract Reference: FTBS14741

Operator: Covrad Heat Transfer Ltd

Address: Sir Henry Parks Road

Canley Coventry CV5 6BN

Monitoring Organisation: RPS Consultants Ltd.

Address: Grafton Building, Caswell Science &

Technology Park, Caswell,

Towcester, Northamptonshire, NN12 8EQ.

Report Date: 07 February 2011

Report Approved By: Martin Johnson

Position: Senior Environmental Consultant

MCERTS Registration Number: MM 03 168

Signature:

Visit number 1 of 1



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Monitoring Objectives

At the request of Bob Holmes of Covrad Heat Transfer Ltd, RPS Consultants Ltd. conducted stack emission monitoring at the Coventry site in January 2011.

The monitoring programme at this installation was carried out to provide data on emissions to atmosphere for comparison with the limits specified in the air emission criteria for this site.

The following tables detail the parameters requested for monitoring at each emission point and the actual monitoring conducted.

Table 1.1

Parameters Requested to be Monitored	Emission Point Assembly Shop Booth (LH)					
Total Particulate Matter	·					
Specific Requirements	Normal					

Notes:

✓ Represents pollutants sampled

Table 1.2

Parameters Requested to be Monitored	Emission Point Assembly Shop Booth (Mid)
Total Particulate Matter	V
Specific Requirements	Normal

Notes:

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Represents pollutants sampled

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Table 1.3

Parameters Requested to be Monitored	Emission Point Assembly Shop Booth (RH)
Total Particulate Matter	V
Specific Requirements	Normal

Notes:

Represents pollutants sampled

Table 1.4

Parameters Requested to be Monitored	Emission Point Industrial Spray Booth 1 (RH)
Total Particulate Matter	V
Specific Requirements	Normal

Notes:

Represents pollutants sampled

Table 1.5

Parameters Requested to be Monitored	Emission Point Industrial Spray Booth 1 (LH)
Total Particulate Matter	V
Specific Requirements	Normal

Notes:

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Represents pollutants sampled

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Table 1.6

Parameters Requested to be Monitored	Emission Point Industrial Spray Booth 2 (LH)
Total Particulate Matter	V
Specific Requirements	Normal

Notes:

Represents pollutants sampled

Table 1.7

Parameters Requested to be Monitored	Emission Point Industrial Spray Booth 2 (RH)				
Total Particulate Matter	✓				
Specific Requirements	Normal				

Notes:

Represents pollutants sampled

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Monitoring Results

Table 2.1 Monitoring results for emission point Assembly Shop Booth (LH), Carried out on 12/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	1.5	mg/m ³	0.20	273K, 101.3kPa, Wet	12/01/2011	11:29 - 12:31	BS EN 13284- 1:2002	MCERTS	Normal

Table 2.2 Monitoring results for emission point Assembly Shop Booth (Mid), Carried out on 12/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	1.4	mg/m ³	0.19	273K, 101.3kPa, Wet	12/01/2011	13:41 - 14:43	BS EN 13284- 1:2002	MCERTS	Normal

Table 2.3 Monitoring results for emission point Assembly Shop Booth (RH), Carried out on 13/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	3.4	mg/m ³	0.22	273K, 101.3kPa, Wet	13/01/2011	10:24 - 11:26	BS EN 13284- 1:2002	MCERTS	Normal

Table 2.4 Monitoring results for emission point Industrial Spray Booth 1 (RH), Carried out on 14/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	6.3	mg/m ³	0.29	273K, 101.3kPa, Wet	14/01/2011	14:15 - 15:17	BS EN 13284- 1:2002	MCERTS	Normal

Table 2.5 Monitoring results for emission point Industrial Spray Booth 1 (LH), Carried out on 14/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	2.0	mg/m ³	0.20	273K, 101.3kPa, Wet	14/01/2011	10:17 - 11:19	BS EN 13284- 1:2002	MCERTS	Normal

Table 2.6 Monitoring results for emission point Industrial Spray Booth 2 (LH), Carried out on 17/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	2.8	mg/m ³	0.25	273K, 101.3kPa, Wet	17/01/2011	13:34 - 14:36	BS EN 13284- 1:2002	MCERTS	Normal

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Table 2.7 Monitoring results for emission point Industrial Spray Booth 2 (RH), Carried out on 17/01/2011

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	50	2.2	mg/m ³	0.23	273K, 101.3kPa, Wet	17/01/2011	11:55 - 12:57	BS EN 13284- 1:2002	MCERTS	Normal

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Operating Information

Table 3.1 Operating conditions during the monitoring of emission point Assembly Shop Booth (LH) carried out on 12/01/2011

Parameter	Result	
Sample Date	12/01/2011	
Process Type	Batch	
Process Duration	1 Hour	
If 'Batch', was monitoring carried out over the whole batch?	No	
Abatement/Operational?	Operational	
Item Sprayed	1.5 Radiators	

Comparison of Operator CEM and Periodic Monitoring Results				
Substance CEMs Results (mg/m³) Periodic Monitoring Results (mg/m³)				
No CEMS Installed/Data Available				

Table 3.2 Operating conditions during the monitoring of emission point Assembly Shop Booth (Mid) carried out on 12/01/2011

Parameter	Result	
Sample Date	12/01/2011	
Process Type	Batch	
Process Duration	1 Hour	
If 'Batch', was monitoring carried out over the whole batch?	No	
Abatement/Operational?	Operational	
Item Sprayed	4 Radiator Parts	

Comparison of Operator	Comparison of Operator CEM and Periodic Monitoring Results					
Substance CEMs Results (mg/m³) Periodic Monitoring Results (mg/m³)						
No CEMS	No CEMS Installed/Data Available					

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Table 3.3 Operating conditions during the monitoring of emission point Assembly Shop Booth (RH) carried out on 13/01/2011

Parameter	Result	
Sample Date	13/01/2011	
Process Type	Batch	
Process Duration	1 Hour	
If 'Batch', was monitoring carried out over the whole batch?	No	
Abatement/Operational?	Operational	
Item Sprayed	3 Radiators Sprayed	

Comparison of Operator	Comparison of Operator CEM and Periodic Monitoring Results					
Substance	CEMs Results (mg/m³)	Periodic Monitoring Results (mg/m³)				
No CEMS	No CEMS Installed/Data Available					

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Table 3.4 Operating conditions during the monitoring of emission point Industrial Spray Booth 1 (RH) carried out on 14/01/2011

Parameter	Result	
Sample Date	14/01/2011	
Process Type	Batch	
Process Duration	1 Hour	
If 'Batch', was monitoring carried out over the whole batch?	No	
Abatement/Operational?	Operational	
Item Sprayed	1 x Radiator, 3 x Coolers	

Comparison of Operator	Comparison of Operator CEM and Periodic Monitoring Results					
Substance	CEMs Results (mg/m³)	Periodic Monitoring Results (mg/m³)				
No CEMS	No CEMS Installed/Data Available					

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Table 3.5 Operating conditions during the monitoring of emission point Industrial Spray Booth 1 (LH) carried out on 14/01/2011

Parameter	Result	
Sample Date	14/01/2011	
Process Type	Batch	
Process Duration	1 Hour	
If 'Batch', was monitoring carried out over the whole batch?	No	
Abatement/Operational?	Operational	
Item Sprayed	7 x Small Coolers	

Comparison of Operator CEM and Periodic Monitoring Results					
Substance	CEMs Results (mg/m³)	Periodic Monitoring Results (mg/m³)			
No CEMS Installed/Data Available					

Table 3.6 Operating conditions during the monitoring of emission point Industrial Spray Booth 2 (LH) carried out on 17/01/2011

Parameter	Result
Sample Date	17/01/2011
Process Type	Batch
Process Duration	1 Hour
If 'Batch', was monitoring carried out over the whole batch?	Yes
Abatement/Operational?	Operational
Items Sprayed	3 Radiators

Comparison of Operator CEM and Periodic Monitoring Results			
Substance	CEMs Results (mg/m³)	Periodic Monitoring Results (mg/m³)	
No CEMS	S Installed/Data Available		

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Table 3.7 Operating conditions during the monitoring of emission point Industrial Spray Booth 2 (RH) carried out on 17/01/2011

Parameter	Result
Sample Date	17/01/2011
Process Type	Batch
Process Duration	1 Hour
If 'Batch', was monitoring carried out over the whole batch?	No
Abatement/Operational?	Not Installed
Item Sprayed	4 x Small Coolers & 1 Radiator

Comparison of Operator CEM and Periodic Monitoring Results			
Substance	CEMs Results (mg/m³)	Periodic Monitoring Results (mg/m³)	
No CEMS	Installed/Data Available		

Monitoring Deviations

Table 4.1 Monitoring Deviations for Emission Point Assembly Shop Booth (LH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter	None	None	None

Table 4.2 Monitoring Deviations for Emission Point Assembly Shop Booth (Mid)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter None		None	None

Table 4.3 Monitoring Deviations for Emission Point Assembly Shop Booth (RH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter None		None	None

Table 4.4 Monitoring Deviations for Emission Point Industrial Spray Booth 1 (RH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter	None	None	None

Table 4.5 Monitoring Deviations for Emission Point Industrial Spray Booth 1 (LH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter	None	None	None

Table 4.6 Monitoring Deviations for Emission Point Industrial Spray Booth 2 (LH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter	None	None	None

Table 4.7 Monitoring Deviations for Emission Point Industrial Spray Booth 2 (RH)

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter	None	None	None

Report for Periodic Monitoring of Emissions to Atmosphere

Part 2: **Supporting Information**

Permit Number: PPC/067 Var Ref: 002

Operator: **Covrad Heat Transfer Ltd**

Installation: Coventry

Emission Points: Assembly Shop Booth (LH), Assembly Shop Booth (Mid), Assembly Shop Booth (RH), Industrial Spray Booth 1 (RH), Industrial Spray Booth 1 (LH), Industrial Spray Booth 2 (LH) & Industrial Spray Booth 2 (RH)

12th – 17th January 2011 Monitoring Dates:

Contract Reference: FTBS14741

Operator: Covrad Heat Transfer Ltd

Address: Sir Henry Parks Road

> Canley Coventry CV5 6BN

RPS Consultants Ltd. Monitoring Organisation:

Grafton Building, Caswell Science & Address:

Technology Park, Caswell,

Towcester, Northamptonshire, NN12 8EQ.

Report Date: 07 February 2011

Report Approved By: Martin Johnson

Position: Senior Environmental Consultant

MCERTS Registration Number: MM 03 168

Signature:



RPS Consultants Ltd. has produced this report within the term of the contract with the client and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the elect and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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Appendix 4- Assembly Shop Booth (RH) Sampling, Analysis & Uncertainty Data

Appendix 5- Industrial Spray Booth 1 (RH) Sampling, Analysis & Uncertainty Data

Appendix 6- Industrial Spray Booth 1 (LH) Sampling, Analysis & Uncertainty Data

Appendix 7- Industrial Spray Booth 2 (LH) Sampling, Analysis & Uncertainty Data

Appendix 8- Industrial Spray Booth 2 (RH) Sampling, Analysis & Uncertainty Data

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APPENDIX 1: General Information

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Monitoring Organisation Staff Details

Table 5.1 Sampling Personnel

Sampling Personnel	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Katie Brewis	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 07 876
Richard Carter	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 07 861

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Richard Carter	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 07 861

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Martin Johnson	Senior Environmental Consultant	Level 2	TE1, TE2, TE3, TE4	MM 03 168

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Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditaton
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284- 1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Gas Temperatures	BS-EN 13284- 1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Low Concentration Total Particulate Matter	BS EN 13284- 1:2002	RPSCE/1/7c	MCERTS	Gravimetric	D9	RPS Laboratories	UKAS

Table 7.1 – Checklist Used

Equipment Checklist Used	File Location Address	
FTBS14741 Checklist	FTBS14741 Electronic & Work File	

APPENDIX 2: Assembly Shop Booth (LH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Assembly Shop Booth (LH) Project Ref: FTBS14741

Date: 12/01/11 Run: TPM

Project Rei. Pr	10314741					
				Stack Diamte	r (m)	0.80
Stack Static p	Stack Static press.mm H ₂ O:		Stack Area (m2):		12):	0.503
Traverse		Port A			Port B	
Point No.	Δр,	Root ∆ p	Stack Temp	Δр,	Root ∆ p	Stack Temp
	mm H₂O		°C	mm H ₂ O		°C
1	7.4	2.720	10	7.6	2.757	10
2	8.6	2.933	10	8	2.828	11
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	7.4	2.720	10	7.6	2.757	10
Maximum	8.6	2.933	10	8.0	2.828	11
Mean	8.0	2.826	10.0	7.8	2.793	10.5
Sum	16	5.653	20	15.6	5.585	21
Total Sum						

Max. pitot press. =	8.6
Min. pitot press. =	7.4
Ratio Max:Min =	1.2 :1

Gas Data

Visit number 1 of 1

Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	•

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity. Not Permitted	Y
Duct Gas Flow. Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	Υ
Handrails with removable chains / self closing gates across the top of the ladder?	Υ
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Υ
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	Y
Handrails not restricting access to ports?	Υ
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Υ
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

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Company Name: Covrad Heat Transfer Ltc In-stack Filter?
Site Ref. Coventry Sampling Point Ref: Assembly Shop Booth Outstack Filter?

Date: 12/01/11

Bar. Press.mm Hg

K Factor Dn used

Nozzle No.

7.983

0.977

8.919 Ambient Temp. Start Time Stop Time

Leak Rate (fin / %) Leak Rate (start / %)

Box/Probe setting

Run: TPM Project Ref: FTBS14741

Sample Filter Weights

	outtible i men men	ounipio i ittel treigitte					
	Reference	Laboratory	Increase, mg				
Filter	67881	RPS	0.84				
Probe Washings	T120187	RPS	1.4				

			Meter Correction	on Yd
Sample	Filter	Blank	Weighings	

	Campie i ikei Diank treigininge				
	Reference	Laboratory	Increase, mg		
Filter	67879	RPS	0.17		
Probe Wash	T120186	RPS	0.5		

Impinger Weigh	ts
Initial	

11:29

12:31

	impinger weigi	เเร	
Weights	Initial	Final	Increase, g
Impinger 1	714.9	709	-5.9
Impinger 2			0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	870	886.9	16.9
		Total	11.0

Sample Point	Clock Time min	Pitot ∆ p, mm H₂O	Stack Temp, °C	Orifice Δ H	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	7.0	10	62.4	62.4	1455050	13				2.5	10	2.646
	5	7.0	10	62.4	62.4		15				2.5	10	2.646
	10	7.0	10	62.4	62.4		16				2.5	9	2.646
2	15	7.0	10	62.4	62.4		16				2.5	9	2.646
	20	7.6	10	67.8	67.8		17				3	10	2.757
	25	7.6	10	67.8	67.8		18				3	10	2.757
Endpoint	30												
1	0	7.4	10	66.0	66.0		18				3	11	2.720
	5	7.6	10	67.8	67.8		19				3	11	2.757
	10	7.6	11	67.8	67.8		19				3	12	2.757
2	15	7.6	12	67.8	67.8		19				3	12	2.757
	20	7.6	12	67.8	67.8		19				3	12	2.757
	25	7.4	12	66.0	66.0		19				3	12	2.720
Endpoint	30					1456660.2							
	60.00	7.4	10.6	65.7	65.7	1.610	17.3	#DIV/0!	#DIV/0!	#DIV/0!	2.8	10.7	2.7

Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 12/01/11

Project Ref: FTBS14741

Sampling Point Ref: Assembly Shop Booth (LH)	Run: TPM
Meter Volume Sampled, acm	1.610
Sample Run Start Time	11:29
Sample Run End Time	12:31
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	738.00
Stack Pressure, mm Hg	738.21
Average Stack Temp, °C	10.6
Meter Volume at Wet STP, scm	1.459
Stack Moisture Content, %	0.9
Average Stack Velocity, m/sec	9.037
Stack Flow Rate, scms wet, STP	4.245
Nozzle Diameter, mm	7.98
% Isokinetic Variation	95.7
Total Mass of Particulate, mg	2.2
Percentage of Total Particulate Collected on Filter	37.5
Stack Particulate Concentration, mg/m³	1.5
Particulate Mass rate, kg/hour	0.023
Emission Limit value	50

Sample Train Blank Results				
Sample Blank Particulate Concentration, mg/m ³	0.5			
Total Weight Gain, mg (Sample Train Blank)	0.7			
Blank Result Less than 10% of Limit Value	Y			

Uncertainty Calculation for Total Particulate Matter to BS EN 13284-1 Determined Concentration 1.5 mg/m3 (at Reference Cond) Measured Values Sampled Volume 1.6102 Sampled gas Temperature Sampled gas Pressure 98.43 Sampled gas Humidity % by volume Oxygen conter % by volume Lea 2.24 Uncollected Mas Mass Standard Uncertainties for Measured Values 0.001 Sampled Volume Sampled gas Temperature Sampled gas Pressure kPa Sampled gas Humidity % by volume % by volume Oxygen content Mass 0.14152385 mg Uncertainty Calculation for Oxygen Correction Uncertainty Calculation for Volume Correction Oxygen Correction Factor Volume Correction Factor Sensitivity Uncertainty, Sensitivity Uncertainty. Coefficient Uv Coefficient Sampled gas Temperature 0.0031 0.0063 Oxygen Measurement Sampled gas Pressure 0.0093 0.0093 Sampled gas Humidity 0.0091 0.0091 Sqrt (Uv)^2 Total Uv Total Uo N/A 0.023 Uncertainty Contributions (Itemised) Uncertainty Contribution Sensitivity coefficient Concentration m3 mg 0.02 mg.m⁻³ 0.10 mg.m⁻³ 0.00 mg.m⁻³ 0.00 mg.m⁻³ 0.00 mg.m⁻³ Volume Correction 1.445 1.06 1.61 % 2.24 N/A 0.69 6.32 % 0.00 % 0.00 % Oxygen Correction 0.00 1.00 Uncollected Mas Total Uncertainty 0.10 mg.m Uncertainty Result (Uncertainty has been expanded with a coveragefactor of 2 (K=2)) mg.m⁻³ Expanded Uncertainty = 0.20 13.04 % of Result 0.00 % of ELV

APPENDIX 3: Assembly Shop Booth (Mid) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Assembly Shop Booth (Mid) Project Ref: FTBS14741

Date: 12/01/11 Run: TPM

			_ Stack Diamter (m) _			0.80
Stack Static press.mm H ₂ O:		-1.4	Stack Area (m2):		0.503	
Traverse		Port A			Port B	
Point No.	Δр,	Root∆p	Stack Temp	Δр.	Root ∆ p	Stack Temp
	mm H ₂ O		°C	mm H ₂ O		°C
1	6.6	2.569	10	5	2.236	10
2	6.8	2.608	10	5.4	2.324	9
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	6.6	2.569	10	5.0	2.236	9
Maximum	6.8	2.608	10	5.4	2.324	10
Mean	6.7	2.588	10.0	5.2	2.280	9.5
Sum	13.4	5.177	20	10.4	4.560	19
Total Sum						

Max. pitot press. = Min. pitot press. = Ratio MaxMin = 5.0 1.4:1

Gas Data

Visit number 1 of 1

Gas Data	
Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	

Requirement Met?
Y
Y
Y
Y
Y
Y
Y
Y
Y
Y

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Meter Correction Yd 0.977

	Sample Filter Weights			
	Reference	Laboratory	Increase, mg	
Filter	67873	RPS	0.88	
Probe Washings	T120189	RPS	1.4	

	Sample Filter Blank					
	Reference Laboratory Increase, mg					
Filter	67882	RPS	0.15			
Probe Wash	T120188	RPS	0.9			

Ambient Temp.	15	Leak Rate (fin / %)	0.2
Start Time	13:41	Leak Rate (start / %)	0.2
Stop Time	14:43	Box/Probe setting	

	Impinger Weig	hts	
Weights	Initial	Final	Increase, g
Impinger 1	709	702.2	-6.8
Impinger 2			0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	886.9	903.5	16.6
		Total	9.8

Sample Point	Clock Time min	Pitot ∆ p, mm H ₂ O	Stack Temp, °C	Orifice Δ H	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	5.0	10	76.1	76.1	1456666.6	17				3	7	2.236
	5	5.0	10	76.1	76.1		17				3	7	2.236
	10	5.0	10	76.1	76.1		17				3	7	2.236
2	15	4.4	10	67.0	67.0		18				2.5	8	2.098
	20	4.6	11	70.0	70.0		19				2.5	8	2.145
	25	4.4	11	67.0	67.0		19				2.5	8	2.098
Endpoint	30												
1	0	5.0	11	76.1	76.1		19				2.5	8	2.236
	5	5.0	11	76.1	76.1		19				2.5	9	2.236
	10	5.2	11	79.1	79.1		20				2.5	9	2.280
2	15	5.0	12	76.1	76.1		20				2.5	9	2.236
	20	5.2	12	79.1	79.1		20				2.5	9	2.280
	25	5.0	12	76.1	76.1		20				2.5	9	2.236
Endpoint	30					1458419							
	60.00	4.9	10.9	74.6	74.6	1.752	18.8	#DIV/0!	#DIV/0!	#DIV/0!	2.6	8.2	2.2

Authorisation/Permit Number: PPC/067 Var Ref: 002

Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 12/01/11

Project Ref: FTBS14741

Sampling Point Ref: Assembly Shop Booth (Mid)	Run: TPM
Meter Volume Sampled, acm	1.752
Sample Run Start Time	13:41
Sample Run End Time	14:43
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	738.00
Stack Pressure, mm Hg	737.90
Average Stack Temp, °C	10.9
Meter Volume at Wet STP, scm	1.579
Stack Moisture Content, %	0.8
Average Stack Velocity, m/sec	7.373
Stack Flow Rate, scms wet, STP	3.458
Nozzle Diameter, mm	9.10
% Isokinetic Variation	97.8
Total Mass of Particulate, mg	2.3
Percentage of Total Particulate Collected on Filter	38.6
Stack Particulate Concentration, mg/m ³	1.4
Particulate Mass rate, kg/hour	0.018
Emission Limit value	50

Sample Train Blank Results						
Sample Blank Particulate Concentration, mg/m ³	0.7					
Total Weight Gain, mg (Sample Train Blank)	1.1					
Blank Result Less than 10% of Limit Value	Y					

Determined Concentration	1.4	mg/m3 (at Re	ference Cond)]				
Measured Values								
Sampled Volume	1.7524	m ³						
Sampled gas Temperature		k						
Sampled gas Pressure		kPa						
Sampled gas Humidity		% by volume						
Oxygen content		% by volume			Leak	0.20	%	
Mass		mg		Uncolle	cted Mass	0	mg	
		_	_	Oncone	ctca mass		mg	
Standard Uncertainties for			1					
Sampled Volume		m3	-					
Sampled gas Temperature		k	-					
Sampled gas Pressure		kPa	-					
Sampled gas Humidity		% by volume	4					
Oxygen content		% by volume						
Mass	0.14152385	mg						
Volume Correction Factor	0.909 Sensitivity		Uncertainty,	Oxygen Correction	in Factor	1.0000 Sensitivity		Uncerta
	Coefficient		Uv Uv	l		Coefficient		Uncerta
Sampled ass Temperature			0.0062	Oxygen Mea	surement			N/A
parribled das Temperature								
Sampled gas Temperature Sampled gas Pressure			0.0092					
Sampled gas Pressure	0.0092		0.0092					
	0.0092	Sqrt (Uv)^2						
Sampled gas Pressure	0.0092	Sqrt (Uv)^2 Total Uv	0.0091				Total Uo	NIA
Sampled gas Pressure Sampled gas Humidity	0.0092 0.0091		0.0091 0.0144				Total Uo	NIA
Sampled gas Pressure	0.0092 0.0091 (Itemised)	Total Uv	0.0091 0.0144 0.025			Uncertai		NIA
Sampled gas Pressure Sampled gas Humidity	0.0092 0.0091 (Itemised)		0.0091 0.0144 0.025	ity coefficient	Col	Uncertain ncentration	Total Uo	
Sampled gas Pressure Sampled gas Humidity	0.0092 0.0091 (Itemised)	Total Uv	0.0091 0.0144 0.025	ity coefficient	0.02	ncentration mg.m ⁻³	nty Contribution	%
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing)	0.0092 0.0091 (Itemised)	Total Uv	0.0091 0.0144 0.025	0.92 0.63	0.02 0.09	mg.m ⁻³ mg.m ⁻³	nty Contribution	%
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction	0.0092 0.0091 (Itemised) 1.566 2.28 N/A	Total Uv	0.0091 0.0144 0.025	0.92 0.63 0.00	0.02 0.09 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0092 0.0091 (Itemised) 1.586 2.28 N/A 0.00	Total Uv	0.0091 0.0144 0.025	0.92 0.63 0.00 1.00	0.02 0.09 0.00 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction	0.0092 0.0091 (Itemised) 1.586 2.28 N/A 0.00	Total Uv	0.0091 0.0144 0.025	0.92 0.63 0.00 1.00 0.63	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0092 0.0091 (Itemised) 1.586 2.28 N/A 0.00	Total Uv	0.0091 0.0144 0.025	0.92 0.63 0.00 1.00	0.02 0.09 0.00 0.00 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0092 0.0091 (Itemised) 1.586 2.28 N/A 0.00 0.00	Total Uv	0.0091 0.0144 0.025 Sensitiv	0.92 0.63 0.00 1.00 0.63	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0092 0.0091 (itemised) 1.566 2.28 N/A 0.00 0.00	Total Uv Talue m3 mg mg.m³ mg as been expande	0.0091 0.0144 0.025 Sensitiv	0.92 0.63 0.00 1.00 0.63 Total Uncertainty	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0092 0.0091 (itemised) 1.566 2.28 N/A 0.00 0.00	Total Uv	0.0091 0.0144 0.025 Sensitiv	0.92 0.63 0.00 1.00 0.63 Total Uncertainty	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0092 0.0091 (itemised) 1.566 2.28 N/A 0.00 0.00	Total Uv Talue m3 mg mg.m³ mg as been expande	0.0091 0.0144 0.025 Sensitiv	0.92 0.63 0.00 1.00 0.63 Total Uncertainty	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % 9% 2 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0092 0.0091 (itemised) 1.566 2.28 N/A 0.00 0.00	Total Uv falue m3 mg mg.m³ mg as been expande	0.0091 0.0144 0.025 Sensitiv	0.92 0.63 0.00 1.00 0.63 Total Uncertainty gefactor of 2 (K=2)) mg.m ⁻³	0.02 0.09 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 6.21 0.00	% % %

APPENDIX 4: Assembly Shop Booth (RH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref. Coventry Sampling Point Ref. Assembly Shop Booth (RH) Project Ref. FTBS14741 Date: 13/01/11 Run: TPM

				0.80		
Stack Static p	ress.mm H ₂ O:	4	Stack Area (m2):			0.503
Traverse		Port A	Port B			
Point No.	Δр,	Root∆p	Stack Temp	Δр.	Root ∆ p	Stack Temp
	mm H ₂ O		°C	mm H ₂ O		°C
1	4.6	2.145	9	5.4	2.324	11
2	6	2.449	11	4	2.000	10
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	4.6	2.145	9	4.0	2.000	10
Maximum	6.0	2.449	11	5.4	2.324	11
Mean	5.3	2.297	10.0	4.7	2.162	10.5
Sum	10.6	4.594	20	9.4	4.324	21
Total Sum						

 Max. pitot press. =
 6.0

 Min. pitot press. =
 4.0

 Ratio Max.Min =
 1.5 :1

Gas Data

Visit number 1 of 1

Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	

Requirement Met?
Y
Y
Y
Y
Y
Y
Y
Y
Y
Y

Authorisation/Permit Number: PPC/067 Var Ref: 002 Report Version: 1
Date of Issue: 07 February 2011

 Company Name: Covrad Heat Transfer Ltc In-stack Filter?
 In
 Bar. Press.mm Hg
 738
 K Factor
 15.359

 Site Ref. Coventry
 Sampling Point Ref. Assembly Shop Bootf Outstack Filter?
 Cp
 0.824
 Dn used
 9.1

 Date:
 13/01/11
 13/01/11
 Nozzle No.
 1017

 Project Ref. FTBS14741
 Project Ref. FTBS14741
 Nozzle No.
 1017

Meter Correction Yd 0.977

 Sample Filter Blank Weighings

 Reference
 Laboratory
 Increase, mg

 Filter
 67876
 RPS
 0.21

 Probe Wash
 T120190
 RPS
 0.5

 Ambient Temp.
 19
 Leak Rate (fin / %)
 0.2

 Start Time
 10:24
 Leak Rate (start / %)
 0.2

 Stop Time
 11:26
 Bow/Probe setting

	Impinger Weigl	hts	
Weights	Initial	Final	Increase, g
Impinger 1	702.2	695.4	-6.8
Impinger 2			0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	903.5	914.5	11.0
		Total	4.2

Sample Point	Clock Time min	Pitot ∆ p, mm H₂O	Stack Temp, °C	Orifice ∆ H	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	4.4	9	67.6	67.6	1458429.8	18				3	9	2.098
	5	4.4	9	67.6	67.6		18				3	7	2.098
	10	4.4	9	67.6	67.6		18				3	7	2.098
2	15	4.4	9	67.6	67.6		19				3	7	2.098
	20	4.4	10	67.6	67.6		19				3	8	2.098
	25	4.8	11	73.7	73.7		20				3	8	2.191
Endpoint	30												
1	0	4.8	10	73.7	73.7		20				3	9	2.191
	5	4.8	10	73.7	73.7		21				3	9	2.191
	10	4.8	10	73.7	73.7		21				3	8	2.191
2	15	4.8	11	73.7	73.7		21				3	8	2.191
	20	4.8	11	73.7	73.7		21				3	8	2.191
	25	4.4	11	67.6	67.6		#REF!				3	8	2.098
Endpoint	30					1460115.8						<u> </u>	
	60.00	4.6	10.0	70.7	70.7	1.686	19.8	#DIV/0!	#DIV/0!	#DIV/0!	3.0	8.0	2.1

Authorisation/Permit Number: PPC/067 Var Ref: 002

Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 13/01/11

Project Ref: FTBS14741

Sampling Point Ref: Assembly Shop Booth (RH)	Run: TPM
Meter Volume Sampled, acm	1.686
Sample Run Start Time	10:24
Sample Run End Time	11:26
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	738.00
Stack Pressure, mm Hg	738.29
Average Stack Temp, °C	10.0
Meter Volume at Wet STP, scm	1.506
Stack Moisture Content, %	0.3
Average Stack Velocity, m/sec	7.125
Stack Flow Rate, scms wet, STP	3.354
Nozzle Diameter, mm	9.10
% Isokinetic Variation	96.2
Total Mass of Particulate, mg	5.1
Percentage of Total Particulate Collected on Filter	54.9
Stack Particulate Concentration, mg/m ³	3.4
Particulate Mass rate, kg/hour	0.041
Emission Limit value	50

Sample Train Blank Res	ults
Sample Blank Particulate Concentration, mg/m ³	0.5
Total Weight Gain, mg (Sample Train Blank)	0.7
Blank Result Less than 10% of Limit Value	Υ

Determined Concentration	3.4	mg/m3 (at Ref	erence Cond)]				
Measured Values								
Sampled Volume	1.686	m ³]					
Sampled gas Temperature	292.75	k	1					
Sampled gas Pressure	98.44	kPa	1					
Sampled gas Humidity	0	% by volume	1					
Oxygen content	21	% by volume	1		Leak	0.20	%	
Mass	5.1	mg]	Uncolled	cted Mass	0	mg]
Standard Uncertainties for I	Measured Va	lues						
Sampled Volume	0.001	m3]					
Sampled gas Temperature	2	k]					
Sampled gas Pressure	1	kPa						
Sampled gas Humidity	1	% by volume]					
Oxygen content	0.1	% by volume]					
Mass	0.14152385	mg]					
	Sensitivity Coefficient		Uncertainty, Uv			Sensitivity Coefficient		Uncer
	Coefficient	1	Uv			Coefficient		U
Sampled gas Temperature	0.0031	1	0.0062	Oxygen Mea	surement	N/A	-	N
Sampled gas Pressure	0.0092	-	0.0092					
Sampled gas Humidity	0.0091	Cont (Ulv)A2	0.0091 0.0143					
		Sqrt (Uv)^2 Total Uv	0.0143				Total Uo	N
		1000	0.024				Total oo	
Uncertainty Contributions (I						Uncertair	nty Contribution	
	V	/alue	Sensitiv	ity coefficient	Co	ncentration	%	
Volume Correction	1.501	m3		2.26		mg.m ⁻³	1.61	
Mass (weighing) Oxygen Correction	5.10 N/A	mg		0.66 0.00		mg.m ⁻³ mg.m ⁻³	2.77 0.00	
System Leak	0.00	mg.m ⁻³		1.00		mg.m ⁻³	0.12	
Uncollected Mass	0.00	mg		0.66		mg.m ⁻³	0.00	%
				Total Uncertainty	0.11	mg.m ^{·3}	J	
	(Uncertainty h	ias been expande	d with a coveraç	gefactor of 2 (K=2))				
Uncertainty Result								
Uncertainty Result	Expand	ed Uncertainty =	0.22	mg.m ⁻³				

APPENDIX 5: Industrial Spray Booth 1 (RH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Industrial Spary Booth 1 (RH) Project Ref: FTBS14741

Date: 14/01/11 Run: TPM

Flojett Rei. Fl	100 14741					
				0.59		
Stack Static p	ress.mm H ₂ O:	5.8	Stack Area (m2):			0.273
Traverse		Port A			Port B	
Point No.	Δр,	Root ∆ p	Stack Temp	Δр,	Root∆p	Stack Temp
	mm H ₂ O		°C	mm H ₂ O		°C
1	15.6	3.950	18	13.8	3.715	19
2	3.6	1.897	18	3.8	1.949	17
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	3.6	1.897	18	3.8	1.949	17
Maximum	15.6	3.950	18	13.8	3.715	19
Mean	9.6	2.924	18.0	8.8	2.832	18.0
Sum	19.2	5.847	36	17.6	5.664	36
Total Sum						

Max. pitot press. = Min. pitot press. = Ratio Max:Min = 3.6 4.3 :1

Gas Data

Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity: Not Permitted	Y
Duct Gas Flow. Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	Y
Handrails with removable chains / self closing gates across the top of the ladder?	Y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	Y
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Υ
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Υ

Report Version: 1 Date of Issue: 07 February 2011 Authorisation/Permit Number: PPC/067 Var Ref: 002 Visit number 1 of 1 Page 41 of 62 Probe Washings

Leak Rate (fin / %)

Leak Rate (start / %)

Box/Probe setting

Company Name: Covrad Heat Transfer Ltc In-stack Filter? Bar, Press.mm Hg K Factor 8.946 Site Ref. Coventry Sampling Point Ref: Industrial Spary Booth Outstack Filter? Dn used 7.983 Date: 14/01/11 Run: TPM Nozzle No. Project Ref: FTBS14741

Start Time Stop Time

0.977 Meter Correction Yd Sample Filte

ample Filter Weig	ints			Sample Filter Blank	Weighings	
Reference	Laboratory	Increase, mg		Reference	Laboratory	Increase, mg
67964	RPS	5.97	Filter	67960	RPS	0.04
T120024	RPS	2.6	Probe Wash	T120023	RPS	0.8

Impinger Weights											
Weights	Initial	Final	Increase, g								
Impinger 1	890.9	883.4	-7.5								
Impinger 2			0.0								
Impinger 3			0.0								
Impinger 4			0.0								
Impinger 5			0.0								
Silica Gel	876.5	893.6	17.1								

Total

9.6

14:15

15:17

Ambient Temp.

Sample Point	Clock Time min	Pitot ∆ p, mm H ₂ O	Stack Temp, °C	Orifice ∆ H	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	9.6	17	85.9	85.9	1461852.6	16				4.5	16	3.098
	5	9.6	17	85.9	85.9		16				5	16	3.098
	10	8.8	17	78.7	78.7		17				5	17	2.966
2	15	4.2	17	37.6	37.6		17				2.5	17	2.049
	20	4.0	17	35.8	35.8		17				2	17	2.000
	25	4.0	17	35.8	35.8		17				2	17	2.000
Endpoint	30												
1	0	10.4	17	93.0	93.0		17				6	17	3.225
	5	10.4	17	93.0	93.0		17				6	17	3.225
	10	10.4	18	93.0	93.0		17				6	17	3.225
2	15	4.4	18	39.4	39.4		17				2	17	2.098
	20	4.4	18	39.4	39.4		17				2	17	2.098
	25	4.0	18	35.8	35.8		17				2	17	2.000
Endpoint	30					1463364.1							
	60.00	7.0	17.3	62.8	62.8	1.512	16.8	#DIV/0!	#DIV/0!	#DIV/0!	3.8	16.8	2.6

Authorisation/Permit Number: PPC/067 Var Ref: 002

Report Version: 1 Date of Issue: 07 February 2011 Page 42 of 62 Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 14/01/11

Project Ref: FTBS14741

Sampling Point Ref: Industrial Spary Booth 1 (RH)	Run: TPM
Meter Volume Sampled, acm	1.512
Sample Run Start Time	14:15
Sample Run End Time	15:17
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	738.00
Stack Pressure, mm Hg	738.43
Average Stack Temp, °C	17.3
Meter Volume at Wet STP, scm	1.370
Stack Moisture Content, %	0.9
Average Stack Velocity, m/sec	8.726
Stack Flow Rate, scms wet, STP	2.178
Nozzle Diameter, mm	7.98
% Isokinetic Variation	95.3
Total Mass of Particulate, mg	8.6
Percentage of Total Particulate Collected on Filter	69.7
Stack Particulate Concentration, mg/m³	6.3
Particulate Mass rate, kg/hour	0.049
Emission Limit value	50

Sample Train Blank Res	ults
Sample Blank Particulate Concentration, mg/m ³	0.6
Total Weight Gain, mg (Sample Train Blank)	0.8
Blank Result Less than 10% of Limit Value	Υ

Determined Concentration	6.3	mg/m3 (at Ref	erence Cond)]				
Measured Values								
Sampled Volume	1,5115	m ³]					
Sampled gas Temperature		k	1					
Sampled gas Pressure		kPa	1					
Sampled gas Humidity		% by volume	1					
Oxygen content		% by volume	1		Leak	0.00	%	
Mass		mg	1	Uncolle	cted Mass	0	mg	
	••		-					-
Standard Uncertainties for		m3	1					
Sampled Volume Sampled gas Temperature		k	1					
		kPa	1					
Sampled gas Pressure			1					
Sampled gas Humidity Oxygen content		% by volume % by volume	1					
	0.14152385		1					
IMIGSS	0.14102360	my	J					
Uncertainty Calculation for	Volume Corr	ection		Uncertainty Calcu	lation for	Oxygen Correct	tion	
Volume Correction Factor	0.915			Oxygen Correction	n Factor	1.0000		
	Sensitivity		Uncertainty,			Sensitivity		Uncerta
	Coefficient		Uv			Coefficient		Uo
Sampled gas Temperature	0.0032		0.0063	Oxygen Mea	asurement	N/A		N/A
Campica gas remperatare	0.0002	-	0.0000					
Sampled gas Pressure			0.0093					
	0.0093							
Sampled gas Pressure	0.0093	Sqrt (Uv)^2	0.0093 0.0092 0.0145	- 1				
Sampled gas Pressure	0.0093	Sqrt (Uv)^2 Total Uv	0.0093 0.0092				Total Uo	N/A
Sampled gas Pressure Sampled gas Humidity	0.0093		0.0093 0.0092 0.0145				Total Uo	NIA
Sampled gas Pressure	0.0093 0.0092 (Itemised)	Total Uv	0.0093 0.0092 0.0145 0.022			Uncertai		NIA
Sampled gas Pressure Sampled gas Humidity	0.0093 0.0092 (Itemised)		0.0093 0.0092 0.0145 0.022	ity coefficient		Uncertain ncentration	Total Uo	
Sampled gas Pressure Sampled gas Humidity	0.0093 0.0092 (Itemised)	Total Uv	0.0093 0.0092 0.0145 0.022		Co 0.10	ncentration mg.m ⁻³	nty Contribution	%
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing)	0.0093 0.0092 (Itemised) V 1.358 8.57	Total Uv	0.0093 0.0092 0.0145 0.022	ity coefficient 4.60 0.73	Co 0.10 0.10	mg.m ⁻³ mg.m ⁻³	nty Contribution	% 5 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A	Total Uv	0.0093 0.0092 0.0145 0.022	ity coefficient 4.60 0.73 0.00	Co 0.10 0.10 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 1.62 0.00	% 5 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A 0.00	Total Uv	0.0093 0.0092 0.0145 0.022	ity coefficient 4.60 0.73 0.00 1.00	Co 0.10 0.10 0.00 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A	Total Uv	0.0093 0.0092 0.0145 0.022	4.60 0.73 0.00 1.00 0.73	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A 0.00	Total Uv	0.0093 0.0092 0.0145 0.022	ity coefficient 4.60 0.73 0.00 1.00	Ce 0.10 0.10 0.00 0.00 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A 0.00 0.00	Total Uv	0.0093 0.0092 0.0145 0.022 Sensitiv	ity coefficient 4.60 0.73 0.00 1.00 0.73 Total Uncertainty	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0093 0.0092 (Itemised) V 1.358 8.57 N/A 0.00 0.00	Total Uv	0.0093 0.0092 0.0145 0.022 Sensitiv	4.60 0.73 0.00 1.00 0.73	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0093 0.0092 (itemised) V 1.358 8.57 N/A 0.00 0.00	Total Uv	0.0093 0.0092 0.0145 0.022 Sensitiv	ity coefficient 4.60 0.73 0.00 1.00 0.73 Total Uncertainty	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0093 0.0092 (itemised) V 1.358 8.57 N/A 0.00 0.00	Total Uv Value m3 mg mg.m³ mg	0.0093 0.0092 0.0145 0.022 Sensitiv	ity coefficient 4.60 0.73 0.00 1.00 0.73 Total Uncertainty	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% 5 % 0 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0093 0.0092 (itemised) V 1.358 8.57 N/A 0.00 0.00	rotal Uv (alue m3 mg mg.m-3 mg as been expande	0.0093 0.0092 0.0145 0.022 Sensitiv	ity coefficient 4.60 0.73 0.00 1.00 0.73 Total Uncertainty gefactor of 2 (K=2)) mg.m³	Ce 0.10 0.10 0.00 0.00 0.00	ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.61 1.62 0.00	% %) %

APPENDIX 6: Industrial Spray Booth 1 (LH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Industrial Spray Booth 1 (LH) Project Ref: FTBS14741

Date: 14/01/11 Run: TPM

				0.60			
Stack Static p	ress.mm H ₂ O:	19.8		Stack Area (m2):			
Traverse		Port A			Port B		
Point No.	Δр,	Root∆p	Stack Temp	Δр,	Root ∆ p	Stack Temp	
	mm H ₂ O		°C	mm H ₂ O		°C	
1	4.4	2.098	20	19	4.359	15	
2	6.6	2.569	20	19	4.359	2	
3							
4							
5							
6							
7							
8							
9							
10							
Minimum	4.4	2.098	20	19.0	4.359	2	
Maximum	6.6	2.569	20	19.0	4.359	15	
Mean	5.5	2.333	20.0	19.0	4.359	8.5	
Sum	11	4.667	40	38	8.718	17	
Total Sum							

Max. pitot press. = Min. pitot press. = Ratio Max:Min = 4.4 4.3 :1

Gas Data

Visit number 1 of 1

Gas Data	
Oxygen %	21.0
CO ₂ %	0.04
CO %	,

Oxygen Correction

Required Correction Value	0			
Actual Oxygen Factor	1			
Enter 0 if correction is not required				

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity: Not Permitted	Y
Duct Gas Flow. Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	Y
Handrails with removable chains / self closing gates across the top of the ladder?	Y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	Y
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Υ
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Υ

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Company Name: Covrad Heat Transfer Ltc In-stack Filter? Bar, Press.mm Hg K Factor 15.05 Site Ref. Coventry Sampling Point Ref: Industrial Spray Booth Outstack Filter? Dn used Date: 14/01/11 Run: TPM Nozzle No. Project Ref: FTBS14741

Meter Correction Yd 0.977

Sample Filter Weights Reference Laboratory Increase, mg 67875 RPS 1.7 Probe Washings RPS 1.4 T120193

Sample Filter Blank Weighings									
	Reference	Reference Laboratory							
Filter	67874	RPS	0.14						
Probe Wash	T120192	RPS	1						

Ambient Temp.	12	Leak Rate (fin / %)	0.3
Start Time	10:17	Leak Rate (start / %)	0
Stop Time	11:19	Box/Probe setting	

Impinger Weights								
Weights	Initial	Final	Increase, g					
Impinger 1	925.1	889.3	-35.8					
Impinger 2			0.0					
Impinger 3			0.0					
Impinger 4			0.0					
Impinger 5			0.0					
Silica Gel	914.3	959.8	45.5					
		Total	9.7					

Sample Point	Clock Time min	Pitot ∆ p, mm H₂O	Stack Temp, °C	Orifice ∆ F	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	4.0	17	60.2	60.2	1460139.6	17				2	18	2.000
	5	4.0	18	60.2	60.2		18				2	18	2.000
	10	4.0	19	60.2	60.2		19				2	18	2.000
2	15	4.8	19	72.2	72.2		19				2	18	2.191
	20	4.8	19	72.2	72.2		19				2	18	2.191
	25	4.8	19	72.2	72.2		19				2	18	2.191
Endpoint	30												
1	0	6.0	19	90.3	90.3		19				4	18	2.449
	5	6.0	19	90.3	90.3		19				4	18	2.449
	10	6.0	19	90.3	90.3		19				3	18	2.449
2	15	4.0	19	60.2	60.2		19				3	18	2.000
	20	4.0	19	60.2	60.2		19				3	18	2.000
	25	4.2	19	63.2	63.2		19				3	18	2.049
Endpoint	30					1461839.2							
	60.00	4.7	18.8	71.0	71.0	1.700	18.8	#DIV/0!	#DIV/0!	#DIV/0!	2.7	18.0	2.2

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Report Version: 1 Date of Issue: 07 February 2011 Page 47 of 62 Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 14/01/11

Project Ref: FTBS14741

Sampling Point Ref: Industrial Spray Booth 1 (LH)	Run: TPM
Meter Volume Sampled, acm	1.700
Sample Run Start Time	10:17
Sample Run End Time	11:19
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	738.00
Stack Pressure, mm Hg	739.46
Average Stack Temp, °C	18.8
Meter Volume at Wet STP, scm	1.531
Stack Moisture Content, %	0.8
Average Stack Velocity, m/sec	7.302
Stack Flow Rate, scms wet, STP	1.879
Nozzle Diameter, mm	9.10
% Isokinetic Variation	98.2
Total Mass of Particulate, mg	3.1
Percentage of Total Particulate Collected on Filter	54.8
Stack Particulate Concentration, mg/m ³	2.0
Particulate Mass rate, kg/hour	0.014
Emission Limit value	50

Sample Train Blank Res	ults
Sample Blank Particulate Concentration, mg/m ³	0.7
Total Weight Gain, mg (Sample Train Blank)	1.1
Blank Result Less than 10% of Limit Value	Υ

Determined Concentration	2.0	mg/m3 (at Ref	erence Cond)]				
Measured Values								
Sampled Volume	1.6996	m ³]					
Sampled gas Temperature	291.75	k						
Sampled gas Pressure	98.59	kPa						
Sampled gas Humidity	0	% by volume						
Oxygen content	21	% by volume			Leak	0.15	%]
Mass	3.1	mg		Uncolle	cted Mass	0	mg]
Standard Uncertainties for	Measured Va	lues						
Sampled Volume	0.001	m3]					
Sampled gas Temperature	2	k	1					
Sampled gas Pressure	1	kPa	1					
Sampled gas Humidity	1	% by volume]					
Oxygen content	0.1	% by volume						
Mass	0.14152385	mg						
Uncertainty Calculation for		ection 1		Uncertainty Calc			tion	
Volume Correction Factor	0.911			Oxygen Correction				
	Sensitivity Coefficient		Uncertainty, Uv			Sensitivity Coefficient		Uncer
Complet ass Temperature				Ou man Ma				
Sampled gas Temperature	0.0031	•	0.0062	Oxygen Me	asurement	IN/A	1	N
0II			0.0092					
Sampled gas Pressure	0.0092							
Sampled gas Pressure Sampled gas Humidity	0.0091	Sart (Llv)A2	0.0091					
		Sqrt (Uv)^2 Total Uv	0.0091 0.0144 0.024				Total Uo	N
Sampled gas Humidity	0.0091		0.0144				Total Uo	N
	0.0091 Itemised)	Total Uv	0.0144 0.024	to a officient		Uncertai	Total Uo	N
Sampled gas Humidity Uncertainty Contributions (0.0091 Itemised) V	Total Uv	0.0144 0.024	ity coefficient		ncentration	nty Contribution	
Sampled gas Humidity Uncertainty Contributions (Volume Correction	0.0091 Itemised) V 1.519	Total Uv	0.0144 0.024 Sensitivi	1.33	0.03	ncentration mg.m ⁻³	nty Contribution	%
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing)	0.0091 Itemised) V 1.519 3.10	Total Uv	0.0144 0.024 Sensitivi	1.33 0.65	0.03 0.09	mg.m ⁻³ mg.m ⁻³	nty Contribution % 1.81 4.57	%
Sampled gas Humidity Uncertainty Contributions (Volume Correction	0.0091 Itemised) V 1.519	Total Uv	0.0144 0.024 Sensitivi	1.33	0.03 0.09 0.00	ncentration mg.m ⁻³	nty Contribution	% % %
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing) Oxygen Correction	0.0091 Itemised) V 1.519 3.10 N/A	Total Uv	0.0144 0.024 Sensitivi	1.33 0.65 0.00 1.00 0.65	0.03 0.09 0.00 0.00	ncentration mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 4.57 0.00	% % %
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing) Oxygen Correction System Leak	0.0091 Itemised) V 1.519 3.10 N/A 0.00	Total Uv	0.0144 0.024 Sensitivi	1.33 0.65 0.00 1.00	0.03 0.09 0.00 0.00	mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 4.57 0.00	% % %
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0091 Itemised) V 1.519 3.10 N/A 0.00 0.00	Total Uv	0.0144 0.024 Sensitivi	1.33 0.65 0.00 1.00 0.65	0.03 0.09 0.00 0.00 0.00 0.00	ncentration mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 4.57 0.00	% % %
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0091 Itemised) 1.519 3.10 N/A 0.00 0.00 (Uncertainty h	Total Uv	0.0144 0.024 Sensitivi	1.33 0.65 0.00 1.00 0.65 Total Uncertainty	0.03 0.09 0.00 0.00 0.00 0.00	ncentration mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 4.57 0.00	% % %
Sampled gas Humidity Uncertainty Contributions (Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0091 Itemised) 1.519 3.10 N/A 0.00 0.00 (Uncertainty h	m3 mg mg.m³ mg	0.0144 0.024 Sensitivi	1.33 0.65 0.00 1.00 0.85 Total Uncertainty	0.03 0.09 0.00 0.00 0.00 0.00	ncentration mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³ mg.m ⁻³	1.61 4.57 0.00	% % %

Visit number 1 of 1

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APPENDIX 7: Industrial Spray Booth 2 (LH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Industrial Spray Booth 2 (LH) Project Ref: FTBS14741

Date: 17/01/11 Run: TPM

				Stack Diamter	r (m)	0.59
Stack Static p	ress.mm H ₂ O:	-3		Stack Area (m	12):	0.273
Traverse		Port A				
Point No.	Δр,	Root∆p	Stack Temp	Δр.	Root ∆ p	Stack Temp
	mm H ₂ O		°C	mm H ₂ O		°C
1	13.2	3.633	19	13	3.606	19
2	15.6	3.950	19	17	4.123	19
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	13.2	3.633	19	13.0	3.606	19
Maximum	15.6	3.950	19	17.0	4.123	19
Mean	14.4	3.791	19.0	15.0	3.864	19.0
Sum	28.8	7.583	38	30	7.729	38
Total Sum						

Max. pitot press. = Min. pitot press. = Ratio Max:Min = 13.0 1.3 :1

Gas Data

Gas Data	
Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity: Not Permitted	Y
Duct Gas Flow. Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	Y
Handrails with removable chains / self closing gates across the top of the ladder?	Y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	Y
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Υ
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Υ

Authorisation/Permit Number: PPC/067 Var Ref: 002 Date of Issue: 07 February 2011 Visit number 1 of 1 Page 51 of 62 Probe Washings

 Company Name: Covrad Heat Transfer Ltx In-stack Filter?
 In
 Bar. Press.mm Hg
 746
 K Factor
 2.871

 Site Ref. Coventry
 Sampling Point Ref. Industrial Spray Booth Outstack Filter?
 Cp
 0.824
 Dn used
 6.067

 Date:
 17/01/11
 Nozzle No.
 1016

 K Factor
 2.871
 Ambient Temp.
 13
 Leak Rate (fin / %)

 Dn used
 6.067
 Start Time
 13.34
 Leak Rate (start / %)

 Nozzle No.
 1016
 Stop Time
 14.36
 Box/Probe setting

Project Ref. FTBS14741

Sample Filter Weights Sample Filter Blank Weighings Reference Laboratory Reference Increase, mg Laboratory Increase, mg 67961 RPS 1.4 Filter 67976 RPS 0.04 Probe Wash T120025 0.5 T120026 RPS RPS

Impinger Weights Weights Initial Increase, g Impinger 1 880 695.6 -184.4 0.0 Impinger 2 Impinger 3 0.0 Impinger 4 0.0 Impinger 5 Silica Gel 0.0 906.8 1091.6 184.8 Total 0.4

Sample Point	Clock Time min	Pitot ∆ p, mm H ₂ O	Stack Temp, °C	Orifice △ F	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	12.0	16	34.5	34.5	1465177.1	14				2	9	3.464
	5	12.2	16	35.0	35.0		12				2	11	3.493
	10	12.2	16	35.0	35.0		10				2	11	3.493
2	15	18.8	17	54.0	54.0		10				2	14	4.336
	20	19.0	16	54.5	54.5		10				5	18	4.359
	25	19.0	16	54.5	54.5		11				5	18	4.359
Endpoint	30												
1	0	12.5	16	35.9	35.9		11				3	18	3.536
	5	12.5	16	35.9	35.9		12				3	17	3.536
	10	12.5	16	35.9	35.9		12				3	17	3.536
2	15	18.4	17	52.8	52.8		14				4	11	4.290
	20	18.4	17	52.8	52.8		12				4	11	4.290
	25	18.4	17	52.8	52.8		12				4	11	4.290
Endpoint	30					1466484							
	60.00	15.5	16.3	44.5	44.5	1.307	11.7	#DIV/0!	#DIV/0!	#DIV/0!	3.3	13.8	3.9

Meter Correction Yd

0.977

Authorisation/Permit Number: PPC/067 Var Ref: 002

Report Version: 1 Date of Issue: 07 February 2011 Page 52 of 62 Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 17/01/11

Project Ref: FTBS14741

Sampling Point Ref: Industrial Spray Booth 2 (LH)	Run: TPM
Meter Volume Sampled, acm	1.307
Sample Run Start Time	13:34
Sample Run End Time	14:36
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	746.00
Stack Pressure, mm Hg	745.78
Average Stack Temp, °C	16.3
Meter Volume at Wet STP, scm	1.207
Stack Moisture Content, %	0.0
Average Stack Velocity, m/sec	13.080
Stack Flow Rate, scms wet, STP	3.309
Nozzle Diameter, mm	6.07
% Isokinetic Variation	95.6
Total Mass of Particulate, mg	3.4
Percentage of Total Particulate Collected on Filter	41.2
Stack Particulate Concentration, mg/m³	2.8
Particulate Mass rate, kg/hour	0.034
Emission Limit value	50

Sample Train Blank Res	ults
Sample Blank Particulate Concentration, mg/m ³	0.4
Total Weight Gain, mg (Sample Train Blank)	0.5
Blank Result Less than 10% of Limit Value	Υ

Determined Concentration	2.8	mg/m3 (at Ref	erence Cond)]				
Measured Values								
Sampled Volume	1,3069	m ³]					
Sampled gas Temperature		k	1					
Sampled gas Pressure	99.43	kPa	1					
Sampled gas Humidity	0	% by volume	1					
Oxygen content		% by volume	1		Leak	0.30	%]
Mass	3.4	mg	1	Uncolle	cted Mass	0	mg	1
		_	J				_	,
Standard Uncertainties for			1					
Sampled Volume	0.001	m3 k	-					
Sampled gas Temperature Sampled gas Pressure		kPa	1					
Sampled gas Humidity	1	% by volume	1					
Oxygen content		% by volume	1					
Mass		mg]					
Uncertainty Calculation for	Volume Corr	ection		Uncertainty Calcu	ılation for	Oxygen Correct	ion T	
Volume Correction Factor	0.941			Oxygen Correction	on Factor	1.0000		
	Sensitivity Coefficient		Uncertainty, Uv			Sensitivity Coefficient		Uncer
Complet and Tomographus		1	0.0066	Oxygen Me		N/A		N
Sampled gas Temperature		1		Oxygen Me.	asurement	N/A	1	IN
Sampled gas Pressure		1	0.0095					
Sampled gas Humidity	0.0094	Sgrt (Uv)^2	0.0094 0.0149					
		Total Uv	0.019				Total Uo	N
	d- 1 b							
Uncertainty Contributions						Uncertair	nty Contribution	
		/alue	Sensitiv	ity coefficient		ncentration	%	
Volume Correction	1.207	m3		2.33		mg.m ⁻³	1.62	
Mass (weighing) Oxygen Correction	3.40 N/A	mg		0.83		mg.m ⁻³ mg.m ⁻³	4.16 0.00	
System Leak	0.00	mg.m ⁻³		1.00	0.00	mg.m ⁻³	0.17	%
Uncollected Mass	0.00	mg		0.83		mg.m ⁻³	0.00	%
				Total Uncertainty	0.13	mg.m ^{.3}	J	
Uncertainty Result	(Uncertainty h	ias been expande	d with a coverag	gefactor of 2 (K=2))				
					,			
	Expand	ed Uncertainty =	0.25	mg.m ⁻³	J			
		=>	8.94	% of Result]			

APPENDIX 8: Industrial Spray Booth 2 (RH) Sampling, Analysis & Uncertainty Data

Company Name: Covrad Heat Transfer Ltd Site Ref: Coventry Sampling Point Ref: Industrial Spray Booth 2 (RH) Project Ref: FTBS14741

Date: 17/01/11 Run: TPM

				Stack Diamter	r (m)	0.59	
Stack Static p	ress.mm H ₂ O:	-5		Stack Area (m2):			
Traverse		Port A Port B					
Point No.	Δр,	Root∆p	Stack Temp	Δр.	Root∆p	Stack Temp	
	mm H ₂ O		°C	mm H ₂ O		°C	
1	10.5	3.240	14	14.2	3.768	14	
2	19	4.359	14	20.4	4.517	14	
3							
4							
5							
6							
7							
8							
9							
10							
Minimum	10.5	3.240	14	14.2	3.768	14	
Maximum	19.0	4.359	14	20.4	4.517	14	
Mean	14.8	3.800	14.0	17.3	4.142	14.0	
Sum	29.5	7.599	28	34.6	8.285	28	
Total Sum							

Max. pitot press. =	20.4	
Min. pitot press. =	10.5	
Ratio Max:Min =	1.9 :1	

Gas Data

Gas Data	
Oxygen %	21.0
CO ₂ %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
Enter 0 if correction is not required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity. Not Permitted	Y
Duct Gas Flow: Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	Y
Handrails with removable chains / self closing gates across the top of the ladder?	Y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	Y
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Y
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

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Company Name: Covrad Heat Transfer Ltc In-stack Filter? Bar, Press.mm Hg K Factor 2.941 Site Ref. Coventry Sampling Point Ref: Industrial Spray Booth Outstack Filter? 6.067 Dn used Date: 17/01/11 Run: TPM Nozzle No. 1014 Project Ref: FTBS14741

Meter Correction Yd 0.977

Sample Filter Weights Reference Laboratory Increase, mg 67963 RPS 1.1 Probe Washings 1.68 T120195 RPS

Sample Filter Blank Weighings Reference Laboratory Increase, mg Filter 67962 RPS 0.04 Probe Wash T120194 RPS 1.1

Ambient Temp. Leak Rate (fin / %) 11:55 Start Time Leak Rate (start / %) Stop Time 12:57 Box/Probe setting

	Impinger Weigl	nts	
Weights	Initial	Final	Increase, g
Impinger 1	883.4	880	-3.4
Impinger 2			0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	893.6	906.8	13.2
		Total	9.8

Sample Point	Clock Time min	Pitot ∆ p, mm H₂O	Stack Temp, °C	Orifice ∆ H	H, mm H ₂ O	Gas Meter Reading	Temp at Gas Meter Outlet	Condenser Temp,	Filter Box Temp	Probe Temp	Pump Vacuum	Impinger Stem Temp.	Root∆p,
				Desired	Actual	m ³	°C	°C	°C	°C	Inches Hg	°C	
1	0	13.0	14	38.2	38.2	1463763	14				4	12	3.606
	5	13.2	12	38.8	38.8		15				4	9	3.633
	10	13.0	14	38.2	38.2		15				4	9	3.606
2	15	18.0	14	52.9	52.9		14				4	9	4.243
	20	18.0	14	52.9	52.9		14				4	9	4.243
	25	18.0	14	52.9	52.9		14				4.5	9	4.243
Endpoint	30												
1	0	13.4	14	39.4	39.4		14				4	9	3.661
	5	13.4	14	39.4	39.4		14				4	9	3.661
	10	13.4	14	39.4	39.4		14				4	9	3.661
2	15	15.8	14	46.5	46.5		13				4	10	3.975
	20	17.4	14	51.2	51.2		13				4	10	4.171
	25	17.4	14	51.2	51.2		13				4	10	4.171
Endpoint	30					1465155.5							
	60.00	15.3	13.8	45.1	45.1	1.393	13.9	#DIV/0!	#DIV/0!	#DIV/0!	4.0	9.5	3.9

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Report Version: 1 Date of Issue: 07 February 2011 Page 57 of 62 Company Name: Covrad Heat Transfer Ltd

Site Ref: Coventry Date: 17/01/11

Project Ref: FTBS14741

Sampling Point Ref: Industrial Spray Booth 2 (RH)	Run: TPM
Meter Volume Sampled, acm	1.393
Sample Run Start Time	11:55
Sample Run End Time	12:57
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	746.00
Stack Pressure, mm Hg	745.63
Average Stack Temp, °C	13.8
Meter Volume at Wet STP, scm	1.288
Stack Moisture Content, %	0.9
Average Stack Velocity, m/sec	13.017
Stack Flow Rate, scms wet, STP	3.321
Nozzle Diameter, mm	6.07
% Isokinetic Variation	101.6
Total Mass of Particulate, mg	2.8
Percentage of Total Particulate Collected on Filter	39.6
Stack Particulate Concentration, mg/m³	2.2
Particulate Mass rate, kg/hour	0.026
Emission Limit value	50

Sample Train Blank Results							
Sample Blank Particulate Concentration, mg/m ³	0.9						
Total Weight Gain, mg (Sample Train Blank)	1.1						
Blank Result Less than 10% of Limit Value	Υ						

Determined Concentration	2.2	mg/m3 (at Ref	erence Cond)]				
Measured Values								
Sampled Volume	1,3925	m ³]					
Sampled gas Temperature		k	1					
Sampled gas Pressure		kPa	1					
Sampled gas Humidity		% by volume						
Oxygen content		% by volume			Leak	0.10	%	
Mass		mg	1	Lincolle	cted Mass	0.10	mg	
Mass	2.10	mg	J	Oricone	cteu Mass	0	ilig	
Standard Uncertainties for	Measured Va	lues	,					
Sampled Volume		m3						
Sampled gas Temperature		k	-					
Sampled gas Pressure		kPa	-					
Sampled gas Humidity		% by volume	-					
Oxygen content		% by volume	-					
Mass	0.14152385	mg	J					
Uncertainty Calculation for	Volume Corr	ection		Uncertainty Calcu	lation for	Oxygen Correct	tion	
Volume Correction Factor	0.934]		Oxygen Correctio		1.0000	1	
Volume Correction Factor	Sensitivity		Uncertainty,	Oxygen Correctio	iii r actui	Sensitivity		Uncertai
	Coefficient		Uv			Coefficient		Uo
								N/A
Sampled gas Temperature	0.0033		0.0065	Oxygen Mea	asurement	N/A		
Sampled gas Temperature Sampled gas Pressure		-	0.0065	Oxygen Mea	asurement	N/A		
	0.0094			Oxygen Mea	asurement	N/A		
Sampled gas Pressure	0.0094	Sqrt (Uv)^2	0.0094 0.0093 0.0148	Oxygen Mea	asurement	N/A		
Sampled gas Pressure	0.0094	Sqrt (Uv)^2 Total Uv	0.0094 0.0093	Oxygen Mea	asurement	N/A	Total Uo	N/A
Sampled gas Pressure Sampled gas Humidity	0.0094		0.0094 0.0093 0.0148	Oxygen Mea	asurement	N/A	Total Uo	
Sampled gas Pressure	0.0094 0.0093 (Itemised)	Total Uv	0.0094 0.0093 0.0148 0.021		asurement		nty Contribution	N/A
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions	0.0094 0.0093 (Itemised)	Total Uv	0.0094 0.0093 0.0148 0.021	ity coefficient	Co	Uncertai ncentration	nty Contribution	N/A
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction	0.0094 0.0093 (Itemised) V	Total Uv	0.0094 0.0093 0.0148 0.021	ity coefficient	Co 0.03	Uncertai ncentration mg.m ⁻³	nty Contribution	N/A
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing)	0.0094 0.0093 ((temised) V 1.276 2.78	Total Uv	0.0094 0.0093 0.0148 0.021	ity coefficient	Co 0.03 0.11	Uncertain ncentration mg.m ⁻² mg.m ⁻³	nty Contribution	N/A
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction	0.0094 0.0093 (Itemised) V 1.276 2.78 N/A	Total Uv	0.0094 0.0093 0.0148 0.021	ity coefficient	Co 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction	(itemised) 1.276 2.78 N/A 0.00	Total Uv	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	(itemised) 1.276 2.78 N/A 0.00	Total Uv	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	(Itemised) V 1.276 2.78 N/A 0.00 0.00	Total Uv	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78 Total Uncertainty	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak	(Itemised) V 1.276 2.78 N/A 0.00 0.00	Total Uv	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0094 0.0093 (itemised) V 1.276 2.78 N/A 0.00 0.00	Total Uv	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78 Total Uncertainty	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0094 0.0093 (itemised) V 1.276 2.78 N/A 0.00 0.00	Total Uv Value m3 mg mg.m² mg	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78 Total Uncertainty gefactor of 2 (K=2)) mg.m³	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %
Sampled gas Pressure Sampled gas Humidity Uncertainty Contributions Volume Correction Mass (weighing) Oxygen Correction System Leak Uncollected Mass	0.0094 0.0093 (itemised) V 1.276 2.78 N/A 0.00 0.00	rotal Uv (alue m3 mg mg.m-3 mg as been expanded	0.0094 0.0093 0.0148 0.021 Sensitivi	ity coefficient 1.69 0.78 0.00 1.00 0.78 Total Uncertainty	Coi 0.03 0.11 0.00 0.00	Uncertain ncentration mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³ mg.m ³	1.6 5.0 0.0	N/A 1 % 9 % 0 % 6 %

Certificate of Analysis





		Te	st Certificate		Date 31/01/201
Client	RPS Towcester			Order No.	FTBS 14741
	Grafton Building			Certificate No.	WK11-0298
		& Technology Park		Issue No.	1
	Caswell, Towces Northants	Stell			
	NN12 8EQ				
Contact	Katie Brewis			Date Received	20/01/2011
Description	14 litters & 14 s	olutions for TPM		Technique	Gravimetric
Sample No.	633765	067879			Method
Total particulate matter		0.17 mg			D9(U)
Sample No.	633766	T120186			Method
Total particulate matter	•	<0.5 mg			D9(U)
Sample No.	633767	067881			Method
Total particulate matter		0.84 mg			D9(U)
Sample No.	633768	T120187			Method
Total particulate matter		1.4 mg			D9(U)
Sample No.	633769	067882			Method
Total particulate matter	,	0.15 mg			D9(U)
Sample No.	633770	T120188			Method
Total particulate matter		0.9 mg			D9(U)
Sample No.	633771	067873			Method
fotal particulate matter		0.88 mg			D9(U)
Sample No.	633772	T120189			Method
otal particulate matter	,	1.4 mg			D9(U)
Sample No.	633773	067876			Method
Total particulate matter		0.21 mg			D9(U)
Sample No.	633774	T120190			Method
Total particulate matter		<0.5 mg			D9(U)
Sample No.	633775	067877			Method
Total particulate matter	-	2.80 mg			D9(U)
Sample No.	633776	T120191			Method
Total particulate matter		2.3 mg			D9(U)

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PPC/067 Var Ref: 002 VisitNumber: 1 of 1



Test Certificate

Date 31/01/2011

		Test Ce	nuncate
Client	RPS Towo	ester	Certificate No. WK11-0298
			Issue No. 1
Sample No.	633777	067874	Method
Total particulate ma	atter	0.14 mg	D9(U)
Sample No.	633778	T120192	Method
Total particulate ma	atter	1.0 mg	D9(U)
Sample No.	633779	067875	Method
Total particulate ma	atter	1.70 mg	D9(U)
Sample No.	633780	T120193	Method
Total particulate ma	atter	1.4 mg	D9(U)
Sample No.	633781	067960	Method
Total particulate ma	atter	<0.04 mg	D9(U)
Sample No.	633782	T120023	Method
Total particulate ma	atter	0.8 mg	D9(U)
Sample No.	633783	067964	Method
Total particulate ma	atter	5.97 mg	D9(U)
Damaged filter			
Sample No.	633784	T120024	Method
Total particulate ma	atter	2.6 mg	D9(U)
Sample No.	633785	067962	Method
Total particulate ma	atter	0.04 mg	D9(U)
Sample No.	633786	T120194	Method
Total particulate ma	atter	1.1 mg	D9(U)
Sample No.	633787	067963	Method
Total particulate ma	atter	1.68 mg	D9(U)
Sample No.	633788	T120195	Method
Total particulate ma	atter	1.9 mg	D9(U)
Sample No.	633789	067976	Method
Total particulate ma	atter	<0.04 mg	D9(U)
Sample No.	633790	T120025	Method
Total particulate ma	atter	0.5 mg	D9(U)
Sample No.	633791	067961	Method
Total particulate ma	atter	1.42 mg	D9(U)
Sample No.	633792	T120026	Method
Total particulate ma	atter	2.0 mg	D9(U)

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Report Issue Number: 1 Date of Issue: February 2011 PPC/067 Var Ref: 002 VisitNumber: 1 of 1



Date 31/01/2011 Test Certificate

RPS Towcester Client Certificate No. WK11-0298 Issue No.

Tested By Ceri Wanklyn 28/01/2011 Date

Approved By Date 31/01/2011

> Joanne Dewhurst Laboratory Manager

For and on authority of RPS Laboratories Ltd.

RPS Laboratories terms and conditions apply - a copy is available on request.

Method Symbols (U) Analysis is UKAS Accredited (N) Analysis is not UKAS Accredited

Concentration values (mg/m3 and ppm) are provided to assist with interpretation only, they are not covered by the scope of UKAS accreditation

Analysis carried out on samples 'as received'

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PPC/067 Var Ref: 002 Report Issue Number: 1 Date of Issue: February 2011 VisitNumber: 1 of 1