

Breedon Cement Ltd

# BCSVR18/19-C3

Part C3 – Variation to a bespoke installation – Reference document



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[Date]

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## Operating techniques

### Types and amounts of raw material

Name of installation	Hope Cement Works - BP3731VJ v004			
Capacity	95,8350			
Schedule 1 activity	Description of raw material and composition	Maximum amount (tonnes)	Annual throughput 2017	Description of the use of the raw material including any main hazards (safety data sheet)
Clinker production	Shale	10,000	284217	Primary raw material
	Limestone	75,000	1464323	Primary raw material
	PFA (wet conditioned)	1,100	25135	Shale substitute
	PFA (run of station)	2,500	50889.71	Shale substitute
	PFA (biomass)	2,500	4587.42	Shale substitute
	Sodium Bicarbonate	120	536.28	Shale substitute
Grinding cement clinker	Gypsum	7035	69669	Grinding aid
	Ferrous Sulphate	80	4185	Chromate reducer

Notes :

1) By 'capacity', we mean the total storage capacity (tonnes) or total treatment capacity (tonnes each day).

2) By 'maximum amount', we mean the maximum amount of raw materials on the site at any one time.

## Monitoring

### Measures used for monitoring emissions

This document sets out the measures used for monitoring emissions stated in table 2 of form C3 – *varying a bespoke installation permit*. Conditions for measuring emissions to air from point sources and process monitoring are set out in Hope Cement Works Environmental permit BP3731VJ v004. Hope Cement Works uses both continuous emission monitors, and extractive testing to monitor air emissions. All CEM monitors are compliant with EN14181 regarding QAL 1, 2 and 3 testing. Manual spot samples are used for monitoring emissions to water, all samples are sent to a UKAS accredited laboratory for testing.

The existing facilities for the sampling of emissions to air meet the requirements of Environment Agency technical guidance note M1.

Site Environmental Operating Procedures set out the methods used to assess the measures.

*EOP 1 – Air Emissions*

*EOP 2 – Discharge to water*

The species monitored, methodology and monitoring frequency are set out in the below tables 1, 2 and 3.

Table 1 emission limits and monitoring requirements for kiln exhausts						
Emission Ref	Source	Parameter	Limit	Ref Period	Monitoring frequency	monitoring standard or method
A1 & A2	Kilns L1 & L2 main stack bag filters	Particulate matter	10 mg/Nm <sup>3</sup>	Daily Average	Continuous Measurement	BS EN 1481
		Oxides of Nitrogen (NO and NO <sub>2</sub> expressed as NO <sub>2</sub> )	500 mg/Nm <sup>3</sup>			
		Carbon Monoxide	2200 mg/Nm <sup>3</sup>			
		Sulphur Dioxide	850 mg/Nm <sup>3</sup>			
			400 mg/Nm <sup>3</sup>			
		Total Ammonia	No Limit			
			TBC with EA			
		Total Organic Carbon (TOC)	120 mg/Nm <sup>3</sup>			
Hydrogen Chloride	10 mg/Nm <sup>3</sup>					

		Hydrogen fluoride	1 mg/Nm <sup>3</sup>	Periodic over minimum 1-hour period		ISO 15713
		Cadmium Thallium and their compounds (total)	0.05 mg/Nm <sup>3</sup>	Average value over minimum 30 minute maximum 8-hour period	6 Monthly	BS EN 14385
		Mercury and its compounds	0.05 mg/Nm <sup>3</sup>			BS EN 13211
		Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/Nm <sup>3</sup>			BS EN 14385
		Dioxins / furans (i-TEQ)	0.1 ng/Nm <sup>3</sup>	Average value over sample period between 6 - 8 hours		BS EN 1948 Parts 1, 2 & 3
		Dioxins / furans (WHO-TEQ Humans/mammals/fish/birds)	No limit set			
		PCB's	No limit set	Average value over sample period of between 6 - 8 hours	6 monthly	BS EN/TS 1948 part 4
		Dioxin like PCBs (WHO-TEQ Humans/Mammals/fish/birds)				BS ISO 11338 parts 1,2
		PAHs Specific individual poly- cyclic aromatic hydrocarbons)				

Table 2 - Point Source emissions to air - Non-kiln sources						
Emission Ref	Source	Parameter	Limit	Ref Period	Monitoring frequency	monitoring standard or method
A3 and A4	Clinker coolers (Electrostatic precipitators)	Particulate matter	20 mg/Nm <sup>3</sup>	Daily average	continuous	BS EN 14267 - 3
A5 and A6	Cement Mills CM1 and CM2 (bag filters)		10 mg/Nm <sup>3</sup>	Average value over 30-minute period	Quarterly	BS EN - 13284-1
A7 and A8	Coal Mills (bag filter)		10 mg/Nm <sup>3</sup>	Average value over 30-minute period	Six monthly	

Table 3 - Point source emissions to water and land						
W1 and W2	Ponds 3 and 4	Suspended solids	20 mg/l	Spot sample	Monthly	BS EN 872
		Oil or grease	None visible			Visual check
		pH	06-Sep			BS EN ISO 10523:2012

## Point source emissions to air

For kiln exhaust gases, extractive testing is carried out by MCERTS certified contract company Exova Catalyst, twice annually. The monitoring methods and sample locations are specified as below.

### A1 - Kiln No.1

### A2 - Kiln No.2

Parameter	Monitoring				Analysis				MCERTS Testing	LOD (Average)
	Standard	Technical Procedure	ISO 17025 Testing	Testing Lab	Analytical Procedure	Analytical Technique	ISO 17025 Analysis	Analysis Lab		
Cadmium & Thallium	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.001 mg/m <sup>3</sup>
Heavy Metals	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.005 mg/m <sup>3</sup>
Mercury	MID 14385	CAT-TP-06	Yes	CAT	M112	CV-AFS	Yes	RPS	Yes	0.0004 mg/m <sup>3</sup>
Tin	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.002 mg/m <sup>3</sup>
Zinc	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.003 mg/m <sup>3</sup>
Beryllium	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.0003 mg/m <sup>3</sup>
Boron	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.005 mg/m <sup>3</sup>
Selenium	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.001 mg/m <sup>3</sup>
Tellurium	EN 14385	CAT-TP-06	Yes	CAT	M31	ICP-MS	Yes	RPS	Yes	0.001 mg/m <sup>3</sup>
Dioxins & Furans	EN 1948	CAT-TP-07	Yes	CAT	WI 1122	GC-HRMS	Yes	MAR	Yes	0.0007 ng/m <sup>3</sup>
PCBs	EN 1948	CAT-TP-07	Yes	CAT	WI 1180	GC-HRMS	Yes	MAR	Yes	0.0002 ng/m <sup>3</sup>
PAHs	ISO 11338	CAT-TP-08	Yes	CAT	SOP 12K	GC-MS (Soxhlet)	Yes	CLS	Yes	0.23 µg/m <sup>3</sup>
Sulphur Dioxide	EN 14791	CAT-TP-09	Yes	CAT	CAT-AP-01	IC	Yes	CAT	Yes	0.03 mg/m <sup>3</sup>
Hydrogen Chloride	EN 1911	CAT-TP-11	Yes	CAT	CAT-AP-01	IC	Yes	CAT	Yes	0.03 mg/m <sup>3</sup>
Hydrogen Fluoride	ISO 15713	CAT-TP-10	Yes	CAT	CAT-AP-01	IC	Yes	CAT	Yes	0.03 mg/m <sup>3</sup>
Ammonia	EN 14791	CAT-TP-14	Yes	CAT	A6	IC	Yes	RPS	Yes	0.06 mg/m <sup>3</sup>
Non-Methane VOCs	CEN/TS 13649	CAT-TP-16	Yes	CAT	O8   M124   G8   M109	GC-FID   GC-MS	No	RPS	No	0.18 mg/m <sup>3</sup>
Benzene	CEN/TS 13649	CAT-TP-16	Yes	CAT	O8   M124   G8   M109	GC-FID   GC-MS	Yes	RPS	Yes	0.18 mg/m <sup>3</sup>
Styrene	CEN/TS 13649	CAT-TP-16	Yes	CAT	O8   M124   G8   M109	GC-FID   GC-MS	Yes	RPS	Yes	0.36 mg/m <sup>3</sup>
Monochloromethane	CEN/TS 13649	CAT-TP-16	Yes	CAT	O8   M124   G8   M109	GC-FID   GC-MS	Yes	RPS	Yes	0.9 mg/m <sup>3</sup>
1,3-Butadiene	CEN/TS 13649	CAT-TP-16	Yes	CAT	O8   M124   G8   M109	GC-FID   GC-MS	No	RPS	No	1.79 mg/m <sup>3</sup>

Water Vapour	EN 14790	CAT-TP-05	Yes	CAT	CAT-TP-05	Gravimetric	Yes	CAT	Yes	0.10 % v/v
Total VOCs (as Carbon)	EN 12619:2013	CAT-TP-20	Yes	CAT	Flame Ionisation Detection by Sick 3006 FID			Yes	0.32 mg/m <sup>3</sup>	
Nitrous Oxide	EN ISO 21258	CAT-TP-40	Yes	CAT	IR by ABB AO2020-URAS26			Yes	0.39 mg/m <sup>3</sup>	
Oxides of Nitrogen (as NO <sub>2</sub> )	EN 14792	CAT-TP-21	Yes	CAT	Chemiluminescence by Horiba PG-250			Yes	0.41 mg/m <sup>3</sup>	
Carbon Monoxide	EN 15058	CAT-TP-21	Yes	CAT	NDIR by Horiba PG-250			Yes	0.56 mg/m <sup>3</sup>	
Carbon Dioxide	ISO 12039	CAT-TP-21	Yes	CAT	NDIR by Horiba PG-250			Yes	0.10 % v/v	
Methane	FS TGN M22	CAT-TP-22(b)	Yes	CAT	FTIR by Gaset Technologies Oy DX4000			Yes	0.02 mg/m <sup>3</sup>	
Ethane	FS TGN M22	CAT-TP-22(b)	Yes	CAT	FTIR by Gaset Technologies Oy DX4000			Yes	0.08 mg/m <sup>3</sup>	
Propane	FS TGN M22	CAT-TP-22(b)	Yes	CAT	FTIR by Gaset Technologies Oy DX4000			Yes	0.06 mg/m <sup>3</sup>	
Ethylene	FS TGN M22	CAT-TP-22(b)	Yes	CAT	FTIR by Gaset Technologies Oy DX4000			Yes	0.12 mg/m <sup>3</sup>	
Oxygen	EN 14789	CAT-TP-21	Yes	CAT	Dry Zirconia Cell by Horiba PG-250			Yes	0.10 % v/v	
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	CAT-TP-41	Yes	CAT	Pitot Tube and Thermocouple			Yes	1.8 m/s	

### Analysis laboratories

(with short name reference as appears in the table above)

Exova Catalyst (CAT)	ISO 17025 Accreditation Number: 4279
Concept Life Sciences Ltd (CLS)	ISO 17025 Accreditation Number: 1549
RPS Laboratories Ltd (RPS)	ISO 17025 Accreditation Number: 0605
Marchwood Scientific Services Ltd (MAR)	ISO 17025 Accreditation Number: 1668



## Sampling Locations

### Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	2.48
Width	m	-
Area	m <sup>2</sup>	4.83
Port Depth	cm	9
Orientation of Duct	-	Vertical
Number of Ports	-	4
Sample Port Size	-	4" BSP

### Platform Details

General Platform Information	Value
Permanent / Temporary Platform	Permanent
Inside / Outside	Outside

EA Technical Guidance Note M1 / EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	Yes
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	Yes
Platform has vertical base boards (approx. 0.25m high)	Yes
Platform has chains / self-closing gates at top of ladders	Yes
There are no obstructions present which hamper insertion of sampling equipment	Yes
Safe Access Available	Yes
Easy Access Available	Yes

### Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and EN 15259, and therefore there are no improvement recommendations

### 15259 Homogeneity Test Requirements

A valid EN 15259 Homogeneity test was performed by Exova Catalyst on this Stack on 5th October 2015, Report ID: CAT-2422, and the stack gas profile was found to be homogenous.

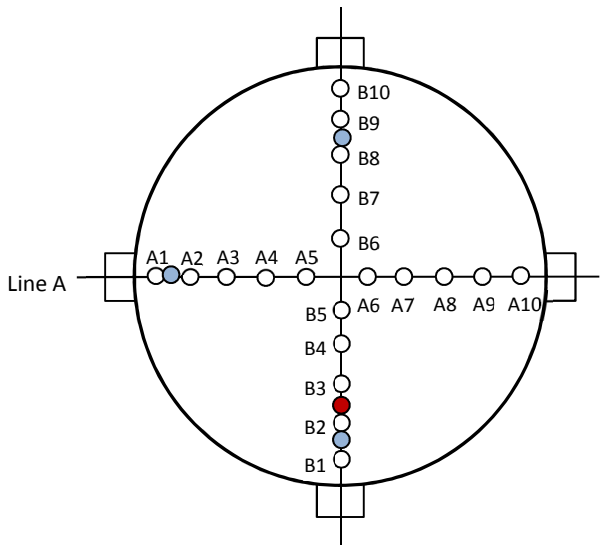
### Sampling Plane Validation Criteria (from EN 15259)

Criteria in EN 15259	Units	Traverse 1				Required	Compliant
Lowest Differential Pressure	Pa	275				> 5 Pa	Yes
Mean Velocity	m/s	22.6				-	-
Lowest Gas Velocity	m/s	18.2				-	-
Highest Gas Velocity	m/s	24.2				-	-
Ratio of Above	: 1	1.3				< 3 : 1	Yes
Maximum Angle of Swirl	°	6				< 15°	Yes
No Local Negative Flow	-	Yes				-	Yes

### Plant photos



Sample points



○	= isokinetic point sampled at
●	= isokinetic point not sampled at
●	= combustion gases sample point
◐	= non-isokinetic sample point

## Particulate monitoring

For point source emissions to air from non-kiln sources, extractive testing is carried out by MCERTS certified contract company CES Environmental Instruments Ltd. The monitoring frequency varies for each source and can be seen in Table 2. The details of the monitoring methods and sample locations are specified as below for each point source.

### A1 - Kiln No.1 & A2 - Kiln No.2

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 2450mm	4.716 m <sup>3</sup>	Vertical	PM = 2/2	PM = 16	BS EN - 15259
<p><b>Comments</b>  Sample ports 2 of 4 BSP sockets</p> <p>Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes</p> <p>Sample positions calculated using the Tangential method for circular ducts</p> <p><b>Pilot traverse</b>  Along lines A &amp; B at positions consistent with BS EN 15259 these positions are 3.2%, 10.5%, 19.4%, 32.3 %, 67.7%, 80.6%, 89.5%, 96.8%</p> <p><b>Sample Positions</b>  Along lines A &amp; B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 16 points (8 on each of two lines) these positions are 3.2%, 10.5%, 19.4%, 32.3%, 67.7%, 80.6%, 89.5%, 96.8%,</p>					
				<b>Yes</b>	<b>No</b>
Has homogeneity been carried out					✓
If Yes is stack homogenous				-	-
<b>Compliance with BS EN 15259</b>				<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream				✓	
Does the sample plane comply downstream				✓	
Are the appropriate sample ports fitted				✓	
Do the stack gas velocity / temperature profiles comply				✓	
Minimum platform area 5m <sup>2</sup>				✓	



### A3 – Clinker cooler No.1

Species	Sampling Method
Particulate Matter	BS EN 13284
Moisture	BS EN 14790

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 2750mm	5.942 m <sup>3</sup>	Vertical	PM = 2/2	PM = 16	BS EN - 15259

#### Comments

Sample ports 2 of 4 BSP sockets

Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes

Sample positions calculated using the Tangential method for circular ducts

#### Pilot traverse

Along lines A & B at positions consistent with BS EN 15259 these positions are 3.2%, 10.5%, 19.4%, 32.3%, 67.7%, 80.6%, 89.5%, 96.8%

#### Sample Positions

Along lines A & B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 16 points (8 on each of two lines) these positions are 3.2%, 10.5%, 19.4%, 32.3%, 67.7%, 80.6%, 89.5%, 96.8%,

	Yes	No
Has homogeneity been carried out		✓
If Yes is stack homogenous		
<b>Compliance with BS EN 15259</b>	<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream	✓	
Does the sample plane comply downstream		✓
Are the appropriate sample ports fitted	✓	
Do the stack gas velocity / temperature profiles comply	✓	
Minimum platform area 5m <sup>2</sup>	✓	



## A4 – Clinker cooler No.2

Species	Sampling Method
Particulate Matter	BS EN 13284
Moisture	BS EN 14790

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 2750mm	5.942 m <sup>3</sup>	Vertical	PM = 1/1	PM = 8	BS EN - 15259

### Comments

Sample ports 2 of 4 BSP sockets

Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes.

Sample positions calculated using the Tangential method for circular ducts

### Pilot traverse

Along lines A & B at positions consistent with BS EN 15259 these positions are 3.2%, 10.5%, 19.4%, 32.3 %, 67.7%, 80.6%, 89.5%, 96.8%

### Sample Positions

Along lines A & B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 16 points (8 on each of two lines) these positions are 3.2%, 10.5%, 19.4%, 32.3%, 67.7%, 80.6%, 89.5%, 96.8%,

	Yes	No
Has homogeneity been carried out		✓
If Yes is stack homogenous	-	-
<b>Compliance with BS EN 15259</b>	<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream	✓	
Does the sample plane comply downstream		✓
Are the appropriate sample ports fitted		✓
Do the stack gas velocity / temperature profiles comply	✓	
Minimum platform area 5m <sup>2</sup>	✓	





## A5 – Cement Mill No.1

Species	Sampling Method
Particulate Matter	BS EN 13284

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 1300mm	1.328 m <sup>3</sup>	Vertical	PM = 2/2	PM = 8	BS EN - 15259
<p><b>Comments</b>            Sample ports 2 of 4 BSP sockets</p> <p>Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes.</p> <p>Sample positions calculated using the Tangential method for circular ducts</p> <p><b>Pilot traverse</b>            Along lines A &amp; B at positions consistent with BS EN 15259 these positions are 6.7%, 25.0%, 75.0%, 93.3%</p> <p><b>Sample Positions</b>            Along lines A &amp; B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 16 points (8 on each of two lines) these positions are:            6.7%, 25.0%, 75.0%, 93.3%,</p>					
				<b>Yes</b>	<b>No</b>
Has homogeneity been carried out					✓
If Yes is stack homogenous				-	-
<b>Compliance with BS EN 15259</b>				<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream				✓	
Does the sample plane comply downstream				✓	
Are the appropriate sample ports fitted				✓	
Do the stack gas velocity / temperature profiles comply				✓	
Minimum platform area 5m <sup>2</sup>					✓



## A6 – Cement Mill No.2

Species	Sampling Method
Particulate Matter	BS EN 13284
Moisture	BS EN 14790

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 1300mm	1.328 m <sup>3</sup>	Vertical	PM = 2/2	PM = 8	BS EN - 15259

### Comments

Sample ports 2 of 4 BSP sockets

Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes.

Sample positions calculated using the Tangential method for circular ducts

### Pilot traverse

Along lines A & B at positions consistent with BS EN 15259 these positions are 6.7%, 25.0%, 75.0%, 93.3%

### Sample Positions

Along lines A & B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 16 points (8 on each of two lines) these positions are: 6.7%, 25.0%, 75.0%, 93.3%,

	Yes	No
Has homogeneity been carried out		✓
If Yes is stack homogenous	-	-
<b>Compliance with BS EN 15259</b>	<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream	✓	
Does the sample plane comply downstream	✓	
Are the appropriate sample ports fitted	✓	
Do the stack gas velocity / temperature profiles comply	✓	
Minimum platform area 5m <sup>2</sup>		✓





A7 – Coal Mill No.1

Species	Sampling Method
Particulate Matter	BS EN 13284
Moisture	BS EN 14790

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 0930mm	0.680 m <sup>3</sup>	Vertical	PM = 2/2	PM = 8	BS EN - 15259

**Comments**

Sample ports 2 of 4 BSP sockets

Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes.

Sample positions calculated using the Tangential method for circular ducts

**Pilot traverse**

Along lines A & B at positions consistent with BS EN 15259 these positions are 6.7%, 25.0%, 75.0%, 93.3%

**Sample Positions**

Along lines A & B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 8 points (4 on each of two lines) these positions are: 6.7%, 25.0%, 75.0%, 93.3%,

	Yes	No
Has homogeneity been carried out		✓
If Yes is stack homogenous	-	-
<b>Compliance with BS EN 15259</b>	<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream	✓	
Does the sample plane comply downstream	✓	
Are the appropriate sample ports fitted	✓	
Do the stack gas velocity / temperature profiles comply	✓	
Minimum platform area 5m <sup>2</sup>		✓



## A8 – Coal Mill No.2

Species	Sampling Method
Particulate Matter	BS EN 13284-1
Moisture	BS EN 14790

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling points positions per plane	Standard
Dia= 0930mm	0.680 m <sup>3</sup>	Vertical	PM = 2/2	PM = 8	BS EN - 15259

### Comments

Sample ports 2 of 4 BSP sockets

Sample times are calculated from the total sample time equally divided by the no of sample positions per plane. The minimum sample time per position is 3 minutes.

Sample positions calculated using the Tangential method for circular ducts

### Pilot traverse

Along lines A & B at positions consistent with BS EN 15259 these positions are 6.7%, 25.0%, 75.0%, 93.3%

### Sample Positions

Along lines A & B at as many of the positions required within the standard method as can be achieved given the clearance limitations behind each socket. BS EN 15259 requires sampling at 8 points (4 on each of two lines) these positions are:

6.7%, 25.0%, 75.0%, 93.3%,

	Yes	No
Has homogeneity been carried out		✓
If Yes is stack homogenous	-	-
<b>Compliance with BS EN 15259</b>	<b>Yes</b>	<b>No</b>
Does the sample plane comply upstream	✓	
Does the sample plane comply downstream	✓	
Are the appropriate sample ports fitted	✓	
Do the stack gas velocity / temperature profiles comply	✓	
Minimum platform area 5m <sup>2</sup>		✓



## Specific questions for the combustion sector

Table 1 - Fuel usage

Installation Reference	Hope Cement Works - BP3731VJ v004		
Type of fuel	When run as normal	When started up	When shut down
Coal	✓	✓	✓
Gas Oil			
Heavy fuel oil			
Natural gas			
WID waste	✓		
Kerosene	✓	✓	✓

### Fuels composition

All fuel compositions are taken as an average of data between January 2018– September 2018, apart from MBM which hasn't been burned since 2017. MBM figures are therefore the average of the 2017 composition data. All analysis is completed externally by a UKAS accredited laboratory.

Fuel use and analysis	Hope Cement Works - BP3731VJ v004							
Installation reference	Hope Cement Works - BP3731VJ v004							
Parameter	Unit	Fuel 1 - Eckingham Coal (2018 avg)	Fuel 2 - Welsh Coal (2018 avg)	Fuel 3 - MBM (2017 avg)	Fuel 4 - SRF (2018 avg)	Fuel 5 - PUR Foam (2018 avg)	Fuel 6 - polychip (2018 avg)	Fuel 7 End of life tyres (2018 avg)
Maximum percentage of gross thermal input	%	67.39		(Fuel not used since September 2017)	9.92	2.57	0.23	19.88
Moisture	%	12.16	6.54	4.54	19.09	2.03	3.6	Not tested
Ash	% wt/wt dry	20.87	12.43	19.17	20.93	20.74	6.03	
Sulphur	% wt/wt dry	1.53	0.03	0.47	0.22	0.14	0.1	
Chlorine	% wt/wt dry	0.06	2.17	0.75	0.78	0.51	0.62	
Arsenic	% wt/wt dry	21.59	19.12	0.36	7.69	1.55	5.68	
Cadmium	% wt/wt dry	0.18	0.09	0.08	0.75	0.75	8.86	
Carbon	% wt/wt dry	45.91	13.5	8.53	6.71	7.8	5.87	
Chromium	% wt/wt dry	54.88	29.18	18.09	130.34	130.34	83.04	
Copper	% wt/wt dry	35.6	39.17	27.77	379.54	379.54	46.56	
Hydrogen	% wt/wt dry							
Lead	% wt/wt dry	27.16	13.92	7.08	104.86	104.86	48.28	

<b>Mercury</b>	<i>% wt/wt dry</i>	0.14	0.31	0.02	0.19	0.19	0.47
<b>Nickel</b>	<i>% wt/wt dry</i>	42.47	38.28	10.51	91.29	91.29	20.92
<b>Nitrogen</b>	<i>% wt/wt dry</i>						
<b>Oxygen</b>	<i>% wt/wt dry</i>						
<b>Vanadium</b>	<i>mg/kg dry</i>	70.42	56.25	1.03	75.75	75.75	5.43
<b>Zinc</b>	<i>mg/kg dry</i>	61.16	52.41	139.75	334.19	334.19	1965.88
<b>Net calorific value</b>	<i>Mj/kg</i>	21.38	27.89	19	13.65	13.65	34.09