



**Title: Monitoring of Particulate Matter (PM) Emissions**

**Permit Number:** EPR/BP3790CG  
**Operator:** Unimetals Recycling (UK) Limited  
**Installation:** A1 Emissions Control System Exhaust  
**Monitoring Dates:** 14 March 2025

Reference Number: EI/10629

Client Organisation: Unimetals Recycling (UK) Limited  
Address: Harrimans Lane  
Dunkirk  
Nottingham  
NG7 2SD

Monitoring Organisation: CES Environmental Instruments Ltd  
Address: Bretby Business Park  
Ashby Road  
Burton on Trent  
Staffordshire  
DE15 0YZ

Date of Report: 19 March 2025

Report Prepared By: Martin Rodgers  
MCERTS Registration Number: MM 04 531 (Level 2, TE1, TE2, TE3, TE4)

Signed:   
.....

Report Approved By: Robert Allen  
MCERTS Registration Number: MM 02 009 (Level 2, TE1, TE2, TE3, TE4)

Signed:   
.....

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## **Part 1: Executive Summary**

### **1.1 Monitoring Objectives**

Unimetals Recycling (UK) Limited placed a contract with CES Environmental Instruments Ltd for the compliance check monitoring of emissions to air from the A1 Emissions Control System Exhaust.

#### **A1 Emissions Control System Exhaust**

Treatment consisting only of shredding and granulation of ferrous and non-ferrous metals for recovery.

The test work was undertaken on 14 March 2025 by CES Environmental Instruments Ltd Engineers and carried out as part of CES Environmental Instruments Ltd job reference EI/10629.

The substances monitored were:-

Particulate Matter

On the day of testing there were no special requirements for the monitoring.

## 1.2 Monitoring Results

Emission Point Reference: A1 Emissions Control System Exhaust

Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty of Measurement (95% CI)	Blank Result	Units	Reference Conditions	Emission Rate	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method	Operating Status
Particulate Matter	20	0.09	0.12	0.03*	mg/m <sup>3</sup>	273K, 101.3kPa	0.003 kg/hr	14 March 2025	09:44-12:52	BS EN 13284-1	UKAS & MCERTS	Normal Operation

\* Indicates where a value less than the limit of detection of the weighing procedure (0.09mg) has been reported, the value lies between the detection limit and zero. A value of half the limit of detection (0.045mg) has been used to calculate the concentration.

## 1.3 Operating Information

Emission Point Reference: A1 Emissions Control System Exhaust

Process Type	Batch Sample Details	Fuel	Product	Load	Abatement
Continuous	-	Light Iron	Scrap Metal	Normal Operation	Cyclone

Comparison of Operator Continuous Emissions Monitoring Systems (CEMS) and Periodic Monitoring Results								
Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty of Measurement (95% CI)	Units	Reference Conditions	Date of Sampling	Start and End Times	CEMS Results
No CEMS Installed								

## 1.4 Monitoring Deviations

None.

## **Part 2: Supporting Information**

### **Appendix 1 General Information**

### CES Environmental Instruments Ltd staff details

Name	Role	MCERT Registration Number	Level 1	Level 2	TE1	TE2	TE3	TE4	At site
Martin Rodgers	Team Leader	MM 04 531		✓	✓	✓	✓	✓	T
				Dec 2029	June 2027	Mar 2029	Dec 2029	June 2028	
Dominick Woolley	Technician	MM 24 1862 Trainee							✓

T = Nominated Team Leader on Site

### CES Environmental Instruments Ltd method details

Pollutant	Method	CES Procedure
Particulate Matter	BS EN 13284-1	WI 4/1

### Monitoring Equipment Used

Gravimat & Probe

CES Environmental Instruments Ltd Reference: C20

## **Appendix 2**

### **Diagrams of Emission Point**

## Sampling Location

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling Positions Per Plane	Standard
Dia=1000mm	0.786m <sup>2</sup>	Vertical	PM = 2/2	8	BS EN 15259
<p><b>Comments:</b> Sample ports: 2 off 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>Pitot Traverse</b> Along lines A and 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 and 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 2 lines) these positions are: 6.7%, 25.0%, 75.0%, 93.3%</p>					
				Yes	No
<b>Has homogeneity test been carried out?</b>					✓
<b>If Yes - Is stack gas homogenous?</b>				-	-
<b>Any physical or regulatory restrictions regarding usage of equipment?</b> N/A					

Compliance with BS EN 15259 / EA TGN M1	Yes	No
<b>Does the sample plane comply upstream?</b>	✓	
<b>Does the sample plane comply downstream?</b>	✓	
<b>Are the appropriate sample ports fitted?</b>	✓	
<b>Do the stack gas velocity / temperature profiles comply?</b>	✓	
<b>Minimum platform area &gt;5m<sup>2</sup></b>	✓	



**Appendix 3**  
**Particulate Matter (Sampling Measurement & Results)**

**Site :** Unimetals Recycling (UK) Limited - Nottingham  
**Date :** 14 March 2025  
**Plant :** A1 Emissions Control System Exhaust  
**File Ref. :** 10629

**Mean Particulate Results**

Filter	Time	mg/m <sup>3</sup> (Actual Conditions)	m <sup>3</sup> /hr	mg/Nm <sup>3</sup> (Reference Conditions)	Nm <sup>3</sup> /hr	kg/hr
64133	09:44-10:46	0.11	40888	0.12	37346.0	0.004
64365	10:48-11:50	0.05	40216	0.05	36732.0	0.002
64131	11:51-12:52	0.08	41241	0.09	37669.0	0.003
	<b>Mean</b>	0.08	40782	0.09	37249.0	0.003

**Control Blank Filter**

Filter	Volume (m <sup>3</sup> )
64133	1.524
64365	1.502
64131	1.542
	1.523 (Reference Conditions with no correction for Oxygen)

**Filter** 522161

**Tare Weight** 17962.51 mg  
**Gross Weight** 17962.56 mg \*

**Gain** 0.04 mg

**Measured Oxygen** %

**Concentration** 0.03 mg/Nm<sup>3</sup>

Results Correct to

Temperature	Pressure	Oxygen	Gas
°C/K	mbar/kPa	%	Wet/Dry
0/273	1013/101.3		Wet

\* Indicates where a value less than the limit of detection of the weighing procedure (0.09mg) has been reported, the value lies somewhere between the detection limit and zero. A value of half the limit of detection (0.045mg) has been used to calculate the concentration.

**Velocity Results**

	Time	m/s
<b>Test 1</b>	09:44-10:46	14.50
<b>Test 2</b>	10:48-11:50	14.20
<b>Test 3</b>	11:51-12:52	14.60
	<b>Mean</b>	<b>14.43</b>

protocol simultaneous isokinetic extraction measurement

collector-no. 133  
 engineer MR  
 plant name A1 ECS Exhaust  
 place Unimetals, Nottingham  
 remarks Normal Operation  
 Diam = 1000mm  
 Test 1

operating parameter

normal density humid [ kg / m<sup>3</sup> ] : 1.27  
 water vapour [ %Vol ] : 3  
 ambient pressure [ mbar ] : 1010  
 duct cross-section [ m<sup>2</sup> ] : 0.786

extraction parameter

change of meas. point [h:m:s] : 00:07:30  
 points / axis : 4  
 nozzles diameter [ mm ] : 6.4  
 isokinetic factor : 1  
 tare weight [ mg ] : 18031.93  
 gross weight [ mg ] : 18032.11

evaluation

meas. time [h:m:s] : 00:59:60  
 dust weight [ mg ] : 0.18

## extracted partial volume

actual conditions [ m<sup>3</sup> ] : 1.668  
 in norm wet [ Nm<sup>3</sup> ] : 1.524  
 in norm dry [ Nm<sup>3</sup> ] : 1.478

## volume flow in duct

actual conditions [m<sup>3</sup>/h] : 40888  
 in norm wet [Nm<sup>3</sup>/h] : 37346  
 in norm dry [Nm<sup>3</sup>/h] : 36226

## dust concentration

actual conditions [mg/m<sup>3</sup>] : 0.11  
 in norm wet [mg/Nm<sup>3</sup>] : 0.12  
 in norm dry [mg/Nm<sup>3</sup>] : 0.12

protocol simultaneous isokinetic extraction measurement

14/03/2025 09:44

14/03/2025 10:46

measured values table

axis	depth	T_probe [°C]	v_duct [m/s]	angle [grd]	Q_act. [m³/h]	volume [m³]	meas. time [ H:M:S ]	p10 [mbar]	p40 [mbar]
1	1	25	14.5	1.2	1.63	0.204	00:07:30	2.00	-82
1	2	25	14.5	1.3	1.68	0.210	00:07:30	2.00	-84
1	3	25	14.5	1.5	1.68	0.210	00:07:30	2.00	-84
1	4	25	14.4	1.7	1.66	0.208	00:07:30	2.00	-83
2	1	25	14.5	1.3	1.68	0.210	00:07:30	2.00	-84
2	2	25	14.4	1.7	1.66	0.208	00:07:30	2.00	-83
2	3	25	14.4	1.5	1.67	0.209	00:07:30	2.00	-84
2	4	25	14.4	1.5	1.67	0.209	00:07:30	2.00	-84
		25	14.5	1.5	1.67	0.208		2.00	-84

protocol simultaneous isokinetic extraction measurement

14/03/2025 10:48

14/03/2025 11:50

collector-no. 365  
 engineer MR  
 plant name A1 ECS Exhaust  
 place Unimetals, Nottingham  
 remarks Normal Operation  
 Diam = 1000mm  
 Test 2

operating parameter

normal density humid [ kg / m<sup>3</sup> ] : 1.27  
 water vapour [ %Vol ] : 3  
 ambient pressure [ mbar ] : 1010  
 duct cross-section [ m<sup>2</sup> ] : 0.786

extraction parameter

change of meas. point [h:m:s] : 00:07:30  
 points / axis : 4  
 nozzles diameter [ mm ] : 6.4  
 isokinetic factor : 1  
 tare weight [ mg ] : 17384.17  
 gross weight [ mg ] : 17384.25

evaluation

meas. time [h:m:s] : 00:59:60  
 dust weight [ mg ] : 0.08

extracted partial volume  
 actual conditions [ m<sup>3</sup> ] : 1.644  
 in norm wet [ Nm<sup>3</sup> ] : 1.502  
 in norm dry [ Nm<sup>3</sup> ] : 1.457

volume flow in duct  
 actual conditions [m<sup>3</sup>/h] : 40216  
 in norm wet [Nm<sup>3</sup>/h] : 36732  
 in norm dry [Nm<sup>3</sup>/h] : 35630

dust concentration  
 actual conditions [mg/m<sup>3</sup>] : 0.05  
 in norm wet [mg/Nm<sup>3</sup>] : 0.05  
 in norm dry [mg/Nm<sup>3</sup>] : 0.05

protocol simultaneous isokinetic extraction measurement

14/03/2025 10:48

14/03/2025 11:50

measured values table

axis	depth	T_probe [°C]	v_duct [m/s]	angle [grd]	Q_act. [m³/h]	volume [m³]	meas. time [ H:M:S ]	p10 [mbar]	p40 [mbar]
1	1	26	14.2	0.5	1.64	0.205	00:07:30	2.00	-81
1	2	26	14.2	0.6	1.65	0.206	00:07:30	2.00	-81
1	3	26	14.3	0.4	1.66	0.207	00:07:30	2.00	-82
1	4	26	14.2	0.7	1.64	0.205	00:07:30	2.00	-81
2	1	26	14.1	0.6	1.63	0.204	00:07:30	2.00	-81
2	2	26	14.2	0.6	1.64	0.205	00:07:30	2.00	-81
2	3	26	14.3	0.5	1.65	0.206	00:07:30	2.00	-82
2	4	26	14.2	0.7	1.65	0.206	00:07:30	2.00	-81
		26	14.2	0.6	1.64	0.205		2.00	-81

protocol simultaneous isokinetic extraction measurement

collector-no. 131  
 engineer MR  
 plant name A1 ECS Exhaust  
 place Unimetals, Nottingham  
 remarks Normal Operation  
 Diam = 1000mm  
 Test 3

operating parameter

normal density humid [ kg / m<sup>3</sup> ] : 1.27  
 water vapour [ %Vol ] : 3  
 ambient pressure [ mbar ] : 1011  
 duct cross-section [ m<sup>2</sup> ] : 0.786

extraction parameter

change of meas. point [h:m:s] : 00:07:30  
 points / axis : 4  
 nozzles diameter [ mm ] : 6.4  
 isokinetic factor : 1  
 tare weight [ mg ] : 18695.55  
 gross weight [ mg ] : 18695.69

evaluation

meas. time [h:m:s] : 00:59:60  
 dust weight [ mg ] : 0.14

extracted partial volume  
 actual conditions [ m<sup>3</sup> ] : 1.688  
 in norm wet [ Nm<sup>3</sup> ] : 1.542  
 in norm dry [ Nm<sup>3</sup> ] : 1.496

volume flow in duct  
 actual conditions [m<sup>3</sup>/h] : 41241  
 in norm wet [Nm<sup>3</sup>/h] : 37669  
 in norm dry [Nm<sup>3</sup>/h] : 36539

dust concentration  
 actual conditions [mg/m<sup>3</sup>] : 0.08  
 in norm wet [mg/Nm<sup>3</sup>] : 0.09  
 in norm dry [mg/Nm<sup>3</sup>] : 0.09

protocol simultaneous isokinetic extraction measurement

14/03/2025 11:51

14/03/2025 12:52

measured values table

axis	depth	T_probe [°C]	v_duct [m/s]	angle [grd]	Q_act. [m³/h]	volume [m³]	meas. time [ H:M:S ]	p10 [mbar]	p40 [mbar]
1	1	25	14.6	1.1	1.68	0.211	00:07:30	2.00	-86
1	2	25	14.5	3.8	1.68	0.210	00:07:30	2.00	-86
1	3	25	14.6	1.7	1.68	0.210	00:07:30	2.00	-86
1	4	25	14.5	0.1	1.68	0.210	00:07:30	2.00	-86
2	1	25	14.6	0.1	1.70	0.213	00:07:30	2.00	-87
2	2	25	14.6	0.0	1.69	0.212	00:07:30	2.00	-86
2	3	25	14.6	0.0	1.69	0.211	00:07:30	2.00	-86
2	4	25	14.6	0.0	1.69	0.211	00:07:30	2.00	-86
		25	14.6	0.9	1.69	0.211		2.00	-86

## **Appendix 4 Calibration Certificates**

## Certificate of Calibration

Date of Issue: 30 September 2024

Certificate No. CES2523

page 1 of 2

CES Environmental Instruments Ltd  
Bretby Business Park, Ashby Road  
Burton-on-Trent, Staffordshire, DE15 0YZ  
Tel: 01283 216334 Fax: 01283 550939

  
Certified By

### Instrument Details

Instrument Type	Gravimat SHC-502
Instrument Make	Erwin Sick
Instrument Serial No.	05398822
Quality No.	C220
Calibration Date	30 09 24
Calibrated By Name	M.Rodgers

### Ambient Conditions

Air Temperature (°C)	23	**
Barometric Pressure (mbar)	985	
Relative Humidity (%)	64	**

### Instruments used to undertake calibration

E Type Pitot	UKAS Certificate No. K55647V	(Qu. No. C136)
Manometer Type FC012	UKAS Certificate No. 27318	(Qu. No. C082)
Manometer Type FC012	UKAS Certificate No. 27319	(Qu. No. C081)
Barometer Type 104	UKAS Certificate No. K55933P	(Qu. No. C138)
Gallus Dry Gas Meter	UKAS Certificate No. N037163	(Qu. No. C333)
RIS Supercal XT	UKAS Certificate No. 10345	(Qu. No. C014)

\* Not UKAS traceable

\*\* Indication only

### Flow and Extraction

The reference pitot was placed in a wind tunnel located at Bretby Business Park. The Gravimat SHC-502 Sampling Probe under test was mounted within the same wind tunnel in close proximity to the reference pitot. The wind tunnel was operated to generate a differential pressure across each pitot, a direct comparison was made. The differential pressures measured were in the region of the calibration points of the reference pitot. Correction factors were applied to the reference pitot and compared to the differential pressure shown for the pitot under test. The extraction system of the unit was operated for a period of one minute.

### Volume Flow

A calibrated dry gas meter was connected to the sampling nozzle of the Gravimat SCH-502. A volume of air is pulled through the sampling system. The measured value shown on the calibrated dry gas meter is then compared to the indicated value on the Gravimat SCH-502 display.

### Barometric Pressure

The barometric pressure was measured using a calibrated barometer. The indicated pressure was compared to the Gravimat SHC-502 display.

### Temperature

The probe thermocouple was placed in a thermocouple oven and heated. The temperature was measured using a calibrated thermocouple and temperature indicator. The resultant temperature was compared to the Gravimat SCH-502 display.

### Current

A mA current source was injected into the Gravimat SCH-502 using a mA current generator. The injected current was compared to the Gravimat SCH-502 display.

## Certificate of Calibration

Date of Issue: 30 September 2024

Certificate No CES2523  
page 2 of 2

CES Environmental Instruments Ltd  
Bretby Business Park, Ashby Road  
Burton-on-Trent, Staffordshire, DE15 0YZ  
Tel: 01283 216334 Fax: 01283 550939

  
Certified By

### Instrument Details

Instrument Type Gravimat SHC-502  
Instrument Make Erwin Sick  
Instrument Serial No 05398822  
Quality No C220  
Calibration Date 30/09/2024

### Ambient Conditions

Air Temperature (°C) 23 \*\*  
Barometric Pressure (mbar) 985  
Relative Humidity (%) 64 \*\*  
Air Density @ 0°C (kg/m³) 1.277  
Corrected Air Density (kg/m³) 1.1452

### Calibration Details

#### Flow and Extraction

Applied Pressure (Pa)	Pitot Correction	Applied Pressure Corrected (Pa)	SMP502 (Calculated) (Pa)	Pressure Factor	Calculated Velocity (m/s)	SMP502 Velocity (m/s)	Velocity Factor
5.1	1.009	5.1	5.5	0.94	2.998	3.100	0.97
38.6	1.002	38.7	40.4	0.96	8.219	8.400	0.98
84.6	1.004	84.9	86.6	0.98	12.179	12.300	0.99
147.9	0.999	147.8	155.9	0.95	16.063	16.500	0.97
237.8	1.000	237.8	245.4	0.97	20.379	20.700	0.98
<b>Mean (excluding 4.0Pa)</b>				<b>0.96</b>			<b>0.98</b>

#### Volume Flow

Nominal Flow Rate	Actual Flow Rate	Actual Flow Rate	Orifice Constant
l/min	l/min	m³	
10.0	9.450	0.189	12.224
15.0	14.850	0.297	12.808
20.0	19.975	0.400	12.921
25.0	23.932	1.436	12.938
30.0	30.005	0.600	12.919

**Instrument Orifice Constant @ 1.5m³/hr 12.938**

#### Barometric Pressure

Pressure	
Required Value (mbar)	Indicated Value (mbar)
969.0	969.0
985.0	985.0
1005.0	1005.0
1015.0	1015.0
1020.0	1020.0

#### Temperature

Temperature Input	
Required Value (°C)	Indicated Value (°C)
25.0	25.0
50.0	49
100.0	100
150.0	150.0
200.0	199.0
250.0	250.0

#### Current

Current Value	
Required Value (mA)	Indicated Value (mA)
0	0.0
5	5.0
10	10.0
15	15.1
20	20.0

#### Time

Time Period mins	Required Value mins	Within Limit
3:00	2:59 → 3:01	Yes
5:00	4:59 → 5:01	Yes
10:00	9:59 → 10:01	Yes

## **Appendix 5 Uncertainty Calculations**

Uncertainty calculation for EN 13284 Determination of low range mass concentration of dust, Manual Gravimetric Method

Limit value (ELV)	10 mg.m <sup>-3</sup>	Reference oxygen	% by volume
Measured concentration	0.12 mg.m <sup>-3</sup> (at reference conditions)		

Measurement Equation

$$c = \frac{m}{V} f_c$$

Measured Quantities	Symbol	Value	Standard uncertainty	Units	Uncertainty as percentage	Uncertainty at lv	Requirement of std
Sampled Volume	V <sub>m</sub>	1.524	uV <sub>m</sub>	0.001 m <sup>3</sup>	0.07		<=2%
Sampled gas Temperature	T <sub>m</sub>	273	uT <sub>m</sub>	2 k	0.73		<=1%
Sampled gas Pressure	ρ <sub>m</sub>	101.3	uρ <sub>m</sub>	0.1 kPa	0.10		<=1%
Sampled gas Humidity	H <sub>m</sub>	0	uH <sub>m</sub>	1 % by volume	1.00		<=1%
Oxygen content	O <sub>2,m</sub>		uO <sub>2,m</sub>	0.1 % by volume	#DIV/0!		<=5%
Mass particulate	m	0.18	um	0.09 mg	50.00	0.59	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter							
Leak	L	2		%	2.00		<=2%
Uncollected Mass (Instack filter - no rinse)	UCM	0		mg	0		<=10%

Intermediate calculations				
Factor for std conds	fs	1.00		
uncertainty components	symbol	sensitivity coeff	u (in units of fs)	
	ρ <sub>m</sub>	0.010	0.001	
	H <sub>m</sub>	0.010	0.010	$f_s = \frac{(100 - H_m) 273 \rho_m}{100 T_m 101.3}$
	T <sub>m</sub>	0.004	0.007	
	ufs		0.012	1.24
Corrected volume	V	1.52	uV	0.019 m <sup>3</sup>
				1.25
Factor for O2 correction	fc	1.00		
uncertainty components	symbol	sensitivity coeff	u	
	O <sub>2,m</sub>	0.05	0.005	$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$
Factor for O2 Correction	ufc	1.00	0.005	0.48

Parameter	Value	Units	Sensitivity coeff	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard cc)	V	1.52 m <sup>3</sup>	0.08	0.00 mg.m <sup>-3</sup>	1.25 %
Mass	m	0.18 mg	0.66	0.06 mg.m <sup>-3</sup>	50.00 %
Factor for O2 Correction	fc	1.00	0.12	0.00 mg.m <sup>-3</sup>	0.48 %
Leak	L	0.00 mg.m <sup>-3</sup>	1.00	0.00 mg.m <sup>-3</sup>	1.15 %
Uncollected mass	UCM	0.00 mg	0.66	0.00 mg.m <sup>-3</sup>	0.00 %
<b>Combined measurement uncertainty</b>				<b>0.06 mg.m<sup>-3</sup></b>	
Expanded uncertainty as percentage of measured value		100.06	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)	
Expanded uncertainty in units of measurement		0.12	mg.m <sup>-3</sup>		
Expanded uncertainty as percentage of limit value		1.18	% ELV		

Verified