



CERTIFICATE OF CALIBRATION

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Page 1 of 3

Approved Signatories:

- | | | | |
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| <input type="checkbox"/> | B Davies | <input checked="" type="checkbox"/> | S Gray |

Signed:

Date of issue:

29 Apr 19

Certificate Number:

4486

Customer Name and Address:

Scottish Government
Water, Air, Soils and Flooding Division
Environmental Quality Directorate
Scottish Government
Victoria Quay
Edinburgh
EH6 6QQ

Description:

Calibration factors for the air monitoring station(s) at
South Lanarkshire Council

Ricardo Energy & Environment ID:

ED61598/4486

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

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CERTIFICATE OF CALIBRATION



Date of issue: 29 Apr 19
 Certificate Number: 4486
 Ricardo Energy & Environment ID: ED61598/4486

South Lanarkshire Council NOx analysers

Station	Date of Audit	Species	Analyser Serial no	Zero Response ¹	Zero uncertainty ppb	Calibration Factor ²	Factor uncertainty %	Converter eff. (%) ³
South Lanarkshire Blantyre	20-Mar-19	NOx	18-0740	2.0	2.6	1.1566	3.50	100.0
		NO		0.0	2.6	1.1318	3.50	
South Lanarkshire Cambuslang	04-Dec-18	NOx	1152590008	0.1	2.5	0.9445	4.09	98.2
		NO		-0.4	2.5	0.9354	4.05	
South Lanarkshire East Kilbride	04-Dec-18	NOx	7460075	0.1	2.6	1.2088	3.54	101.5
		NO		-0.3	2.6	1.1996	3.50	
South Lanarkshire Hamilton	04-Dec-18	NOx	7460073	-6.3	2.5	1.0216	3.50	101.5
		NO		-0.9	2.5	1.0320	3.50	
South Lanarkshire Raith Interchange 2	06-Dec-18	NOx	102200001	-0.4	2.5	1.0057	4.08	98.8
		NO		-0.4	2.5	0.9991	4.12	
South Lanarkshire Rutherglen	07-Dec-18	NOx	7460076	-0.9	2.5	0.9644	3.81	98.6
		NO		-0.8	2.5	0.9583	3.86	
South Lanarkshire Uddingston	06-Dec-18	NOx	10020068	-1.4	2.5	0.9716	3.64	100.0
		NO		-1.4	2.5	0.9673	4.28	
South Lanarkshire Lanark	06-Dec-18	NOx	10020067	-0.3	2.5	0.9780	3.50	98.4
		NO		-0.2	2.5	0.9760	3.50	

PM10 analysers

Station	Date of audit	Analyser Serial no	Calculated ko	Uncertainty %	Total flow	Uncertainty %	Main flow	Uncertainty %
South Lanarkshire Blantyre	20-Mar-19	9750			4.61	2.2		2.2
South Lanarkshire Cambuslang	04-Dec-18	8256			4.75	2.2		2.2
South Lanarkshire East Kilbride	04-Dec-18	8257			4.86	2.2		2.2
South Lanarkshire Hamilton	04-Dec-18	8258			5.16	2.2		2.2
South Lanarkshire Raith Interchange 2	06-Dec-18	9377			4.51	2.2		2.2
South Lanarkshire Rutherglen	07-Dec-18	8140			4.71	2.2		2.2
South Lanarkshire Uddingston	06-Dec-18	6247			4.57	2.2		2.2
South Lanarkshire Lanark	06-Dec-18	6248			4.75	2.2		2.2

PM2.5 analysers

Station	Date of audit	Analyser Serial no	Calculated ko	Uncertainty %	Total flow	Uncertainty %	Main flow	Uncertainty %
South Lanarkshire Blantyre	20-Mar-19	9750			4.61	2.2		2.2
South Lanarkshire Cambuslang	21-Mar-19	8256			4.75	2.2		2.2
South Lanarkshire East Kilbride	22-Mar-19	8257			4.86	2.2		2.2
South Lanarkshire Hamilton	23-Mar-19	8258			5.16	2.2		2.2
South Lanarkshire Raith Interchange 2	24-Mar-19	9377			4.51	2.2		2.2
South Lanarkshire Rutherglen	25-Mar-19	8140			4.71	2.2		2.2
South Lanarkshire Uddingston	26-Mar-19	6247			4.57	2.2		2.2
South Lanarkshire Lanark	27-Mar-19	6248			4.75	2.2		2.2



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¹ The zero response is the zero reading on the data logging system of the analyser when audit zero gas was introduced to the analysers under test.

² The calibration factor is the multiplying factor required to scale the reading on the data logging system of the analyser into reported concentration units (ppb for NO, NOx, SO₂, O₃ and ppm for CO. Where 1ppm = 1000ppb). It should be used in conjunction with the zero response. A corrected concentration is calculated using the following equation:

$$\text{Concentration} = F(\text{Output} - \text{Zero Response})$$

Where F = Calibration Factor provided on this certificate

Output = Reading on the data logging system of the analyser

Zero Response = Zero Response provided on this certificate

³ Converter eff. is the measured efficiency of the NO₂ to NO converter within the oxides of nitrogen analyser under test.

⁴ The measured main flow rate (where this is applicable) is the flow rate through the sensor unit of the TEOM particulate analyser under test. The measured total flow rate is the total flow rate through the particulate analyser under test. Units of flow are l.min⁻¹, reported at prevailing ambient conditions unless otherwise specified. Where flow rates are highlighted in bold, it indicates that measurements were not made at the analyser sample inlet. These measurements therefore may not accurately reflect analyser performance in normal operation.

⁵ The calculated k₀ value (specifically for TEOM analysers) is the calculated k₀ spring constant based on tests undertaken with filters of known weight.

The calibration results shaded are those that fall within our scope of accreditation, all other results on this certificate are not UKAS accredited, but have been included for completeness.