



CERTIFICATE OF CALIBRATION

Ricardo Energy & Environment 18 Blythswood Square, Glasgow, G2 4BG

Telephone 01235 753434



Approved Signatories:

- | | | | |
|--------------------------|----------|-------------------------------------|------------|
| <input type="checkbox"/> | S. Eaton | <input type="checkbox"/> | B Stacey |
| <input type="checkbox"/> | D Hector | <input type="checkbox"/> | S Stratton |
| <input type="checkbox"/> | N Rand | <input checked="" type="checkbox"/> | S Telfer |
| <input type="checkbox"/> | B Davies | <input type="checkbox"/> | S Gray |

Signed:

Date of issue: 14 January 2021

Certificate Number: 5273

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
Falkirk Council

Ricardo Energy & Environment ID:

ED11194/5273

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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Ricardo Energy & Environment
18 Blythswood Square (2nd Floor),
Glasgow,
G2 4BG
Tel: 01235 753205

Registered office
Shoreham Technical Centre
Shoreham-by-Sea
West Sussex
BN43 5FG

Registered in England No.
08229264

VAT Registration No.
GB 212 8365 24



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Falkirk 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
Falkirk Bainsford	06 January 2021	NOx	HUK15020067	-4.1	2.6	1.0931	3.50	93.3
		NO		0.0	2.6	1.0894	3.50	
Falkirk Grangemouth MC	05 January 2021	NOx	8906170204	0.2	2.5	0.9961	3.82	99.7
		NO		-0.7	2.5	0.9881	3.83	
Falkirk Haggs	06 January 2021	NOx	4793	1.3	2.6	1.1259	3.50	98.5
		NO		0.6	2.6	1.1278	3.50	
Falkirk Hope Street	07 January 2021	NOx	8907040214	4.2	2.6	1.0669	3.76	93.8
		NO		3.1	2.6	1.0726	3.83	
Falkirk West Bridge Street	07 January 2021	NOx	1228	-6.2	2.6	1.1184	3.50	98.3
		NO		1.2	2.6	1.1253	3.50	

Fidas analysers

Station	Date of audit	Analyser Serial no	Calculated ko ^a	Uncertainty %	Total flow ^a	Uncertainty %	Main flow	Uncertainty %
Falkirk Bainsford	06 January 2021	13696			4.25	2.2		2.2
Falkirk Grangemouth MC	05 January 2021	11616			4.36	2.2		2.2
Falkirk Grangemouth Zetland Park	06 January 2021	13554			4.48	2.2		2.2
Falkirk Haggs	06 January 2021	6179			4.33	2.2		2.2
Falkirk Hope Street	07 January 2021	13555			4.47	2.2		2.2
Falkirk West Bridge Street	07 January 2021	7661			4.40	2.2		2.2

SO2 analysers

Station	Date of Audit	Analyser Serial no	Zero Response ¹	Zero uncertainty ppb	Calibration Factor ²	Factor uncertainty %	Response to m xylene (ppb)
Falkirk Bo'hess	05 January 2021	616X62GNF	0.1	2.5	0.9144	2.6	
Falkirk Grangemouth MC	05 January 2021	SM7N38YX	2.7	2.5	0.8775	3.3	
Falkirk Hope Street	07 January 2021	103004	1.2	2.5	0.9626	3.2	
Falkirk Grangemouth Zetland Park	06 January 2021	408066600209	1.4	2.5	0.9406	2.8	
Grangemouth Moray	22 January 2021	124MLC3B	3.7	2.4	0.8009	2.6	



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The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NO_x analysers) by documented methods. The factors have been calculated using certified gas standards. The particulate analysers listed above have been tested for sample flow rates and k_0 (where appropriate) by documented methods. Note that the test results are valid on the day of test only, as analyser drift over time cannot be quantified. All results for gaseous species are given in ppb (parts per billion) mole fractions or ppm (parts per million) mole fractions.

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, NO_x, 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:

Concentration = F(Output - 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 k_0 value (specifically for TEOM analysers) is the calculated k_0 spring constant based on tests undertaken with filters of known weight. The % deviation indicates the closeness of the calculated result to the manufacturer's specified value of k_0 .

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.