



CERTIFICATE OF CALIBRATION

Ricardo Energy & Environment 18 Blythswood Square, Glasgow, G2 4BG
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Page 1 of 3

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:

02 July 2021

Certificate Number:

5478

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
Angus Council

Ricardo Energy & Environment ID:

ED11194/5478

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.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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Angus Council

FIDAS analysers

Table with 10 columns: Station, Date of audit, Analyser Serial no, Calculated ko², Uncertainty %, Total flow⁴, Uncertainty %, Main flow, Uncertainty %. Row 1: Angus Forfar Glamis Road, 21 June 2021, 15452, 4.94, 2.2, 2.2.





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The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NOx analysers) by documented methods.

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).

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.

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 % deviation indicates the closeness of the calculated result to the manufacturer's specified value of k0.

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.