



# CERTIFICATE OF CALIBRATION

Ricardo Energy and Environment, Gemini Building, Fermi Avenue Harwell, Didcot,



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Approved Signatories:

☐ S. Eaton  
☐ D Hector  
☒ N Rand

☐ B Stacey  
☐ S Stratton  
☐ A Madle

Signed:

Date of issue: 18 Jun 18

Certificate Number: 04009

Customer Name and Address:

ECO2 Ltd,  
Vision House,  
Oak Tree Court,  
Mulberry Drive  
Cardiff Gate Business Park  
Cardiff  
CF23 8RS

Description:

Calibration factors for the air monitoring station at  
ECO2 Ltd Margam Green Energy Park

Ricardo Energy & Environment ID:

ED62187001 / July 2017

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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ECO2 Ltd Margam Green Energy Park  
Date of audit: 18 Jul 2017

| Species | Analyser<br>Serial no | Zero<br>Response <sup>1</sup> | Zero<br>uncertainty<br>ppb | Calibration<br>Factor <sup>2</sup> | Factor<br>uncertainty<br>% | Converter eff.<br>(%) <sup>3</sup> |
|---------|-----------------------|-------------------------------|----------------------------|------------------------------------|----------------------------|------------------------------------|
| NOx     | 019717                | 11.9                          | 2.6                        | 1.0375                             | 3.5                        | 88.5                               |
| NO      | 019717                | 4.0                           | 2.5                        | 1.0393                             | 3.5                        | n/a                                |

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The gaseous ambient analysers listed above have been tested for zero response, calibration factor, linearity and converter efficiency (NO<sub>x</sub> 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.

<sup>1</sup> 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.

<sup>2</sup> 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<sub>x</sub>, SO<sub>2</sub>, O<sub>3</sub> 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

<sup>3</sup> Converter eff. is the measured efficiency of the NO<sub>2</sub> to NO converter within the oxides of nitrogen analyser under test.

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.

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