Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0401

Accredited to ISO/IEC 17025:2005

Ricardo-AEA Limited (Trading as Ricardo Energy & Environment)

Issue No: 025 **Issue date:** 23 November 2018

Ricardo-AEA
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Website: www.ricardo-aea.com/cms/

Calibration performed by the Organisations at the locations specified below

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	Activity	Location code
Address Ricardo Energy & Environment Ludbridge Mill East Hendred Wantage OX12 8LN **Local contact** Mr S Eaton Tel: +44 (0)1235 753212 Email: stewart.eaton@ricardo-aea.com	Certified Reference Gases for Air Quality Monitoring Environmental Air Quality Monitoring Instruments Local Office for Site Activities	Harwell
Address Ricardo Energy & Environment 18 Blythswood Square Glasgow G2 4AD **Local contact** Mr David Hector Tel: +44 (0)1235 753523 Email: david.hector@ricardo-aea.com	Environmental Air Quality Monitoring Instruments Local Office for Site Activities	Glasgow

Site activities performed away from the locations listed above:

Location details	Activity	Location code
Air Quality Monitoring Stations	Environmental Air Quality Monitoring Instruments	Site
Clients Premises	Particle Number Counting Calibration	Site

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DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
CERTIFIED REFERENCE GASES FOR AIR QUALITY MONITORING				Harwell
Carbon monoxide (CO) in air or nitrogen	2 ppm to 5 ppm 5 ppm to 50 ppm	4.5 % 2.0 %	NOTE ppm = parts per million by mole fraction	
Nitric oxide (NO) in nitrogen	0.1 ppm to 0.2 ppm 0.2 ppm to 1 ppm	3.5 % 3.0 %	ppb = parts per billion by mole fraction	
Nitrogen dioxide (NO_2) in air	0.1 ppm to 0.2 ppm 0.2 ppm to 1 ppm	4.0 % 3.5 %		
Sulphur dioxide (SO_2) in air	0.1 ppm to 0.2 ppm 0.2 ppm to 1 ppm	3.0 % 2.5 %		
ENVIRONMENTAL INSTRUMENTS FOR AIR QUALITY MONITORING				Harwell Glengarnock
Ozone photometers	10 ppb to 400 ppb			
Calibration factor		3.5 %		
Zero response		3.0 ppb		
Ozone calibrators	10 ppb to 400 ppb	3.5 % + 3.0 ppb		
Particle Counters				
Airborne particle number concentration. Calibration factor for condensation particle counters CPC/PNC	Concentration range 0 cm^{-3} to 100,000 cm^{-3} depending upon particle size	7.3%	Comparison against a traceable reference condensation particle counter at diameters from 10 nm to 200 nm	Harwell and Site
Particle Dilution Systems				
Particle Concentration Reduction Factor (PCRF) measurements of volatile particle removers (VPR)	Dilution factors of the system calibrated at particle diameters from 10 nm to 200 nm	7.5%	Comparison of the particle concentration upstream and downstream of the dilution system.	Harwell and Site

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AIR QUALITY MONITORING STATIONS				Site
Carbon monoxide (CO) analysers	2.0 ppm to 5 ppm 5 ppm to 50 ppm	10 % 2.0 %		
Zero response		0.20 ppm		
Chemiluminescent analysers for nitric oxide and nitrogen dioxide (NO and NO_2)	50 ppb to 2000 ppb			
Calibration factor		3.5 %		
Zero response		2.0 ppb		
Ultraviolet fluorescence analysers for sulphur dioxide (SO_2)	50 ppb to 2000 ppb			
Calibration factor		2.5 %		
Zero response		2.0 ppb		
Ultraviolet absorption analysers for ozone (O_3)				
Calibration factor	0 ppb to 100 ppb 100 ppb to 400 ppb	3.0 ppb 3.0 %		
Zero response		3 ppb		
Determination of particle analyser flow rate	1 litre/min to 18 litre/min	2.2 %		
Determination of Non Automatic hydrocarbon sampler flow rate	10 ml/min to 30 ml/min Flow difference of 0 ml/min to 20 ml/min	1.3 % + 0.37 ml/min 1.7 % + 0.002 ml/min		
Determination of TEOM analyser spring constant (k_0)	4000 g/s^2 to 25000 g/s^2	1.0 %		

END