CERTIFICATE OF ACCREDITATION

This is to attest

AIR LIQUIDE INDIA SPECIALITY GASES PRIVATE LIMITED

PLOT NO N 163 MIDC TARAPUR, BOISAR, DIST PALGHAR-401506
BOISAR, MAHARASHTRA, INDIA

Calibration Laboratory CL-259

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Expiration Date January 1, 2026
Effective Date May 2, 2025

International Accreditation Service
Issued under the authority of IAS management

Visit www.iasonline.org for current accreditation information.

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.
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AIR LIQUIDE INDIA SPECIALITY GASES PRIVATE LIMITED

www.airliquide.com/india

Contact Name Seema Patil **Contact Phone** +91 9311962972

Accredited to ISO/IEC 17025:2017 *Effective Date May 2, 2025*

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Chemical/Gas			
Natural Gas Mixture			
amount fraction	**(% mol/mol)**	**(% mol/mol)**	**In-house method TM005/TA**
nitrogen	0.1 to 12	0.3 % relative + 0.0005	Calibration of gas mixtures by ISO 6143:2001 using gas chromatography with thermal conductivity detection (GC-TCD)
carbon dioxide	0.05 to 8	0.22 % relative + 0.0003	
methane	64 to 100	0.10 % relative + 0.11	
ethane	0.1 to 14	0.25 % relative	
propane	0.05 to 8	0.52 % relative + 0.0005	
iso-butane	0.01 to 0.15 0.15 to 1.2	0.0006 0.4 % relative	
n-butane	0.01 to 0.15 0.15 to 1.2	0.0006 0.4 % relative	
neo-pentane	0.002 to 0.35	1.0 % relative + 0.0002	
iso-pentane	0.005 to 0.35	0.6 % relative + 0.0002	
n-pentane	0.005 to 0.35	0.6 % relative + 0.0002	
n-hexane	0.001 to 0.35	1.6 % relative + 0.00005	Calibration of gas mixtures using gas chromatography with flame ionization detection (GC-FID)
2-methylpentane	0.001 to 0.35	1.6 % relative + 0.00005	

** If information in this CMC is presented in non-SI units, the conversion factors stated in NIST Special Publication 811 "Guide for the Use of the International System of Units (SI)" apply.*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
3-methylpentane	0.001 to 0.35	1.6 % relative + 0.00005	Calibration of gas mixtures using gas chromatography with flame ionization detection (GC-FID)
2,2-dimethylbutane	0.001 to 0.35	1.6 % relative + 0.00005	
benzene	0.001 to 0.2	1.6 % relative + 0.00005	
cyclohexane	0.001 to 0.2	1.6 % relative + 0.00005	
n-heptane	0.001 to 0.2	1.6 % relative + 0.00005	
toluene	0.001 to 0.1	1.6 % relative + 0.00005	
methylcyclohexane	0.001 to 0.1	1.6 % relative + 0.00005	
n-octane	0.0005 to 0.05	1.6 % relative + 0.00005	
n-nonane	0.0005 to 0.02	1.6 % relative + 0.00005	
n-decane	0.0005 to 0.005	1.6 % relative + 0.00005	
oxygen	0.005 to 1	5 % relative	Calibration of gas mixtures using gas chromatography with thermal conductivity detection (GC-TCD)
Gas Mixture Properties (Calculated Values from composition)			
superior calorific value molar basis ($kJ \cdot mol^{-1}$) mass basis ($MJ \cdot kg^{-1}$) volume basis ($MJ \cdot m^{-3}$) net calorific value molar basis ($kJ \cdot mol^{-1}$) mass basis ($MJ \cdot kg^{-1}$) volume basis ($MJ \cdot m^{-3}$) relative density density ($kg \cdot m^{-3}$) gross Wobbe index ($MJ \cdot m^{-3}$) net Wobbe index ($MJ \cdot m^{-3}$) molar mass ($kg \cdot kmol^{-1}$) compression factor	Calculations are restricted to gas mixtures with amount fraction (% mol/mol) nitrogen: <30 carbon dioxide: <15 ethane: <15 other component: <5 methane: no restriction	 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative 0.1% relative	Values calculated according to ISO 6976:1995 (including amendment No.1, May 1998) on a real or ideal gas basis assuming mixture is dry (free from water) Combustion properties can be expressed in units of the Joule (J) or in kilowatt hours (kWh)
gross calorific value molar basis ($kJ \cdot mol^{-1}$)	Calculations are applicable to any	1.0 $kJ \cdot mol^{-1}$	Values calculated by ISO 6976:2016 on a real or

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
mass basis ($MJ \cdot kg^{-1}$) volume basis ($MJ \cdot m^{-3}$) net calorific value molar basis ($kJ \cdot mol^{-1}$) mass basis ($MJ \cdot kg^{-1}$) volume basis ($MJ \cdot m^{-3}$) relative density density ($kg \cdot m^{-3}$) gross Wobbe index ($MJ \cdot m^{-3}$) net Wobbe index ($MJ \cdot m^{-3}$) molar mass ($kg \cdot kmol^{-1}$) compression factor	gaseous natural gas, natural gas substitute, or other combustible fuel, except that for properties on a volume basis, where the method is restricted only to gas mixtures for which the compression factor is greater than 0.9	0.025 $MJ \cdot kg^{-1}$ 0.040 $MJ \cdot m^{-3}$ 0.9 $kJ \cdot mol^{-1}$ 0.023 $MJ \cdot kg^{-1}$ 0.037 $MJ \cdot m^{-3}$ 0.0006 0.0008 $kg \cdot m^{-3}$ 0.032 $MJ \cdot m^{-3}$ 0.030 $MJ \cdot m^{-3}$ 0.017 $kg \cdot kmol^{-1}$ 0.0001	ideal gas basis assuming mixture is dry (free from water) Combustion properties can be expressed in units of the Joule (J) or in kilowatt hours (kWh)
gross heating value net heating value relative density compressibility factor	There are no composition or property-related restrictions on the method specified	0.1 % relative 0.1 % relative 0.1 % relative 0.1 % relative	Calculated values according to methods given in GPA 2172-09 (2009) using data tables from GPA 2145-09
gross heating value net heating value relative density density compressibility factor	There are no composition or property-related restrictions on the method specified	0.1 % relative 0.1 % relative 0.1 % relative 0.1 % relative 0.1 % relative	Calculated values according to methods given in ASTM D3588-98 (2011) using data tables from GPA 2145-09
Binary Emission Gas Mixtures			
amount fraction	**(mol/mol)**	**(mol/mol)**	**In-house method TM014**
carbon dioxide in nitrogen or synthetic air oxygen in nitrogen methane in nitrogen 	0.1 % to 5 % 5 % to 15 % 0.5 % to 3 % 3 % to 25 % 0.1 % to 2 % 2 % to 5 %	0.50 % relative + 15 parts in 10^6 0.20 % relative + 170 parts in 10^6 0.50 % relative + 85 parts in 10^6 0.40 % relative + 100 parts in 10^6 0.35 % relative + 10 parts in 10^6 0.15 % relative + 50 parts in 10^6	Calibration of gas mixture by ISO 12963:2017 using dynamically generated reference gases in accordance with ISO 6145 Part 7: Thermal mass flow controllers

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
methane in synthetic air	0.1% to 2 % 2 % to 2.5 %	0.35 % relative + 10 parts in 10^6 0.15 % relative + 50 parts in 10^6	Calibration of gas mixture by ISO 12963:2017 using dynamically generated reference gases in accordance with ISO 6145 Part 7: Thermal mass flow controllers
carbon monoxide in nitrogen or synthetic air	10 ppm to 100 ppm 100 ppm to 1000 ppm	0.25 % relative + 0.55 parts in 10^6 0.80 % relative	
nitric oxide in nitrogen	10 ppm to 60 ppm 60 ppm to 600 ppm	0.20 % relative + 0.25 parts in 10^6 0.40 % relative + 0.13 parts in 10^6	
nitrogen dioxide in synthetic air	5 ppm to 500 ppm	4.0 % relative	
sulphur dioxide in nitrogen or synthetic air	10 ppm to 200 ppm 200 ppm to 1000 ppm	0.17 % relative + 1.0 parts in 10^6 0.60 % relative + 0.12 parts in 10^6	

[1]The uncertainty covered by the Calibration and Measurement Capability (CMC) is expressed as the expanded uncertainty having a coverage probability of approximately 95 %. It is the smallest measurement uncertainty that a laboratory can achieve within its scope of accreditation when performing calibrations of a best existing device. The measurement uncertainty reported on a calibration certificate may be greater than that provided in the CMC due to the behavior of the calibration item and other factors that may contribute to the uncertainty of a specific calibration.

[2]When uncertainty is stated in relative terms (such as percent, a multiplier expressed as a decimal fraction or in scientific notation), it is in relation to instrument reading or instrument output, as appropriate, unless otherwise indicated.

ppm = parts in 10^6