RAAD VOOR ACCREDITATIE

Dutch Accreditation Council RvA
PO Box 2768 NL-3500 GT Utrecht

De Stichting Raad voor Accreditatie,
bij wet aangewezen als de nationale accreditatie-instantie voor Nederland,
verklaart hierbij accreditatie te hebben verleend aan:

VSL B.V.
Delft

De instelling heeft aangetoond in staat te zijn het produceren van referentiematerialen op een competente wijze uit te voeren.

Deze accreditatie is gebaseerd op een beoordeling tegen de vereisten zoals vastgelegd in EN ISO 17034:2016.

De accreditatie is van toepassing op de activiteiten zoals gespecificeerd in de gewaarmerkte bijlage die is voorzien van het registratienummer.

De accreditatie is van kracht, onder voorwaarde dat de instelling blijft voldoen aan de vereisten.

De accreditatie voor registratienummer:

P 002

is verleend op 28 oktober 2009

Deze verklaring is geldig tot
1 november 2025

Het bestuur van de Raad voor Accreditatie,
namens deze,

mr. J.A.W.M. de Haas

RAAD VOOR ACCREDITATIE

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PO Box 2768 NL-3500 GT Utrecht

The Dutch Accreditation Council RvA, by law appointed as the national accreditation body for The Netherlands, hereby declares that accreditation has been granted to:

VSL B.V.
Delft

The organisation has demonstrated to be able to produce reference materials in a competent manner.

This accreditation is based on an assessment against the requirements as laid down in EN ISO 17034:2016.

The accreditation covers the activities as specified in the authorized annex bearing the accreditation number.

The accreditation is valid provided that the organisation continues to meet the requirements.

This accreditation with registration number:

P 002

is granted on 28 October 2009

This declaration is valid until
1 November 2025

The board of the Dutch Accreditation Council,
on its behalf,

mr. J.A.W.M. de Haas

Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO 17034:2016
Registration number: **P 002**

of **VSL B.V.**

This annex is valid from: **19-01-2023** to **01-11-2025** Replaces annex dated: **20-01-2022**

Location(s) where activities are performed under accreditation

Head Office

Thijsseweg 11
2629 JA
Delft
The Netherlands

Location	Abbreviation/ location code
Thijsseweg 11 2629 JA Delft The Netherlands	A

This annex has been approved by the Board of the Dutch Accreditation Council, on its behalf,

J.A.W.M. de Haas

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No.	Matrix / Artifact	Property Value / Identity / Characterisation Range	CMC	Characterisation Procedure / Technique
RM 20	**Gas mixtures**			
	Binary Gas Mixtures			
1.	CO in N_2 and synthetic air CO in N_2 and synthetic air CO_2 in N_2 and synthetic air CO_2 in N_2 and synthetic air CH_4 in N_2 and synthetic air CH_4 in N_2 and synthetic air CH_4 in N_2 C_3H_8 in N_2 and synthetic air C_3H_8 in N_2 and synthetic air C_3H_8 in N_2 O_2 in N_2 O_2 in N_2 NO in N_2 NO in N_2 NO in N_2 NO_2 in N_2 and synthetic air NO_2 in N_2 and synthetic air N_2O in synth. air or N_2 SO_2 in N_2 and synthetic air SO_2 in N_2 and synthetic air SO_2 in N_2 and synthetic air	$0.5 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ 10.10^{-6} – $50 \cdot 10^{-2}$ $0.5 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $50 \cdot 10^{-2}$ $0.5 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $2.2 \cdot 10^{-2}$ $2.2 \cdot 10^{-2}$ – $50 \cdot 10^{-2}$ $1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $1 \cdot 10^{-2}$ $1 \cdot 10^{-2}$ – $50 \cdot 10^{-2}$ $0.5 \cdot 10^{-6}$ –$10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $50 \cdot 10^{-2}$ $0.1 \cdot 10^{-6}$ – $1 \cdot 10^{-6}$ $1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $1 \cdot 10^{-2}$ $10 \cdot 10^{-6}$ – $100 \cdot 10^{-6}$ $100 \cdot 10^{-6}$ – $1000 \cdot 10^{-6}$ $0.3 \cdot 10^{-6}$ – $1000 \cdot 10^{-6}$ $0.5 \cdot 10^{-6}$ – $1 \cdot 10^{-6}$ $1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $5 \cdot 10^{-2}$	2 % – 0.09 % 0.09 % – 0.09 % 2 % – 0.09 % 0.09 % – 0.09 % 0.4 % – 0.3 % 0.3 % – 0.12 % 0.12 % – 0.12 % 0.2 % – 0.14 % 0.14 % – 0.12 % 0.12 % – 0.12 % 2 % – 0.08 % 0.08 % – 0.08 % 2 % – 0.9 % 0.9 % – 0.5 % 0.5 % – 0.10 % 1.5 % – 1 % 1.0 % – 0.5 % 2 % – 1 % 2 % – 0.9 % 0.9 % – 0.09 % 0.09 % – 0.09 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: ND-IR, ND-UV, photo acoustic-IR, cavity ring down spectroscopy, chemiluminescence, pulsed fluorescence-UV, electrochemical and/or paramagnetic techniques, GC-TCD, GC-FID, Gas Filter Correlation Infra-Red spectroscopy, GC-SCD and/or GC-PDHID.
	H_2S in N_2 H_2S in N_2 H_2S in CH_4 C_2H_5OH in synth. air or N_2 NH_3 in N_2 H_2O in N_2 and CH_4	$1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $1000 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $1000 \cdot 10^{-6}$ $75 \cdot 10^{-6}$ – $800 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ – $300 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $100 \cdot 10^{-6}$	2.5 % – 1 % 1.5 % – 0.5 % 2 % – 1 % 1 % – 0.5 % 5 % – 2 % 5 %	CRM (NH_3 in N_2) CRM (H_2O in N_2 and CH_4)
2.	**Natural gas** Methane Ethane Propane *n*-Butane *i*-Butane *n*-Pentane *i*-Pentane neo-Pentane *n*-Hexane Nitrogen Carbon dioxide Helium Hydrogen	 60 % – 99.9 % 0.1 % – 14 % 0.05 % – 10 % 0.01 % – 3 % 0.01 % – 3 % 0.01 % – 0.8 % 0.01 % – 0.8 % 0.01 % – 0.8 % 0.01 % – 0.4 % 0.1 % – 20 % 0.05 % – 20 % 0.05 % – 0.4 % 3.5% – 15 %	 0.15 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 1 % – 0.5 % 0.5 % – 0.2 % 0.7 % – 0.2 % 0.5 % – 0.2 % 1 % – 0.5 % 0.4% – 0.2 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID

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No.	Matrix / Artifact	Property Value / Identity / Characterisation Range	CMC	Characterisation Procedure / Technique
3.	**Main refrigerant (MR)** Ethane Propane Nitrogen Methane	 (20 % – 35 %) mol/mol (5 % – 15 %) mol/mol (8 % – 16 %) mol/mol (45 % – 90 %) mol/mol	 0.5 % – 0.3 % 0.5 % – 0.3 % 0.5 % – 0.3 % 0.2 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
4.	**Coke oven gas** Hydrogen Methane Carbon monoxide Carbon dioxide Nitrogen	 0.2 % – 70 % 4 % – 35 % 3 % – 70 % 1 % – 25 % 3 % – 45 %	 0.5 % 0.5 % 0.5 % 0.5 % 0.5 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
5.	**Automotive gas** O_2 CO CO_2 C_3H_8	 0.1 % – 22 % 0.1 % – 9 % 1 % – 18 % 0.005 % – 0.5 %	 0.3 – 0.2% 0.3 – 0.2% 0.2 % 0.5 – 0.2%	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: ND-IR, GC-TCD and/or GC-FID
6.	**Sulphur in Methane** Hydrogen sulphide Methyl mercaptane Ethyl mercaptane Carbonyl sulphide Dimethyl sulphide	$10 \cdot 10^{-6}$ – $50 \cdot 10^{-6}$	3 – 2 %	Preparation by a single primary reference procedure (gravimetry). Verification method GC-SCD
7.	**Stack gas** Carbon monoxide Carbon dioxide Nitrogen monoxide Sulphur dioxide Propane	 $10 \cdot 10^{-6}$ – $1\,000 \cdot 10^{-6}$ $1 \cdot 10^{-2}$ – $20 \cdot 10^{-2}$ $10 \cdot 10^{-6}$ – $1\,000 \cdot 10^{-6}$ $10 \cdot 10^{-6}$ – $1\,000 \cdot 10^{-6}$ $3 \cdot 10^{-6}$ – $1000 \cdot 10^{-6}$	 1 % – 0.15 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
8.	**Refinery gas A** Methane Ethane Ethene Propane Propene 1,3-Butadiene 1-Butene *i*-Butene Hydrogen Nitrogen Helium	 10 % – 13 % 1 % – 3 % 12 % – 16 % 0.4 % – 0.7 % 3 % – 5 % 0.75 % – 1.5 % 0.4 % – 0.65 % 0.4 % – 0.65 % 7 % – 9 % 3.5 % – 4.5 % 50 % – 60 %	 0.4 % – 0.2 % 0.6 % – 0.3 % 0.6 % – 0.3 % 0.6 % – 0.3 % 0.6 % – 0.3 % 2 % – 1 % 2 % – 1 % 2 % – 1 % 1 % – 0.5 % 1 % – 0.5 % 1 % – 0.5 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD, GC-FID, ND-IR, ND-UV, pulsed fluorescence-UV.

No.	Matrix / Artifact	Property Value / Identity / Characterisation Range	CMC	Characterisation Procedure / Technique
9.	**Refinery gas B** Methane Ethane Propane Hydrogen *n*–Butane *i*-Pentane *n*-Pentane *n*-Hexane Carbon monoxide Carbon dioxide Nitrogen	 10 % – 13 % 1.5 % – 2.5 % 0.4 % – 0.6 % 7 % – 8 % 0.8 % – 4.2 % 0.5 % – 1 % 0.5 % – 1 % 0.01 % – 0.1 % 1 % – 4 % 0.4 % – 0.8 % 60 % – 80 %	 0.15 % 0.3 % 0.3 % 0.15 % 0.3 % 0.5 % 0.5 % 0.5 % 0.4 % 0.4 % 0.3 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
10.	**VOC (in cylinders)** ethane, ethene, Ethyne, propene, propane, 1-Butene, *i*-Butene, 1,3-Butadiene, n-Butane, *i*-Butane, *cis*-2-Butene, *trans*-2-Butene, 2-methyl-1,3-Butadiene, *n*-Pentane, *i*-Pentane, 1-Pentene, *trans*-2-Pentene, *cis*-2-Pentene,*n*-Hexane, *n*-Heptane, *n*-Octane, iso-Octane, 3-methyl-Pentane, 2-methyl-pentane, Benzene, Toluene, Ethylbenzene, *o*-Xylene, *m*-Xylene, *p*-Xylene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene in nitrogen	$2 \cdot 10^{-9}$ – $1000 \cdot 10^{-9}$	5 % – 2 %	Preparation by a single primary reference procedure (gravimetry). Verification method: GC-FID
11.	**BTEX** benzene, toluene, ethylbenzene, *o*-xylene, *m*-xylene, *p*-xylene in nitrogen	$2 \cdot 10^{-9}$ – $1000 \cdot 10^{-9}$	5 % – 2 %	Preparation by a single primary reference procedure (gravimetry). Verification method: GC-FID, and/or GC-ATD

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12.	**Energy gases**			Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
	Helium	0.025 % – 1 %	1 % – 0.5 %	
	Hydrogen	0.2 % – 85 %	0.8 % – 0.2 %	
	Methane	1 % – 99.9 %	0.3 % – 0.15 %	
	Nitrogen	0.1 % – 70 %	0.7 % – 0.2 %	
	Carbon monoxide	1 % – 70 %	1 % – 0.5 %	
	Carbon dioxide	0.05 % – 45 %	0.5 % – 0.2 %	
	Oxygen	0.2 % – 1.5 %	1.5 % –1.3 %	
	Ethene	1.0 % – 16 %	0.5 % – 0.2 %	
	Ethane	0.2 % – 14 %	0.5 % – 0.2 %	
	Propene	0.05 % – 5 %	0.5 % – 0.2 %	
	Propane	0.05 % – 10 %	0.5 % – 0.2 %	
	n-Butane	0.01 % – 3 %	0.5 % – 0.2 %	
	i-Butane	0.01 % – 3 %	0.5 % – 0.2 %	
	1,3-Butadiene	0.5 % – 1.5 %	0.5 % – 0.2 %	
	1-Butene	0.2 % – 0.8 %	0.5 % – 0.2 %	
	i-Butene	0.2 % – 0.8 %	0.5 % – 0.2 %	
	n-Pentane	0.01 % – 1 %	0.5 % – 0.2 %	
	i-Pentane	0.01 % – 1 %	0.5 % – 0.2 %	
	Neo-Pentane	0.01 % – 0.8 %	2 % – 1 %	
	n-Hexane	0.01 % – 0.4 %	0.5 % – 0.2 %	
13.	**OVOC in nitrogen**			Preparation by a single reference procedure (gravimetry) Verification method: GC-FID.
	Methanol	$1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ mol/mol	5 %	
	Ethanol	$1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ mol/mol	3 %	
	Acetone	$1 \cdot 10^{-6}$ – $10 \cdot 10^{-6}$ mol/mol	2 %	
14.	**Single and Multi-Component Gas Mixtures** containing: permanent gases, hydrocarbons up to n-C_6H_{14}, automotive gas mixtures, stack gas mixtures, sulphur components, BTEX mixtures, Nobel gases, greenhouse gases, NH_3, HNO_3, H_2O in Nitrogen, Synthetic Air, Methane, Helium, Hydrogen, Argon	$0.1 \cdot 10^{-6}$ – $50 \cdot 10^{-2}$ mol/mol	10% – 0.1%	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: ND-IR, ND-UV, photo acoustic-IR, cavity ring down spectroscopy, chemiluminescence, pulsed fluorescence-UV, electrochemical and/or paramagnetic techniques, GC-TCD, GC-FID, GC-SCD and/or GC-PDHID.

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15.	**Single and Multi-Component Gas Mixtures** containing: VOC's, s-VOC's, OVOC's, BTEX, alcohols in Nitrogen, Synthetic Air, Methane, Helium, Hydrogen, Argon	$0.1 \cdot 10^{-9}$ – $1000 \cdot 10^{-6}$ mol/mol	30 % – 0.5 %	Preparation by a single reference procedure (gravimetry) Verification method selected from: ND-IR, ND-UV, photo acoustic-IR, cavity ring down spectroscopy, chemiluminescence, pulsed fluorescence-UV, electrochemical and/or paramagnetic techniques, GC-TCD, GC-FID, GC-SCD and/or GC-PDHID.
16.	**S-VOCs in sorption tubes** (ISO 6145-4) Naphthalene Dodecamethyl-cyclohexasiloxane n-Decane n-Dodecane n-Tetradecane n-Hexadecane n-Octadecane n-Eicosane Dimethyl phthalate Diethyl phthalate	10 ng – 1000 ng	 8 % 6 % 5 % 5 % 7 % 9 % 11 % 11 % 6 % 12 %	Prepared by continuous syringe injection (ISO 6145-4) Verification method: ATD-GC-FID
17.	**Siloxanes in methane** (in cylinder) Hexamethyldisiloxane (L2) Octamethyltrisiloxane (L3) Hexamethyl-cyclotrisiloxane (D3) Octamethyl-cyclotetrasiloxane (D4) Decamethyl-cyclopentasiloxane (D5)	 $0.5 \cdot 10^{-6}$ – $50 \cdot 10^{-6}$ mol/mol $0.3 \cdot 10^{-6}$ – $35 \cdot 10^{-6}$ mol/mol $0.3 \cdot 10^{-6}$ – $20 \cdot 10^{-6}$ mol/mol $0.2 \cdot 10^{-6}$ – $9 \cdot 10^{-6}$ mol/mol $0.1 \cdot 10^{-6}$ – $3 \cdot 10^{-6}$ mol/mol	 2 % 2 % 3 % 3 % 4 %	Prepared by a single primary reference procedure (gravimetry) Verification method: GC-FID

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DV 10	**Density and Viscosity**			
DV 11	Density of liquids			
18.	Density of demineralised doubly distilled water	998 kg/m^3 (at 15 °C – 40 °C)	0.001 %	Measurement by Oscillation type density meter.
DV 12	Viscosity of liquids			
19.	Organic solutions and oils	Kinematic viscosity (0.6 mm^2/s – 47000 mm^2/s levels at 15 °C – 40 °C)	0.1 % – 0.5 %	Measurement by a single primary reference measurement procedure: Measurement by Ostwald-type viscometers
20.	Organic solutions and oils	Dynamic viscosity (0.4 mPa·s – 42000 mPa·s levels at 15 – 40 °C)	0.1 % – 0.5 %	Calculated from kinematic viscosity and density