

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: **08-03-2023** to **01-11-2025**

Replaces annex dated: **19-01-2023**

Location(s) where activities are performed under accreditation

Head Office

Thijssseweg 11
2629 JA
Delft
The Netherlands

Location	Abbreviation/ location code
Thijssseweg 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 ₃ H ₈ in N ₂ and synthetic air C ₃ H ₈ in N ₂ and synthetic air C ₃ H ₈ in N ₂ O ₂ in N ₂ O ₂ in N ₂ NO, NO _x in N ₂ NO, NO _x in N ₂ NO, NO _x in N ₂ N ₂ O in synthetic 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	0.5·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 50·10 ⁻² 0.5·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 50·10 ⁻² 0.5·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 2.2·10 ⁻² 2.2·10 ⁻² – 50·10 ⁻² 1·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 1·10 ⁻² 1·10 ⁻² – 50·10 ⁻² 0.5·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 50·10 ⁻² 0.1·10 ⁻⁶ – 1·10 ⁻⁶ 1·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 10·10 ⁻² 0.3·10 ⁻⁶ – 1000·10 ⁻⁶ 0.5·10 ⁻⁶ – 1·10 ⁻⁶ 1·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 5·10 ⁻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 % – 0.1 % 2 % – 1 % 2 % – 0.9 % 0.9 % – 0.09 % 0.09 % – 0.09 %	Prepared by a single primary reference procedure (gravimetry). The preparation of NO, NO _x in N ₂ is based on gravimetry in accordance with ISO 6142-1. The NO _x fraction represents the sum of all nitrogen-containing species in the mixture. 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.
	NO ₂ , NO _x , in N ₂ and synthetic air NO ₂ , NO _x , in N ₂ and synthetic air	10·10 ⁻⁶ – 100·10 ⁻⁶ 100·10 ⁻⁶ – 1000·10 ⁻⁶	1.5 % – 1.0 % 1.0 % – 0.5 %	Prepared by a single primary reference procedure (gravimetry) The preparation of NO ₂ , NO _x in N ₂ or synthetic air are based on gravimetry in accordance with ISO 6142-1. The NO _x fraction represents the sum of all nitrogen-containing species in the mixture (predominantly nitric acid and N ₂ O ₄); the latter amount fractions are provided for information.
	H ₂ S in N ₂ H ₂ S in N ₂ H ₂ S in CH ₄ C ₂ H ₅ OH in synth. air or N ₂ NH ₃ in N ₂ H ₂ O in N ₂ and CH ₄	1·10 ⁻⁶ – 10·10 ⁻⁶ 10·10 ⁻⁶ – 1000·10 ⁻⁶ 10·10 ⁻⁶ – 1000·10 ⁻⁶ 75·10 ⁻⁶ – 800·10 ⁻⁶ 30·10 ⁻⁶ – 300·10 ⁻⁶ 10·10 ⁻⁶ – 100·10 ⁻⁶	2.5 % – 1 % 1.5 % – 0.5 % 2 % – 1 % 1 % – 0.5 % 5 % – 2 % 5 %	CRM (NH ₃ in N ₂) CRM (H ₂ O in N ₂ and CH ₄)

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2.	Natural gas Methane Ethane Propane <i>n</i> -Butane <i>i</i> -Butane <i>n</i> -Pentane <i>i</i> -Pentane neo-Pentane <i>n</i> -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
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 ₃ H 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	10·10 ⁻⁶ – 50·10 ⁻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	10·10 ⁻⁶ – 1 000·10 ⁻⁶ 1·10 ⁻² – 20·10 ⁻² 10·10 ⁻⁶ – 1 000·10 ⁻⁶ 10·10 ⁻⁶ – 1 000·10 ⁻⁶ 3·10 ⁻⁶ – 1000·10 ⁻⁶	1 % – 0.15 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID

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8.	Refinery gas A Methane Ethane Ethene Propane Propene 1,3-Butadiene 1-Butene <i>i</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.
9.	Refinery gas B Methane Ethane Propane Hydrogen <i>n</i> -Butane <i>i</i> -Pentane <i>n</i> -Pentane <i>n</i> -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>i</i> -Butene, 1,3-Butadiene, <i>n</i> -Butane, <i>i</i> -Butane, <i>cis</i> -2-Butene, <i>trans</i> -2-Butene, 2-methyl-1,3-Butadiene, <i>n</i> -Pentane, <i>i</i> -Pentane, 1- Pentene, <i>trans</i> -2-Pentene, <i>cis</i> -2-Pentene, <i>n</i> -Hexane, <i>n</i> -Heptane, <i>n</i> -Octane, iso- Octane, 3-methyl-Pentane, 2-methyl-pentane, Benzene, Toluene, Ethylbenzene, <i>o</i> -Xylene, <i>m</i> -Xylene, <i>p</i> -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

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11.	BTEX benzene, toluene, ethylbenzene, <i>o</i> -xylene, <i>m</i> -xylene, <i>p</i> -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
12.	Energy gases Helium Hydrogen Methane Nitrogen Carbon monoxide Carbon dioxide Oxygen Ethene Ethane Propene Propane <i>n</i> -Butane <i>i</i> -Butane 1,3-Butadiene 1-Butene <i>i</i> -Butene <i>n</i> -Pentane <i>i</i> -Pentane Neo-Pentane <i>n</i> -Hexane	0.025 % – 1 % 0.2 % – 85 % 1 % – 99.9 % 0.1 % – 70 % 1 % – 70 % 0.05 % – 45 % 0.2 % – 1.5 % 1.0 % – 16 % 0.2 % – 14 % 0.05 % – 5 % 0.05 % – 10 % 0.01 % – 3 % 0.01 % – 3 % 0.5 % – 1.5 % 0.2 % – 0.8 % 0.2 % – 0.8 % 0.01 % – 1 % 0.01 % – 1 % 0.01 % – 0.8 % 0.01 % – 0.4 %	1 % – 0.5 % 0.8 % – 0.2 % 0.3 % – 0.15 % 0.7 % – 0.2 % 1 % – 0.5 % 0.5 % – 0.2 % 1.5 % – 1.3 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 0.5 % – 0.2 % 2 % – 1 % 0.5 % – 0.2 %	Preparation by a single primary reference procedure (gravimetry). Verification method selected from: GC-TCD and/or GC-FID
13.	OVOC in nitrogen Methanol Ethanol Acetone	$1 \cdot 10^{-6} - 10 \cdot 10^{-6}$ mol/mol $1 \cdot 10^{-6} - 10 \cdot 10^{-6}$ mol/mol $1 \cdot 10^{-6} - 10 \cdot 10^{-6}$ mol/mol	5 % 3 % 2 %	Preparation by a single reference procedure (gravimetry) Verification method: GC-FID.
14.	Single and Multi- Component Gas Mixtures containing: permanent gases, hydrocarbons up to $n\text{-C}_6\text{H}_{14}$, 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 <i>n</i> -Decane <i>n</i> -Dodecane <i>n</i> -Tetradecane <i>n</i> -Hexadecane <i>n</i> -Octadecane <i>n</i> -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