



Quality of biomethane required in European countries for injecting into natural gas grid

Update

February 2024

Contact

MARCOGAZ AISBL

Rue Belliard, 40

1040 Brussels – Belgium

marcogaz@marcogaz.org

www.marcogaz.org

ABOUT MARCOGAZ

Founded in 1968, MARCOGAZ represents 28 member organisations from 20 countries. Its mission encompasses monitoring and policy advisory activities related to the European technical regulation, standardisation and certification with respect to safety and integrity of gas systems and equipment, rational use of energy as well as environment, health and safety issues. It is registered in Brussels under number BE0877 785 464.

DISCLAIMER

This document and the material herein are provided “as is”. All reasonable precautions have been taken by MARCOGAZ to verify the reliability of the content in this document. However, neither MARCOGAZ nor any of its officials, agents, data or other third-party content providers provides a warranty of any kind, either expressed or implied, and they accept no responsibility or liability for any consequence of use of the document or material herein.

The information contained herein does not necessarily represent the views of all Members of MARCOGAZ. The mention of specific companies or certain projects or products does not imply that they are endorsed or recommended by MARCOGAZ in preference to others of a similar nature that are not mentioned. The designations employed, and the presentation of material herein, do not imply the expression of any opinion on the part of MARCOGAZ concerning the legal status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

1. Background

Biomethane plays a key role in the decarbonisation of the natural gas chain, nevertheless with the exception of some countries its share of the natural gas market is still moderate, although growing.

Biomethane is, in principle, a gas interchangeable with natural gas.

MARCOGAZ started some years ago to collect information about the quality required for biomethane to be injected into natural gas networks in different European countries, in order to allow a comparison of the different National approaches.

To set natural gas quality parameters is a right of each European country and each one has a different approach:

- National regulation
- Standards
- Gas company requirements with specific contracts with the biomethane producer
- Other

This document is an update of the document published in 2019 and available on MARCOGAZ website¹. Main changes are:

- Collect information for 14 European countries, 2 more than in the previous version.
- Changes in the quality parameter requirements in some countries.

¹ https://www.marcogaz.org/wp-content/uploads/2021/04/WG_GQ-187.pdf

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
GCV (kWh/m³)	9.5 – 10.5 (L) 10.7 – 12.8 (H)		10.23 - 13.23		8.4-13.1	10.7 – 13.1	9.9-12.8	9.71-12.58			10.8 – 12.77	Value ± 1% of average GCV in gas network for last month at the place of injection (general range for gas network is 9.4-11.8)	> 10.55	10.25 - 11.75 ⁷
WI (kWh/m³)	12.5 – 13.06 (L) 13.64 – 15.70 (H)	43.46 - 44.41 MJ/m ³	13.368-16.016		11.0 – 13.0 (L) 13.6 – 15.7 (H)	13.3 – 15.7	13.5 - 15.5	13.14 - 14.54	14.1 - 15.5	13.82 - 15.05	14.49 – 15.05		12.5 – 15.8	13.11 - 14.28 ⁷
Relative density	0.555 - 0.70		0.555 - 0.70	0.555 - 0.70	0.55 - 0.75	0.55 – 0.70		0.555 - 0.7	0.555 - 0.7		-		0.555 - 0.7	N/A ⁸

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
Reference conditions: Combustion / volume	0°C / 0°C, 101.325 kPa	25°C / 0°C, 101.325 kPa	0°C / 0°C, 101.325 kPa	15°C / 15°C, 103.25 kPa	25°C / 0°C, 101.325 kPa	?	?	15°C / 15°C, 101.325 kPa	25°C / 0°C, 101.325 kPa	15°C / 15°C, 101.325 kPa	25°C / 0°C, 101.325 kPa	15°C / 15°C, 101,325 kPa	25°C / 0°C, 101.325 kPa	15°C / 15°C, 101,325 kPa
GCV ⁵ (MJ/m ³ , 15/15)	32.4 – 35.9 (L) 36.5 – 43.7 (H)		34.8 – 45.1		28.7 – 44.7	38.5 – 47.2 ⁶	32.4 – 46.1 ⁶	35.0 – 45.3				33.8 – 42.5		36.90 - 42.30
IW ⁵ (MJ/m ³ , 15/15)	42.7 – 44.6 (L) 46.6 – 53.6 (H)	41.23 – 42.13	45.5 – 54.5		37.6 – 44.4 (L) 46.4 – 53.6 (H)	47.9 – 56.5 ⁶	48.6 – 55.8 ⁶	47.3 – 52.3	48.2 – 52.9	49.8 – 54.18				47.20 - 51.41 ⁹
Water dew point (°C at 70 bar abs)	< -5 At MOP	≤ -8 (High pressure L - HTL) ≤ -8 (Regional L – RTL) ≤ -10 at 8 bar abs (Distribution L – RNB)	< 2	≤ -8			< -8	≤ -5	-8	< -10 for MOP < 7 barg < -10 at MOP	-8	≤ -7 (40 bar)	1 April – 30 Sep < +3.7°C; 1 Oct – 31 March < -5.0°C; at 5.5 MPa	N/A

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
Water (mg/m ³)				< 32	< 50 (MOP > 10bar) < 200 (MOP <10 bar)	< 60					-			≤ 50.0
HC dew point (°C at 1-70 bar abs)	< -2	≤ 80 (mg/m ³ (n) at 3°C)	<5	≤ -2	< -2		<0	≤0	-2	<-2	-2	<0		≤ -2.0

Total Sulfur (mgS/m ³)	< 30	≤ 5.5 (≤ 20) (High pressure L – HTL) (before odorization)	< 50	≤ 20 (without odorant) ≤ 30 (with odorant)	< 6 < 8 (after odorization)	< 30	< 1 20	≤ 20 (without odorization)	< 30	< 50	When the gas can reach an Interconnection Point: < 20, without odorant	< 30	< 40	≤ 50.0
		≤ 5.5 (≤ 20) (Regional L – RTL) (before odorization)									≤ 5.5 (≤ 20) (Distribution L – RNB) (before odorization)			

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
		ion L – RNB) (after odorization)												
Mercaptan sulfur (mgS/m ³)	< 6	≤ 6		≤ 6 (without odorant)	< 6			< 6			< 6		< 16	
Mercaptanes (mgS/m ³)			< 17				< 16.9		< 6					
H ₂ S + COS (mgS/m ³)	< 5	≤ 5	< 15		< 5		< 6.8		< 5		< 5			
H ₂ S (mgS/m ³)				≤ 5		< 5		≤ 5		≤ 5		≤ 5	< 7	≤ 5.0
CO ₂ (% Mol)	< 2.5 (Exemptions exist for the DSO system: up to 3,5% (H gas) / up to 11,7% (L gas))	≤3 (High pressure L - HTL) ≤10.3 (Regional L – RTL) ≤10.3 (Distribution L – RNB)	< 2.5	≤ 4	< 10 L-gas* < 5 H-gas*	< 4	<2	≤ 2.5	<2.5 transmission <3 distribution	<2.5	2.5	≤ 3 Transmission ≤ 5 distribution	< 3	≤ 2.5 ^{10, 11}
N ₂ +CO ₂ (% Mol)											-			

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
O ₂ (% Mol)	0.01 (exemption: up to 0.7% in the transmission grid / up to 0,75% in the distribution grid/exemption up to 0,4% in the distribution grid for new projects > 2023)	≤0.0005 (High pressure L - HTL) ≤0.5 (Regional L – RTL) ≤0.5 (Distribution L – RNB)	<0,3 in transmission grid < 1 in distribution grid ¹	≤ 1	< 0.001 (MOP > 16bar) < 3 (MOP <16 bar)	< 0.5	< 0.02	≤ 0.6	< 0.5	< 0.2 < 1 for MOP< 38 bar	When the gas can reach an Interconnection Point: 0.001, 0.01, 0.1 depending on location When the gas cannot reach an Interconnection Point: 0.5	≤ 0.02 Transmission ≤ 0.5 distribution	< 0.5	<0.2 on transmission grid < 1.0 on distribution grid ¹²
Hg (µg/m ³)	< 1		< 1								1		< 30	N/A
Cl (mg/m ³)	< 1	≤ 5	< 1	Acc. to CEN/TR (WI 00408007)				< 1		≤ 1.5 ³	1		<1	N/A ¹³

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
F (mg/m ³)	< 10	≤ 5	< 10	Acc. to CEN/TR (WI 00408007)		< 1		< 3		≤ 5 ³	10		< 10	N/A ¹³
Halogenures (mg/m ³)										< 1.5		≤ 1.5		N/A ¹³
H ₂ (% Mol)	< 6	≤ 0.02 (High pressure L - HTL) ≤ 0.5 (Regional L - RTL) ≤ 0.5 (Distribution L - RNB)	< 5	≤ 2	< 2**	< 5		≤ 1		< 0.1	When the gas can reach an Interconnection Point: 0 When the gas cannot reach an Interconnection Point: 2	≤ 0.01 Transmission ≤ 0.1 distribution	< 2	≤ 0.1
NH ₃ (mg/m ³)	< 3		< 3	≤ 10	Technically free*			≤ 10	< 3	≤ 20 ³	10		< 2	≤ 10.0 ¹⁴
Amines				≤ 10 (mg/m ³)	Technically free*			≤ 10			10			≤ 10.0 ¹⁴

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
CO (% Mol)	< 2	≤2900 mg/m ³	< 2	≤ 0.1				≤ 0.1			0.1		< 0.1	≤ 0.1 ¹⁴
Cyanides (HCN) ppm														N/A
BTX (mg/m ³)			< 500							≤ 100 ³ (Xilene)	500 ppm	≤ 10		N/A
Siloxanes (mg/m ³)		<0.1 as Si		≤ 0.3 as Si	< 5*		< 10	≤ 1	< 1	≤ 0.5 as Si	1	≤ 5	< 0.3 as Si	≤ 0.3 ¹⁴
Impurities (mg/m ³)	Gas that can be transported, stored and marketed without undergoing further treatment		Technically free	Technically free	Technically free	Technically free					-			N/A ¹⁵

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
Dust (mg/m ³)		≤ 100 Size > 5µm	Technical ly free	Technical ly free	Technical ly free			Technical ly free			5 µm	≤ 3 µm Transmis sion ≤ 5 µm distributi on	< 1 Size > 10 µm	N/A ¹⁵
Methane			≥ 90		>90 Mol- % (L)* >95 Mol- % (H)*							≥ 95		N/A
Propane											3	≤ 3		N/A
Methane number				≥ 65										N/A
Injection temperature	5 – 35 °C	5-30 °C (High pressure L - HTL) 5-30 °C (Regional L – RTL) 5-20 °C (Distribut ioN L – RNB)									2 – 38 °C	0-40 °C (High pressure) 0-20 °C (low pressure <0,4MPa)		1 – 38 °C

Standard / Reference	GRTgaz Contrat relatif au raccordement d'une installation de production de biométhane et d'injection de biométhane dans le réseau de transport de gaz naturel, conditions générales, version du 13 janvier 2022														
	GRDF, Prescriptions techniques	ISO 6326 ISO 6327 ISO 6570 ISO 6974 ISO 6976 ISO 15970 Richtige n R-16-46, 18/08/2016	Protocolo de Detalle PD-01 "Medición, Calidad y Odorización de Gas"	EN 16726 EN 16723-1 EN 16723-2	DVGW G260 *DVGW G262 ** DIN 51624			UNI TR 11537		Gas Safety (Management) Regulation, 1996 Network Entry Agreements	EN16726 EN16723-1	459/2012 Sb. (national law) TPG 902 02 Technical rules for gas industry	Regulation of the Minister (national law) ¹⁸	Code of operation CSA + EN16726-1 ¹⁶	

	FR	NL ⁴	ES	SE	DE	CH	AT	IT	DK	GB ²	BE ¹⁷	CZ	PL	IE
	es du distributeur GRDF, April 2017													
Update at	January 2024	March 2018	January 2024	January 2019	March 2018			January 2024	March 2018	March 2018	January 2024	April 2018	January 2024	January 2024

Footnotes:

¹ < whenever that: CO₂ < 2% mol, water dew point < -8°C, biomethane flow in transmission pipelines < 5.000 m³/h.

² additional requirements for other parameters not included in the table.

³ for biomethane derived from waste, biomethane has to comply with the UK Environment Agency's End-of-Waste Quality Protocol.

⁴ at date of emission of this table, biomethane has been injected only in L gas network, although there is regulation for doing it on H gas network.

⁵ properties calculated at reference condition 15°C/ 15 °C, 103.25 kPa, using ISO 13443:2006 Annex A conversion factors. Rounded to 1 decimal.

⁶ Due to lack of information on reference condition, direct transformation from kWh to MJ done.

⁷ Derived by dividing the equivalent MJ/m³ value (at standard reference conditions) by 3.6.

⁸ Currently no Relative Density (RD) limit, but there is a Code Modification proposal to introduce a RD ≤ 0.7.

⁹ There is currently a Code Modification proposal to reduce the lower WI limit from 47.2 to 46.5 MJ/m³.

¹⁰ The CO₂ limit of 2.5% mol may be exceeded provided total inert gases (including CO₂) < 8% mol.

¹¹ There may be additional CO₂ limits set on biomethane production plants in their Connected System Agreement (CSA) for that site.

¹² There is currently a Code Modification proposal to increase the O₂ limit on the TX system from 0.2 to 0.5% mol.

¹³ There are no specific limits for Cl and F, but there is an overall limit for Organo-Halides < 1.50 mg/m³.

¹⁴ Additional requirements for biomethane producers in their Connected System Agreements (CSA) based on EN 16723-1.

¹⁵ No specific limit for dust and impurities, but requirement to be technically free of dust and impurities per BS 3156 11.0 (1998).

¹⁶ The gas quality specification is appended to the Code of Operations - which sets out the terms and conditions for the use of the GNI TX and DX system, plus additional requirements for biomethane producers in their Connected System Agreement (CSA) based on EN-16723-1.

¹⁷ Quality values required by contracts in some in Belgium for decentralized injection of new gases (biomethane, synthetic methane, industrial rest gas, ...) into natural gas network.

¹⁸ Polish Regulation of the Minister:

1. Regulation of the Minister of Economy of July 2, 2010 on detailed conditions for the operation of the gas system – consolidated text issue (published: Journal of Laws of 2018, item 1158); Quality requirements are set-up in Paragraph 38, page 10.
2. Regulation of the Minister of Energy of September 21, 2018 amending the regulation on detailed conditions for the operation of the gas system (published: Journal of Laws of 2018 item 1814); This document does not change requirements regarding gas quality.
3. Regulation of the Minister of Climate and Environment of August 6, 2022 amending the regulation on detailed conditions for the operation of the gas system (published: Journal of Laws of 2022 item 1899); Updated quality requirements are given in Paragraph 2, Subsection 18), page 4.