



**NET4GAS, s.r.o**

# **HP PIPELINE DN1400, NODE KP – NODE PŘIMDA**

## **Composition of Process Gas**

**12.06.2018**

**DVZ**

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## 1 GENERAL

### 1.1 Scope of the Document

This document shall define the process gas composition and the range of components to be expected for transport through HP Pipeline DN 1400, node Kateřinský potok – node Přímada as specified by NET4GAS. It shall be taken into consideration when performing process calculations regarding

- compression of process gas,
- venting of process gas and

and for the material selection of the piping and process equipment.

### 1.2 Definitions

Term	Explanation
Project	HP Pipeline DN 1400, node Kateřinský potok – node Přímada
Employer	NET4GAS
Consultant	ILF Consulting Engineers

### 1.3 Abbreviations

Term	Explanation
HPPL	High Pressure Pipeline
N4G	NET4GAS

## 2 GAS COMPOSITION AND RANGE

### 2.1 Typical Gas Composition

Typical Gas Composition and general gas data is considered as follows:

	Unit	Brandov import (OPAL)	Olbernhau II
Methane	% mol	96,6904	96,6232
Ethane	% mol	2,2435	2,0460
Propane	% mol	0,1920	0,3616
iso-Butane	% mol	0,0465	0,0629
n-Butane	% mol	0,0296	0,0546
neo-Pentane	% mol	0,0021	0,0000
iso-Pentane	% mol	0,0059	0,0095
n-Pentane	% mol	0,0043	0,0066
n-Hexane + C6+	% mol	0,0100	0,0115
Oxygen	ppm	0,32	0,59
Carbon Dioxide	% mol	0,2845	0,1847
Nitrogen	% mol	0,4897	0,6400
Mercaptan Sulphur (RSH)	mgS/m <sup>3</sup>	0,00	0,01
Hydrogen Sulphide (H <sub>2</sub> S) and Carbonyl Sulphide (COS)	mgS/m <sup>3</sup>	0,00	0,01
Total Sulphur	mgS/m <sup>3</sup>	0,00	0,01
Wobbe index *	kWh/m <sup>3</sup>	14,815	14,827
Gross Calorific Value *	kWh/m <sup>3</sup>	11,225	11,243
Net Calorific Value *	kWh/m <sup>3</sup>	10,124	10,141

	Unit	Brandov import (OPAL)	Olbernhau II
Relative density		0,5741	0,5752
Standard Gas density	kg/Sm <sup>3</sup>	0,69	0,69
Molecular weight	g/mol	16,5951	16,6256
Water (H <sub>2</sub> O) dew point (40 bar)	°C	-26,0	-19,3
Hydrocarbons (C <sub>x</sub> H <sub>y</sub> ) dew point	°C	-13,3	-8,4

Standard pressure bar abs 1.01325

Standard temperature °C 20

Fluid state GAS

## 2.2 Extreme Gas Composition

The Extreme Gas Composition is based on N4G transport conditions (see 2.3)

Component	Mol-Fraction
Methane CH <sub>4</sub>	85.0%
Ethane C <sub>2</sub> H <sub>6</sub>	7.0%
Propane C <sub>3</sub> H <sub>8</sub>	3.0%
Butane-C <sub>4</sub> H <sub>10</sub>	2.0%
C <sub>5</sub> +	0.5%
Nitrogen N <sub>2</sub>	1.59%
Carbon Dioxide CO <sub>2</sub>	0.89%
Oxygen O <sub>2</sub>	0.02%
Water H <sub>2</sub> O	See 2.3.2
Hydrogen Sulphide H <sub>2</sub> S	See 2.3
Mercaptan Sulphur RSH	See 2.3

Component	Mol-Fraction
Total Sulphur	See 2.3
SUM	100.00%

Table 2 - 1 Extreme Gas Composition (transport condition N4G)

## 2.3 Gas Quality Range

The gas quality range for transport through HP Pipeline DN 1400 is defined with the following chemical and physical parameters acc. N4G transport conditions:

### 2.3.1 Chemical Composition

Constituent	%mol
Methane	min. 85%
Ethane	max. 7%
Propane	max. 3%
Sum of Butanes	max. 2%
Sum of Pentanes and higher hydrocarbons	max. 0.5%
Oxygen	max. 0.02%
Nitrogen	max. 5%
Carbon dioxide	max. 3%
Hydrogen sulphide (H <sub>2</sub> S)	max. 6 mg/m <sup>3</sup>
Mercaptan sulphur (RSH)	max. 5 mg/m <sup>3</sup>
Total sulphur	max. 30 mg/m <sup>3</sup>
Wobbe number	min. 12.7 kWh/m <sup>3</sup> (45.7 MJ/m <sup>3</sup> ) max. 14.5 kWh/m <sup>3</sup> (52.2 MJ/m <sup>3</sup> )
Relative density	min. 0.56 max. 0.70
Gross Calorific Value (Real Gross Dry)	min. 9.4 kWh/m <sup>3</sup> (33.8 MJ/m <sup>3</sup> ) max. 11.8 kWh/m <sup>3</sup> (42.5 MJ/m <sup>3</sup> )

Related to normal conditions  $t_2 = 15\text{ °C}$  and  $p = 101.325\text{ kPa}$  and temperature of flue gases  $t_1 = 15\text{ °C}$ , for dry gas - relative humidity  $\phi=0$ , gas containing no water vapour.

### 2.3.2 Water Dew Point

Water dew point max.  $-7\text{ °C}$  at 4 MPa

### 2.3.3 Hydrocarbons Dew Point

Hydrocarbons dew point max.  $0\text{ °C}$  at 1.7 MPa

## 2.4 Gas Impurities, Liquids and Solids

The gas is filtered and subsequently pressure reduced within the EUGAL Metering Station in Deutschneudorf about 3 km upstream the Node Kateřinský potok.

Potential impurities might be expected at start up after commissioning of the pipeline and during operation of the pipeline.

Free liquids are expected only due to pressure testing within the line valve and scraper stations.