|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CONTRACTOR   |  |  | | --- | --- | | GasOil nazov | **GasOil Technology a. s.**  Nám. sv. Egídia 40/93  058 01 Poprad  Slovakia |   CUSTOMER   |  |  | | --- | --- | |  | **Conexus Baltic Grid**  Stigu street 14  Riga, LV-1021  Latvia |   CO-FINANCIER  **INOVATION AND NETWORKS**  **EXECUTIVE AGENCY**  **Connecting Europe Facility**  Project (Action) number 8.2.4-0031-LV-W-M-18 | | | | | Exemplar No.: | |
| Phase:  **Construction Design** | |
| Project Name:  Installation of Gas Compression Unit at Incukalns Underground Gas Storage | | | | | Contract No.:  **CON-2020/364**  **0173/20/60** | |
| **Document No.**: GCUI-CD-GOT-GEN-SPC-001 | | | | | Revision: **---** | |
| Document Name:  **CONSTRUCTION DESIGN**  **GENERAL ENGINEERING**  **DRAFT**  **Composition of Process Gas** | | | | | | |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |
|  |  |  |  |  | |  |
|  |  | |  |

content

[1 GENERAL 3](#_Toc45178517)

[1.1 Scope of the Document 3](#_Toc45178518)

[1.2 Definitions 3](#_Toc45178519)

[1.3 Abbreviations 3](#_Toc45178520)

[1.4 References 3](#_Toc45178521)

[1.5 Codes and Standards 3](#_Toc45178522)

[2 GAS COMPOSITION AND RANGE 4](#_Toc45178523)

[2.1 Gas composition for injection 4](#_Toc45178524)

[2.2 Gas composition for extraction 4](#_Toc45178525)

[2.3 Gas Quality Range 5](#_Toc45178526)

[2.3.1 Chemical Composition 5](#_Toc45178527)

[2.3.2 Water Dew Point 5](#_Toc45178528)

[2.3.3 Hydrocarbons Dew Point 5](#_Toc45178529)

[2.4 Gas Impurities, Liquids and Solids 5](#_Toc45178530)

# GENERAL

## Scope of the Document

This document shall define the process gas composition and the range of components to be expected at the inlet of CS Incukalns as specified by CBG. It shall be taken into consideration when performing process calculations regarding

- compression of process gas,

- venting of process gas and

- utilization of process gas as fuel gas within CS Incukalns

and for the material selection of the process equipment.

## Definitions

Table 1.1

|  |  |
| --- | --- |
| Term | Explanation |
| Project | Development of Construction Design for the Installation of Gas Compression Unit at Incukalns Underground Gas Storage and Author’s Supervision |
| Employer | Conexus Baltic Grid |
| Contractor | GasOil Technology a. s. |

## Abbreviations

Table 1.2

| Term | Explanation |
| --- | --- |
| CBG | Conexus Baltic Grid |
| CS | Compressor Station |

## References

Table 1.3

|  |  |  |
| --- | --- | --- |
| No. | Number | Title |
|  |  |  |

## Codes and Standards

Table 1.4

| No. | Number | Title |
| --- | --- | --- |
| 1 | LVS 459 | Natural gas. Gas properties, parameters, quality assessment |

# GAS COMPOSITION AND RANGE

## Gas composition for injection

Average gas compositions to be considered are provided

Table 2‑1 – Gas composition for injection

| Gas analysys: MOL% | | Min | Max | Avg |
| --- | --- | --- | --- | --- |
|  | MW |
| Nitrogen | 28,01 | 0,544 | 0,856 | 0,71 |
| Carbon Dioxide | 44,01 | 0,056 | 0,187 | 0,13 |
| Methane (C1) | 16,04 | 94,631 | 97,181 | 96,38 |
| Ethane (C2) | 30,07 | 1,510 | 3,617 | 2,18 |
| Propane (C3) | 44,09 | 0,207 | 0,831 | 0,44 |
| i-Butane (i-C4) | 58,12 | 0,045 | 0,094 | 0,07 |
| n-Butane (n-C4) | 58,12 | 0,033 | 0,168 | 0,07 |
| i-Pentane (i-C5) | 72,15 | 0,006 | 0,016 | 0,01 |
| n-Pentane (n-C5) | 72,15 | 0,004 | 0,011 | 0,01 |
| n-Hexane (n-C6) | 86,17 | 0,000 | 0,001 | 0,00 |
| Methylcyclopentane | 84,16 | - | - | - |
| Methylcyclohexane | 98,18 | - | - | - |
| n-Heptane (n-C7) | 100,20 | 0,000 | 0,003 | 0,00 |
| n-Octane (n-C8) | 114,22 | 0,000 | 0,000 | 0,00 |
| n-Nonae (n-C9 | 128,20 | 0,001 | 0,004 | 0,00 |
| Oxygen | 16,00 | 0,005 | 0,006 | 0,01 |
| TOTAL |  |  |  | 100,00 |
| AVG. MOL. WT. |  |  |  | 16,66 |

## Gas composition for extraction

Average gas compositions to be considered are provided

Table 2‑2 – Gas composition for extraction

| Gas analysys: MOL% | | Min | Max | Avg |
| --- | --- | --- | --- | --- |
|  | MW |
| Nitrogen | 28,01 | 0,674 | 0,852 | 0,76 |
| Carbon Dioxide | 44,01 | 0,103 | 0,137 | 0,12 |
| Methane (C1) | 16,04 | 94,094 | 97,202 | 96,38 |
| Ethane (C2) | 30,07 | 1,602 | 2,306 | 2,09 |
| Propane (C3) | 44,09 | 0,280 | 0,557 | 0,47 |
| i-Butane (i-C4) | 58,12 | 0,050 | 0,088 | 0,08 |
| n-Butane (n-C4) | 58,12 | 0,042 | 0,092 | 0,08 |
| i-Pentane (i-C5) | 72,15 | 0,007 | 0,016 | 0,01 |
| n-Pentane (n-C5) | 72,15 | 0,005 | 0,011 | 0,01 |
| n-Hexane (n-C6) | 86,17 | 0,000 | 0,001 | 0,00 |
| Methylcyclopentane | 84,16 | - | - | - |
| Methylcyclohexane | 98,18 | - | - | - |
| n-Heptane (n-C7) | 100,20 | 0,000 | 0,005 | 0,00 |
| n-Octane (n-C8) | 114,22 | 0,000 | 0,000 | 0,00 |
| n-Nonae (n-C9 | 128,20 | 0,001 | 0,003 | 0,00 |
| Oxygen | 16,00 | 0,005 | 0,006 | 0,01 |
| TOTAL |  |  |  | 100,00 |
| AVG. MOL. WT. |  |  |  | 16,66 |

## Gas Quality Range

The gas quality range at the entry of the CS Incukalns is defined with the following chemical and physical parameters.

### Chemical Composition

Chemical Composition see Table 2‑1 – Gas composition for injection and Table 2‑2 – Gas composition for extraction.

Wobbe number 50.67 MJ/m3

Relative density (@ 15°C) 0.586

Gross Calorific Value (Real Gross Dry) 54.47 MJ/kg

907.75 MJ/kmol

38.47 MJ/m3

Related to normal conditions t =0 °C and p=101.325 kPa and for dry gas - relative humidity φ=0, gas containing no water vapour.

### Water Dew Point

Water Dew Point max. -10°C (@4.0 MPaa)

### Hydrocarbons Dew Point

Hydrocarbons Dew Point max. -63°C (@ 2600 kPaa)

## Gas Impurities, Liquids and Solids

The gas is filtered within the CS Incukalns.

Potential impurities might be expected at start up after commissioning of the CS Incukalns.

Free liquids are expected only due to pressure testing within the CS.