

# Gas Quality Specifications

## TC Energy and other pipelines

### TC Energy Pipelines

| Specs                | Canadian Mainline   | NGTL/ATCO/ (CGL Rules)                                   | Foothills (BC) Zone 8                                    | Foothills (Sask.) Zone 9                                 | GTN                          | North Baja   | ANR   |
|----------------------|---|--|--|--|------------------------------|--|---|
| Hydrogen Sulphide    | Max. 23 mg/m <sup>3</sup>                                 | Max. 23 mg/m <sup>3</sup>                                | Max. 23 mg/m <sup>3</sup>                                | Max. 23 mg/m <sup>3</sup>                                | Max. 0.25 grains/Ccf         | Max. 0.25 grains/Ccf   | Max. 1 grains/Ccf SE & SW area 1/4 grains/Ccf Mainline area   |
| Total Sulphur        | Max. 115 mg/m <sup>3</sup>                                | Max. 115 mg/m <sup>3</sup>                               | Max. 230 mg/m <sup>3</sup>                               | Max. 230 mg/m <sup>3</sup>                               | Max. 10 grains/Ccf           | Max. 0.75 grains/Ccf Total, 0.3 grains/Ccf mercaptan                                   | Max. 20 grains/Ccf  |
| Carbon Dioxide       | Max. 2% by volume   | Max. 2% by volume  | Max. 2% by volume  | Max. 2% by volume  | Max. 2% by volume            | Max. 2% by volume  | Max. 2% by volume   |
| Oxygen               | Max. 0.4% by volume                                       | Max. 0.4% by volume                                      | Max. 0.4% by volume                                      | Max. 0.4% by volume                                      | Max. 0.4% by volume          | Max. 0.2% by volume  | Max. 1% by volume   |
| Nitrogen             | See TCPL Mainline Tariff                                  | Not specified  | Not specified  | Not specified  | Not specified                | Max. 3% incl. CO <sub>2</sub> , N <sub>2</sub> , He, O <sub>2</sub> , & other diluents | Max. 3% by volume   |
| Temperature          | Max. 50°C   | Max. 49°C  | Max. 43.3°C  | Max. 49°C  | Max. 110°F                   | Max. 105°F or Min. 50°F  | Min. 40°F<br>Max. 120°F                                       |
| Heating Value        | Min. 36 MJ/m <sup>3</sup><br>Max. 41.34 MJ/m <sup>3</sup> | Min. 36 MJ/m <sup>3</sup>                                | Min. 36 MJ/m <sup>3</sup>                                | Min. 36 MJ/m <sup>3</sup>                                | Min. 995 BTU/ft <sup>3</sup> | Min. 990 BTU/ft <sup>3</sup> or<br>Max. 1150 BTU/ft <sup>3</sup>                       | Min. 967 BTU/ft <sup>3</sup><br>Max. 1200 BTU/ft <sup>3</sup> |
| Water                | Max. 65 mg/m <sup>3</sup>                                 | Max. 65 mg/m <sup>3</sup> or Max. dp -10°C at > 8275 kPa | Max. 65 mg/m <sup>3</sup> or Max. dp -10°C at > 8275 kPa | Max. 65 mg/m <sup>3</sup> or Max. dp -10°C at > 8275 kPa | Max. 4 lbs/MMcf              | Max. 7 lbs/MMcf  | Max. 7 lbs/MMcf   |
| Hydrocarbon Dewpoint | Max. -10°C at 5500kPa absolute                            | Max. -10°C at operating pressure                         | Max. -10°C at operating pressure                         | Max. -10°C at operating pressure                         | Max. 15°F up to 800 psig     | Max. 20°F up to 600 psig   | Max. 15°F   |
| Interchangeability   | See TCPL Mainline Tariff                                  | Not Specified  | Not Specified  | Not Specified  | Not Specified                | Wobbe Number:<br>Min.: 1279<br>Max.: 1385  | Not Specified   |

### Canadian Pipelines

| Specs                | Alliance Canada   | Enbridge (Union)  | Enbridge (Tecumseh Pipeline)                               | TransGas   | West Coast                | TQM                        |
|----------------------|---|---|--|--|---------------------------|----------------------------|
| Hydrogen Sulphide    | Max. 23 mg/m <sup>3</sup>   | Max. 7 mg/m <sup>3</sup>                                  | Max. 7 mg/m <sup>3</sup>                                   | Max. 6 mg/m <sup>3</sup>   | Max. 6 mg/m <sup>3</sup>  | Max. 23 mg/m <sup>3</sup>  |
| Total Sulphur        | Max. 115 mg/m <sup>3</sup>  | Max. 460 mg/m <sup>3</sup> , 5mg/m <sup>3</sup> mercaptan | Max. 460 mg/m <sup>3</sup> , 5 mg/m <sup>3</sup> mercaptan | Max. 23 mg/m <sup>3</sup> total, 6 mg/m <sup>3</sup> mercaptan           | Max. 23 mg/m <sup>3</sup> | Max. 115 mg/m <sup>3</sup> |
| Carbon Dioxide       | Max. 2% by volume   | Max. 2% by volume   | Max. 2% by volume  | Max. 2% by volume  | Max. 2% by volume         | Max. 2% by volume          |
| Oxygen               | Max. 0.4% by volume   | Max. 0.4% by volume                                       | Max. 0.4% by volume  | Max. 0.4% by volume  | Max. 0.4% by volume       | Max. 0.4% by volume        |
| Nitrogen             | Max. 4% by volume incl. N <sub>2</sub> , CO <sub>2</sub> , O <sub>2</sub> | Not specified   | Not specified  | Max. 15 ml/m <sup>3</sup> each (nitric oxide & total oxides of nitrogen) | Not specified             | Not specified              |
| Temperature          | Max. 50°C, Min. 5°C   | Max. 43°C   | Not specified  | Max. 50°C  | Max. 54°C                 | Max. 50°C                  |
| Heating Value        | Min. 36 MJ/m <sup>3</sup> ,<br>Max. 60 MJ/m <sup>3</sup>                  | Min. 36 MJ/m <sup>3</sup><br>Max. 40.2 MJ/m <sup>3</sup>  | Min. 36 MJ/m <sup>3</sup><br>Max. 40.2 MJ/m <sup>3</sup>   | Min. 35 MJ/m <sup>3</sup>  | Min. 36 MJ/m <sup>3</sup> | Min. 36 MJ/m <sup>3</sup>  |
| Water                | Max. 65 mg/m <sup>3</sup>   | Max. 65 mg/m <sup>3</sup>                                 | Max. 80 mg/m <sup>3</sup>                                  | Max. 65mg/m <sup>3</sup> at 101.325 kPa and 15°C                         | Max. 65 mg/m <sup>3</sup> | Max. 65 mg/m <sup>3</sup>  |
| Hydrocarbon Dewpoint | -5°C at normal opt. conditions  | Max. -8°C at operating pressure                           | Max. -10°C at 5500 kPa                                     | Max. -10°C at opt. Pressure  | Max. -9°C at del. pres.   | Not specified              |
| Interchangeability   | Not Specified   | Refer to Union Tariff                                     | Refer to Enbridge Tariff                                   | Refer to TransGas Tariff   | Not Specified             | Refer to TQM Tariff        |

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## US Pipelines

| Specs                       | Alliance USA  | Empire  | GLGT  | Iroquois   | Northern Border  |
|-----------------------------|---|---|---|--|--|
| <b>Hydrogen Sulphide</b>    | Max. 1 grains/Ccf   | Max. 1 grains/Ccf   | Max. 1/4 grains/Ccf   | Max. 1/4 grains/Ccf  | Max. 0.3 grains/Ccf  |
| <b>Total Sulphur</b>        | Max. 5 grains/Ccf   | Max. 20 grains/Ccf  | Max. 20 grains/Ccf  | Max. 1.25 grains/Ccf   | Max. 2 grains/Ccf, (0.3 grains mercaptan/Ccf)                      |
| <b>Carbon Dioxide</b>       | Max. 2% by volume   | Max. 2% by volume   | Max. 2% by volume   | Max. 2% by volume  | Max. 2% by volume  |
| <b>Oxygen</b>               | Max. 0.4% by volume   | Max. 1% by volume   | Max. 1% by volume   | Max. 0.2% by volume  | Max. 0.4% by volume  |
| <b>Nitrogen</b>             | Max. 4% N <sub>2</sub> , CO <sub>2</sub> & O <sub>2</sub> by volume | Not specified   | Max. 3% by volume   | Max. 2.75% N <sub>2</sub> +O <sub>2</sub><br>4% N <sub>2</sub> + CO <sub>2</sub> | Not specified  |
| <b>Temperature</b>          | Max. 122°F, Min. 41°F   | Max. 120°F, Min. 40°F   | Max. 120°F, Min. 20°F   | Max. 120°F   | Min. 32°F Max. 120°F   |
| <b>Heating Value</b>        | Min. 962 BTU/ft <sup>3</sup>  | Min. 950 BTU/ft <sup>3</sup><br>Max. 1200 BTU/ft <sup>3</sup> | Min. 967 BTU/ft <sup>3</sup><br>Max. 1069 BTU/ft <sup>3</sup> | Min. 967 BTU/ft <sup>3</sup><br>Max. 1110 BTU/ft <sup>3</sup>                    | Min. 967 BTU/ft <sup>3</sup>                                       |
| <b>Water</b>                | Max. 4 lbs/MMcf   | Max. 7 lbs/MMcf   | Max. 4 lbs/MMcf   | Max. 4 lbs/MMcf at<br>14.73 psi & 60°F   | Max. 4 lbs/MMcf  |
| <b>Hydrocarbon Dewpoint</b> | Max. 23°F at opt. pres.   | Not specified   | Not specified   | Max. 15°F  | Max. -5°F (800psia),<br>-10°F (1000 psia),<br>-18°F at (1100 psia) |
| <b>Interchangeability</b>   | Not specified   | Not specified   | Not specified   | See Iroquois Tariff  | Not specified  |

| Specs                       | NWP  | PNGTS   | SOCAL   | Tennessee GP  | Viking  |
|-----------------------------|--|---|---|---|---|
| <b>Hydrogen Sulphide</b>    | Max. 0.25 grains/Ccf   | Max. 0.25 grains/Ccf  | Max. 0.25 grains/Ccf  | Max. 0.25 grains/Ccf  | Max. 1 grains/Ccf (delivery)<br>Max. 1/4 grains/Ccf (receipt) |
| <b>Total Sulphur</b>        | Max. Non Laplata Facilities<br>5 grains/Ccf,<br>Laplata Facilities<br>0.75 grains/Ccf,<br>0.3 grains mercaptan/Ccf | Max. 20 grains/Ccf  | Max. 0.75 grains/Ccf<br>(0.3 grains mercaptan/Ccf)            | Max. 5 grains/Ccf (delivery)<br>Max. 10 grains/Ccf (receipt)                                | Max. 20 grains/Ccf  |
| <b>Carbon Dioxide</b>       | Max. 2% by volume  | Max. 3% by volume   | Max. 3% by volume   | Max 2% by volume (delivery)<br>Max. 3% by volume (receipt)                                  | Max. 3% by volume   |
| <b>Oxygen</b>               | Max 0.2% by volume   | Max. 0.2% by volume   | Max. 0.2% by volume   | Max. 0.2% by volume   | Max. 0.2% by volume   |
| <b>Nitrogen</b>             | Max. 3% incl. O <sub>2</sub> , CO <sub>2</sub>   | Max. 4% incl. CO <sub>2</sub>                                 | Max. 4% incl. O <sub>2</sub> , CO <sub>2</sub> and inerts     | Max. 4% incl. CO <sub>2</sub> , O <sub>2</sub><br>Max 2.75% N <sub>2</sub> + O <sub>2</sub> | Max. 4% incl. CO <sub>2</sub>                                 |
| <b>Temperature</b>          | Non Laplata Facilities<br>Max. 120°F<br>Laplata Min. 40°F,<br>Max. 120°F   | Max. 120°F  | Min. 50°F, Max. 105°F   | Max. 120°F  | Max. 120°F  |
| <b>Heating Value</b>        | Min. 985 BTU/ft <sup>3</sup>   | Min. 967 BTU/ft <sup>3</sup><br>Max. 1100 BTU/ft <sup>3</sup> | Min. 990 BTU/ft <sup>3</sup><br>Max. 1150 BTU/ft <sup>3</sup> | Min. 967 BTU/ft <sup>3</sup><br>Max. 1110 BTU/ft <sup>3</sup>                               | Min. 967 BTU/ft <sup>3</sup><br>Max. 1100 BTU/ft <sup>3</sup> |
| <b>Water</b>                | Max. 7 lbs/MMcf  | Max. 7 lbs/MMcf   | Max. 7 lbs/MMcf at<br><800psi or < 20°F<br>at > 800psi        | Max. 7 lbs/MMcf at<br>14.73psi at 60°F  | Max. 7 lbs/MMcf at<br>14.73psi at 60°F                        |
| <b>Hydrocarbon Dewpoint</b> | Max. 15°F (100-1000psia)   | Not specified   | See SOCAL Tariff  | Max.15°F  | Not specified   |
| <b>Interchangeability</b>   | Not Specified  | Not Specified   | See SOCAL Tariff  | See Tennessee GP Tariff   | Not Specified   |

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### Contact us

Website: Contact us  
<http://www.tccustomerexpress.com/index.html>  
 Email: [nominations@tcenergy.com](mailto:nominations@tcenergy.com)  
 The Pipeline: 403-920-PIPE (7473)