

# NORTHWEST NATURAL GAS COMPANY

P.U.C. Or. 25

Second Revision of Sheet RR-24  
Cancels First Revision of Sheet RR-24

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## GENERAL RULES AND REGULATIONS

(continued)

### Rule 24. Gas Quality Standards and Determination of Thermal Units.

The quality of Natural Gas or Biomethane procured and delivered by the Company or by Customers under **Schedule T** shall conform to standard purity requirements of the Commission; shall have an energy content between 985 and 1155 Btu per standard cubic foot; and shall permit satisfactory operation of appliances. Biomethane shall, in addition, conform to the gas quality specifications and associated testing and reporting standards established by the Company, as such standards are amended from time to time. (C)

Customer usage is calculated in energy units, normally in Therms. Determination of thermal units shall consider metered volume, metering pressure, temperature, compressibility ratio, and the energy content of the gas. Therms are computed to a standard base pressure of 14.73 PSIA and a standard temperature of 60 degrees Fahrenheit. Equipment and methods used for billing factor calculations may vary.

Total Energy = Metered Volume x Billing Factor, where Billing Factor = Pressure Factor (PF) X Temperature Factor (TF) X Compressibility Ratio (CR) X BTU Factor (C)

Metered Volume is measured at the Customer Premises. The meter index volume readings are typically in hundreds of cubic feet (ccf). An index multiplier of one (1) is used for most Residential and Commercial Customers. Larger volume Customers may have index multipliers of 10, 100, or 1000. (C)

Metered Volume = Index Volume x Index Multiplier

The Pressure Factor times compressibility ratio (PF x CR) for Residential and small Commercial Customer billings is approximately 1.0091 when metering pressure is 6.5 inches water column, and approximately 1.1293 for 2.0 psig metering pressure. The pressure factor will be calculated on a Customer-specific basis for metering pressures above 2.0 psig. Some meters may use a pressure-compensating device for automatic calculation of the pressure factor at the meter site. (C)

Pressure Factor (PF) =  $\frac{\text{Metering Pressure (PSIG)} + \text{Atmospheric Pressure (PSIA)}}{14.73 \text{ PSIA}}$

Atmospheric Pressure (PSIA) is calculated in accordance with American Gas Association (AGA) recommendations (AGA 3, as revised from time to time), and is determined from plat map average elevation and an average determined from the daily barometric pressure during the billing period.

Atmospheric Pressure (PSIA) = 14.73 x Barometric Factor x Elevation Factor

Barometric Factor =  $\frac{\text{PDX Barometer Reading (inHg)} + 0.025}{29.99}$

Elevation Factor =  $0.9871 \times \frac{(55457 - \text{Elevation})}{(54735 + \text{Elevation})}$

(continue to Sheet RR-24.1)

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Issued by: **NORTHWEST NATURAL GAS COMPANY**

d.b.a. NW Natural  
220 N.W. Second Avenue  
Portland, Oregon 97209-3991

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# NORTHWEST NATURAL GAS COMPANY

P.U.C. Or. 25

Third Revision of Sheet RR-24.1  
Cancels Second Revision of Sheet RR-24.1

## GENERAL RULES AND REGULATIONS

(continued)

### Rule 24. Gas Quality Standards and Determination of Thermal Units (continued).

Temperature Factor (TF) is an average determined from representative samples of metering temperatures for the billing period. Temperature information for most accounts will be obtained from daily temperature data for the weather stations specified in this **Rule 24**, as published daily by third party sources. The temperature factor might alternatively be applied through on-site temperature compensating devices or other temperature recording equipment.

$$\text{Temperature Factor} = \frac{520}{(\text{Metering Temperature } ^\circ\text{F} + 460)}$$

Temperature data will be based on the daily temperatures reported for the weather stations listed in the table below. Each weather station corresponds to one of eight weather zone assignments within the Company's Oregon service territory. Each account is assigned a weather zone based upon where the Customer's premise is located on a geographical plat map. In most cases, the weather zone assigned to a plat will correspond with its assigned service district. NW Natural uses data received from County Assessors Offices in the process of establishing weather zone assignments.

Weather Station	NWN Weather Zone
Astoria (350328)*	Astoria
Coos Bay (356073)*	Coos Bay
Newport (WBAN 24285)	Lincoln City
Corvallis Oregon AgriMet Weather Station (CRVO)	Albany
Hood River Oregon AgriMet Weather Station (HOXO)	The Dalles
Portland (356751)*	Portland
Eugene (352709)*	Eugene
Salem (357500)*	Salem

(C)

\* Denotes NOAA weather station

If at any time the daily temperature data is not available for any of the listed weather stations, the Company will use data from a substitute station within the respective weather zone, and will adjust the data for the high and low temperature differential between the two stations. In the event that temperature data for any weather station is continually unavailable or unreliable, the Company will select a replacement weather station within the respective weather zone. When a replacement weather station is established, the normal weather heating degree days for the replacement station will be adjusted so that the data used for the replacement weather station remains aligned with the data used to determine normal weather in the Company's last general rate case.

(continue to Sheet RR-24.2)

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**GENERAL RULES AND REGULATIONS**

(continued)

**Rule 24. Gas Quality Standards and Determination of Thermal Units (continued).**

Compressibility Ratio (CR) is calculated in accordance with AGA recommendations. The CR is dependent on pressure, temperature and gas composition. At very high metering pressures, the value becomes significant (about 1.100 at 500 PSIG). For larger volume Customers, the CR may be applied through on-site equipment. At low metering pressures, it has a value close to about 1.000, and an approximation is used.

$$\text{Compressibility Ratio (CR)} = 1 + \text{Metering Pressure} / 6000$$

The Btu Multiplier, Btu per standard cubic foot (Btu/scf), is Gross Heating Value measured at 60 degrees at 14.73 PSIA and without water vapor, in accordance with AGA methods. The energy content of gas shall be measured at the Company's Receipt and storage points. The Btu multiplier for a billing period is based on the appropriate gas source during the billing period.

(continue to Sheet RR-25)

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