



Compressed Natural Gas (CNG) - Factory Fill

1 Scope

1.1 Material Description. This specification covers automotive fuel grade compressed natural gas (CNG).

1.2 Symbols. Not applicable.

1.3 Applicability. This fuel is intended primarily for factory-fill at vehicle assembly plants. Factory-fill CNG is intended for use in either mono-fuel CNG or bi-fuel CNG/Gasoline vehicles.

1.4 Remarks. This specification reflects the current composition of commercially available vehicle grade compressed natural gas as sold in most regions of North America, South America, Europe, Japan, and Asia. This specification pertains only to natural gas as delivered to the vehicle assembly plant. It does not apply to the natural gas dispensed into the vehicle fuel container(s).

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM D1142	ASTM D4084	ISO 11541	ISO 15971
ASTM D1945	ASTM D5504	ISO 15403-1	ISO 19739 CORR 1
ASTM D2597	ISO 6974-6	ISO 15403-2	SAE J1616
ASTM D3588			

2.2 GM Standards/Specifications.

GMW3059	GMW3221
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2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

The fuel shall meet all applicable environmental regulations in effect at the vehicle assembly plant location. These regulations take precedence over requirements within this specification.

Test requirements given in this specification are, as the case may be, minimum or maximum **acceptance limits** for valid tests. No adjustments for test precision are to be applied as test variability was taken into account in the determination of the requirements.

All ASTM and ISO specified tests shall be performed according to the latest published version unless otherwise required by this specification

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Requirements on Delivery. These specifications apply to samples taken directly from the primary delivery pipeline at the vehicle assembly plant or pressurized cylinders delivered to the assembly plant.

- Samples shall not be taken from the dispensing station or assembled vehicles.
- The supplier shall be responsible for meeting the listed requirements even if the properties are not directly measured.
- Specifications are summarized in Table 1.

3.2.1 Chemical Requirements.

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Page 1 of 5



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3.2.1.1 Hydrocarbons. The CNG fuel shall contain the C1 through C6+ hydrocarbon content shown in Table 1 as measured by ASTM D1945 or ISO 6974-6.

3.2.1.2 Hydrogen. The maximum hydrogen content shall be 2% (mole) and 0.1% (mole) for dry and wet gas respectively as defined in 3.2.2.1. Hydrogen content shall be measured by ASTM D1945 or ISO 6974-6.

3.2.1.3 Nitrogen. The maximum nitrogen plus carbon dioxide content shall be a 10% (mole) as measured by ASTM D1945 or ISO 6974-6.

3.2.1.4 Inert Gases. The maximum carbon dioxide plus nitrogen content for dry and wet gas shall be 10% (mole) as measured by ASTM D1945 or ISO 6974-6. For wet gas, the maximum CO₂ portion shall be 3.0% (mole).

3.2.2 Potential Corrosives.

3.2.2.1 Water Content. The water vapor content of the CNG fuel shall be such that the dew point temperature is 5.6 °C (10 °F) below the monthly lowest dry bulb temperature for the specific geographic location of the vehicle assembly plant at the full service pressure of the vehicle.

- For the purposes of this specification, CNG fuel with water content < 32 mg/m³ is considered dry gas. CNG fuel with water content of 32 mg/m³ or more is considered wet gas.
- The water content is measured by ASTM D1142 or ISO 11541.

3.2.2.2 Sulfur and Sulfur Compounds. The maximum hydrogen sulfide content shall be 16 mg/m³. The total content of sulfur compounds including odorant shall be 120 mg/m³ and 115 mg/m³ for dry and wet gas respectively as measured by ASTM D5504 or ISO 19739 CORR 1.

3.2.2.3 Oxygen. The maximum oxygen (O₂) content shall be 1.0% (mole) as measured by ASTM D1945 or ISO 6974-6.

3.2.2.4 Methanol/Glycol. The CNG fuel shall contain no methanol or glycol.

3.2.3 Physical Requirements.

3.2.3.1 Particulate Matter. The CNG fuel shall be filtered so that maximum particulate size is 5 µm. Filters shall be maintained and changed as necessary.

3.2.3.2 Compressor Oil. Any oil content that adversely affects CNG vehicle operation is unacceptable. There is no standardized test method for quantifying the oil content in CNG fuel; ISO 15403-2 notes that Original Equipment Manufacturer (OEM) experience indicates a range up to 0.02%v/v is acceptable.

3.2.4 Performance Requirements.

3.2.4.1 Wobbe Index. The minimum Wobbe index shall be 46.0 MJ/m³ (gross) at 0 °C as measured by ASTM D3588 with SAE J1616, or ISO 15971.

3.2.4.2 Methane Number. The minimum methane number shall be 75 as determined by ISO 15403-1, Annex D.

3.2.4.3 Odorant. To provide for the safe detection of leaks at very low concentrations, the CNG fuel shall be odorized similar to the level found in the local distribution system. Data shall be supplied to confirm the odorant content in the CNG fuel.

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Page 2 of 5

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