LNG- LIQUIFIED NATURAL GAS SPECIFICATIONS

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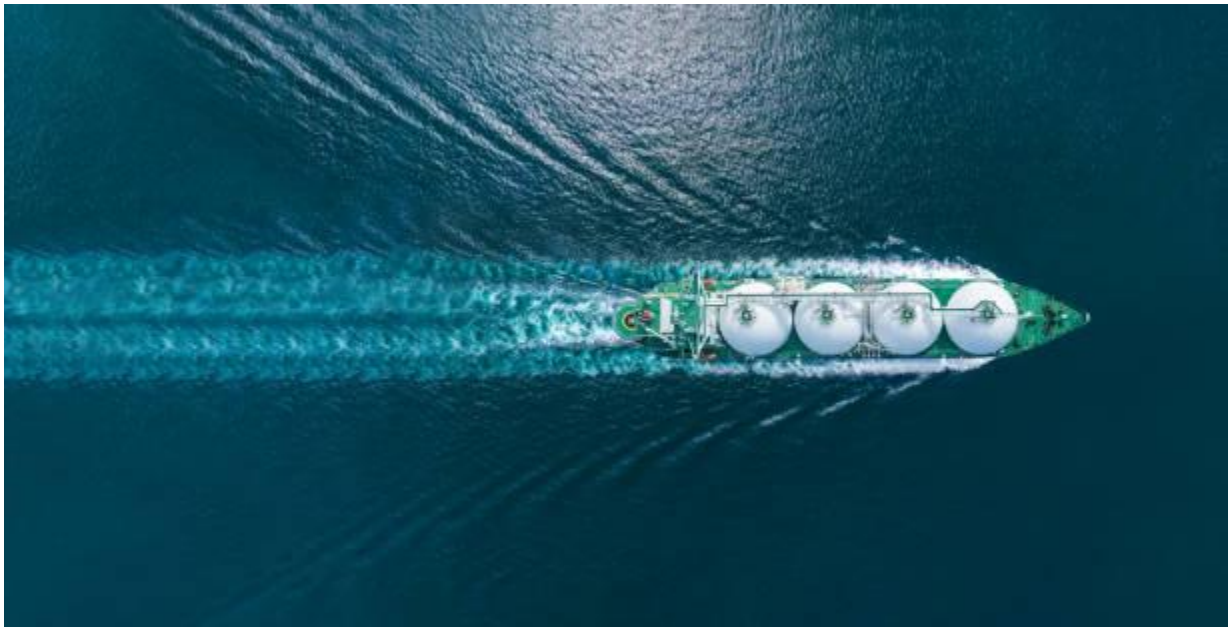
The details are already published on the main website ***https://EN590Diesel.com*** *and the* ***Liquefied Natural Gas (LPG) Product Information & Specifications Page***.

This specification file contains the LNG - Liquified Natural Gas Product Specifications for common variants (Bulk / Wholesale and Small Volumes).



Technical Liquefied Natural Gas (LNG) Specifications & International Quality Standards

As a primary-tier energy supplier, **The Vanilla+ Corporation / Indico Stratton Corporation LTD** supports the supply of Liquefied Natural Gas (LNG) for international bulk commodity transactions, industrial consumption, commercial distribution, marine applications and small-volume LNG requirements.

LNG is a cryogenic liquid consisting predominantly of methane, together with varying concentrations of ethane, propane, butanes, nitrogen and other trace components. Its commercial quality is determined by its chemical composition, calorific value, density, Wobbe Index, methane number and the concentration of relevant impurities.

LNG is not produced to one universal chemical specification. The final quality profile depends on the natural gas source, gas-treatment process, liquefaction facility, destination market, receiving terminal and contractual acceptance requirements.

The following technical specification matrices cover the principal parameters used in commercial LNG trading, including bulk LNG cargoes, terminal deliveries, road tanker distribution, ISO tank containers and small-scale LNG supply.

Important: The numerical values below include indicative commercial composition ranges and examples taken from published LNG terminal specifications. They are technical reference information and do not constitute a universal guarantee that every LNG cargo meets every listed value. Final contractual limits must be confirmed against the applicable Certificate of Quality, receiving-terminal rules and Sales and Purchase Agreement (SPA).

1. Typical Commercial LNG Chemical Composition – Bulk and Small-Volume Supply

The chemical composition of commercial LNG is normally determined through gas chromatography. Methane is the principal component, while the concentrations of heavier hydrocarbons and inert gases influence the product's density, energy content, combustion properties and suitability for different gas networks.

The following matrix presents indicative composition ranges encountered in commercial LNG. These ranges are provided for technical orientation and should not be interpreted as one contractual grade or as guaranteed minimum and maximum limits.

Component / Property	Chemical Formula	Indicative Composition (mol %)	Commercial / Technical Relevance
Methane	CH_4	Approximately 85–99+	Principal energy-bearing component of LNG.
Ethane	C_2H_6	Approximately 0–10	Heavier hydrocarbon that influences calorific value and liquid density.

Propane	C_3H_8	Approximately 0–5	Contributes to gross heating value and affects LNG physical properties.
Iso-Butane	i-C_4H_{10}	Generally trace to approximately 1.5	Heavier hydrocarbon component affecting density and energy characteristics.
Normal Butane	n-C_4H_{10}	Generally trace to approximately 1.5	Heavier hydrocarbon component included in the total C_4 fraction.
Pentanes and Heavier Hydrocarbons	C_5+	Generally trace quantities to approximately 0.2	Heavy hydrocarbon fraction controlled according to liquefaction and receiving-terminal requirements.
Nitrogen	N_2	Approximately 0–2	Inert component that affects heating value, density and vapor characteristics.
Carbon Dioxide	CO_2	Normally trace after LNG pretreatment	Controlled impurity removed or reduced during natural gas processing.

Oxygen	O_2	Normally very low	Controlled component subject to applicable terminal and gas-quality limits.
Hydrogen Sulphide	H_2S	Normally very low or below agreed limits	Sulphur compound controlled through gas treatment and contractual quality requirements.
Mercaptans	R-SH	Normally very low or below agreed limits	Sulphur-containing compounds subject to the applicable total sulphur specification.
Water / Moisture	H_2O	Removed to very low levels during pretreatment	Controlled to prevent freezing, hydrate formation and operational problems.
Mercury	Hg	Trace / controlled at very low levels	Controlled trace contaminant due to its potential impact on aluminium cryogenic equipment.

2. LNG Physical, Thermal and Energy Specifications

LNG physical and energy characteristics are essential for determining commercial value, storage requirements, transportation arrangements and compatibility with the receiving facility. These parameters are calculated or measured using the applicable composition analysis and agreed reference conditions.

Property / Characteristic	Indicative Commercial Value	Unit / Reference Conditions	Technical Relevance
Liquid Storage Temperature	Approximately -162	°C; near atmospheric pressure	Cryogenic temperature required to maintain natural gas in liquid form at near-atmospheric pressure.
LNG Liquid Density	Approximately 420–480	kg/m³; composition and temperature dependent	Used in cargo quantity, mass and energy calculations.

Gross Calorific Value (Mass Basis)	Approximately 52–56	MJ/kg	Energy released by complete combustion on a mass basis, including the latent heat of water condensation.
Net Calorific Value (Mass Basis)	Approximately 47–50	MJ/kg	Energy value excluding the latent heat recovered through condensation of combustion water.
Gross Calorific Value (Gas Volume Basis)	Approximately 38.99–47.00	MJ/Nm^3; reference conditions must be stated	Energy content of regasified natural gas, calculated from the gas composition.
Net Calorific Value (Gas Volume Basis)	Approximately 35.18–42.90	MJ/Nm^3; reference conditions must be stated	Net energy content of regasified natural gas.
Gross Wobbe Index	Approximately 49.9–58.3	MJ/Nm^3; reference	Indicates interchangeability of fuel gases in combustion equipment, subject to

		conditions must be stated	the relevant equipment and network requirements.
Relative Density of Regasified Gas	Approximately 0.55–0.70	Dimensionless; relative to air	Used in gas-quality and combustion calculations.
Methane Number	70 minimum in some published terminal specifications; approximately 73–93 typical in one published specification	Dimensionless; calculation method dependent	Relevant to knock resistance and performance in certain gas engines.
Volume Reduction Through Liquefaction	Approximately 600:1	Gas-to-liquid volume ratio; conditions dependent	Allows large quantities of natural gas to be transported and stored in liquid form.
Appearance	Clear, colourless liquid	Physical characteristic	Normal visual appearance of LNG.

Odour	Odourless in its untreated form	Physical characteristic	LNG is generally not odorized in the same way as some distributed natural gas systems.

3. Commercial LNG Quality Acceptance Parameters – Example Terminal Specification

International LNG terminals establish quality acceptance requirements to ensure that incoming cargoes are compatible with terminal storage, regasification equipment and the downstream gas network.

The following matrix reproduces a representative set of published LNG terminal limits. It is based on the Gasum LNG and LBG terminal quality specification and is included as an example of the type of acceptance criteria that may be used in commercial LNG transactions.

Quality Parameter	Unit	Example Minimum	Example Maximum
Methane	mol %	80.0	—

Ethane	mol %	—	9.0
Propane	mol %	—	3.0
n-Butane + i-Butane	mol %	—	1.0
n-Pentane + i-Pentane	mol %	—	0.2
Hexane	mol %	—	0.1
Nitrogen	mol %	—	1.2
Carbon Dioxide	mol %	—	0.01
Gross Calorific Value	MJ/Nm^3	38.99	47.00

Net Calorific Value	MJ/Nm³	35.18	42.90
Gross Wobbe Index	MJ/Nm³	49.9	58.3
LNG Liquid Density	kg/m³	420	480
Methane Number	—	70	93 typical range
Total Sulphur	mg/Nm³	—	30

Reference conditions: The published Gasum specification identifies its calorific-value reference conditions and calculation basis. The reference temperature and pressure used in any commercial LNG contract must be stated explicitly. Nm³ values from different documents should not be compared without checking their reference conditions.

4. Additional LNG Terminal Quality Controls – Sulphur, Impurities and Contaminants

In addition to hydrocarbon composition and energy content, LNG receiving facilities may impose limits on sulphur compounds, oxygen, carbon dioxide, water, mercury, hydrocarbon dew point and physical contaminants.

The following table provides examples of additional quality controls appearing in published terminal specifications. Limits vary between terminals and should be treated as destination-specific acceptance criteria.

Property / Contaminant	Unit	Example Published Limit	Technical Purpose
Hydrogen Sulphide (H_2S)	mg/Nm³ or mg/Sm³	Example terminal limit: 5 mg/Sm³	Controls corrosive and toxic sulphur compounds.
Total Sulphur	mg/Nm³	Example terminal limits include 21–30 mg/Nm³	Controls the combined sulphur content under the applicable analytical definition.

Mercaptans	mg/Nm³	Destination-specific; one published terminal manual specifies 6 mg/Sm³	Controls organic sulphur compounds.
Carbonyl Sulphide (COS)	mg/Nm³	Included in certain combined H_2S + COS limits	Additional sulphur-compound control where specified by the terminal.
Oxygen	mol %	Example limits include 0.02–0.6	Controls oxygen concentration in the delivered gas specification.
Carbon Dioxide	mol %	Example terminal limits include 0.01–2.5	Controls CO_2 concentration to protect cryogenic and downstream systems.
Water / Moisture	ppm by volume or other agreed basis	Very low residual moisture; one published terminal manual specifies 0.1 ppm by volume	Prevents freezing, hydrate formation and operational problems.

Mercury	ng/Sm³ or equivalent	Example published limit: 10 ng/Sm³	Controls trace mercury due to its potential to damage aluminium heat exchangers.
Hydrocarbon Dew Point	°C at stated pressure	Example terminal limit: 0°C under specified pressure conditions	Controls the risk of heavier hydrocarbons condensing in downstream gas systems.
Solids / Particulate Matter	Inspection / agreed filtration criteria	No unacceptable solid or liquid contaminants	Protects transfer lines, filters, pumps, vaporizers and storage equipment.

Important: The limits in this table originate from different published terminal documents and are not a combined acceptance specification. In particular, ppm, mg/Nm³, mg/Sm³ and ng/Sm³ are different measurement expressions and must not be treated as interchangeable without conversion using the correct reference conditions.

5. Bulk LNG Cargo Specifications – International Maritime and Terminal Deliveries

Bulk LNG is normally traded in large cargo quantities and transported using specialized cryogenic LNG carriers. Such transactions require a complete cargo quality profile, quantity measurement methodology, loading and discharge procedures, and compatibility with the receiving terminal.

For bulk LNG cargoes, the commercial specification normally covers the complete hydrocarbon composition, energy content, liquid density, impurity limits and other parameters required by the receiving facility.

Bulk LNG Parameter	Typical Commercial Reference	Unit	Commercial Importance
Product	Liquefied Natural Gas	—	Cryogenic natural gas product supplied under the agreed SPA.
Principal Component	Methane, with associated natural gas components	mol %	Defines the principal composition of the cargo.

Liquid Density	Approximately 420–480	kg/m³	Used in cargo volume, mass and energy calculations.
Liquid Temperature	Approximately -160 to -162	°C; product and pressure dependent	Determines cryogenic handling and storage conditions.
Gross Calorific Value	Destination-specific; example terminal range 38.99–47.00	MJ/Nm³	Important for energy settlement and downstream gas compatibility.
Gross Wobbe Index	Destination-specific; example terminal range 49.9–58.3	MJ/Nm³	Used to assess gas interchangeability and combustion compatibility.
Methane Number	Destination and application dependent; some terminals specify a minimum of 70	—	Relevant to LNG used in gas engines and certain marine applications.

Total Sulphur	Example published terminal maximum: 30	mg/Nm³	Controls sulphur-related quality and emissions characteristics.
Quantity Determination	Agreed cargo measurement and energy calculation procedure	m³, tonnes, MMBtu or GJ	Establishes the delivered quantity and commercial settlement basis.
Delivery Point	Named LNG loading or receiving terminal	Contractual location	Determines custody transfer, inspection and delivery obligations.

Bulk LNG transactions commonly require the following supporting technical and commercial documents, depending on the contract and delivery arrangement:

- Certificate of Quality (CoQ).
- Certificate of Analysis (CoA).
- Detailed LNG composition report.
- Gross and net calorific value calculation.
- Wobbe Index calculation.
- LNG density and temperature measurement records.
- Loading port quantity and quality documentation.
- Bill of Lading for maritime shipments.
- Independent surveyor report, where appointed.
- Safety Data Sheet (SDS).
- Certificate of Origin, where applicable.

6. Small-Volume LNG Specifications – Road Tankers, ISO Containers and Industrial Distribution

Small-volume LNG supply uses the same fundamental LNG product as large-scale LNG trading. The distinction is principally in the quantity delivered, transportation equipment, storage capacity, transfer arrangements and the receiving customer's technical requirements.

Small-scale LNG is commonly supplied through cryogenic road tankers, ISO cryogenic containers, satellite storage installations and dedicated industrial distribution systems. The product remains subject to composition, energy-content, density and impurity requirements agreed with the supplier and receiving facility.

Small-Volume LNG Parameter	Technical Requirement / Reference	Unit	Application / Relevance
LNG Composition	Methane-rich natural gas with composition documented by the supplier	mol %	Applies to road tanker, ISO container and satellite installation deliveries.
Gross / Net	Declared through the applicable Certificate of	MJ/kg or MJ/Nm³	Used to establish energy content and suitability for the customer's equipment.

Calorific Value	Quality and composition analysis		
LNG Density	Measured or calculated according to the agreed procedure and actual composition	kg/m³	Used for delivered quantity and inventory calculations.
Storage Temperature	Cryogenic temperature appropriate to LNG composition and storage pressure	°C	Required for insulated cryogenic tanks and transfer equipment.
Storage Pressure	Specified by the cryogenic tank and delivery system design	bar / kPa	Must remain within the approved operating limits of the storage and transfer equipment.
Water / Moisture	Controlled to the applicable LNG product and terminal specification	ppm or agreed analytical unit	Important for cryogenic operation and prevention of freezing-related problems.

Sulphur Compounds	Within the agreed total sulphur and individual compound limits	mg/Nm³ or other contract unit	Relevant to combustion equipment, emissions and customer quality requirements.
Carbon Dioxide / Nitrogen	Within the applicable composition and receiving-system limits	mol %	Influences energy content, gas quality and operating characteristics.
Delivery Measurement	Calibrated transfer meter or agreed tank measurement procedure	kg, tonnes or m³	Determines the quantity transferred to the receiving installation.
Boil-Off Gas Management	Controlled by the approved tank design and operating procedure	System-specific	Relevant to storage duration, pressure management and product handling.
Product Documentation	Certificate of Quality, delivery documentation and SDS, as applicable	Documents	Supports product traceability and receiving inspection.

Small-Scale LNG Delivery Formats and Typical Commercial Applications

Small-volume LNG can serve customers who do not have access to a direct natural gas pipeline or who require a flexible cryogenic fuel supply arrangement.

Supply Format	Delivery Method	Typical Customer	Technical Considerations
LNG Road Tanker	Cryogenic road tanker delivery to an approved receiving installation.	Industrial facilities, factories, commercial energy users and satellite terminals.	Tank compatibility, transfer connection, pressure management and delivery measurement.
ISO Cryogenic Container	Intermodal transportation by road, rail or sea using an approved cryogenic container.	Remote industrial users, international distribution and locations without pipeline access.	Container design approval, handling compatibility, insulation and transport regulations.
Satellite LNG Storage	Delivery into a stationary cryogenic storage facility with	Industrial plants, commercial distribution systems and	Storage capacity, vaporizer sizing, pressure regulation

	downstream vaporization.	remote energy users.	and customer demand profile.
Small-Scale LNG Marine Supply	Approved LNG bunkering or ship-to-ship / truck-to-ship transfer arrangements.	Vessels and marine operators using LNG as fuel.	Fuel quality, custody transfer, bunkering procedures and applicable marine fuel requirements.

7. Lean LNG, Rich LNG and LNG Grade Variations

Commercial LNG can be described according to its relative hydrocarbon composition. These descriptions are useful when assessing the relationship between methane concentration, heavier hydrocarbons, density and energy content.

LNG Type / Variation	Composition Characteristics	Typical Technical Characteristics	Commercial Application
Lean LNG	Relatively high methane concentration and lower concentrations of heavier hydrocarbons.	Generally lower liquid density and potentially lower volumetric heating value than richer LNG, depending on composition.	Gas networks and industrial consumers whose equipment and contracts accept the relevant composition and energy profile.
Rich LNG	Comparatively higher concentrations of ethane, propane and other heavier hydrocarbons.	May have higher gross heating value and different density, Wobbe Index and combustion characteristics.	Industrial and commercial consumers whose receiving systems can accommodate the delivered gas quality.

Pipeline-Compatible LNG	Composition selected to meet the requirements of a particular receiving gas network after regasification.	Subject to network limits for calorific value, Wobbe Index, relative density and impurities.	LNG terminals supplying gas transmission and distribution networks.
Marine Fuel LNG	LNG meeting the applicable fuel-quality requirements for the intended marine engine and delivery arrangement.	Quality assessment may include composition, methane number, energy content and other fuel parameters.	Marine propulsion and auxiliary power applications.
Bio-LNG / Renewable LNG	Liquefied biomethane or renewable methane that meets the applicable LNG quality requirements.	Can have physical and chemical properties comparable to conventional LNG, subject to its composition and processing.	Customers seeking renewable gas supply supported by appropriate sustainability and origin documentation.

8. LNG Testing Methods and Applicable International Standards

LNG quality is established through a combination of laboratory analysis, composition calculations, physical measurement and agreed custody-transfer procedures. The relevant standards depend on the parameter being tested and the intended application.

International Standard	Technical Scope	Application in LNG Trading
ISO 6974	Natural gas composition determination by gas chromatography.	Determination of methane, ethane, propane, butanes, nitrogen and other gas components.
ISO 6976	Calculation of calorific values, density, relative density and Wobbe Index from gas composition.	Calculation of gross and net heating values and combustion characteristics.
ISO 6578	Refrigerated hydrocarbon liquids – determination of density using calculation methods.	LNG density determination and related quantity calculations.

ISO 8943	Sampling of liquefied natural gas using continuous and intermittent methods.	Representative LNG sampling during transfer and custody-transfer operations.
ISO 19739	Determination of sulphur compounds in natural gas by gas chromatography.	Analysis of relevant sulphur-containing compounds in gas samples.
ISO 23306:2020	Specification of LNG as a fuel for marine applications.	LNG fuel quality requirements and relevant test reference methods for marine applications.
ISO 16903	Characteristics of LNG, influencing the design and material selection of LNG installations.	Technical reference for LNG properties and facility design considerations.

The applicable edition of each standard, the precise analytical procedure and any national or terminal-specific requirements should be confirmed in the relevant contract. A standard's inclusion in this table does not mean that every test is mandatory for every LNG delivery.

9. LNG Quality Documentation and Certificates Available to Buyers

Depending on the supply arrangement, delivery location and contractual requirements, buyers may request a technical and commercial documentation package to verify the identity, quality, quantity and origin of the LNG being supplied.

Document / Certificate	Purpose	Typical Transaction Stage
Certificate of Quality (CoQ)	Records the agreed technical quality characteristics of the LNG.	Loading, dispatch or delivery, as agreed.
Certificate of Analysis (CoA)	Provides analytical results for the tested LNG sample or gas composition.	Quality verification.
LNG Composition Report	Identifies the relative proportions of methane and other relevant components.	Quality assessment and energy calculation.
Calorific Value Report	Records gross and net heating values using the agreed reference conditions.	Energy settlement and customer acceptance.

Density Measurement Report	Supports LNG quantity and energy calculations.	Loading, unloading or transfer.
Independent Inspection Report	Documents the inspection scope and relevant observations of the appointed independent surveyor.	Where required by the buyer, seller or terminal.
Safety Data Sheet (SDS)	Provides product hazard, handling, storage and emergency information.	Before handling, transportation and receipt.
Certificate of Origin	Provides origin information where issued and applicable to the transaction.	Commercial, customs or regulatory documentation.
Bill of Lading	Records maritime shipment and carriage details.	Bulk LNG maritime cargoes.
Delivery / Transfer Record	Records the delivered quantity and relevant transfer information.	Road tanker, ISO container and other small-volume deliveries.

Vanilla+ / Indico Stratton Corporation LTD works to establish the applicable LNG quality, measurement and documentation requirements before commercial execution. This allows buyers to assess the product against their intended application, receiving infrastructure and contractual acceptance criteria.

For bulk cargoes and small-volume deliveries alike, the final LNG specification should be confirmed in writing before loading or dispatch. The Certificate of Quality, agreed measurement procedure and receiving facility requirements provide the technical basis for determining whether the delivered product complies with the transaction.

About Liquefied Natural Gas

Liquefied Natural Gas is one of the most important internationally traded energy commodities. It allows natural gas to be transported between countries and regions that are not directly connected through conventional natural gas pipeline infrastructure.

Natural gas is extracted from underground reservoirs, offshore gas fields and other geological formations. Before it can become commercial LNG, the extracted gas undergoes processing to remove unwanted substances and components that could interfere with liquefaction, transportation or its intended end use.

Depending on the source gas, this treatment can include the removal of water, carbon dioxide, hydrogen sulphide, mercury and heavier hydrocarbon components. The treated gas is subsequently cooled through an industrial liquefaction process until it becomes a cryogenic liquid.

At approximately -162°C under atmospheric-pressure conditions, natural gas becomes liquid LNG. Its volume is approximately 1/600 of its original gaseous volume, which provides a major logistical advantage for international transportation and storage.

When LNG reaches its destination, it can be stored in specialized insulated tanks and subsequently converted back into gaseous natural gas through a process called regasification. The resulting gas can then be supplied to pipelines, industrial facilities, power stations and commercial customers.

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