| | | |
|---|---|---|
| MDC energia é valor | **TECHNICAL SPECIFICATION** | Nº: **P2105-PRC-001** |
| | PROJECT: **132 TPD LNG PLANT** | SHEET: 1 de 4 |
| | NÚMBER: **05.2021** | |
| | LOCAL: **BRAZIL** | |
| | TITLE: **REQUEST FOR PROPOSAL** | |

## INDEX OF REVISION

| REV. | DESCRIPTION |
|---|---|
| 0 | ISSUED FOR QUOTATION |

| | REV. 0 | REV. 1 | REV. 2 | REV. 3 | REV. 4 | REV. 5 | REV. 6 | REV. 7 | REV. 8 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 01/12/2021 | | | | | | | | |
| EXECUTION | JEF | | | | | | | | |
| VERIFICATION | DW | | | | | | | | |
| APPROVAL | LNF | | | | | | | | |

## 1.SCOPE OF SUPPLY

The purpose of this specification is to establish the minimum requirements for the quotation and purchase of 01 (ONE) **LNG PLANT** to be installed in Brazil.

The PROPONENT is free to propose the solution that fits to the process conditions informed in Item 5. PROCESS DATA AND REQUIREMENT, considering the best cost/benefits among **natural gas liquefaction technologies available in the market.**

## 2.SYSTEM OF UNITS

The quotation must be addressed in International System of Units (SI) with exception to pressure that must be informed in bar / barg and temperature that must be informed in ºC, where applicable.

## 3. LOCAL ENVIRONMENT CONDITIONS

| | **Design** | Hot Day | Cold Day | Aver. Day | Units |
|---|---|---|---|---|---|
| Barometric Pressure | 0.953 | 0.953 | 0.953 | 0.953 | bar a |
| Dry Bulb | 29.7 | 33.2 | 13.7 | 20.6 | $^0$C |
| Wet Bulb | 24.7 | 25.4 | 7.7 | 15.6 | $^0$C |
| Relative Humidity | 66.82 | 67.27 | 42.77 | 59.86 | % |
| Wind Speed | 55 | | | | km/h |
| Seismic Zone | Not Applicable | | | | - |
| Power | 440 V / 60 Hz / 3 phases | | | | - |
| Electrical Area Classification | Greenfield | | | | - |

## 4. UTILITIES AND POWER

All utilities (cooling water, steam, nitrogen etc) and power consumption needed to operate the LNG plant must be listed and quantified in the quotation.

Local power supply is available, no cooling water or make-up available.

## 5. EFFLUENT AND EMISSIONS

All effluent and emissions shall be informed in the quotation with flow and composition.

## 6. PROCESS DATA AND REQUIREMENT

| | | |
|---|---|---|
| Tag | UN-1000 | |
| Technology | Natural Gas Liquefaction | |
| Operation | Continuous | |
| Service | LNG | |
| **Product LNG Requirements** | | |
| Flow | 5,500 | kg/h |
| Pressure Min. | 1.0 | barg |
| Temperature Máx | -162 | °C |
| Composition (ANP 16/2008) | | |
| Methane Min | 90.0 | mole % |
| Ethane Max | 10.0 | mole % |
| Propane Max | 1.0 | mole % |
| Butane+ Max | 0.5 | mole % |
| Oxygen Max | 0.5 | mole % |
| Nitrogen Max | 3.0 | mole % |
| Carbon Dioxide Max | 1.0 | mole % |
| Hydrogen Sulfide | 0 | $mg/m^3$ |
| Total Sulphur | 0 | $mg/m^3$ |
| High Heat Value | 35,000 a 43,000 | $kJ/m^3$ |
| Wobbe Index | 46,500 a 53,500 | $kJ/m^3$ |
| | | |
| **Raw Natural Gas Conditions** | | |
| Flow max | (1) | kg/h |
| Pressure Min. | (1) | barg |
| Temperature Max | 45 | °C |
| Composition(2) | | |
| Methane | 89.3891 | mole % |
| Ethane | 4.4092 | mole % |
| Propane | 0.8963 | mole % |
| i-Butane | 0.2369 | mole % |
| n-Butane | 0.5151 | mole % |
| i-Pentane | 0.2781 | mole % |
| n-Pentane | 0.2678 | mole % |
| n-Hexane | 1.5968 | mole % |
| Heptane+ | 0.0000 | mole % |
| Hydrogen Sulfide | 0.01 | $mg/m^3$ |
| Total Sulphur | 2.44 | $mg/m^3$ |
| Water | Saturated | |

**Notes:**

(1) To be defined and informed by Vendor.

(2) To be confirmed in later stages.

## 7. REQUIRED DOCUMENTS WITH QUOTATION

Proponents must issue technical-commercial proposal with the following documents as a minimum:

I. Milestone schedule;
II. Capex and Opex;
III. Process description;
IV. Block flow diagram with heat and material balance;
V. General arrangement;
VI. Equipment list;
VII. List of utilities consumption;
VIII. List of power consumption;
IX. Automation philosophy and communication protocol;
X. Catalogs.
XI. List of previous projects with scope of supply

## 8. STANDARS AND CODES

**Process and Mechanical**

ASME BPVC VIII Div.1 Boiler and Pressure Vessel Code
ASME B16.5 Pipe Flanges and Flanged Fittings
ASME B16.9 Factory-Made Wrought Buttwelding Fittings
ASME B16.10 Face-to-Face and End-to-End Dimensions of Valves
ASME B16.11 Forged Fittings, Socket-Welding and Threaded
ASME B16.34 Valves - Flanged, Threaded and Welding End
ASME B18.2.2 Square and Hex Bolts and Screws (inch series)
ASME B31.3 Process Piping
ASME B36.19 Stainless Steel Pipe
ASME RTP-1 Reinforced Thermoset Plastic Corrosion-Resistant Equipment
API 520 Sizing, Selection, and Installation of Pressure-relieving Devices
API 521 Pressure-Relieving and Depressing Systems
API 526 Flanged Steel Pressure Relief Valves

**Electrical**

IEC 60079 Explosive Atmospheres
NFPA 70 National Electrical Code (NEC) - Installation of electrical wiring and equipment
NFPA 497 Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Area