

# **ENERGY INFRASTRUCTURE Ltd.**

## **ESHEL TERMINAL.**

## **VAPOR COMBUSTION UNIT (VCU)**

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**(Ver. 002)**

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## 1. **GENERAL:**

This document is an order specification and scope of work for the design, construction, inspection, installation and commission of a vapor combustion unit (VCU).

The VCU shall be used for handling gasoline vapors generated or displaced during loading of road tank trucks at ESHEL terminal.

## 2. **SITE CONDITION:**

Ambient Temperature:	2-40 °C
Elevation:	210 m'
Humidity:	40%- 90%
Rain falls:	350 mm'/year
RVP gasoline (winter):	80 kpa.
(summer):	50 kpa.
Loading Switches:	Yes
Electrical power (volt, phase, cycle):	400, 3, 50 Hz.
Zone classification:	Zone 2 Group IIA T3

## 3. **SCOPE OF SUPPLY:**

The manufacturer shall be the responsible for design, fabrication, testing, supply, delivery, erection, commission and performance testing of the VCU system on the site.

The design shall contain the 8" main vapor line calculation according to the specified loading profile. According to the calculation the VCU manufacturer shall determine the need for the supply and installation of blower.

The unit shall be tasted according to the following tests:

- Factory Acceptance Test (FAT) prior to factory release.
- Commissioning & Performance Test (C&PT).

The VCU shall be pre-fabricated and supply on steel frame to minimized field works. The unit shall contain all the equipment such as but not limited: valves, pipes, electrical elements, instrument devices, control equipment necessary for safe operation:

- VCU unit
- Blower unit operated with VFD system (if necessary).  
The blower (if necessary) steel frame shall be fitted with a roof against sun and rain.
- Detention Arrestor.
- Variable Frequency Driven (VFD) air-assisted fan (if necessary).
- Burner units.
- Emergency Shutoff Valve
- Automatic dampers for controlling of combusting air.
- Sampling nozzles: for sampling of flue gas, according to the Israeli regulation as specify at document "Stack Emission Testing Procedure".

#### 4. **EXCLUDED WORKS:**

- Civil Works foundation
- Electrical site cables from electricity room to the VCU.
- Interconnection pipework between VCU and site equipment (vapor line calculation shall be part of the VCU manufacturer work).
- Anchor bolts.
- Firefighting equipment and pipelines.
- Lightning protection.
- Earthing connection.
- LPG system: Tank, pipelines, valves and all accessories needed for system supply and installation.

#### 5. **VCU REQUIRMENTS:**

- The VRU shall be designed in such a way to minimize the on-site assembly work.
- The VRU shall be designed for truck fuel loading terminal operation of 12 hours 5 days per week and additional day of 5 hours operation.
- The unit shall be designed for outdoor operation where the ambient temperature range is between 2-40 °C.  
Equipment sensitive to temperatures outside of this range shall be protected from excess heating due to solar radiation.
- The design and construction of the VCU shall be of a sound engineering standard and fit for purpose. The design shall comply with

- all statutory requirements and meet the requirements of the national and international codes and standard.
- The unit shall be operated with no visible smoke, flame, backfire or odor during all process neither at startup, shutdown or at regular operation
- The VCU shall achieving Volatile Organic Compound (VOC) Destruction Efficiencies (DRE) up to 99.9%.  
Benzene: 1 mg/Nm<sup>3</sup>  
NO<sub>2</sub>: 200 mg/Nm<sup>3</sup>  
CO: 100 mg/Nm<sup>3</sup>
- The unit shall be handling all kind of distillate vapors, such as but not limited: gasoline vapors, diesel vapors, kerosene vapors. The vapors shall be released during the bottom loading of fuel trucks at the terminal.
- Process data:
  - ✓ Max total loading: 1400 m<sup>3</sup>/hr.
  - ✓ Distillates loading: 800 m<sup>3</sup>/hr.
  - ✓ Gasoline loading: 600 m<sup>3</sup>/hr.
- Electrical power (volt, phase, cycle): 400, 3, 50 Hz.

## 6. VCU TECHNICAL SPECIFICATION:

- GENERAL:
  - ✓ All pipes shall be conforming to API standard.
  - ✓ All flanges shall be conforming to ANSI #150 or #300 R.F welded neck for flange 2" and above, and socket weld for flange smaller than 2".
  - ✓ All studs and nuts shall be cadmium plated, B-7 grade studs and 2-H grade nuts.
  - ✓ The gaskets shall be spiral wound gasket acc. To ASME B 16.20 graffiti filled
  - ✓ Pipes 2"-10" shall be at least schedule 40. Pipes larger than 10" shall be standard weight.
  - ✓ Pipes 2" and smaller shall be schedule 80 with socket weld fittings.
  - ✓ All accessories shall be supply from western manufacturer.
  - ✓ External coating and painting:
    - SA 2 ½ sand blast.
    - Primer: Recoatable zinc silicate primer reinforced with epoxy resin -75 microns.

Mid: Recoatable high solid mastic – 125 microns.

Top coat: Recoatable aliphatic polyurethane top coat – 50 microns.

The color (RAL) will specify by the contractor.

- EQUIPMENT SPECIFICATION:

- ✓ VCU

- ✓ Blower: Blower operated with VFD stem (if necessary according to manufacturer loading profile and existing 8" vapor line and a new 8" installation vapor line connected to the VCU) .

- ✓ Steel frame:

All accessories shall be installed on a steel frame for easy transportation and installation.

The unit will be a modular structure fabricated from carbon steel profiles. Lifting lugs will be designed and installed at the appropriate points and allow safe lifting. Jacking bolts will be installed at appropriate points to allow levelling of the unit on its concrete pad.

Earthing points according to the electrical standard will be fitted at each end.

The unit will include all pipe supports as required to accommodate the pipe-work, junction boxes, cables trays etc.'.

- ✓ The unit shall be fitted with access Ladder & Platform to sample ports & combustion chamber

- ✓ Detonation arresters.

The vapor line shall be fitted with flame detonation, type 1, to separate the Vapor Combustion System from the vapor recovery unit (VRU), he loading system.

- ✓ Control panel, Instrument & Software.

The control panel shall be fitted with Programmable Logic Controller. (במידה ונדרש בקר מיצרן מסוים נא לפרט ונעדכן)

- ✓ The vendor shall provide:

1. A complete software
2. Ladder diagrams of the PLC.
3. Programming software for the PLC
4. HMI

5. The vendor shall supply a P&ID of the VCU system that will show the position of all valves/motors/solenoids etc.'. It will include all 4-20 mA signals such as temp', pressure and flow.
  6. The operation program shall be capable of producing a list showing all shut down of the VCU had over the last 30 days.
- FIELD CONNECTIONS:
    1. All unit connections and wiring to and from the unit equipment to the unit panel will be done by the vendor.
    2. All field (out of VCU foot print) cables conduits and trenches will be provided by the customer (PEI).
    3. The vendor will provide all information, documents drawings quantities, types and sizes of cables, and conduit.  
All connections will be done by the vendor.
  - INSTRUMENTS & PROTOCOL:
    - ✓ The connections to the HMI must be provided with an open plug, which will enable the customer to change parameters (not for reading only). The system shall be open to changes and additions by the customer protected with password.
    - ✓ The instruments will be provided with HART protocol and calibration software.
    - ✓ The instrument shall be suitable for outdoor installation, rustproof, waterproof and according to area safe classification.
    - ✓ The VCU shall be equipped with all instrument, wired by means of appropriate cable and cable trays and supports. The cable shall be connected to junction box on the unit skid.
    - ✓ Instruments shall be fully wired in accordance with appropriate NFPA 70 NEC and ISA regulation.
    - ✓ All wiring shall be fully tested and certified before applying power.
    - ✓ All electrical instruments shall be at least IP 65.
    - ✓ Junction boxes for cable termination will be NEM4X rated.
    - ✓ All field instruments shall have UL approved and or ATEX explosion protection documents.
    - ✓ The vendor shall supply wiring diagrams for all instruments.
    - ✓ Instrument flange connections will be of ANSI type.
    - ✓ All screwed instruments connection shall be made with ASME blind flange fitted with NPT connection and valves.

- ✓ A data sheet shall be supplied for each instrument.
- ✓ Maintenance manuals shall be supplied for each instrument.

## 7. **INFORMATION TO BE SUPPLY BY THE VENDOR:**

- **TECHNICAL:**

- ✓ Equipment drawings
- ✓ Equipment Weight
- ✓ VCU Base frame Dimension.
- ✓ Blower Base frame Dimension. (If necessary)
- ✓ Total Weight (VCU, Blower)
- ✓ Combustion Chamber Temperature Range.
- ✓ Max Support Gas Flow Rate (LPG)
- ✓ Min Support Gas Flow Rate (LPG)
- ✓ Support Gas Pressure Range
- ✓ Noise Level @ 1 m' from VCU
- ✓ Emergency Shutdown Valve (Dia. Manufacturer, etc.)
- ✓ VFD Blower Specification (if necessary).
- ✓ VFD Fan Specification (if necessary)
- ✓ Burner Specification.
- ✓ PLC specification
- ✓ Gas Inlet Diameter.
- ✓ Document:
  1. Full PI&D
  2. System drawings (construction, mechanical, electricity, Pannel diagram – dimension layout, section view, as made drawing)
  3. System foot print.
  4. Process and system description – Data sheets.
  5. System accessories specification.
  6. Maintenance and startup procedures.
  7. System manual document
  8. Training description procedure.

## 8. **PERFORMANCE GURANTEE:**

- Supplier shall guarantee the defined process performances of the VOC treatment system in accordance with the requirements of this specification.  
If the process performances are not achieved, supplier shall make all the required modifications at his expenses, inclusive of materials and labor at the site of installation, in order to meet the contractual requirements
- Any deviation from the minimum emissions requirement shall cause the rejection of the system and a full refund by the vendor.
- The vendor will guarantee that the system shall be well function without need to replace or renovate equipment or major components due to normal wear, fracture, or mechanical failure. at least 36 mounts from the start-up time
- In the event a defect is found with any of the equipment during the above period of time vendor will repair or replace the defective equipment free of charge in one week upon notice of such defect from purchaser. If vendor does not respond to request for repair, in a time frame acceptable to purchaser, purchaser will be entitled to carry out the repair by himself, with the cost to the account of the vendor.
- The vendor shall conduct a Performance Test. The performance test terms and conditions will be agreed upon between the vendor and PEI.

## 9. **NAMEPLATE:**

Each item shall have an individual nameplate made of stainless steel.

The name plates contain the following data:

Equipment Service.

Manufacturer name.

Model number.

Manufacture date.

PI&D Number.



#### 10. **PACKING:**

Prior to packing the unit shall be cleaned both internally and externally, and the interior protected by a suitable rust preventative and all opening sealed with either plastic plugs or plywood covers securely bolted to flange.

**Appendix "A":****Documentation Requirements:**

The following table specifies the documents required at the various stage of the supply:

Column A: Shows documents to be submitted with bids.

Column B: Shows documents to be submitted for approval with in eight (8) weeks of the issue of the purchase order.

Column C: Shows final and certified documents to be submitted on delivery of the VCU.

Item	Document	Stage of supply		
		A	B	C
		N° of copies		
.1	Summary of equipment design basis and capacity.	6	3	6
.2	P&ID of VCU	6	3	6
.3	General outline dimensions.	6	3	6
.4	General arrangement plane & elevation.	6	3	6
.5	Electrical & Instrumentation drawing package.	6	3	6
.6	Utility Summary.	6	3	6
.7	Foundation requirements and loads.		3	6
.8	Cross-sections of the unit with complete list of parts, description and material specification.	6		6
.9	Completed VCU data sheets.	6		6
.10	Installation operating and maintenance instruction Hebrew and English allowable nozzle loads and moments.		3	6
.11	List of any special tools required.	6		
.12	List of spare parts recommended for two (2) years operation with itemized prices.	6		6
.13	Test certificates.			3
.14	Vendor and sub-contractor list.	6	3	
.15	Project time line or Gantt chart.	6	3	
.16	Recommendation and experience	1		