• Burners
• Flares
• Incinerators
• Combustion Rentals
• Vapor Control Products

22151 East 91st Street
Broken Arrow, OK 74014 USA
Ph: +1-918-258-8551
Fx: +1-918-251-5519
sales@zeeco.com
www.zeeco.com

Please Return to : sales@zeeco.com
Tel : +1-918-258-8551

STORAGE TANK FILLING / BREATHING VRU – INQUIRY DATA SHEET

DATE : _____

PROJECT REFERENCE NUMBER : _____

CUSTOMER : _____

END USER: _____

JOBSITE LOCATION : _____

REQUIRED DATE OF QUOTE : _____

ANTICIPATED DATE OF AWARD : _____

REQUIRED SHIP DATE / DELIVERY TIME : _____

NOTE : PLEASE PROVIDE AS MUCH INFORMATION AS POSSIBLE. IF YOU ARE NOT ABLE TO PROVIDE ALL OF THE INFORMATION WE WILL MAKE AN ASSUMPTION BASED ON OUR EXPERIENCE AND KNOWLEDGE OF SIMILAR SYSTEMS.

1. **PRODUCT DATA**
   - Product Held In Tanks :_____
   - Multiple Products : _____
   - Reid Vapour Pressure : (*Please provide for each product*). _____
   - Product Temperatures : (Please provide for each product).
     Summer Max / Summer Ave / Winter Max: _____
   - Product Composition (if available) : Please provide as separate sheet.
   - Vapour Composition (*if available*) : Please provide as separate sheet.

2. **VRU Emissions Requirement :** ie (35g/Nm^3 / 10g/Nm^3 / 150mg/Nm^3 / other): _____

3. **Tank Data.** (*Please provide data for each tank included in the system*).
   - Number of Tanks to be connected to the VRU system : _____
   - Size of Tanks : Diameter / Wall Height: _____
   - Maximum Liquid Level; Minimum Liquid Level: _____
   - Pressure Relief Valve Set Points : Pressure / Vacuum settings: _____
   - Type of Roof : Coned or Floating Roof : _____
   - Blanket Gas (Nitrogen, ship exhaust, air/no blanket, etc) :_____

4. Filling Rates

- Fill Rate each Storage Tanks : _____
- Number of tanks that can be filled simultaneously : _____
- Notes :

5. Absorbent / Properties

- Absorbent : _____
- Absorbent Properties : Reid Vapour Pressure : Summer / Winter / Intermediate : _____
- Temperature : Max Summer / Max Winter : _____
- Composition: (*Provide separately if available*).

6. Ambient Conditions

- Temperature : Max Summer / Ave Summer / Min Winter : _____
- Recognised Site Design Temperatures : _____
- Maximum Wet Bulb Temperature : _____
- Site Location / Elevation : Coastal / Inland / Elevation above sea level : _____
- Site Latitude : _____
- Site Wind Design Code / Wind Speed _____
- Site Seismic Design Code / Parameters _____

Available Utilities

- Electricity :
  Power: _____V _____ Phase _____Hz
  Control: _____V _____ Phase _____Hz
- Instrument Air (Yes/No) :_____
  Min Pressure: _____
  Max Pressure: _____
- Hazardous Area Classification (ie, Class 1, Div 2, Group D) :_____

8. Equipment Design

- Liquid Seal Drum (yes/no) : _____
  ASME Code Stamp (yes/no):_____
- Detonation Arrestor (yes/no) : _____
- Dedicated Local PLC or Site DCS Control : _____
- Customer Approved Vendors for Specific Items (PLC, Detonation Arrestor, etc):_____
  _____
- Available Plot Space : _____

Questionnaire – Supporting Notes

1.0 VRU DESIGN DATA SHEET

The design of a vapour recovery unit is specific to the application in which it is used. A properly designed VRU system is important in order to ensure that the unit is neither undersized nor oversized for the terminal, i.e. a system that is appropriately sized for the current and planned future needs. Oversizing would result in a VRU that has excessive power requirements, whereas a VRU that is undersized runs the risk of i) running with higher emissions limits than permitted and/or ii) limiting the loading operations and the terminal.

This Questionnaire/Data Sheet, aims to request a range of data that the VRU designer can utilise to design an appropriately sized VRU.

VAPOUR RECOVERY SYSTEM – USEFUL NOTES

There are many applications where a vapour recovery unit might be used, these are typically:

- Terminals where truck or rail wagon loading is undertaken.
- Terminals where tank filling is undertaken and vapours from these tanks need to be processed.
- Marine terminals where ships are either loaded or unloaded into storage tanks.
- Applications where perhaps a combination of the above are undertaken.

In terms of the VRU design the above applications can be categorised into two primary design approaches:

- Truck Loading Application. This group would generally cover Truck loading and Rail Loading Applications, in which there is NO vapour balancing with the product storage tanks, ie there is no means for the vapours from the trucks to flow back to the tanks.

  For this design approach the product loading and hence vapour flow fluctuates dramatically throughout the operating period. These fluctuations should be accounted for in the design.

- Continuous Duty Application. This group would apply to ship loading, tank filling and breathing and also balanced vapour systems. In these applications the vapour flow rate tends to be continuous for prolonged periods of time. The VRU must be able to account for this demanding vapour flow.

In order to develop an appropriate design a good understanding of the application in which the VRU will be used is required. The following requested data will assist in this process.

It would be very beneficial if as much data as possible can be provided. Naturally there is some data that is an essential minimum that should be provided however where other information is not available we can generally make reasonable assumptions to complete these design process.

2.0 TANK FILLING / TANK BREATHING APPLICATIONS

Tank filling applications fall under the group of continuous duty designs, ie the VRU must be designed to handle a continuous vapour flow over a long period, usually several hours.

Vapour Flow.

Vapour flow from the tanks can be generated from the following mechanisms:

Tank Filling: The process of filling the tanks results in the displacement of vapour from the tank vents into the vapour collection header.

Thermal Growth: The warming of the tanks throughout the day causes expansion of the vapour in the vapour space, in addition to further evaporation / saturation of the vapour space. This expansion will usually result in a out breathing from the tanks.

Draw Out Growth: Where a product is drawn out from a tank, air or inert gases are drawn into the vapour space. Over time the drawn in air/inert gas will become saturated, thus casing vapour growth and an out breathing from the tanks.

The Tank Filling and Thermal Growth factors are usually the most significant of the above three mechanisms, Draw Out vapour Growth can generally be ignored.

Vapour Concentrations:

Hydrocarbon Concentrations in the vapour phase are determined from by the Vapour Pressure of the product in the tank and the temperature of the product and vapour.

The hydrocarbon concentration of the vapour for tank applications should generally considered as saturated, it being anticipated that the vapour phase will have adequate periods of time to become saturated.