

Let Your Gases Lead the Way: A TESCORP Case Study
VRU Best Practices Series



TESCORP® AVR Series® Vapor Recovery Unit with cold weather enclosure

Recently, TESCORP designed and constructed a Vapor Recovery System for an application in the “Bakken” field, North Dakota. The gas was very heavy with the majority of hydrocarbon components consisting of propane and heavier. The source of gas was the crude oil stock tanks at an atmospheric pressure of 13.4 Psia, and the gas was required to be elevated to a discharge pressure of 265 Psia. The design gas flow was 500 Mscfd. In order to achieve this final discharge pressure, three (3) stages of compression were required with post-stage cooling and separation required at each stage of compression.

As we have said before, both summer and winter conditions must be considered in the inter-cooler/after-cooler temperatures. We used 120° F summer and 50° F winter (30 degree approach to ambient).

The gas condensation amounts were as follows:

Inlet Flow	Stage	Pressure (Psia)	Cooler Temp	Liquid Dropout	Disc Gas Flow
500 Mscfd	1	48.1	120	0	500 Mscfd**
500 Mscfd	2	124.6	120	151 Mscfd*	349 Mscfd**
500 Mscfd	3	265	120	237 Mscfd*	112 Mscfd***
500 MScfd	1	37.5	50	131Mscfd*	369 Mscfd**
500 Mscfd	2	88.4	50	191 Mscfd*	178 Mscfd**
500 Mscfd	3	265	50	115 Mscfd*	62 Mscfd***

* **Denotes amount of gas condensed into liquid**

** **Denotes amount of gas discharged from gas/liquid separator**

*** **Denotes amount of gas discharged to sales from the VRU**

As illustrated in the example, a normally configured compressor based upon a dry gas would be a totally different configuration without necessary consideration given to “condensing” of the gas flow.

Special consideration must be given to the produced condensates that are produced at each of the separators. These condensate have great value to the the customer and need to be transported back to the process or shipped for sale. But, the issue to transporting these condensates is that if they are required to be pumped to a higher pressure storage, they are at “bubble point” and their respective NPSHA = 0 (Net Positive Suction Head Available). All pumps have a required NPSHR (required) in order to not cavitate.

Consideration of this NPSHA issue must be approached with caution. Each stage of compression and the associated differential pressures required to meet the storage pressure(s) dictate individual pumping solutions at each of these points. Once again, one solution does not fit all applications and failure to solve these issue creates a non-functioning Vapor Recovery System.

Also, this same gas stream in a different site environment or with different design pressures would dictate different compressor and component results. Therefore, TESCORP does not offer a one-type-fits-all solution. We are aware of the variables and issues that affect the customers problems’ in vapor emission capture and transport.

The primary distinctions of TESCORP Vapor Recover Units are:

1. **Specifically designed for saturated “wet” gases** that have been problematic for many compressor applications. The VentMaster line of compression systems are all designed to accept saturated gases and to add “super heat” in the compression cycle to maintain temperature in excess of dewpoint and therefore eliminate any chance of condensation within the compression process. All VentMaster systems are designed with compressor systems of either reciprocating or rotary vane compressors, specifically designed for saturated gas applications.

2. **All gas condensation is accomplished in the inter-cooler or after-cooler sections** of the system with post two-phase separation specifically designed for these gases and liquid content.
3. ***Specifically designed for easy installation and operation in all oilfield and plant environments.*** The TESCORN VentMaster series is designed and constructed to be a standardized system utilizing commonality of parts and systems for quick deliveries and a low-cost of purchase and installation.



TESCORP'S "VentMaster" VRU Line

TESCORP designs and constructs Vapor Emission Recovery system for both specific engineered applications and standard field site units.

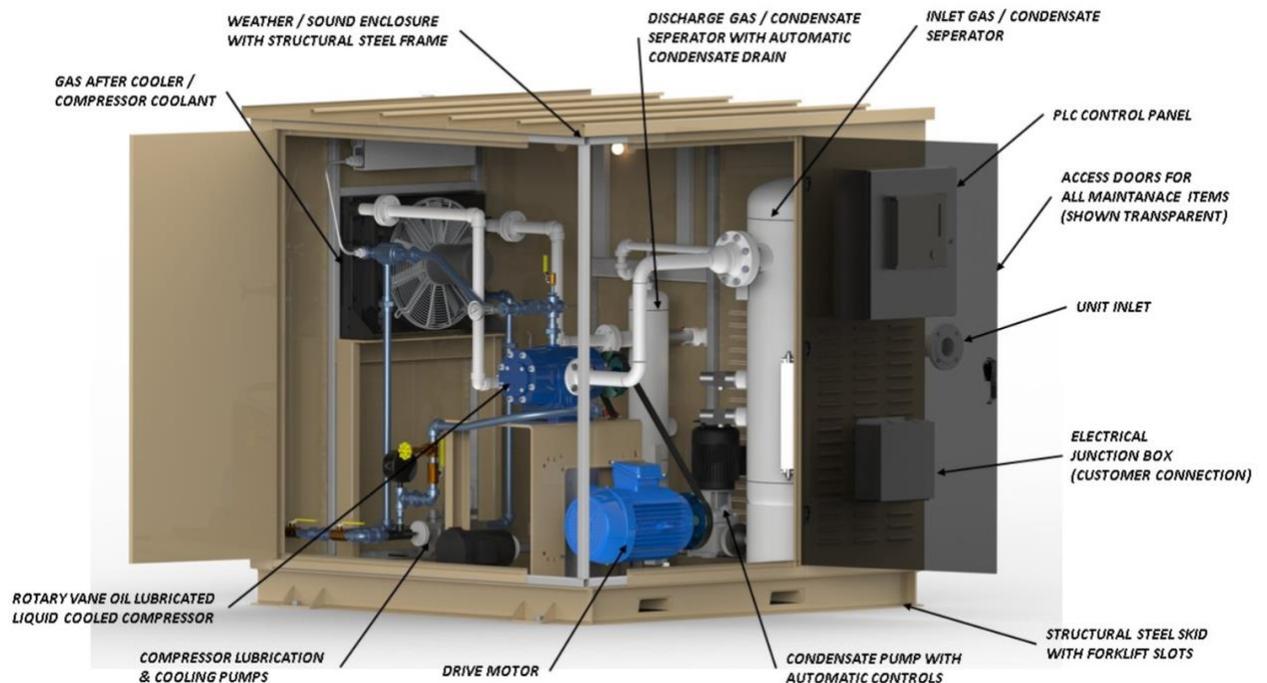
TESCORP is the only company who has developed a whole line of [VRU systems](#) from 3 to 400 horsepower, for wet gases, corrosive gases and what else? Again, this is to focus on and specialize in the saturated wet gases associated with stock tank and flash gas vapor emissions and the problems and idiosyncrasies in working with those gases.

Within this line, there are about 13 different models just addressing these specific applications.

We use something different than an oil-flooded screw, which seems to be an industry norm, in handling the different types of gases you come across in trying to solve your vapor recovery needs. There are some gases you cannot use an oil-flooded screw on no matter what you've read or been told. Additionally, our system are automated, yes but, still made to cover the below AND address your individual needs.

VentMaster design features include:

- All gas condensation is accomplished in the inter-cooler or after-cooler sections of the system with post 2-phase separation specifically designed for these gases and liquid content.
- Designed for all existing oilfield environments from extreme hot to extreme cold application. All VentMaster Vapor Recovery Units are constructed with environmental equipment enclosures to protect the equipment from the elements and to provide acoustic noise dampening for better environmental and personnel protection.
- The units are all constructed per applicable code, i.e. ASME, ANSI and NEC for safe field installation and operation.
- All maintenance items are designed to be easily accessible to the operator through enclosure doors or removable panels.
- The TESCORP-constructed PLC control panel with pre-programmed logic algorithms allows the VentMaster systems to be easily configured to operate at various pressures and flows as may be needed to meet various emission applications.



TESCORP "VentMaster" CVR-2 Vapor Recover Unit

Unlike dry gas compression systems, “Wet Gas” applications have many more design considerations that must be addressed in the application, design, construction and installation of the system. The world of VRUs can be complex, but it’s been a passion of ours for over 40 years. If you would like to schedule an information call, please contact us at sales@tescorp.com.

TESCORP Founder and President,
Vince Thomas