

## Vapor Pressure: RVP, TVP, VPCR<sub>x</sub>

### Introduction

Liquid hydrocarbons have been coming in from gathering systems for years and been handled in different ways. However, the increased liquids production from US shale plays and need to utilize rail and roads to bring product to market has elevated the focus on the safe handling of Crude, Condensate and NGLs. Numerous factors, including economical, safety and environmental drivers, have contributed to this increased focus, but the primary contributor of the increased focus is the sheer volume of liquid hydrocarbons being transported by methods other than pipelines.

Condensate is lighter than crude oil, heavier than natural gas liquids, and, in its natural form, can be dangerous to store and transport. Therefore, stabilizing is now often required to ensure the condensate meets safety specifications, usually measured by vapor pressure (RVP, TVP and/or VPCR<sub>x</sub>). However, up until now there has been no cost effective method to measure the vapor pressure in real time as the product is being processed, stored or loaded in/out of trucks and rail cars.

### Measurement Problems

Measuring the Vapor Pressure of stabilized product in the midstream gathering and stabilization facilities of the more recent shale oil fields has proven to be a challenging analysis due to the amount of paraffin in the condensate stream.

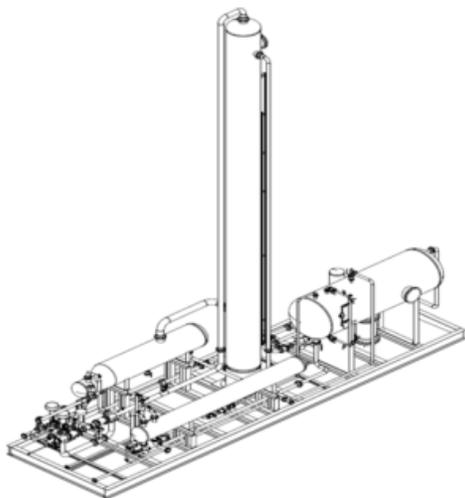


Fig.1 Typical Stabilizer



JP3 Verax VPA™

Making this analysis with a conventional ASTM method requires the sample stream to be measured at 100°F, which is well below the condensing point of the paraffin present in the typical condensate stream. This will cause plugging of sample lines and measurement cells in a traditional RVP analyzer which will cause failure of the device.

### Solutions

The JP3 Verax VPA™ utilizes NIR spectroscopy and chemometrics to determine the Vapor Pressure in the liquid stream. This technology, which has been in use in downstream facilities for decades, enables the direct determination of the vapor pressure of product in the system. JP3 has developed a field deployable system with the Verax that now enables midstream operators, loading / unloading terminals and other oil field facilities to benefit from NIR spectroscopy for the first time.

The Verax has two optical probes that are in contact with the process at the operating temperature and pressure. The optical probes can be mounted directly on the stabilizer outlet, which eliminates the need for any sampling system or manual handling of the product. In addition, the probes are in the process at the higher temperatures which will keep the paraffin in a liquid phase.

The Verax VPA is currently in use at midstream facilities, loading/unloading terminals and on pipelines across most of the major oil & gas basins in the United States.



Typical Installations at Customer Sites: Verax VPA™ control panels, optical probes, and sun shades



## Specifications

### Applications

Fluid Streams	Type: Crude Oil, Condensate, NGL, and LPG; Phase: Liquid
Property Analysis	RVP, TVP, VPCR <sub>x</sub> $\leq \pm 0.5$ psi
Sample System	None
Calibration Gas	None
Line Pressure	0-1500 psig
Line Temperature	-10° to 150° F
Line Flow Rate	1.0 gpm minimum; no maximum
Response Time	< 30 seconds per analysis point
Test Methods	Correlation to: ASTM 323, ASTM 6377, & ASTM 6378
Detection Method	NIR spectroscopy with inline optical probes

### Electrical

Input Power	3.5A @ 24V DC standard; 100-240 VAC optional
Communications	TCP/IP, MODBUS TCP and Serial (others available upon request)
Outputs	8 solid state relays for process control 2 analog 4-20 mA / 0-10 VDC outputs standard configurable alarms/controls

### Physical

Enclosure	NEMA 4X IP 67 powder coated aluminum
Dimensions	Control Panel: 24"W x 30"H x 10"D
Weight	Control Panel: 50 lbs Probe Assembly: 5 lbs
Ambient	-28.9° to 50° C (-20° to 122° F). No environmental control required sunshade required if >90°F
Classification	Control Panel with Z-Purge: Class 1 Div 2 Control Panel without Purge: General Purpose Probe Assembly: Intrinsically Safe / Class 1 Div 1

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