JOHN ZINK HAMWORTHY COMBUSTION®

Oil Treating Variance Solution (OTVS)

Meeting Vapor Pressure Specification

The patented Oil Treating Variance Solution (OTVS) from ETI, a division of John Zink Hamworthy Combustion, uses indirect heating and multi-stage separation to meet RVP or Vapor Pressure of Crude Oil (VPCRx) specification prior to entering oil storage tanks. The results: increased safety and higher yields along with controlled capital and operating cost—all while using up to 60% less plot space.

OTVS minimizes applied heat at the lowest possible pressures to deliver low-duty, on-specification product, and fewer tank emissions. Gas and water are removed upstream, so only oil is heated. The process utilizes engineered separation vessels and final-stage separation is at or near atmospheric pressure. RVP specification is reached prior to oil entering the storage tanks. Gas volumes in the oil tanks will decrease or be non-existent in most scenarios. Installations have already shown lower operating costs and little recycling of off-specification oil.

Technical Advantages

+ Indirect Heat
  - Oil is circulated inside indirect heated coil and can be easily flushed if necessary
  - Re-circulation is at the Indirect Heater inlet
  - State and customer variances allow for placement within 21 feet of tanks
+ Vapor Pressure Specification can be reached efficiently with minimal oil loss to gas phase (flare or VRU)
+ Oil storage tanks are not used as gas separation vessels
  - 100% liquid oil is fed to the tanks with negligible pressure drop, vapors are not prominent at oil storage tanks

OTVS is available in both manual and fully automated designs for bulk and test or single-well applications. ***Its small footprint makes it ideal for retrofits.***

Cost Savings:
Minimized well-pad space decreases construction, maintenance, and operation costs.

Increased Safety:
Indirect heat eliminates catastrophic firetube failure and decreases vapors at the production tanks.

Higher Yield Potential:
Up to a 10% increase at desired vapor specification.

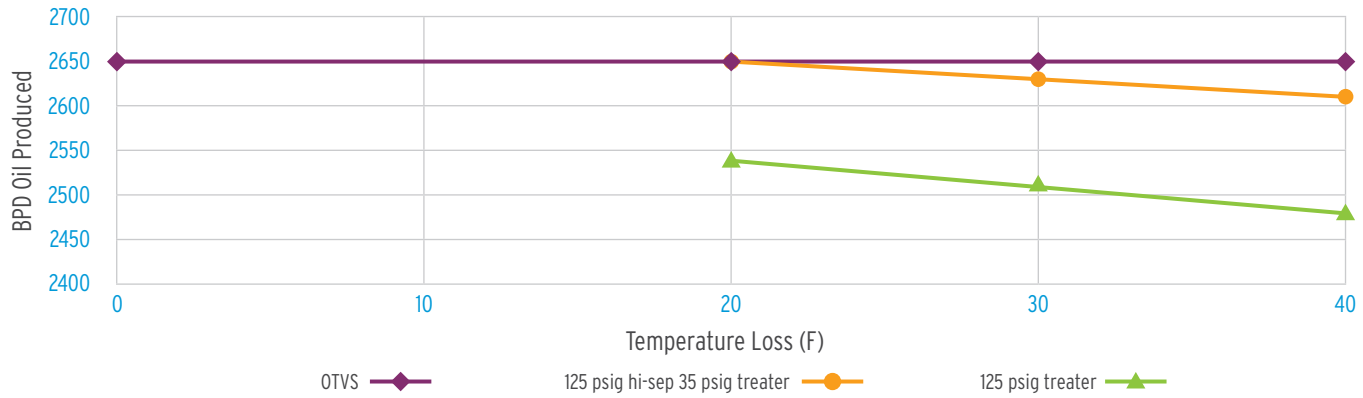
Improved Environmental Impact:
Smaller plot requirements and less liquid to gas phase.

ETI

SIMULATION-BASED CASE STUDY FOR A 4-WELL DESIGN

PROPERTY	80# Heater Treater	▲ 125# Heater Treater	● 125# Hi-Gas Separation - 35# Heater Treater	80# Heater Treater w/ Spec Entering Tanks	125# Heater Treater w/ Spec Entering Tanks	125# Hi-Gas Separation - 35# Heater Treater w/ Spec Entering Tanks	◆ OTVS
Water produced (bbl/d)	5968	5971	5981	5968	5870	5955	**5999**
Heater Duty (MMBTU/hr)	8.39	9.63	9.78	13.60	18.29	13.30	**1.58**
Heater Outlet Temperature (°F)	132.0	144.7	156.3	166.3	200.1	183.0	**108.0**
Assumed Line Losses (°F)	**-30**	**-30**	**-30**	**-30**	**-30**	**-30**	**NA**
Tank Product Temperature (°F)	86.1	89.7	105.6	123.8	152.3	136.3	**107.2**
Gas off in Tanks (MMscfd)	0.183	0.334	0.172	0.141	0.213	0.137	**0.000**
RVP Entering Tanks (psi)	14.4	16.6	15.2	**10.8**	**10.8**	**10.8**	**10.8**
RVP Exiting Tanks (psi)	10.8	10.8	10.8	6.8	5	7.2	**10.8**
Oil Product Flow (bbl/d)	**2493**	**2516**	**2632**	**2191**	**2046**	**2399**	**2651**

HEAT LOSS -VS- OIL PRODUCED MEETING RVP



+ Comparison of OTVS vs. a high-low heater treater design (125 psig hi-sep 35 psig treater) and a heater treater with no inlet separation (125 psig heater treater)
+ OTVS: Due to proximity of indirect heater and insulation heat losses could be near zero
+ Without a high-side separator, product yields are reduced
+ Required duty and product losses increase as the pressure at which the heat is applied increases
+ Payback period could be less than 6 months based on increased yields
+ When examining heat losses in conventional heater treaters, an exit temperature of 160°F or higher may be required to meet vapor pressure

Put our patented OTVS to work for you.

918.234.1800 or
ETIparts@johnzink.com

JOHN ZINK HAMWORTHY COMBUSTION®

Global Headquarters
Tulsa, Oklahoma | United States

johnzinkhamworthy.com
+1 918 234 1800

To locate an office in your region,
visit johnzinkhamworthy.com/contacts/office-locator