METHANE FROM FLARING
TOOLKIT

Flare Design: Enclosed flares

Summary

Enclosed flares provide very high combustion efficiency under any weather conditions. The flare is enclosed within a combustion chamber that controls the mixture of gas and air. The principle limitation is scalability. Operating within an enclosed space has the added advantage of allowing exit gases to be analysed for methane.

How it Works

Enclosed flares feature a refractory-lined combustion chamber, where gas is burnt using multiple burners. Air for combustion is provided via natural draft or supplemented by blowers. The design is similar to thermal oxidisers but designed to handle high VOC streams. As the flame is concealed, its stability can be higher and smokeless operation is achieved with higher destruction efficiency and no .

Enclosed flare (Image courtesy of Zeeco, Inc.® – all rights reserved.)

Advantages

- Very high destruction efficiency (can average above 99.99%)
- Smokeless operation
- No visible flame – little to no noise and radiation levels at ground
- Suitable for a wide range of gas compositions and pressures
- Can be installed in tight places or close to processing facilities
- Provides very high combustion efficiency

regardless of weather conditions

- [x] Independently verified combustion efficiencies, can have provisions for sampling to provide measurable efficiency

Limitations

- [ ] Increased dispersion risk during flame-out conditions due to lower height
- [ ] Limited to no installations offshore due to footprint and capacity limitations
- [ ] Not suitable for higher flowrates due to size limitations
- [ ] Depending on design, maintenance of flare tips can be more challenging than elevated flares

Go Deeper

- Vendor website: Zeeco
- Vendor website: John Zink Hamworthy
- Vendor website: Questor
- Vendor website: Thermoeng

Case study

An onshore gas processing facility explored the options to combust a high-sulphur content tail gas streams. Due to its low heating value, it would have required supplemental fuel gas to achieve full combustion in an elevated flare, increasing its overall and methane emissions.

The site has chosen to use an enclosed flare for such application, as it ensured very high combustion efficiency of the tail gas streams. It provided several benefits:

- Increased combustion efficiency – reduced methane emissions
- Reduced the supplemental fuel gas usage leading to emissions and cost reductions
- Had safety benefits due to increased destruction of toxic sulphur compounds

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How is the flare designed to minimise methane?

Flare Design: Pilots

Flare Design: Air-assisted flare

Flare Design: Nitrogen Purge

Flare Design: Sonic tips with fixed exit slot

Flare Design: Sonic tips with variable exit area

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