



Series QFS Flare Tip Steam-Assisted Flare

Features

- ▶ High Smokeless Rates
- ▶ Maximum Flame Stability
- ▶ Higher Flow Capacity at Given Pressure Drops
- ▶ Low Thermal Radiation
- ▶ Improved Steam/Air Mixing
- ▶ Lower Noise Levels

Applications

- ▶ Any application where smokeless flaring is required and steam is available
- ▶ Applications where steam injection noise is a concern
- ▶ Also available as a bolt-on replacement tip

Design Parameters

Most hydrocarbon gases smoke when burned unless sufficient oxygen is mixed in the combustion zone. Very low pressure gas streams containing unsaturates are particularly prone to smoking. Smoke is produced by



Three QFS Flares with Center Steam Sparger

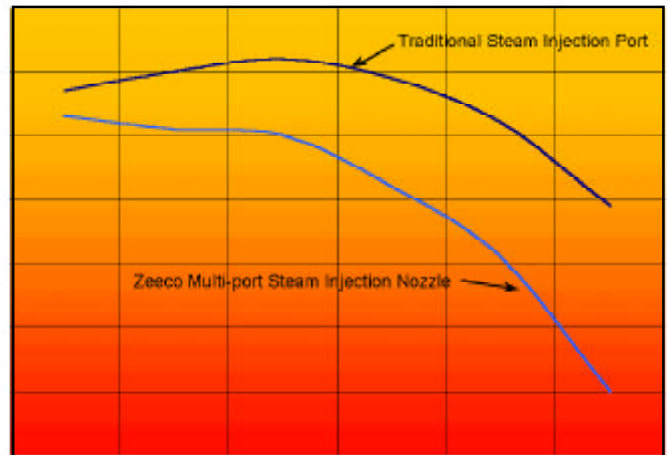


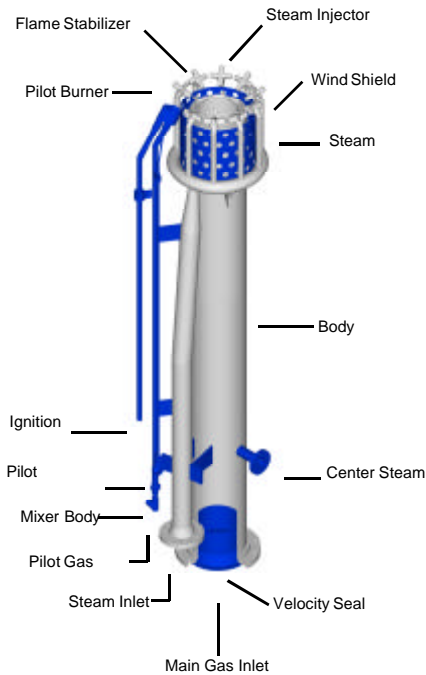
Figure 1 - Steam Injection Noise Comparison

cracking and polymerization reactions that take place in the flame core where flame temperatures are high and there is insufficient oxygen to complete combustion.

When smokeless flaring is required, steam injection is the most common method of smoke suppression utilized. The steam inspirates air into the combustion zone and provides the turbulence necessary to promote better mixing. In addition, the steam also lowers the local combustion temperature of gases, reduces the high temperature thermal cracking of unsaturated or higher molecular weight saturated hydrocarbons and eliminates incipient smoke.

The Series QFS flare tips provide the hydrocarbon processing industry with a high capacity smokeless flare with proven operational reliability.

One of the most persistent problems associated with steam injection is noise. The Zeeco Series QFS Flare utilizes a specially designed steam tip to dramatically reduce noise levels. This proprietary tip distributes steam through a greater number of injection ports to successfully



reduce noise levels well below those associated with traditional steam assisted flare designs. (See Figure 1)

Quality

Reliable flare performance and long flare service life are accomplished through a combination of good engineering design and proper material selection. Premature tip failure is often caused by improper flare tip sizing. An oversized tip size results in insufficient flare gas exit velocities. The flare tip shell becomes eroded due to flame burn-back inside the flare tip and external flame lick in which the flare flame stabilizes against the leeward side of the flare tip. Zeeco's knowledge and experience in flare tip design ensures proper sizing for each flare application.

A critical component of flare tip longevity is proper material selection. Zeeco flares are characterized by the use of superior materials throughout construction. 310 SS is the standard material for flare tips, flame retention rings and steam rings unlike the 309 SS commonly found in other systems on the market. Other materials including Incolloy 800H and Inconel are available upon request. Each Flare system is manufactured to the highest quality standards in our ASME Code shop in Broken Arrow, OK.

Options

All of Zeeco's flare tips are custom designed to meet customer specifications for each application. Zeeco also offers optional equipment to complete the flare system including:

- ▶ Optional center steam sparger
- ▶ FFG-type or electric ignition pilots
- ▶ Substitution of other high-nickel alloys, including Incolloy 800H and Inconel
- ▶ High-capacity pilots
- ▶ Flange patterns to match existing connections
- ▶ Closed Circuit TV Monitoring System



Two QFS-72 Flares with Demountable 492' Stacks

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