High Performance Steam Flare
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QS™ Style Flare Tip

- First successful steam assisted tip developed in 1952
- Perimeter injection only
- Suitable for small and medium flow applications
How Steam Injection Works

► It’s not the steam but the air it takes in with it
► At sonic velocity, the air inspired by the steam is approximately 10 times
► The steam also mixes the air into the flare gas
Problems with Larger Sizes

Often occurs with flare tips greater than 36” diameter

► Non-Combustible Zone in the Center

Poor mixing in central region
Steam Flare Technology Progression

- High Performance Steam Flare
- Multiple steam injection
- Bent steam/air tubes
Steam is used to draw air into a mixing tube where a steam-air mixture is formed.

The tube is used to place the mixture in an effective position to mix with the flare gases.
Steam Control:

1st Generation Steam Flare – Upper Steam Only

Upper steam

Center steam

Waste gas

100 % steam capacity

cooling flow

mA signal

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Steam Control:

2nd Generation Steam Flare – Upper & Lower Steam

Upper steam

Lower steam

Center steam

Waste gas

100% steam capacity

Cooling flow

mA signal

lower

upper

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Question:
What happens to a flare tip when there is too much upper steam and not enough lower steam?

Answer:
The flare gases are capped and flame is forced down the steam tubes and out the bottom of the flare.
Prevent Capping with Proper Steam Control
Next Generation Solutions

Steamizer®XP™ Flare System

► No upper steam
► No center steam
► Improved steam air eduction due to straight tubes.
► Partial Pre-Mix

One steam line
Partial Pre-Mix provides superior smokeless performance by mixing air with the flare gas prior to burning.

- Burning in significantly reduced air mixtures forms soot particles when the hydrocarbons crack from the flames heat.

- This is especially important for unsaturated hydrocarbons, which are already soot precursors.
Improved Smokeless Performance

- Partial Pre-Mix Gas
- Secondary Air
Steam Control

Next Generation Steam Flare – Lower Steam Only

Simple Steam Operation

- Single steam line

Diagram:
- mA signal
- 4 to 20
- 100% steam capacity
- Cooling flow
Increased steam efficiency

- 40% additional smokeless capacity

Single steam line

- Simplified steam control operation
- Lower installation costs of piping, instruments and controls
XP Flare Propane Video

- **Propane**
  - 162,000 lbs/hr

- **Steam**
  - 38,000 lbs/hr

- **Steam Savings Compared to Conventional Flare Tip**
  - 17,000 lbs/hr
Propylene
- 158,000 lbs/hr

Steam
- 52,000 lbs/hr

Steam Savings Compared to Conventional Flare Tip
- 28,500 lbs/hr
The Situation

Samsung Total expressed need to accomplish four main goals

- Increase Smokeless Capacity
- Increase Steam Efficiency
- Increase Flame Stability
- Reduce Noise Pollution
The Solution

After extensive evaluation of flare technologies, XP steam flare technology was chosen for this application by Samsung Total.

The Result

Since start-up, Samsung Total has seen an increase in smokeless capacity using the same steam supply as previous flare tip.

XP Flare accomplished all four main goals set by Samsung Total.
Based on success of Samsung XP installation, several Olefin plants in Korea installed XP flare tips with successful improvement in smokeless operation.
A Gulf Coast olefins plant had the following New Year’s Resolution in 2012

“Give up smoking”

After installing an XP in early 2013, this olefins plant does not smoke at startup or other heavy flaring

Customer is also pleased with ease of operator control
Questions?