Corona Flares Develops New Flare Technology to Reduce Continuous GHG Emissions; More than 90%

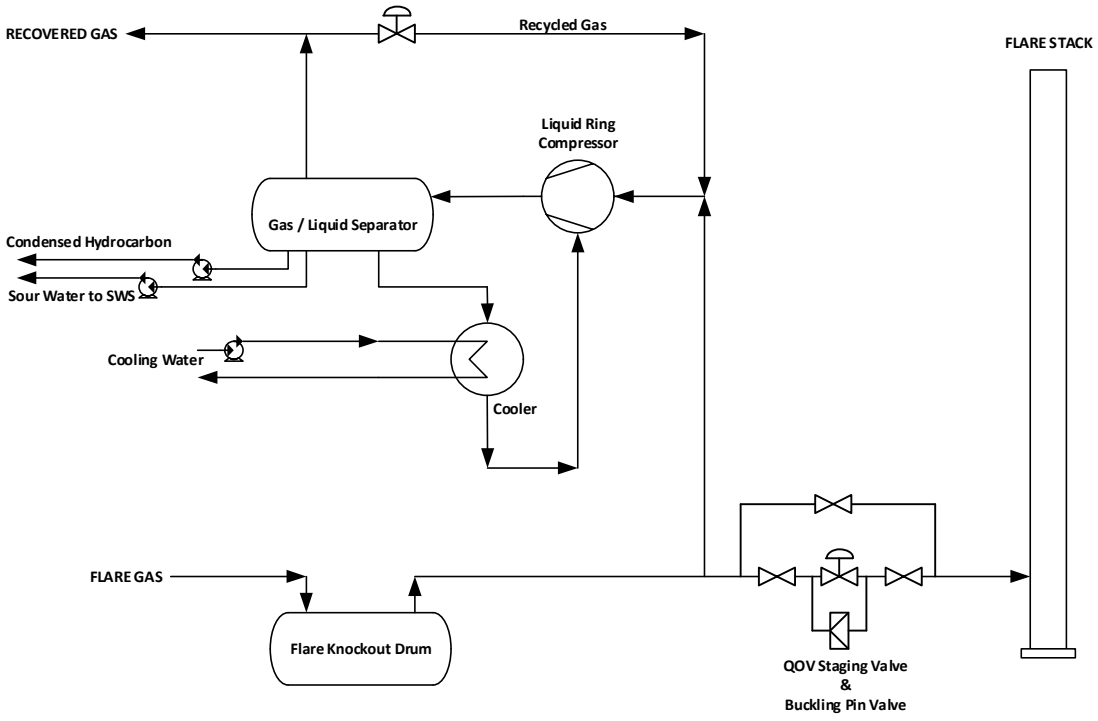
As part of our environmental sustainability objectives, Corona Flares have developed a flare system that can reduce normal continuous GHG emissions by more than 90% of a typical large capacity high pressure flare versus conventional flare technologies commonly used in the oil and gas production industry. This new technology incorporates many unique features and benefits to help operators increase the efficiency of their flaring operations while drastically minimizing the carbon footprint of their oil and gas production operations including:

- ***More than 95% reduction in the GHC emissions created by continuous flare purge gas.***
- ***More than 80% reduction in the GHC emissions created by continuous flare pilot gas.***
- ***Provides 100% smokeless flaring and greater than 99% combustion efficiency over the full range of flare operation.***
- ***Based on existing flare design technology in service for more than 20 years with nearly every major oil and gas producer around the world.***
- ***Utilizes rugged high pressure flare design technology proven to provide low maintenance operation with a proven track record of extended service life.***

As our industry has begun to focus on initiatives and goals of carbon neutrality, GBA-Corona has focused our vast experience in flare system design to develop a flare system to help operators achieve their carbon reduction goals.

Flaring operations are a major contributor to GHG emissions from oil and gas facilities. Most operators have initiatives underway to reduce routine flaring in their operations. These flare reduction initiatives are achieving significant reduction of carbon emissions from flares, but the engineering and safety needs for flares in oil and gas operations will always remain. The primary function of a flare system is a safety device designed to relieve pressure from operating vessels and pipelines in the event of an emergency. Flares ensure the safety of operations and flares must remain available and reliable when the process is in operation.

Although normal flare emissions can be eliminated or materially reduced by the operation of a flare gas recovery system; these recovery systems are very expensive to install and maintain, and are not feasible for many flare applications. Flare gas recovery systems use large compressors that require significant electric power consumption. Therefore, a large carbon footprint is associated with the operation of a flare gas recovery system (even though the flaring emissions are reduced).



FLARE GAS RECOVERY SYSTEM - TYPICAL PROCESS FLOW DIAGRAM

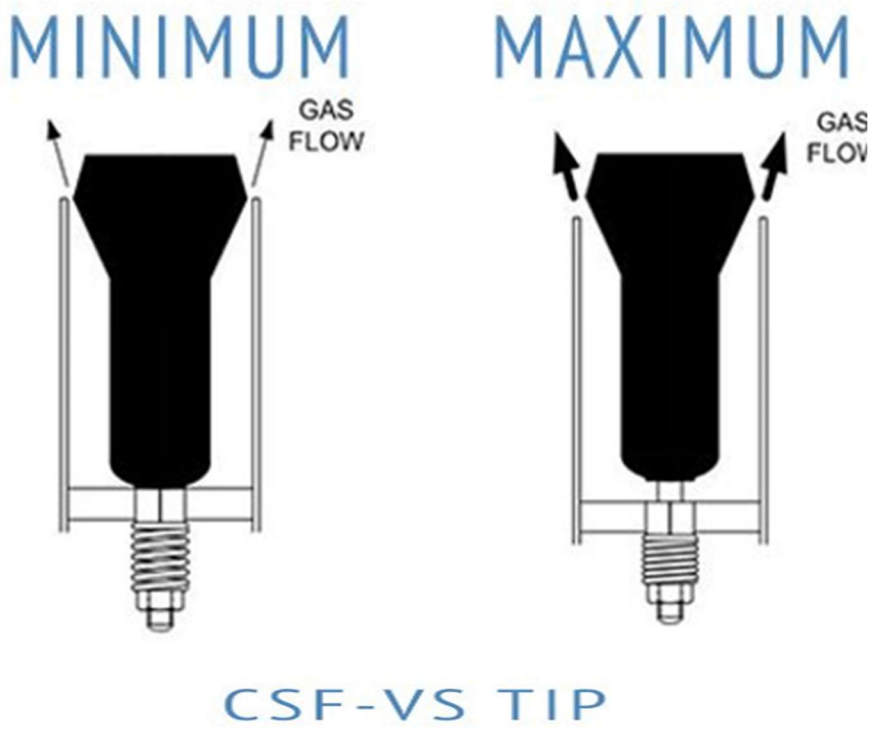
Most flare systems operate continuously with carbon emissions from the flared gases. Even when routine flaring is completely eliminated, there is always a need for continuous emissions from an operating flare because the flare stack must be operated with a minimum purge gas to keep a positive flow of gas through the flare tip and prevent air entering the flare stack and flare header, thereby preventing an explosive air / gas mixture from developing in the flare stack.

Natural gas is typically used as the purge gas. This natural gas burns continuously at the flare tip producing a continuous source of GHG emissions.

Some operators use nitrogen as the flare purge medium instead of natural gas. In many cases, nitrogen purge can actually increase the GHG emissions from a flare. When there are small leaks from the relief valves leaking into a flare header the nitrogen can create a diluted hydrocarbon mixture at the flare that is non-combustible. This release of a small amount of unburned hydrocarbon can create a larger GHG emissions rate than that produced by a natural gas purge that is burned with a 98% combustion efficiency. Also, when there is a flare gas release into a nitrogen purged flare header, this creates the flow of a slug of nitrogen followed by a flow transition from 100% nitrogen to 100% flare gas. As this flow transition reaches the flare tip there can be a large release of unburned hydrocarbons as the gas composition transitions from a noncombustible to a combustible mixture of nitrogen and hydrocarbon.

The optimum solution for GHG reduction is to utilize natural gas purge at the lowest possible rate while still maintaining safe purging of the flare header. In search for this optimum solution, our research and development has focused on reducing the hydrocarbon (natural gas) purge rate to the minimum safe flow rate.

Corona Flares has developed an advanced version of our variable slot pressure assisted flare tip that can safely operate at very low continuous purge rates. At the heart of this development are our variable slot flare nozzles that have been successfully used by nearly every major Oil & Gas producer for more than 20 years. The flare nozzle is the most efficient pressure assisted flare nozzle design in the market, providing 99% combustion efficiency of the flared gases, and ultra-low radiation smokeless flaring. Also remember that this proprietary design has proven to provide reliable, low maintenance operation and longevity that far exceeds the operational life of any other high pressure flare design on the market.



CSF-VS TIP

All other variable slot flare technology relies on nozzles that have material above the exit of the flare tip that can quickly deform due to flame impingement on these metal surfaces of the nozzle. This deformation can lead to rapid failure of the flare tip, and the deformation of the nozzle also creates the need for an increased purge rate to ensure proper distribution of the purge gas to all of the flare nozzles.

The GBA-Corona ULE (Ultra Low Emissions) design uses our proprietary VSF nozzles that seal the flare gas exit utilizing solid forgings in the internals of the flare nozzle. This creates a valve-like seal at the exit of the flare nozzle at lower operating pressures. As the pressure increases the variable slot mechanism opens, allowing the flare gas to exit the nozzle at high velocities. The flame is initiated above the exit of the nozzle (thereby eliminating any material above the flame initiation zone). The GBA-Corona CSF-VSF-ULE has a central VSF nozzle that ensures a stable efficient flame from the center nozzle when operated at low purge rates. This central nozzle is fitted with a continuous pilot that reliable ensures ignition of the purge gases. As the flare gas rate increases above purge rate, the gas is forced through the piloted central nozzle, creating a large

stable flame on the central nozzle. When the pressure in the flare tip further increases the variable slot mechanisms of the outer nozzles begin to open and the waste gas is immediately ignited.

Existing Low to Moderate Purge Design

***New Ultra-Low Emissions Purge Design**

The reduced exit area of the central nozzle purge orifices provides high purge gas exit velocities at extremely low purge rates. The GBA-Corona CSF-VSF-ULE can therefore be safely operated at a minimum purge rate that is orders-of-magnitude less than any other conventional flare tip.

Another source of emissions from flare tips is the continuously flowing flare pilot gas. For many safety reasons and environmental compliance, it is critical that the flare tip be operated with a continuous pilot flame. Flares are typically operated with multiple pilots (for redundancy) depending on the size of the flare tip. All of the pilots are typically operated continuously with pilot gas burning at the rate required to ensure that the pilot remains lit under all extreme weather conditions. This continuous pilot gas requirement contributes to the continuous GHG emissions of operating flares.

GBA-Corona developed our LCHW Pilot design that is proven to reliably remain lit at wind speeds exceeding 160 mph with an extremely low pilot fuel gas requirement of 50,000 BTU/hr. This pilot design has successfully been operated on many flare systems for more than ten years. Typical flare system designs have required the use of two to four continuous pilots in order to ensure redundancy and reliable ignition of large capacity flare tips.

**Simulated operation*

The GBA-Corona CSF-VSF-ULE high pressure flare design can reliably ignite utilizing a single continuous pilot, thereby greatly reducing the GHG emissions from continuously operating pilots. This design utilizes a single continuous pilot that can light the flare tip, with on-demand redundant pilots that can reliably light within seconds of demand. The system can include automatic periodic ignition testing of the redundant pilots to ensure reliability of the redundant pilots.

The GBA-Corona CSF-VSF-ULE ultra-low emissions flare tip can provide a significant reduction of continuous purge GHG emissions compared to any conventional flare design. By using our high efficiency LCHW Pilot with our on-demand redundant pilot design, the continuous emissions from this flare design can provide GHG emissions reductions of more than 90% compared to conventional high pressure flare designs.

Please contact us today to explore how our ultra-low emissions (ULE) flare designs can help you meet and exceed your goals of reducing the carbon footprint of your flare systems.

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Our Mission: **GBA-Corona** is committed to provide flare equipment with the highest quality of design, materials and construction in order to achieve performance and longevity that will exceed our customer's expectations.
Our Quality Policy: **GBA-Corona** accepts responsibility for the complete satisfaction of its customers.