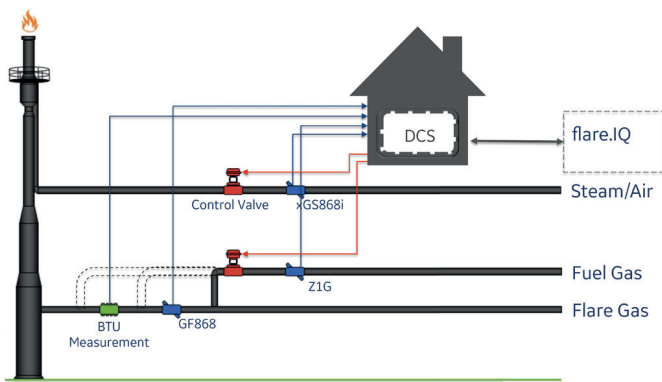# flare.IQ

Complete plug-and-play solution to meet RSR 63.670 compliance

Introduction

Passed by the Environmental Protection Agency (EPA) in December 2015, the Maximum Achievable Control Technology (MACT) Petroleum Refinery Sector Rule (RSR) Part 63.670 requires refiners to be in full compliance by January 30, 2019. The rules apply primarily to flow measurement and burn efficiency of a flare and include many key provisions. For specific MACT RSR 63.670 details, refer to the EPA website, www3.epa.gov.

Ensure compliance to RSR 63.670

Given the potential complexities, complications and overwhelming risks associated with developing an all-encompassing flare system solution, operators can eliminate this burden by partnering with Baker Hughes.

Combining our domain knowledge and proven track record in flare gas flow measurement with our world-class controls expertise, the flare.IQ is a complete plug-and-play solution to meet RSR 63.670 compliance. Fully equipped with the software algorithms required, there is no need for additional long-term development work. Our software-based solution is housed in a convenient Windows® based industrial controller that easily and seamlessly interfaces with your existing DCS. With flare.IQ, the flare system can be controlled to operate within the requirements of RSR 63.670 and comes backed with a letter of compliance with Baker Hughes signatory.
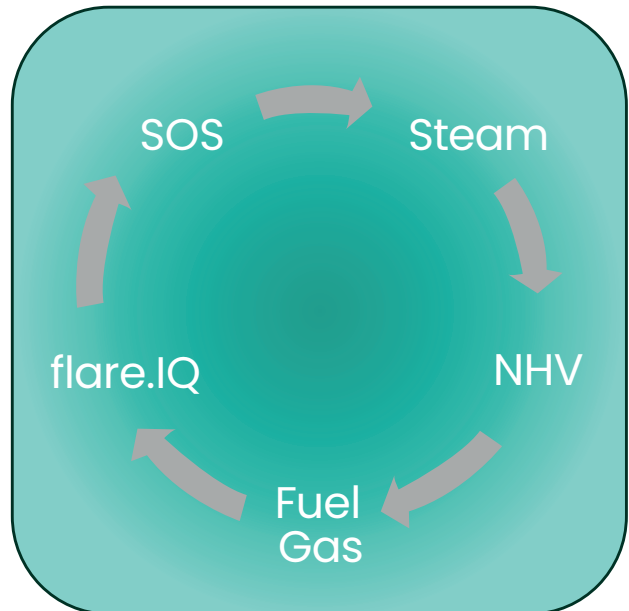
Increase efficiency of the complete flare system

flare.IQ is pre-programmed with all required algorithms necessary to address the most difficult aspects of proper flare control. Baker Hughes's patent pending SmartSteam control algorithm may be customized to the unique fingerprint of each flare system. The program utilizes surrogate modeling to draw correlations between flare flow conditions and the required steam input to operate with no visible emissions.

flare.IQ also employs patented technology to address BTU measurement latency resulting from gas chromatograph (GC) technology. The BTU readings of the flare flow system obtained by the gas chromatograph are a critical input to achieve the required destruction efficiency in the flare combustion zone. flare.IQ utilizes sound speed to help bridge the GC's infrequent BTU readings with near-continuous feedback, improving operator control of the entire flare system.
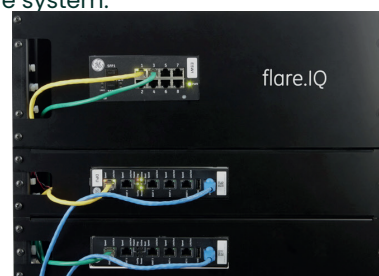
The BTU measurement is typically updated every 15 minutes based on the latency inherent in the gas chromatograph sampling. flare.IQ includes a tuning algorithm that provides course adjustments to the make-up/supplemental gas and steam flow which allows the flare to operate within a tighter control window between the 15-minute updates from the gas chromatograph, as illustrated schematically in the figure on the right. This better optimizes the use of make-up gas and steam to maintain the proper BTU level in the flare combustion zone. When the GC updates, flare.IQ's tuning algorithm learns and adjusts its control set-point values.

As seen in the chart below, flare.IQ (green line) provides an accurate estimation of net heating value (NHV) compared to the on-line analyzer (red line). flare.IQ even serves as a back-up when the on-line analyzer is off-line for calibration or maintenance as seen between the 1000-minute and 1500-minute interval. Once the on-line analyzer is returned to service, it can be seen that the heating value estimate from flare.IQ is in agreement with the real time data from the on-line analyzer.
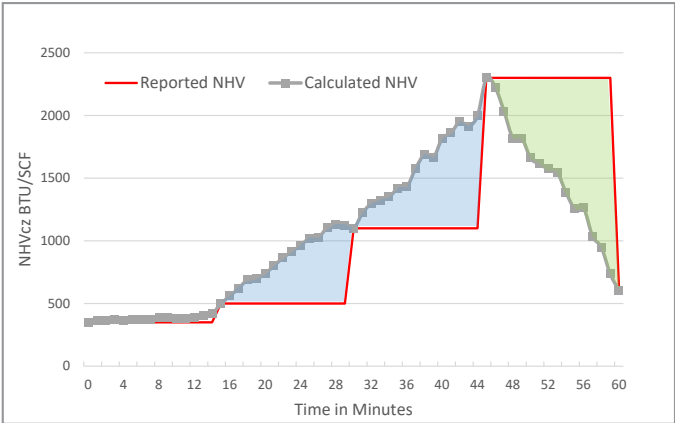
Blue = Under-steamed condition, potentially resulting in a smoking flare or consumption of excess supplemental gas.

Green = Potential over-steam condition. The flare.IQ controller reduces or eliminates these control gaps so that the flare operates and responds to NHV changes in real time.

· HHV, Mass Spectromer · HHV, FlareIQ
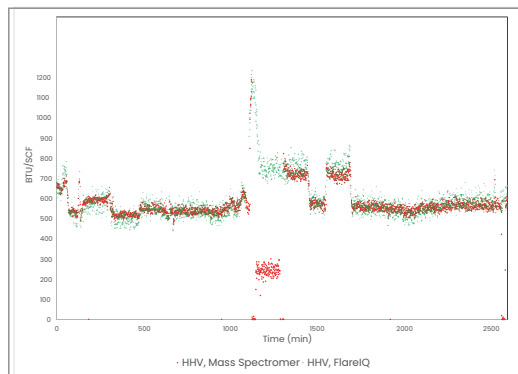
Reduce cost, time, and risk

Baker Hughes's patent-pending process optimization algorithms which provide near-continuous feedback on flare performance will help drive down operational cost with reduced steam and supplemental gas consumption. Employing Baker Hughes's patent-pending algorithms will also reduce the need for further capital investment in measurement assets such as calorimeters or hydrogen analyzers (if a gas chromatograph is being used for BTU measurement).

flare.IQ helps the control engineer better manage the schedule and implementation risk to meet the January 30, 2019. With all the algorithms to control the entire flare system, flare.IQ allows the control engineer to focus on optimizing the control of the process by removing the need to spend valuable time and money implementing the regulatory requirements in the programming. flare.IQ provides a synergistic approach to deploy a system or enterprise-wide solution for flare control.

Detailed Hardware Specifications

Processor

•   Intel 1.66 GHz 64 bit embedded processor

Memory

•   DDR2 667/800 MHz 1GB
•   2 GB Flash Memory

Connectivity

•   1 GBps redundant UDH connections (Ethernet)
•   1 GBps redundant IOnet connections (Ethernet) for Modbus TCP/IP

Installation

•   19" rack mountable
•   Operating Temperature 0°C to + 60°C
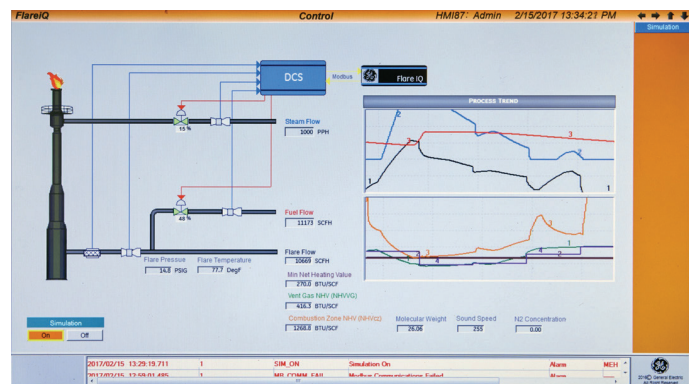•   (extended temperature variants on request)

LED Indicators

•   Diagnostic Display

Power

•   Redundant 24v DC Input

Other

•   QNX real-time operating system