Flare Gas Analysis - BTU

Fast Fact

Real-time Flare Control and EPA RSR Compliance with Industrial Mass Spectrometry

The MAX100-BTU measures the full composition of the vent gas in seconds and reports the Net Heating Value (NHV) for high-precision RSR flare control.

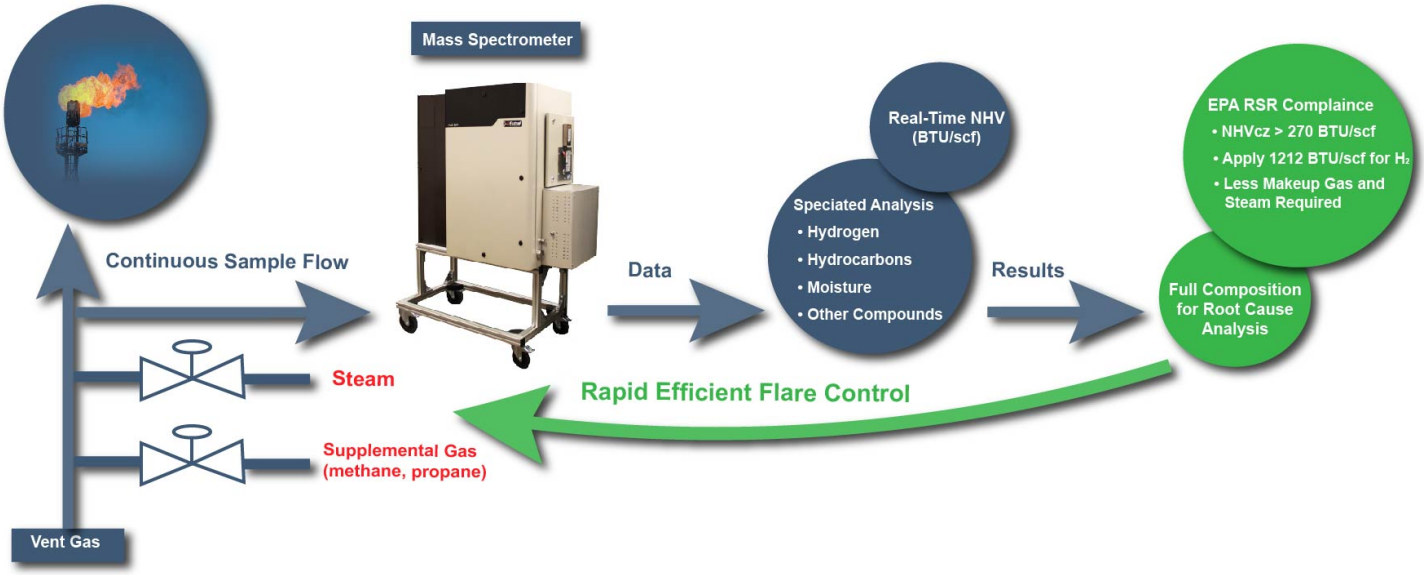


Figure 1. The MAX100-BTU, flare gas analyzer, provides the real-time data necessary to optimize refinery flare control for EPA compliance.

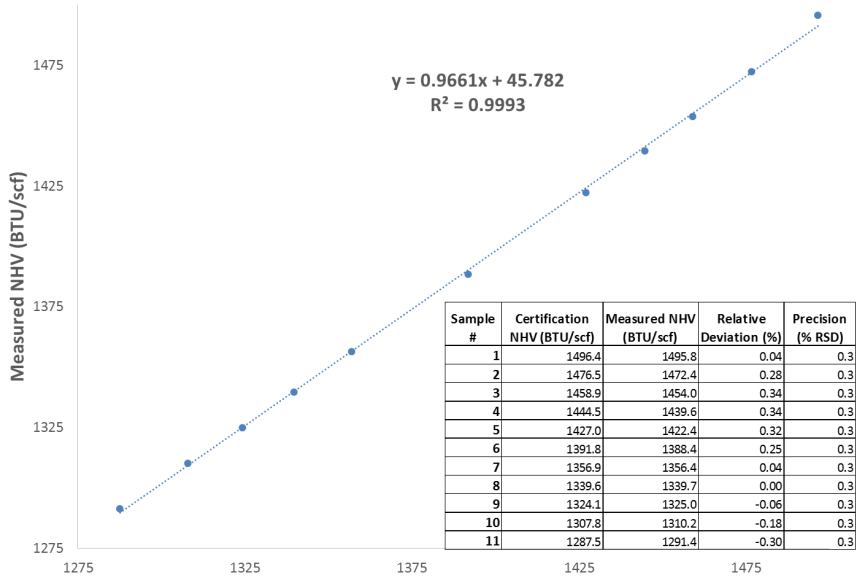
Flare streams often contain waste gas from several process units, and the composition can change dramatically from one minute to the next. A real-time mass spectrometer is ideally suited for the analysis of dynamic samples in challenging combustion control applications. The MAX100-BTU™ measures the full composition of the stream in seconds, and automatically reports the Net Heating Value (NHV). The speciated concentration of hydrogen ensures that the heating value is calculated accurately using the 1212 BTU/scf value specified in the Refinery Sector Rule (RSR). Rapid updates alert operations as the NHV approaches the regulatory limit (270 BTU/scf) and gives them enough time to respond. The refinery remains in compliance while using less supplemental gas and steam.

MAX100-BTU Real-Time Gas Analyzer Specifications

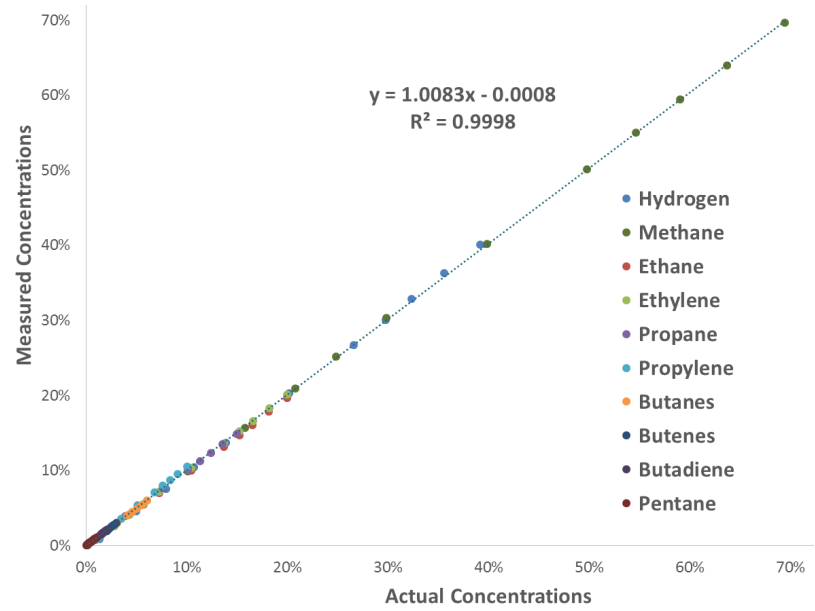
- 24-7 Automated Flare Monitoring
- >99% Demonstrated Uptime
- Extreme resistance to high hydrogen sulfide
- Low Maintenance
- No Carrier, Detector or Dilution Gases Required

High Precision Net Heating Value (NHV) with the MAX100-BTU

The MAX100-BTU, flare gas analyzer, reports real-time NHV with accuracy better than ± 1%



Sample #	Certification NHV (BTU/scf)	Measured NHV (BTU/scf)	Relative Deviation (%)	Precision (% RSD)
1	1496.4	1495.8	0.04	0.3
2	1476.5	1472.4	0.28	0.3
3	1458.9	1454.0	0.34	0.3
4	1444.5	1439.6	0.34	0.3
5	1427.0	1422.4	0.32	0.3
6	1391.8	1388.4	0.25	0.3
7	1356.9	1356.4	0.04	0.3
8	1339.6	1339.7	0.00	0.3
9	1324.1	1325.0	-0.06	0.3
10	1307.8	1310.2	-0.18	0.3
11	1287.5	1291.4	-0.30	0.3



To demonstrate the performance of the MAX100-BTU under a variety of conditions, several samples of known composition were analyzed in series. The samples contained hydrogen, methane, ethane, ethylene, propane, propylene, iso and normal butane, butene, butadiene and pentane at concentrations ranging from ppm to percent levels. The total analysis time to measure all components was <10 seconds, and the results for accuracy, and precision are both significantly better than 1%, relative (Fig 2). The MAX100-BTU provides a rapid, high precision measurement of heating value and total composition for optimal combustion control and environmental compliance.

Figure 2. MAX100-BTU performance on samples containing known concentrations of typical refinery flare components.

A. The calculated heating value (NHV)
B. Component concentrations

Table 1. A comparison of flare gas analysis technologies

	RSR 40 CFR 63.67		40 CFR 60 Subpart Ja			Additional Measurements		Operation		
Flare Gas Analyzers	Net Heating Value (Btu/scf) Updates in Seconds	Speciated Hydrogen	H_2S (0-300 ppm)	Total Sulfur (0-100%)	High-Range Sulfur Validation can use ppm H_2S	Full Speciated Composition	Measures HF	No Dilution Required	Low Maintenance	No Carrier or Detector Gas Required
MAX100-BTU	✓	✓				✓		✓	✓	✓
MAX300-RTG	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Calorimeter	✓							✓		
TDL			✓	*					✓	✓
PUV				✓						
GC-FPD		✓	✓	✓						
GC-TCD		✓	✓					✓		

*Total Sulfur with TDL is typically accounted for by a correlation method using manual sampling and laboratory analysis

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