



Process gas chromatographs. Measurement made easy

# Compliance Solutions for 40CFR60 Subpart Ja

Power and productivity  
for a better world™



# Introduction

ABB offers a proven analytical solution to completely meet your Refinery Flare Monitoring requirements based on our large breadth of application and product expertise within the hydrocarbon processing industry.

- Careful attention to design for operational safety
- Measurement accuracy and reliability to avoid regulatory fines
- Low total cost of ownership



The Environmental Protection Agency has issued the final amendments to the new source performance standards (NSPS) for process heaters and flares at petroleum refineries and ABB has your solution.

**1. 40CFR60 subpart Ja – Total Sulfur Measurements**

- Determine Sulfur Dioxide (SO<sub>2</sub>) emissions from the flare
- Measurement ranges of 1.1 to 1.3 times the Maximum anticipated sulfur concentration

**2. 40CFR60 subpart Ja – Hydrogen Sulfide (H<sub>2</sub>S) Measurements**

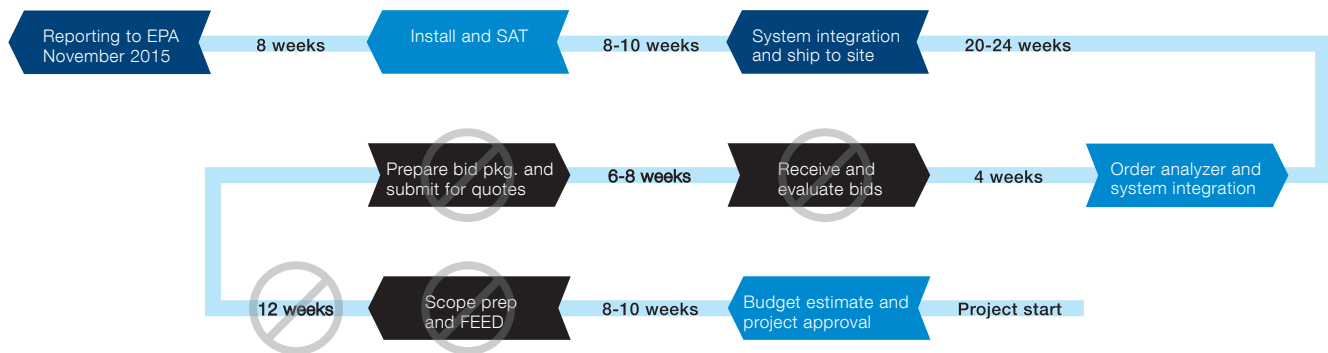
- Determine the Hydrogen Sulfide (H<sub>2</sub>S) in the fuel gas to the flare
- Short-term limit of 162 ppmv as a feed to the flares
- Span value for this measurement is 300 ppmv H<sub>2</sub>S

**3. 40CFR60.18 – Net Heating Value**

- Maintain a minimum BTU content and measure net heating value to the flare
- 300 Btu/scf or greater if the flare is steam-assisted or air-assisted
- 200 Btu/scf or greater if the flare is non-assisted



# System integration timeline



Total project path can be 20 months which can be reduced with a total solution from ABB. Eliminate steps with ABB Sub Part Ja System

## Measurement requirements

The PGC5000 Series of analyzers provides a versatile platform to combine these three measurement requirements in the optimal oven and controller configurations to minimize capital cost, and focus on maximum measurement availability, ease of maintenance, and regulation compliance.

### Total Sulfur measurements – 40CFR60 subpart Ja

ABB's Total Sulfur analyzer, the PGC5007B, employs a field proven combination of hardware and application experience to provide a simple and robust measurement result.

Sample Injection ▶ Oxidation ▶ Separation ▶ Measurement

### Application features and benefits

- As simple as a GC can be; one injection valve, one set of columns, one detector, without complex backflush or heart-cut techniques
- Guaranteed, interference free measurement without matrix, or stream composition, dependencies
- Sulfur specific detection
  - Wide analytical measurement range from 0-100%, to satisfy measurement ranges of 1.1 to 1.3 times the Maximum anticipated sulfur concentration.



Total sulfur measurements – 40CFR60 subpart Ja

# Hydrogen Sulfide (H<sub>2</sub>S) measurements – 40CFR60 subpart Ja

## Analyzer model

The PGC5007B is based and built according to ASTM method D7041-04(2010), **Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels, and Oils by Online Gas Chromatography with Flame Photometric Detection**. With hundreds in service around the world, this analyzer method continues to provide the HPI industry the only **approved, online** analytical method with precision and bias data 2-5 times better than any analytical technique for total sulfur measurements. Taking full advantage of this method's years of hardware and method validation, for Flares, ABB adjusted only the injection valve type, from a liquid injection to a vapor injection.

## Hydrogen Sulfide (H<sub>2</sub>S) measurements – 40CFR60 subpart Ja

### Option 1: PGC5000B (H<sub>2</sub>S measurement)

- This is a direct measurement of H<sub>2</sub>S in fuel gas with a measurement range of 0-300 ppm
- This Analytical Method uses a sample injection with back flush and selector to eliminate interference with a flame photometric detector for H<sub>2</sub>S.
- Sulfinert treated hardware for chemical inertness and measurement accuracy
- Fuel gas stream isolation from flare gas sulfur excursions
- Zero potential of cross contamination when flare gas sulfur exceeds 300 ppm
- Separate and independent daily validation and CGA audit analyses

### Option 2: PGC5007B Total Sulfur Analyzer

The EPA has approved the use of a total sulfur analyzer for the H<sub>2</sub>S measurement provided it can meet a 0-300 ppm measurement range. Since the H<sub>2</sub>S content in fuel gas will always be less than the total sulfur reported from the flare gas, this analyzer can also be used to confirm the H<sub>2</sub>S measurement.

Measurement can be made using the Total Sulfur Analyzer System designed for the flare gas stream. Due to the broad range of measurement, the Total Sulfur Analyzer above can be used to assess compliance with the short-term 162 ppmv H<sub>2</sub>S concentration in the fuel gas.

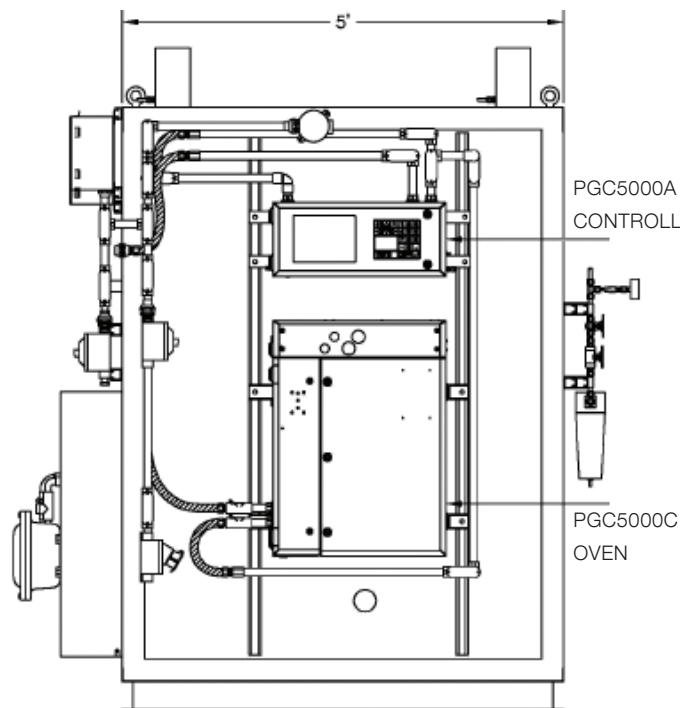
Both sulfur measurements can be made on a single analyzer. One PGC5007B can satisfy the 0-300 ppm H<sub>2</sub>S, and the 1.1 to 1.3 X the Maximum anticipated Total Sulfur requirements.

- Lower overall cost of ownership



PGC5007B Oven interior

# Net heating value – 40CFR60.18



Cabinet with door removed.

Sample drawings of PGC5000 mounted in a freestanding cabinet.



## BTU parameters PGC 5000C

Detector FPD and MultTCD

Cycle time 15 minutes

Valves 6

Repeatability 0.5-1% FS

H2S 0-320 ppm and 0-20%

COS 0-320 ppm

CS2 0-320 ppm

Total Sulfur Calculated total

Percent Level Streams

Component 0-100%

BTU Calculated

## Compliance Made Simple

From initial design engineering through complete system delivery, a fully integrated solution from ABB offers:

- Field proven designs based on best in class analyzer technology
- Seasoned project management as a single point of interface
- Experienced application Chemists and Engineering staff
- Full system support for field startup
- Reduced project time line
- Reduced total installed cost
- Long term field service for the life of the system

Standard Designs include:

- Wall Mounted systems for installation in an existing building
- Cabinet mounted systems
- Walk-in style shelters capable of accommodating multiple analyzer systems
- Parallel method of analysis to the TS application

# Flare application summary

Application option	Total Sulfur application method	H2S Application method	BTU	Ovens	Std. Integration options
1	Two internally switched ranges Total Sulfur = TS (0 ppm – 5000 ppm) Total Sulfur = TS (5000 ppm – 50%) (Other ranges possible to satisfy the 1.1 to 1.3 X requirement)	Directly measured component: H2S (0 – 300 ppm)	Yes	Three B ovens	W, F, S, S1
2	Two Internally switched ranges Total Sulfur = TS (0 ppm – 5000 ppm) Total Sulfur = TS (5000 ppm – 50%) Other ranges possible to satisfy the 1.1 to 1.3 X requirement)	Directly measured component: H2S (0 – 300 ppm)	Yes	Dual One C and one B oven	W, F, S, S1
3	Three Internally switched ranges H2S measured as TS (0 ppm - 300 ppm) Total Sulfur = TS (300 ppm – 5000 ppm) Total Sulfur = TS (5000 ppm – 50%) Other ranges possible to satisfy the 1.1 to 1.3 X requirement)	Measured as Total Sulfur Reported H2S (0 – 300 ppm)	Yes	Dual Two B ovens	W, F, S, S1

W wall mount

F Free standing cabinet

S Shelter with HVAC E1

S1 Shelter with HVAC E2

(for more detail see next page)

## Conclusions

ABB's trained professionals and qualified technical personnel are ready to assist you. We can customize the latest in new technology, products and service tools for mandate compliance.

Contact ABB to schedule your consultation for integrated solutions, on-site service, order parts, technical support or register for training. Contact us today ([www.abb.com/contacts](http://www.abb.com/contacts)) for the following:

- Systems Integration
- Mandate compliance
- Commissioning (Field Start-up)
- Contracts (Preventative Maintenance, Total Maintenance, Full Service)
- Maintenance
- Technical Support
- Training (Operator Training, Maintenance Training)
- Upgrades
- Parts and Repairs (Warranty Exchange, Refurbishment)

# Flare monitors – system configuration solutions

	1	2	3	4	5	6	7	8	9
<b>(1) Application options (see flare application summary table for detailed description)</b>									
1 Three PGC5000B ovens	1								
2 One PGC5000C and one PGC5000B ovens	2								
3 Two PGC5000B Ovens	3								
4 Custom oven configuration	4								
<b>(2) SCS options</b>									
1 Conventional Type Sample System - Single Train		1							
2 Conventional Type Sample System - Dual Train		2							
3 Modular Type Sample System - Single Train		3							
4 Modular Type Sample System - Dual Train		4							
5 Conventional Type Sample System - Single Train - With Sample Probe		5							
6 Conventional Type Sample System - Dual Train - With Sample Probe		6							
7 Modular Type Sample System - Single Train - With Sample Probe		7							
8 Modular Type Sample System - Dual Train - With Sample Probe		8							
<b>(3) Communication options</b>									
1 Ethernet / VistaNET, Wired			1						
2 Ethernet / Modbus TCP/IP, Wired			2						
3 Ethernet / VistaNET, Fiber Optic			3						
4 Ethernet / Modbus TCP/IP, Fiber Optic			4						
5 Analog Output (4-20mA)			5						
6 Data Acquisition & Reporting Package w/o PC Workstation			6						
7 Data Acquisition & Reporting Package w/ PC Workstation			7						
<b>(4) Integration options</b>									
W Analyzer only – shipped loose for wall mount				W					
F Free-Standing SS Cabinet (Nema 3R)				F					
S Shelter with HVAC (E1 Class 1, Group C, D, Division 2)				S					
S1 Shelter with HVAC (E2 Class 1, Group B,C, D, Division 2)				S1					
<b>(5) Cabinet Temperature Control Options</b>									
N No Cabinet					N				
V Vortex Cooler					V				
A Refrigerant A/C Unit					A				
<b>(6) Power Options</b>									
1 120VAC / 1-Phase / 60 Hz						1			
2 208VAC / 3-Phase / 60 Hz 4-Wire						2			
<b>(7) Utility Gas Cylinder Rack Options</b>									
0 No Utility Gas Cylinder Rack Required							0		
1 Remote Gas Cylinder Rack - w/o Regulators, 4 - spaces/side							1		
2 Remote Gas Cylinder Rack - w/ Regulators (qty. 2), BTU or Total Sulfur measurement							2		
3 Remote Gas Cylinder Rack - w/ Regulators (qty. 4), BTU or Total Sulfur measurement							3		
4 Remote Gas Cylinder Rack - w/ Regulators (qty. 6), BTU and Total Sulfur measurement							4		
5 Remote Gas Cylinder Rack - w/ Regulators (qty. 8), BTU and Total Sulfur measurement							5		
<b>(8) Sample Transport Equipment Options</b>									
0 Sample Supply and Return Tube Bundle By Others								0	
1 Sample Supply and Return Tube Bundle By ABB - 50 ft / 50 ft. long								1	
2 Sample Supply and Return Tube Bundle By ABB - 100 ft / 100 ft. long								2	
3 Sample Supply and Return Tube Bundle By ABB - 150 ft / 150 ft. long								3	
<b>(9) Training &amp; Start-Up Options</b>									
0 Not Required									0
1 PGC5000 Training, In Class									1
2 PGC5000 Training, At Site									2
3 PGC5000 and DAS Training, in Class									3
4 PGC5000 and DAS Training, at Site									4
5 PGC5000 Start-Up, At Site									5
6 PGC5000 and DAS Start-Up, At Site									6

# Contact us

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