

FloConnect[®] Emissions Management Solutions

HALLIBURTON

Emissions Management Solutions

Halliburton Testing and Subsea is pro-actively addressing the industry's growing need to manage emissions with several technologically advanced solutions, including proprietary hardware and software tools for the continuous acquisition, storage, evaluation, monitoring, control, and reporting of emissions data. These innovative solutions are engineered specifically for oil and gas applications with the aim of providing critical emissions-related information that enables environmentally conscious, operational decision-making in real time.

Challenge

Provision of critical emissions data to support **quantification** of produced emissions

evaluate services due to limited **benchmarking of** emissions

Difficult to objectively

Leverage technical enhancements and new technologies to support the **reduction of emissions**

Solution

FloConnect[®] Emissions Dashboard

A full understanding of where and what emissions are being produced, with emissions mapping

Environmentally Distinctive Burner

A historical datum and

benchmarking against well testing emissions that can be tracked over time



FloConnect[®] Surface Automation Platform

Implementation of emissions abatement to support future operations



REAL-TIME EMISSIONS MONITORING

The FloConnect emissions dashboard provides a comprehensive, web-based graphical user interface, which gives clients direct access to current emissions data through real-time streaming and historic data via end-of-job reports or file exports. The flexibility of the emissions dashboard allows the system to readily meet current and future regulatory requirements, as well as operator-specific requirements.



Users can get the "big picture" of emissions activity at any given point in time via the emissions dashboard data display.

FloConnect[®] Environmentally Distinctive Burner System





HMI Display Screens

INNOVATIVE DESIGN AND DEVELOPMENT SOLUTIONS WITH PATENTED FEATURES

Quality, smoke-free burn with no escaped fuel through unique nozzle control

The nozzle can precisely control the flow of oil and air through the burner, allowing closure without any unburned fuel escaping. Controlled remotely and powered by an integrated pneumatic system, the nozzle is designed to utilize the combustion air supply. The system allows for individual control of each nozzle's position, enabling operators to adjust to changing well conditions and helps ensure quality, smoke-free burns.

Reduction in radiant heat on the rig achieved through cross-lighting

The nozzles are vertically arranged in carefully selected, overlapping patterns to allow effective cross-lighting of the burner nozzles regardless of wind conditions. This flame pattern reduces the visible area of flame when observed from the rig, reducing the severity of radiant heat on the rig.

Burner Management System

The burner management system has a built-in programmable logic controller (PLC) that safely manages and controls all burner operations. This includes burner startup, individual opening and closing of nozzles to adjust flow rates, drip-free shutdowns with the push of a single button (within 0.3 seconds), and rotation of the burner head for changing wind conditions (± 30°).

Real-Time Control

A remote operator interface provides real-time control of the oil manifold, air manifold, accumulator tank pressure, visual fault alarms, and safeguards against unsafe operation. There is also a remotely operated, dual ignition and flame detection device with real-time pilot status indication.





Industry's first adaptive burner technology specifically designed for the reporting of emissions data, and winner of the Meritorious HSE Award for Engineering Innovation

Fallout Efficiency

99.99952%

Based on Fallout Target Testing

Combustion Efficiency (Carbon Converted into CO₂)

99.4%*

Reference EPA-600/2-83-052

Destruction Efficiency (Carbon Converted into CO₂ + CO)

99.5%

Reference EPA-600/2-83-052

Carbon Dioxide Emissions

41 Ib CO₂ /MMBtu*

Reference EPA-453/R-11-002 & AP 42 *Exceeds EPA Minimum Requirements

Shown to Emit



than EPA standards¹

HIGH-EFFICIENCY OIL BURNER WITH PROVEN TRACK RECORD SINCE 2014, DELIVERING INDUSTRY-LEADING BURN PERFORMANCE AND AUTOMATION

- » Extensive product testing and qualification witnessed and documented by an International Classification Society
- » Testing and qualification references United States Environmental Protection Agency (EPA) benchmarking

FloConnect[®] Surface Automation Platform

Halliburton is assisting oil and gas operators to embrace emissions solutions via process automation and digitalization technologies.

The FloConnect surface automation platform supports emissions reduction and increases sustainability, safety, and efficiency.

This platform provides key insights that help drive companies to optimize their well testing, while increasing environmental awareness through emissions monitoring and abatement.



Sources:

¹ EPA: 2022 EPA emission factor hub "crude oil" CO₂ emission factor (note other greenhouse gases were not tested or compared)

GL Noble Denton Statement of Verification of test data (D00883942)

GHG Emissions Calculations Review, Halliburton Energy Services, Report No.: 001, Rev. 1, DNV Document No.: 1126497 Date: 05/19/2021

L Low Impact

Emissions estimates are intended for demonstrative purposes only. This sustainability data is not intended for and should not be used by any party for any other purpose. The information provided is not meant for reporting purposes or intended to fulfill any reporting requirements.

The information contained herein is based on estimations of input data such as operating hours based on type of work, generally accepted emissions factors, and Halliburton's internal work methods and models. Where appropriate, reasonable estimate(s) and assumption(s) including where available, OEM provided data or equipment, and realistic operating scenarios were used to provide estimates. It does not represent actual measured emissions.

Estimates are calculated using publicly available emissions, supplier provided data, and/or internal work methods where available. Where available, estimates for materials are created using information supplied from Halliburton's suppliers. This data could include a partial or complete "product carbon footprint" or "embedded carbon". Halliburton does not influence and cannot verify the accuracy or methodology of the emissions data provided by suppliers.

Underlying assumptions and information concerning the calculation method will be made available upon request subject to confidentiality requirements and limitations on the ability to release third-party confidential data.

For additional information, please contact sustainability@halliburton.com.

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

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