Calorimeter CWD - Flare Monitoring

Application Note

Direct reading Wobbe-type calorimeter CWD supports users to comply effectively with the new and more stringent EPA flare monitoring regulations





COMPETENCE IN GAS MONITORING

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Flare Gas monitoring using a direct reading Wobbe-type Calorimeter

Industry/Application area

Gas flaring is responsible for a considerable share of the worlds Green House Gas emission. Many countries therefore took and take actions to reduce flaring by new and more stringent regulations preferably in the Oil & Gas and Chemical Industry. In the USA, on April 20, 2015, EPA revised AP-42 emission factors for flaring equipment installed preferably in refineries and chemical plants in order to ensure compliance with the applicable MACT requirements.
For monitoring flare emissions, EPA suggests the use of an on-line gas chromatograph (GC) to determine compliance with any of the operating limits. Alternatively, EPA proposes installation of a device to monitor vent gas net heating value, **such as a continuous calorimeter**. Very likely, a combined system of both analyzing technologies will deliver the most comprehensive information and reliably ensure the operator to comply with all regulations and limits.

Temperature compensation by software

Measuring task

The said requirements regulate, besides flow rate of vent and assist gases, the net heating value of the vent gas. It should contain at least 200 BTU/scf for unassisted and 300 BTU/scf for assisted flares at all times to limit the emission of volatile organic compounds (VOCs). The heating value of the flare gas should be determined as a whole including nitrogen or hydrogen and any other combustibles. Continuous monitoring is mandatory to ensure proper combustion efficiency at all times.
Best suited method to determine heating values of combustion gases is a Wobbe-type calorimeter which, in contrast to CARI-type calorimeters, measures the heating value of a gas mixture in BTU/scf directly without the need of applying correlation functions or using calibration gases and without any possible influence of catalytic burning effects.

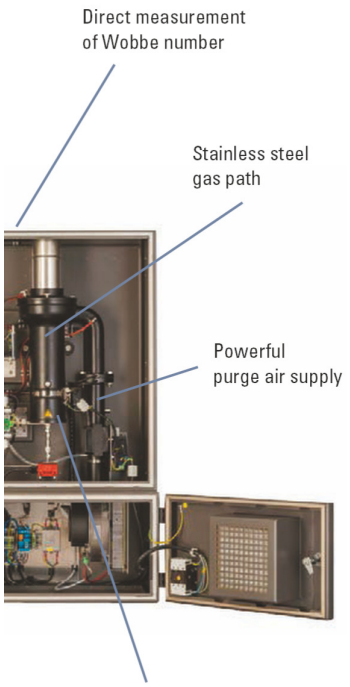
Application segment	CWD2005	CWD2005 CT	CWD2005 PLUS	CWD2005 DPC	CWD2005 SPC	CWD2000 Ex	W2005
Natural gas, Biomethane, Liquid gas	✓	✓	✓	✓	✓	✓	✓
Blast furnace gas, Coke gas, Mixed gas, Low Gas	✓	–	(✓)	–	–	–	✓
Refinery gas, Mixed gas, High gas	✓	–	✓	✓	✓	✓	✓
Certifications / Conformity	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	PTB approval 7.631 08.64	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	NRTL approval by SGS, standards: UL61010-1, CAN/CSA-C22.2 No. 61010-1 (customer reference 710162)	Standards NFPA 496:2013 ANSI/ISA 12.01 (customer specific "limited production certification report")	BVS 04 ATEX E 018 X	–
Measured values	Wobbe-Index, Specific Gravity						Wobbe-Index
Calculated values	Heating value, Calorific value						Heating-/ Calorific value (constant Specific Gravity)
Ex Class	–	–	–	Class I Div 2 Groups B, C, D, T4	Class I Div 2 Groups B, C, D, Methane, T4 (customer specific "limited production certification report")	Class II 2G Ex d IIA T3 Gb	–

Device series CWD2005

Solution: CWD2005 Calorimeter

CWD calorimeter series

CWD stands for **C**alorimetry, **W**obbe-Index, and Specific **D**ensity and designates a modularly designed analyzer series for the determination of calorimetric quantities in gases in various application areas including custody transfer measurements and measurements in hazardous areas. **The CWD2005 directly determines the Wobbe index** as the typical variable for the calorific value. The measurement method is based on the continuous determination of the temperature changes of a carrier medium (air) caused by the energy which is released continuously during combustion of a defined gas flow. The relative gas density is measured simultaneously and used to calculate the heating and combustion value. Unknown or unexpected combustible components in the flare or process gas are as well captured and combusted and thus considered in the measurement. This is essential for achieving reliable data from flare and process gases with rapidly changing gas composition or for synthetic gases in the steel industry.



Features and Benefits

Direct (Wobbe-type) determination of heating value; no indirect (CARI-type) method

Clearly defined zero point: No combustibles results in zero reading

No dependence on high temperature catalytic combustion process and electrochemical O_2 sensor technology

Extensive safety measures: No open flames and very little hot mass with fast cooling-off prevent from self-ignition; integrated safety system activated as soon as purging air supply fails

Sample gas is completely combusted in encapsulated burning chamber; no off gas to be disposed

Sample gas path without hypercritical flow conditions minimizes plugging and reduces maintenance effort significantly

High stability, because ambient temperature variations are compensated via a modeling approach

Short reaction times: Dead time below 5 sec, T90 time below 15 sec; times are almost negligible compared to much higher system dead times originating from gas travel time through pipes, filter, etc.

About UNION Instruments

UNION Instruments GmbH, founded in 1919, is a specialized supplier of measuring instruments in the areas of calorimetry and gas composition. Its user and customer base includes biogas producers, the chemical industry, and energy and water suppliers. The company has its headquarters in Karlsruhe and a subsidiary in Lübeck. With 30 international distributors, UNION Instruments operates worldwide. The company's core businesses include development and production as well as maintenance, service, and support.

Our service performance

Support

The **UNION-hotline** helps to solve all inquiries and urgent issues fast and easy. Device specific concerns can be solved worldwide within minutes by direct communication via TEAMVIEWER.

Original spare parts

Original spare parts for the majority of UNION's products are in stock directly at site and ready for dispatch within a few hours.

Software

For read-out of measurement and calibration data a device-specific software is available for our clients. In addition to the graphic display of measurement data its export in several database formats is possible.

Training

UNION offers individual in-house training or on-site seminars for installation, use and maintenance of our devices even at the customer's premises. Training is individually adapted to the client's requirements.

Repair service

A global service for inspection, maintenance and repair of our devices and systems is provided directly by UNION and via its distributors.

Certification

Since 20 years we have implemented the ISO9001 system.
UNION's products are certified to ATEX and UL/CSA directives accordingly. Industrial safety **"Safety with System"** is part of UNION's company policy.

Engineering

In the last decades UNION compiled a very high level to the state of the art that covers many market segments. So a wide range of possible solution approaches is on-hand.

Calibration

As part of maintenance and service UNION provides the validation and re-calibration of measuring devices in conformity with certified custody transfer instruments and / or traceable protocols.

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