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When Accuracy Matters

THE ETS DICTATES THAT OPERATORS ARE ABLE TO ACCURATELY REPORT FLARE EMISSIONS

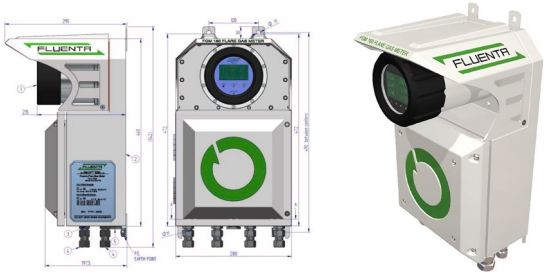
Prior to the European Union Emissions Trading Scheme, the measurement of flare gas on oil and gas production facilities in the North Sea was driven mainly by statutory regulations that required operators to simply report emissions to the Environment Agency. Consequently, there was never an economic incentive to install metering equipment.

The Emissions Trading Scheme (ETS) was introduced in 2005 by the European Union as a part of its climate change policy and is now in its third trading period, which will run until 2030. The basic concept is that the European commission allocates Carbon credits (each credit is worth 1000 Kg of C02) to participating countries, which effectively limits the amount of C02 that can be released to atmosphere. This limit or "cap" is then spread across the major industrial installations in each country. At the end of each year, installations are required to report their emissions and can either sell surplus credits, if they have emitted less than their allowance or buy credits from other installations, if they have exceeded their target. As each trading period begins, the overall allocation is reduced further and the total output of industrially released C02 falls.

Flow measurement compliance with ETS directives

Importantly, depending on the Industry and size of the facility, the Trading Scheme stipulates different levels of accuracy for the instrumentation used to measure both fuel gas and flare gas. For the oil and gas industry, flow meters used to report emissions from flares fall within the Tier 3 accuracy level which, means they must have a degree of uncertainty (accuracy) better than ± 7.5 percent of the measured value. (Dir 2003/87/EC-Appendix 2-2.1.1.3).

In addition, it is a mandatory requirement for the operator to submit a Monitoring Plan (Dir 2003/87/EC-Appendix 2-4.3) explaining how the operator intends to validate the instrumentation used to measure the flare gas emissions. So the operator must effectively prove that the flow meter is within its original specification. This would normally mean returning it to the manufacturer, which is not only inconvenient but extremely costly. For this reason, many operators are now being forced to review their existing arrangements in order to comply with the directive.



Fluenta recently tested its 160 Flare Gas Meter at the renowned CEESI testing facility in Colorado on behalf of a major Middle East oil company. The results show that Fluenta meters perform with an uncertainty of less than 3% without prior calibration and even at low flow velocity.

About CEESI

Colorado Engineering Experiment Station, Inc. (CEESI) performs NIST traceable primary and secondary calibration for numerous types of flow meters and fluids. In addition to quality calibrations, CEESI offers calibration-related engineering services, valve testing, and a wide range of flow measurement training services and consultancy offerings. Their operations began in 1951 at the University of Colorado.

Fluenta chose the CEESI testing facility in Colorado due to customer accreditation. As opposed to other facilities, CEESI also offers a custom piping set-up enabling Fluenta to test the meter on a 30" spool piece and at low flow conditions of 1 to 20 m/s, thereby mimicking the customer's process.

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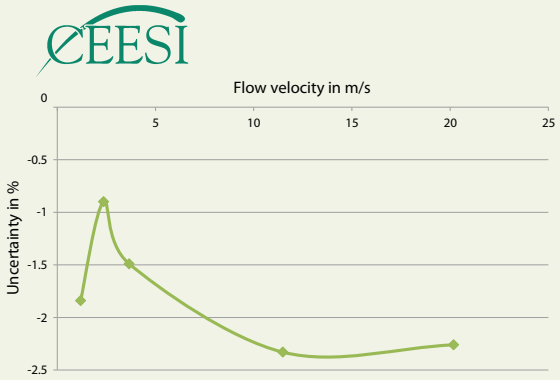
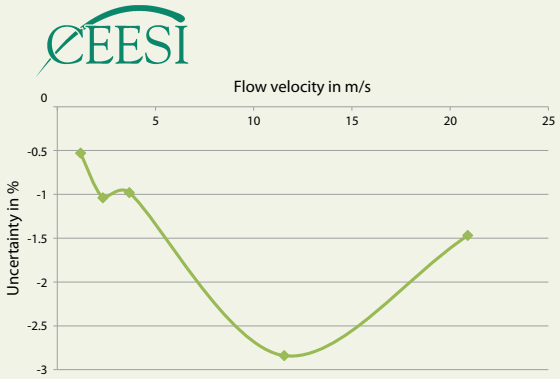


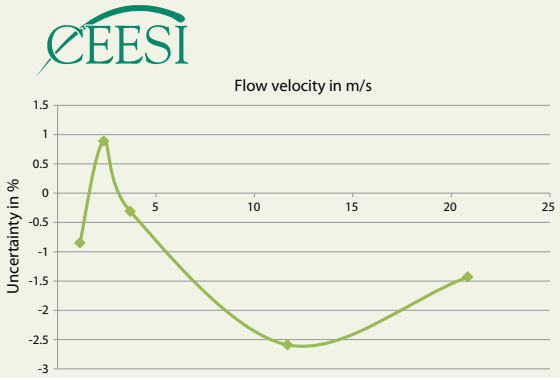
Calibration of a Ultrasonic
Model: Serial Number: 08-FIT-6637
For: Fluenta Order: 1767
Data File: 16FLUE-0016_1 Job: CE24025 Date: 25 March 2016
Meter Diameter: 29 inches
Test gas: AIR Standard density= 0.074896 lbm/ft³
at standard conditions of 529.67 °R, and 14.696 Psia
MtrVel: Meter velocity in meters per second
m/sec: Meter velocity in meters per second
%Error: %Error of calculated from reported velocity
Press: Meter BODY static pressure in bara
Temp: EXIT temperature, degrees Celcius
ACMH: Volumetric flowrate at meter BODY, actual cubic meters per hour
Density: Flowing density at meter BODY, in kilograms per cubic meter

Pt.	MtrVel	m/sec	%Error	Press	Temp	ACFH	Density
1	19.728	20.184	-2.26	0.83686	9.29	30965	1.0326
2	11.223	11.491	-2.33	0.82944	10.1	17629	1.0204
3	3.6055	3.6602	-1.49	0.82656	10.3	5615.1	1.0164
4	2.3359	2.3571	-0.899	0.82634	10.7	3616.1	1.0147
5	1.1632	1.185	-1.84	0.8262	9.91	1817.9	1.0173



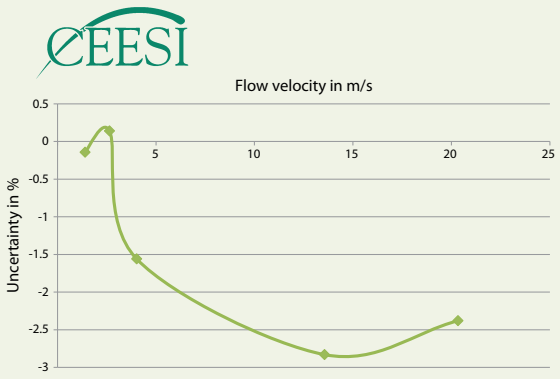
Calibration of a Ultrasonic
Model: Serial Number: 10-FIT-6637
For: Fluenta Order: 1767
Data File: 16FLUE-0020_1 Job: CE24025 Date: 25 March 2016
Meter Diameter: 29 inches
Test gas: AIR Standard density= 0.074896 lbm/ft³
at standard conditions of 529.67 °R, and 14.696 Psia
MtrVel: Meter velocity in meters per second
m/sec: Meter velocity in meters per second
%Error: %Error of calculated from reported velocity
Press: Meter BODY static pressure in bara
Temp: EXIT temperature, degrees Celcius
ACMH: Volumetric flowrate at meter BODY, actual cubic meters per hour
Density: Flowing density at meter BODY, in kilograms per cubic meter

Pt.	MtrVel	m/sec	%Error	Press	Temp	ACFH	Density
1	20.593	20.9	-1.47	0.83691	8.55	32063	1.0354
2	11.235	11.563	-2.84	0.82912	9.4	17739	1.0227
3	3.6245	3.6605	-0.983	0.82602	10.5	5615.6	1.015
4	2.3025	2.3267	-1.04	0.82579	10.9	3569.3	1.0133
5	1.1926	1.199	-0.534	0.82582	11.1	1839.4	1.0127



Calibration of a Ultrasonic
Model: Serial Number: 19-FIT-6637
For: Fluenta Order: 1767
Data File: 16FLUE-0022_1 Job: CE24025 Date: 26 March 2016
Meter Diameter: 29 inches
Test gas: AIR Standard density= 0.074896 lbm/ft³
at standard conditions of 529.67 °R, and 14.696 Psia
MtrVel: Meter velocity in meters per second
m/sec: Meter velocity in meters per second
%Error: %Error of calculated from reported velocity
Press: Meter BODY static pressure in bara
Temp: EXIT temperature, degrees Celcius
ACMH: Volumetric flowrate at meter BODY, actual cubic meters per hour
Density: Flowing density at meter BODY, in kilograms per cubic meter

Pt.	MtrVel	m/sec	%Error	Press	Temp	ACFH	Density
1	20.535	20.833	-1.43	0.84621	-0.0779	31960	1.0801
2	11.381	11.684	-2.59	0.83807	0.395	17924	1.0679
3	3.6761	3.6875	-0.309	0.83507	0.619	5656.9	1.0632
4	2.3576	2.3368	0.89	0.83516	1.5	3584.8	1.0599
5	1.1331	1.1428	-0.849	0.83542	0.354	1753.2	1.0646



Calibration of a Ultrasonic
Model: Serial Number: 22-FIT-6637
For: Fluenta Order: 1767
Data File: 16FLUE-0033_1 Job: CE24025 Date: 28 March 2016
Meter Diameter: 29 inches
Test gas: AIR Standard density= 0.074896 lbm/ft³
at standard conditions of 529.67 °R, and 14.696 Psia
MtrVel: Meter velocity in meters per second
m/sec: Meter velocity in meters per second
%Error: %Error of calculated from reported velocity
Press: Meter BODY static pressure in bara
Temp: EXIT temperature, degrees Celcius
ACMH: Volumetric flowrate at meter BODY, actual cubic meters per hour
Density: Flowing density at meter BODY, in kilograms per cubic meter

Pt.	MtrVel	m/sec	%Error	Press	Temp	ACFH	Density
1	19.854	20.338	-2.38	0.84061	-1.8	31201	1.0798
2	13.172	13.555	-2.83	0.83437	-1.65	20794	1.0712
3	3.9545	4.017	-1.56	0.82999	-1.21	6162.4	1.0638
4	2.6462	2.6425	0.14	0.82983	-2.09	4053.8	1.0671
5	1.399	1.401	-0.143	0.82971	-1.94	2149.3	1.0664

Technical setup

The data from both the reference meter and the Fluenta meter was feed to CEESI's data acquisition centre. CEESI collected these measurements for a period of 30 seconds and calculated the average value including error for that period to reflect stable flow conditions.

Results and interpretation

The results show that taken "straight out of the box" and without any initial calibration, the Fluenta 160 performs with an uncertainty below 3%. These results are achieved even at low flow velocity, which typically is a challenge in flow measurement. These findings are confirmed by multiple results from just one test session – a rare occurrence at any test site.

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