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Mr Steve Brown
Senior Technical Advisor – Gas Networks
The Office of Gas and Electricity Markets
9 Millbank
London
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Consultation on relaxing the accuracy requirements of Calorific Value Determining Devices.

Dear Mr Brown,

With reference to your letter dated 23 November relating to the above, we would seek to clarify the drivers for the relaxation in standards as it would appear to be linked solely to the acceptance of one specific product, in this case the Gas PT2 based on perceived cost advantages over the incumbent technology. We would consider it prudent to discuss these subjects independently of product selection as there are other devices which could potentially be included should you reduce the current standards / increase the uncertainty of CV measurement.

Reducing the measurement standard on Calorific Value.

We consider relaxing the standards a step backward for the UK market. The current limits set in the UK have been easily achievable for a number of years and indeed can be improved on further by utilising data operators currently have on file from their ISO10723 performance evaluation tests.

The UK gas market is changing with new sources of supply under development: Shale, bio-methane, bio-substitute natural gas, and hydrogen from power to gas projects. Similar projects are in place across Europe which result in greater compositional mix in the networks. This is driving requirement for more compositional and modelling data within networks to allow greater insight into the energy flows.

OIML R140:2007 is an "International Recommendation" which recommends amongst others maximum permissible errors and CV measurement times:

- +/-0.5% MPE Class A CVDD,
- Acceptable time interval for individual CV measurements, 15 min depending on CV stability

These recommendations provide National authorities a base to set their own standards. Across Europe the majority of countries still apply their own metrology requirements as OIML R140 is not a directive like MID.

As OIML R140 does not specify ranges each national authority or end user has to ensure a CVDD is tested against country specific ranges (current & future potential). Additionally, OIML R140 is also a comparison test against known standards, it does not demonstrate the uncertainty over a range of mixtures as ISO10723 would.

With the above in mind we would consider an independent evaluation specific to the UK requirements is carried out before a decision is made. In our opinion a single uncertainty calculation, based on a perceived cost benefit does not support such a significant change to the UK regulations.

We would also suggest exploring the option of improving the uncertainty with current freely available data in the interests of improving the overall metering uncertainty.

Proposed Alternative Device

As the proposal is based on a direct comparison of our "inactive" Model 500 Gas Chromatograph we feel obliged to provide comment on the major points raised in the original request from Northern Gas Networks.

The Model 500 in not an obsolete product, the current product status is "inactive". This status change was made in September 2015 with scheduled obsolescence in September 2020. Users should not be concerned about long term support for the installed base. A version of the Model 500 (Non ATEX) is still in production in the USA.

Speed of response/Fast Acting Devices: The latest XA platform can provide a full C_6+, N_2 & CO_2 compositional analysis within sixty seconds or less with the same performance as the current OFGEM approved product. Utilising new sampling products, like the VE probe from Orbital a fast, fully traceable analysis could be provided. Furthermore use of data from an ISO10723 report this solution could provide the lowest uncertainty model on sites where fast response is required.

Calibration: It is a common misconception Gas Chromatographs have to be calibrated on a daily basis, one major user with similar installed base to that in the UK calibrates the chromatograph once per year. Another major user performs a validation every two years and only if performance is out of specification do they calibrate. Why in the UK do we calibrate every day? Simply put because you can. For minimal cost you are proving the measurement within the gas day negating risk for the consumer. Performing a "35 day test" alone for a proven technology, like Gas Chromatographs is indeed also possible. Should field calibration be required it is possible with a Gas Chromatograph which is not be possible with the GasPT2. According to the NMi certificate the unit has to be returned to the producer for calibration increasing the OPEX costs as spare units would be required on site to maintain measurement data. Additionally, the certificate also states the units need to be checked every 4 months, which could potentially indicate a drift outside the uncertainty range. The cost of potentially exchanging the unit 3 times per year should be considered in OPEX costs.

Traceability & Validation: A fundamental in all measurement is tractability of back to international standards and validation of performance in accordance with recognised standards.

On review of the NIA progress report (NIA_NGN_055 Dated: July 2016) related to the field trial of the GasPT2 we understand the trail has not progressed due to the inability to agree a testing regime for the inferential device.

For inferential devices, traceability to international standards cannot be achieved. It cannot be validated to ISO10723, a current requirement from Ofgem approved CVDD's. Without this, uncertainties and errors can never be compared to the permissible values at site, irrespective of what those values are. We consider this a measurement risk which may impact the consumer.

Compositional data, with the exception of CO_2 is inferred from proprietary empirical data (gas families) thus the calculations to ISO6976 are from a limited inferred gas composition, again not traceable to published standards. Considering the upcoming changes in European gas supplies previous empirical data may not be sufficient to cover new requirements such as Hydrogen which will impact most significantly the density and speed of sound calculations.

ISO15971:2008 4.4 states "As a consequence of their acknowledged simplicity, instruments of this general type cannot usually be expected to achieve better than class 3 performance except in most favourable of circumstances " Class 3 performance with which uncertainty limits of no greater than +/-0.5MJ/m^3 on a volume basis calorific value (approximately 1.0%) may be associated.

We would interpret "most favourable of circumstances" is a stable gas composition which may have been in the case in the UK when the product was developed.

Inferential devices would not provide composition data at the metering point. Further consideration of the impact of removing this data should also be considered for flow metering integrity.

See Appendix 1 for further technical comments.

CAPEX Costs: We would challenge the perceived costs of the latest GC solutions as the latest product offering can be mounted with a calibration cylinder inside a standard instrument enclosure as the GasPT2. From discussions with operators purchase costs for a standard 370XA solution are similar or less than the GasPT2 solution. (See Appendix 2 for example product datasheet).

OPEX costs: Additional costs over the GasPT2 solution would be the cylinder rental for carrier gas. The 370XA has been designed to simplify the operation of a gas chromatograph with intuitive software assistants that guide users through common tasks. All diagnostic support can be provided remotely without the need to visit site. With low utility requirements, One He cylinder per 11 months, 20w operating power, 20cc/min flow rate we believe there is no need to compromise on measurement uncertainty. We consider the OPEX costs for the alternative technology could be significantly higher due to the potential for site replacement when the unit drifts out of specification.

Summary

We welcome the opportunity to provide comment on the proposal and look forward to further discussion with the industry on the subject.

Any change to reduce measurement accuracy should be considered carefully and without a full independent evaluation we consider is not in the best interest of the consumer. Across Europe inferential devices are used downstream of traceable measurement devices, we believe there is also a place for these within the UK network to increase insight into the network.

Yours Sincerely

John Hay
Product Manager
Emerson

APPENDIX 1

Comments 1 – comments / questions on traceability of GasPT2 measurements

It is unclear how the device can be deemed to be making traceable measurements in terms of an unbroken chain of comparisons back to primary standards realised by a national metrology institute with each step in the chain contributing to the total measurement uncertainty. If the device is "calibrated" by using traceable reference gas mixtures (with known uncertainty) then:

- How is that calibration information used to confirm/adjust internal parameters in a way that traceability is maintained?
- How is the uncertainty of calibration incorporated into the total uncertainty budget for a single measurement on the device?

It is not clear how information from calibration using a traceable reference gas mixture, containing say all natural gas components up to n-hexane, is then used to produce an "equivalent" mixture composition. In addition to "measured" carbon dioxide, the device reports an equivalent inferred nitrogen, methane, ethane and propane amount fraction.

- How is the calibration information used to derived this inferred equivalent composition when measuring an unknown stream gas?

In the absence of this information it is not possible to construct a measurement equation for the process and derive a rigorous uncertainty budget.

In the case of a gas chromatograph, it is clear how a complete uncertainty budget can be constructed for the way in which is it deployed. The international standards ISO 6976 Parts 1 and 2 define clearly how this can be done whether the instrument is operating in Type 1 (primary calibration) or Type 2 (performance evaluation) modes. The use of the sister international standard ISO 10723 enables a complete offline model of the instrument's performance to be constructed from which the simulated measurement of an infinite number of possible stream gases can be simulated. From this simulation, you can determine the distribution of errors (and their uncertainties) to fully examine whether the instrument fulfils the requirements of the locally allowed maximum permissible bias (MPB) and maximum permissible error (MPE).

With an inferential CVDD device there are no international standards which support and define the method, there are no international standards giving guidance on how to evaluate the performance of such devices.

In the absence of a detailed traceability chain allowing an uncertainty budget to be constructed, then all that remains in terms of assessing performance is to apply a limited number of known traceable mixtures to the device and examine what is measured. **This can only give a very limited idea of the distribution of error associated with the device** (limited to the number of reference gases used). The estimated bias (mean error) of the device will likely itself be inaccurate due to these limitations. Moreover, **the uncertainty on each measurement error cannot be estimated** due to the "black box" nature of the device. Without this information enabling a bottom up approach to uncertainty estimation, **the true distribution of errors and uncertainties can never be established. Hence, the combination of these errors and uncertainties can never be compared to that permissible on site whether it be 0.1 MJ.m-3 or 0.2 MJ.m-3.**

- *How can OFGEM accept an instrument for which the errors and the uncertainties on these errors cannot be satisfactorily determined from first principles?*
- *How can an instrument that cannot be demonstrably traceable be accepted as a directed measurement device?*

Comments 2 - Kelton Uncertainty Calculation

Gas Chromatograph CV uncertainty calculation

The report presents a detailed calculation with values used, for the gas chromatograph CV uncertainty.

The values used for calculation of gas chromatograph uncertainty are overestimated.

- Commercially available calibration gases have lower uncertainties than used in the table on page A7. See table below and attached.
- The repeatability values used for the calibration (listed as calibration tolerance) and gas measurement are overstated. Typical figures from an OFGEM approved 370XA are listed in the table below

Component	**Kelton**			**Typical data for real installations**			**Overall uncertainties**		**Overestimate (2)**
	Cal Gas Uncertainty	Calibration tolerance	Repeatability	Cal Gas Uncertainty (1)	Calibration tolerance	Repeatability	Kelton	Typical data	
N2	0.03	0.03	0.03	0.014	0.002	0.002	0.052	0.014	4
CO2	0.01	0.01	0.01	0.008	0.001	0.001	0.017	0.008	2
C1	0.05	0.05	0.05	0.03	0.0038	0.0038	0.087	0.030	3
C2	0.03	0.03	0.03	0.017	0.0028	0.0028	0.052	0.017	3
C3	0.03	0.03	0.03	0.01	0.0014	0.0014	0.052	0.010	5
NC4	0.002	0.002	0.002	0.0016	0.0008	0.0008	0.003	0.002	2
IC4	0.005	0.005	0.005	0.0022	0.0005	0.0005	0.009	0.002	4
NC5	0.002	0.002	0.002	0.0007	0.0007	0.0007	0.003	0.001	3
IC5	0.002	0.002	0.002	0.0007	0.0005	0.0005	0.003	0.001	3
NEOc5	0.002	0.002	0.002	0.0007	0.0008	0.0008	0.003	0.001	3
C6	0.005	0.005	0.005	0.0012	0.0003	0.0003	0.009	0.001	7

(1) - see attached certificate
(2) Overestimate = Kelton value / typical value

The biggest single uncertainty from the GC measurement comes from the measurement of methane, which is approximately three (3) times less than the value listed in the report.

GasPT2 CV uncertainty calculation

The report does not provide a detailed uncertainty calculation for the GasPT2 physical properties and does not provided source data. Only results are presented. (pages 16 & 17)

The NMI approval is cited as reference document, but only partial data from this report is used, i.e., not the approved CV uncertainty, but a lower value. Test data elsewhere from the device supplier have larger errors / uncertainties than used in the calculation (0.07 % repeatability – Engas, 0.36 % error – TGI)

The GasPT2 is calibrated by its manufacturer. Presumably, using certified reference gas (or gases) as with a GC, however, no uncertainty is attributed to this calibration. Calibration uncertainty should be included in the uncertainty

Conclusion: The report significantly underestimates the differences in CV uncertainty between the GC and the GasPT2

CERTIFICATE OF CALIBRATION

Approved signatory
Name: Anna Pszenna
Signature: A. Pszenna

Issued by: EffecTech
Date of Issue: 06 May 2015
Certificate No.: 15/0324/01

EffecTech
Specialists in Gas Measurement

ilac-MRA | UKAS CALIBRATION 0590

Dove House
Dove Fields
Uttoxeter
Staffordshire ST14 8HU
United Kingdom
www.effectech.co.uk

Customer	:	Emerson Process Management Limited Logie Court, Stirling University, Innovation Park, Stirling, FK9 4NF.
Customer reference	:	PO No.4149002806 (SO No.44223572)
Cylinder number	:	D299146
Destination	:	Emerson Process Management Limited Analytical Division, Unit 3B, Dumyat Business Park, Tullibody, FK10 2PB.
Date of calibration	:	31 March - 30 April 2015
Date of expiry	:	29 April 2016
Description	:	Multi-component sulphur calibration gas mixture in 2% propane, 6% ethane, balance methane

Composition

component	amount fraction (ppm mol/mol)	mass concentration (mg/m^3)
hydrogen sulphide	6.60 ± 0.16	10.0
carbonyl sulphide	1.92 ± 0.07	5.1
methyl mercaptan	0.47 ± 0.04	1.0
ethyl mercaptan	0.33 ± 0.04	0.9
dimethyl sulphide	0.36 ± 0.04	1.0
isopropyl mercaptan	0.28 ± 0.04	1.0
t-butyl mercaptan	0.26 ± 0.04	1.0
n-propyl mercaptan	0.28 ± 0.04	1.0
methyl ethyl sulphide	0.30 ± 0.04	1.0
diethyl sulphide	0.28 ± 0.04	1.1
n-butyl mercaptan	0.26 ± 0.04	1.0
tetrahydrothiophene	6.60 ± 0.16	26.0
s-butyl mercaptan	0.26 ± 0.04	1.0
iso-butyl mercaptan	0.25 ± 0.04	1.0
n-hexyl mercaptan*	0.10 ± 0.03	0.5

*not UKAS accredited
mg/m^3 reference conditions 0°C at 1.01325 bar

Contents pressure at calibration	:	125 bar
Cylinder size	:	50 litres (water capacity)
Cylinder material	:	aluminium
Valve outlet connection	:	BS341 - No.15
Recommended minimum usage pressure	:	3 bar

Components marked 'not UKAS accredited' are outside the scope of accreditation for our laboratory.

Gas mixture calibrated by EffecTech technical methods using high precision gas chromatography with a sulphur chemiluminescence detector (SCD). Target components calibrated directly with a reference gas mixture from the National Physical Laboratory (NPL).

To re-order this calibration gas mixture contact EffecTech quoting certificate number 15/0324/01.
telephone : +44(0)1889 569229, fax : +44(0)1889 569220, email : sales@effectech.co.uk
EffecTech is accredited by UKAS to ISO/IEC 17025 : 2005 to undertake the calibration presented in this certificate. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Comments 3 – NMI Certification and short form report

NMI evaluation certificate

The uncertainty is class A (0.5 % accuracy for CVDD), however, throughout the technical documentation, lower CV errors are used to determine uncertainty.

If the certificate is to be used as a reference document, then the uncertainty used in the calculations should be that specified by the certificate.

NMI Technical Summary **(attached)**

Section 1.2.1 Working range

The ethane range – this is lower than the maximum allowed through the UK transmission system as defined in National Grid's gas transportation ten-year plan.

Section 1.2.4 Check interval and calibration

This section states *"the device is designed to operate without calibration for a minimum of 12 months"* No data is presented to support this assertion. A spot check cannot be considered the same as a calibration check.

"The CVDD can only be calibrated by the producer of the CVDD". Even if the manufacturer's claims are to be believed, and a 12 monthly calibration interval is viable, no details are given of the calibration in the supporting documentation. If the calibration is by the manufacturer then two devices would be required by the user to maintain measurement, drastically changing the cost of ownership assumptions. With the latter, site costs will be incurred. Neither of these possibilities is considered in the cost of ownership assumptions

Comments 4 – comments on "Supporting information to the Request for the relaxation of the Maximum Permissible (MPE) of OFGEM regulated Calorific Value determining Devices (CVDD)"

OFGEM & NMI Test ranges (p6)

If the maximum value of ethane is to be reduced to allow performance to be acceptable, then this should also be applied to traditional gas chromatographic measurements.

Reducing the ethane range for gas chromatographs, would result in lower uncertainties.

Reducing the ethane range is required to accommodate a higher uncertainty with the GasPT2

Furthermore, current conditions, do not necessarily predicate future gas import compositions, and unless the maximum allowable ethane content is reduced, then gas outside the GasPT2 range can still be admitted to the network.

Evaluation of the GasPT2 should be in accordance with that of current devices.

Specifying frequency of calorific value measurements in natural gas applications (pages 9 & 10)

This section is predicated on an outdate knowledge of gas chromatography capabilities. Full compositional analysis is available in one (1) minute or less, without any loss of measurement performance.

APPENDIX 2 – DNVGL Paper & supporting powerpoint – Gas PT *Measurement Error Dependence on Measurement Frequency.*

DNVGL / Orbital are the product licensor/licensee

Table page 4 in the paper

Full compositional measurement is available in 1 minute or less.

The same sampling techniques can be used for the GC/GasPT2, i.e., the sample transit time of 240s for the GC is incorrect.

Using the appropriate figures (GC every 62 s, GasPT2 every 10s), it is clear that the frequency benefit of measurement is overstated by over 80 %.

Powerpoint presentation – slide 7

Error calculation: using an up to date cycle time for the GC reduces the worst case hourly average error from 2.68 to 0.76,

Again, the uncertainty attributed to the GC is overstated by over 70 %, i.e., there is no significant benefit derived from the increased sampling frequency of the GasPT2 if that appropriate GC analysis is selected.

Comment 5 - Appendix 4 – technical note to regulators – Appendix - test results

A range of test results are supplied, without any details of the testing. Where composition is given, all values bar 1 are 85+ % methane. This gives little indication/support for use with wider variation of composition.

Engas - Spain

The results from Enagas testing show repeatability of +/- 0.07 %. This is more than double the value of 0.03 % used in the Kelton uncertainty calculation. Which value is correct for uncertainty calculation?

Engie (France)

The results supplied from France (Engie) show a systematic, negative bias on all calculated

Columbia (TGI)

CV error of 0.362% is listed for a gas with CV of approx. 37kJ. This error is greater than that used for the Kelton uncertainty calculation, for a gas of a fairly typical value in the UK network.

Evaluation Certificate

Number **TC8670** revision 0
Project number 14200680

Issued by	NMi Certin B.V.
In accordance with	– WELMEC guide 8.8 – OIML R140 Edition 2007 (E) "Measuring systems for gaseous fuel".
Producer	Orbital Meece Rd, Swynnerton, Stone Staffordshire ST15 0QN United Kingdom
Measuring instrument	A model of a **calorific value determining device (CVDD)**, intended to be used as a part of a measuring system for gaseous fuel

Type	:	GasPT2
Producer's mark or name	:	Orbital
Destined for the measurement of	:	calorific value, compressibility, Wobbe, relative density, density and concentration of CO_2
Accuracy class	:	A / 0,5
Environment classes	:	M1 / E2
Temperature range gas	:	-10 °C / +40 °C
Temperature range ambient	:	see Description paragraph 1.2.2
Destined for	:	non condensing humidity

The intended location for the instrument is closed.

Further properties and test results are described in the annexes:
– Description TC8670 revision 0;
– Documentation folder TC8670-1.

Issuing Authority

NMi Certin B.V.
28 September 2015

C. Oosterman
Head Certification Board

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Description

1 General information of the calorific value determining device

All properties of the measurement transducer, whether mentioned or not, shall not be in conflict with the legislation.

This Evaluation Certificate is the positive result of the applied voluntary, modular approach, for a component of a measuring instrument, as described in WELMEC guide 8.8.

The complete measuring instrument must be covered by an EC type-examination Certificate.

1.1 Essential parts

Part	Document	Remarks
Main Unit	8670/0-02; 8670/0-03; 8670/0-04; 8670/0-05	CO_2, pressure, temperature
Auxiliary Unit	8670/0-06; 8670/0-07; 8670/0-08; 8670/0-09	Thermal conductivity, speed of sound, pressure, temperature
Main Barrier & Auxiliary Barrier	8670/0-010; 8670/0-11; 8670/0-12	
Barrier Filter Safe Side	8670/0-13	
Barrier Filter Hazardous Side	8670/0-14	
Unit Filter	8670/0-15; 8670/0-16	

1.2 Essential characteristics

1.2.1 Working range
Natural gas, with a heating value from 34,0 to 45,0 MJ/m³ at a base pressure of 1,01325 bar, bas temperature of 15 °C and a combustion temperature of 15 °C. with the following ranges for the different components:

Component	Range [mol%]
CH_4	65 - 100
C_2H_6	0,5 – 12 *
C_3H_8	0,03 - 7
i-C_4H_{10}	0 - 1,5
n-C_4H_{10}	0 - 1,5
i-C_5H_{12}	0 - 0,5
n-C_5H_{12}	0 - 0,5
neo-C_5H_{12}	0 - 0,5
C6+	0 - 0,6
N_2	0 - 10
CO_2	0 - 7

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1.2.2 Temperature range

Part	Temperature Range
Main Unit	-10 °C / +40 °C
Ancillary Unit	-10 °C / +40 °C
* Main Barrier	+5 °C / +40 °C
Ancillary Barrier	+5 °C / +40 °C

1.2.3 Calculations
The calculation of the heating value, relative density, Wobbe, and compressibility is performed according to ISO6976 [1995].

1.2.4 Check interval and calibration
* The device is designed to operate without calibration for a minimum of 12 months. The correct functioning of the CVDD measurements needs to be checked every 4 months. The CVDD can only be calibrated by the producer of the CVDD.

1.2.5 Accountable alarms
Accountable alarms will be generated if extreme values are measured by the CVDD or if otherwise a defect arises (see documentation 8670/0-17).
An accountable alarm will be generated if
- Auxiliary Unit time-out
- Auxiliary Unit speed of sound frequency zero
- Auxiliary Unit pressure sensor fault
- Auxiliary Unit pressure over-range
- Auxiliary Unit pressure under-range
- Auxiliary Unit thermal conductivity sensor fault
- Auxiliary Unit temperature over-range
- Auxiliary Unit temperature under-range
- Auxiliary Unit believes that it is being exposed to air and not natural gas
- Data is being received from the wrong Auxiliary Unit
- Main Unit pressure sensor fault
- Main Unit pressure over-range
- Main Unit pressure under-range
- Main Unit thermistor fault
- Main Unit temperature over-range
- Main Unit temperature under-range
- Main Unit CO2 sensor failure
- Main Unit CO2 sensor input over-range
- Main Unit using its default configuration

In case of an accountable alarm the alarm codes will be transmitted instead of the measurement data.

1.2.6 Software specification (refer to WELMEC guide 7.2):
- Software type P;
- Risk Class C;
- Extension T, while extensions L, D and S are not applicable.

Software version	Checksum	Remarks
V-9.00	6259h	Main Unit
V7.00	D0F2h	Auxiliary Unit

The software version is marked on the name plate of the unit and is readable via serial communication.

1.3 Essential shapes

1.3.1 The name plate on the CVDD contains at least, clearly legible, the following :
- the name of the producer;
- the type;
- the Evaluation Certificate number TC8670;
- the ambient temperature range;
- the software version and checksum (if applicable).

An example of the markings is shown in documentation no. 8670/0-18.

1.3.2 Sealing: see chapter 2.

1.4 Conditional parts

1.4.1 Housing
The housing of the CVDD has sufficient tensile strength.
Metrological important parts only are accessible after breaking one or more seals.
See document 8670/0-01 for an example of the housing.

1.4.2 Power supply
The CVDD needs an external dc power supply: 24,5 V DC. The power supply must always operate between 23,5 V DC and 25,5 V DC or generates an alarm when operating outside of these limits. Between the power supply and the barriers fuses need to be installed with the following charactaristics: Voltage rating: 250 V, Current rating: 0,25 A, Responce time: Fast.

1.4.3 Calibration gas
The applied calibration gas shall be traceable to (inter-)national standards and shall have an appropriate uncertainty.
The verification gas shall fulfil the following requirements:

* - It should contain predominantly, but not exclusively, CH_4;
- It should contain sufficient CO_2 to exercise the MU but less than 2,5% mol;
- It should contain some N_2 but less than 10% mol;
- If the above criteria are met then it is unnecessary to include hydrocarbons other than CH_4.

The temperature of the calibration gas must be kept above the minimum storage temperature.

1.4.4 Serial communication
The Main Unit and the Auxiliary Unit communicate with each other using RS485. The RS485

connections are also used for communication between the Main Unit and other measuring devices. Under normal operation only read commands can be sent to the GasPT2 via the RS485.

1.4.5 Cables
The cables interconnecting the different parts of the CVDD need to fulfill the requirements as described in document 8670/0-19 and need to be interconnected as discribed in document 8670/0-20.

1.4.6 Sampling System
To opperate the CVDD it needs to be connected to a sampling system as described in documentation 8670/0-21.

1.5 Conditional characteristics

1.5.1 Programming
The parameters which are essential for the legal functioning of the CVDD can be changed only by removing jumper 7 of the Unit filters after breaking a seal.

2 Seals

The following items are sealed:
- the housing of the units;
- the housing of the barriers;
- the housing of the filters;
- the barrier cover to the barrier;
- the terminal covers against opening with a sticker sealing;
- the nameplate with the markings.

See document 8670/0-22 for an example of the sealing locations

3 Conditions for Conformity Assessment

- Other parties may use this Evaluation Certificate only with the written permission of the producer.

4 Test reports

An overview of performed tests is given in the test reports:
- No. NMi – 14200680 – 01 issued by NMi Certin B.V.
- No. NMi – 14200680 – 02 issued by NMi Certin B.V.

APPENDIX 2

Rosemount 370XA Enclosure

for Natural Gas Applications

Natural Gas Chromatographs are often used in isolated locations for custody transfer applications. This can leave the gas chromatograph vulnerable to tampering and the gas canisters susceptible to theft. In addition to isolated locations, the gas chromatograph and its sampling handling system can be exposed to extreme environmental conditions. These conditions may allow the gas in the sample system to fall below the Hydrocarbon Dew Point of the gas, causing liquid fallout and inaccurate flow measurements.

An insulated clamshell enclosure for the gas chromatograph and a small calibration gas cylinder provides protection from intrusion from un-authorized third parties and theft with its lead-seal feature. An optional heater ensures an ambient environment of 68 °F (20 °C) when outside temperatures drop to -4 °F (-20 °C), keeping the gas above its Hydrocarbon Dew Point.

Rosemount 370XA Enclosure

Features

The enclosure meets CSA Class I, Division 1 certification and is easy to use. The enclosure comes with the gas chromatograph prewired to an external Class I, Division 1 junction box, reducing the complexity of installation and saving you time and costs.

Designed for Extreme Environments

- UV, sea-water and fungi resistance
- Ability to lock and lead-seal the enclosure to prevent unauthorized 3rd party access

Reduced Installation Costs

- Small, composite clamshell replaces the need for a conventional single room or dual room analyzer building that is cost prohibitive for lower volume applications
- Enclosure enables locating the Rosemount 370XA Gas Chromatograph close to the sample point, shortening the heated sample lines
- Internal tubing and wiring plumbed and connected to the Rosemount 370XA Gas Chromatograph before arriving in the field for easier and quicker field installation

Ease of Use

- No need to remove the Rosemount 370XA Gas Chromatograph from the enclosure to perform routine maintenance as the enclosure is designed with sufficient space and big hands in mind
- Enclosure's clamshell lid with stainless steel lid stays and spring loaded retainer chains is easy to lift yet will not close accidentally for increased safety
- Heat-trace boot entry tubing for sample gas ensures thermal stability to keep the gas sufficiently above its Hydrocarbon Dew Point of the gases to avoid liquid fallout

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Optional Accessories

Sample Probe Regulator

2-4-5000-610 (4") - Genie® Probe Regulator with HSNG/GAG/RLF, ¾" NPT, 4"
2-4-5000-617 (7") - Genie® Probe Regulator with HSNG/GAG/RLF, ¾" NPT, 7"
2-3-5000-702 - Genie® Drive Probe with HSNG/GAG/RLF, ¾" NPT, Adjustable Length

Carrier Gas & Calibration Gas Accessories

2-3-5000-050 - Carrier Manifold (Allows for cylinder replacement without GC interruption)
2-4-9500-078 - Regulator, for Carrier cylinder, with CGA 580 fittings, Dual Stage for High Purity gases
2-4-9500-077 - Regulator, for Calibration Gas, CGA-510 fittings (Natural Gas)
2-9-0020-945 - C6+ Calibration gas in LP5 cylinder
2-9-9020-779 - Calibration Heater Blanket, 50 W, Class I, Div.1, Groups C, D (15 x 42)

Part Number Ordering Matrix

Your part number is determined by your specific needs. Choose options below

370ENC – XXX – XX –XX – XXX – XXX – X

Mounting Option
- F – Frame

Bottle Racks
- NON – None
- CAR – Rack for 2 x Carrier gas cylinder

Calibration Gas Option
- INT – Mounting for internal LP5 Calibration gas cylinder
- EXT – Bulkhead connection for external Calibration gas cylinder

No. of Streams (SCS needs to be ordered separately)
- 1G - 1 Stream Plate
- 2G - 2 Stream Plate
- 3G - 3 Stream Plate

Heater Option
- E1 – Electric heater, 120 VAC, T3 Class
- E2 – Electric heater, 230 VAC, T3 Class
- N1 – No heater

Approval
- CSA – CSA and CSAus, Class I, Division 1
- GEN – No Hazardous Area rating on cabinet, Constructed with C1D1 components

**GC needs to be ordered as Wall Mount. Sample conditioning system for the Rosemount 370XA GC must also be ordered.*

Specifications

Please consult Rosemount if your requirements are outside the specifications listed. Improved performance, alternate products and material offerings may be available depending on the application.

Construction

Environmental Temperature:

-4 °F to +140 °F (-20 °C to +60 °C)

Protection Rating:

External Junction Box: NEMA 4X

Area Safety Certification Options:

GEN: No Hazardous Rating, C1D1 components

CSA: CSA and CSAus Class I, Division 1

Optional Heater:

Electric, 120 VAC or 230 VAC, 300 W, T3

Total Weight (Excludes Calibration Gas Cylinder)

300 lbs (136 Kg)

Material:

Enclosure: Hot-pressed glass fiber reinforced polyester

Frame: Polyester-epoxy coated, 12 gauge low-carbon steel

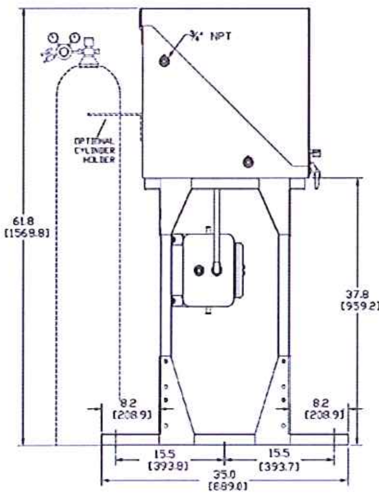
Dimensions:

Enclosure: 24" H x 52" W x 24" D (609 mm H x 1320.8 mm W x 609 mm D)

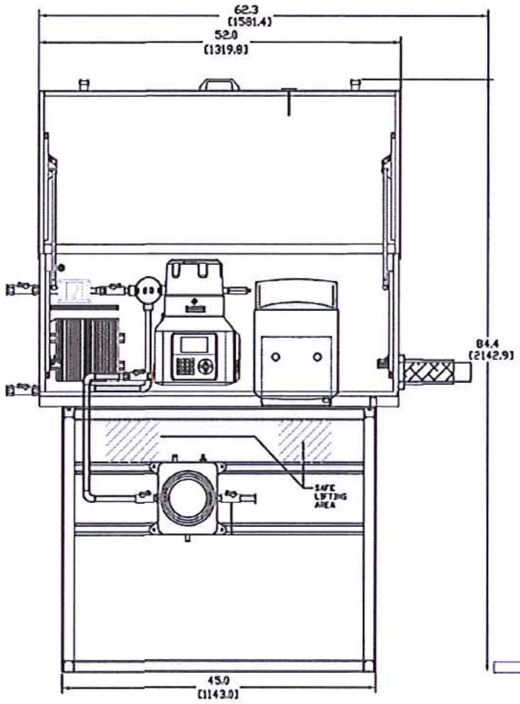
Overall (with lid open): 84" H x 58" W x 35" D (2142 mm H x 1479 mm x 889 mm D)

Mounting: Frame

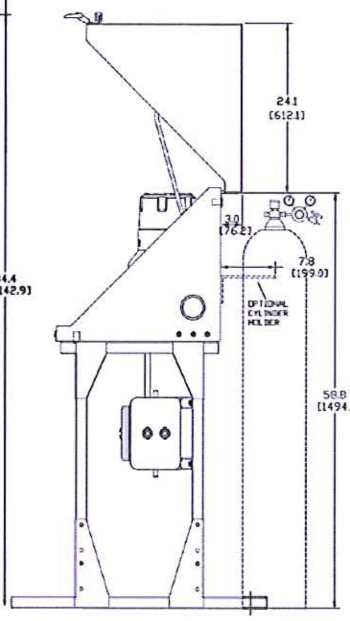
Dimensions



Left View



Front (Door Opened)



Right View

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