



## **Breath Alcohol Calibration Verification Test No. 17-569 Summary Report**

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This test was sent to 46 participants. Each sample pack consisted of four 34L certified reference material dry gas cylinders which participants were requested to analyze. Data were returned from 38 participants (83% response rate) and are compiled into the following tables:

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This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

## Manufacturer's Information

Each sample set consisted of four 34L certified reference material dry gas cylinders (Items 1-4). Participants were requested to analyze the contents of each cylinder and report the apparent breath alcohol concentration.

### SAMPLE PREPARATION-

Each dry gas cylinder was compared to its corresponding Certificate of Analysis. After verifying the breath alcohol concentration with the lot number, the cylinder was labeled with the appropriate Item number and the lot number was removed from the label.

SAMPLE SET ASSEMBLY: Each sample set was assembled with an Item 1, 2, 3 and 4 in a pre-labeled sample pack box.

<u>Item</u>	<u>Breath Alcohol Concentration</u> <u>(g/210L)</u>	<u>Manufacturer's Uncertainty</u> <u>(g/210L)</u>
1	0.040	± 0.0020
2	0.360	± 0.0072
3	0.240	± 0.0048
4	0.140	± 0.0028

*The information presented here details how test samples were prepared as well as any design specifications. This information does not necessarily represent the answers that should or could be obtained from an examination of the sample(s). Final interpretation of the results should be deferred until the summary report is available.*

## **Summary Comments**

This test was designed to allow participants to assess their proficiency in the previous calibration of their breath alcohol instrument. Each participant was supplied with a sample set consisting of four 34L certified reference material dry gas cylinders which contained different breath alcohol concentration (BrAC) values. (Refer to Manufacturer's Information for production details.)

En analysis was performed on reported results for each item. Participants with "extreme" data (En absolute values greater than 1.00) have been marked with an "X". Please refer to the En Analysis Guide for more information on this statistical analysis. Of the 38 participants that reported results, three reported "extreme" data for Item 1, thirteen participants reported "extreme" data for Item 2, nine participants reported "extreme" data for Item 3, and six participants reported extreme data for Item 4. Participants are advised to consider their reported expanded uncertainty when evaluating their En results. At this time, the linearity of the results for each participant will not be analyzed utilizing regression statistics.

Due to the number of En absolute values greater than 1.00, CTS contacted the manufacturer of the dry gas cylinders to ensure there were no issues with the samples. The manufacturer confirmed there were no anomalies in the production data for any of the four lots.

CTS noted many participants reported their instrument's serial numbers. For the sake of anonymity, CTS did not reproduce this information in the report.

\*\*Revised 11/16/2017: Information regarding contacting the manufacturer of the dry gas cylinders added.

## En Analysis Guide

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Normalized Error, or  $E_n$ , is used in proficiency testing in many other industries to judge the quality of measurement results. It measures the relationship of a participant's value to the reference value, relative to the combined uncertainties of those values.  $E_n$  is calculated as follows:

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

Where the assigned value,  $X_{ref}$ , is determined in the manufacturer's reference laboratory,  $U_{ref}$  is the expanded uncertainty of  $X_{ref}$ , and  $U_{lab}$  is the Expanded Uncertainty of a participant's result,  $X_{lab}$ .  $E_n$  is not calculated for participants who did not report their Expanded Uncertainty.

Absolute values of  $E_n$  less than **1.00** should be obtained for the measurements to be acceptable. This is because there is a 95% probability that the calculated  $E_n$  will fall within an absolute value of 1.00. Any absolute values over 1.00 have been highlighted with an "X".

The following table and graph represent the results reported by participants.

$X_{ref}$  and  $U_{ref}$  were determined by the dry gas cylinder manufacturer, which is ISO 17025 accredited.

## Reported Results

*As a verification of calibration, report the ethanol concentration of each cylinder and the uncertainty determined during the last calibration of the instrument.*

TABLE 1 - Item 1

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

Xlab: Participant's concentration  
 Xref: Manufacturer's concentration  
 Ulab: Participant's uncertainty  
 Uref: Manufacturer's uncertainty

Item 1 Manufacturer's Concentration: 0.040 g/210L

Item 1 Manufacturer's Uncertainty: 0.0020 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in En)	Performance Statistic (En1)
28NBEM	Infrared detector.	0.039	0.0030	1008 mbar	-0.28
3KRY6V	E/C	0.039	0.0008	974	-0.46
	IR	0.039	0.0008	974	-0.46
4CTTNY	Electrochemical sensor (fuel cell)	0.041	0.0050	991.4	0.19
4XTU23	Fuel Cell	0.038	0.0030	745	-0.55
4Y4WPL	Infrared	0.039	0.0040	1006 mbar	-0.22
6HE9RW	IR	0.038		1004	
7AYPBH	Infrared	0.039	0.0030	1001 mbar	-0.28
7PRGTX	EC	0.040	0.0010	1010 hPas	0.00
	IR	0.039	0.0010	1010 hPas	-0.45
8W8KFQ	EC	0.037	0.0010	0934 hPas	-1.34 X
	IR	0.038	0.0010	0934 hPas	-0.89
97T7YU	Electrochemical Fuel Cell	0.037	0.0050	745 mm Hg	-0.56
A6RP2M	E/C	0.038	0.0008	976	-0.93
	I/R	0.038	0.0010	976	-0.89
B8B8UR	Infrared	0.040	0.0008	1004.3	0.00
BY3ABV	IR/EC	0.039		1004 hPa	
CAGRHR	IR	0.043	0.0020	953	1.06 X

TABLE 1 - Item 1

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

Xlab: Participant's concentration  
 Xref: Manufacturer's concentration  
 Ulab: Participant's uncertainty  
 Uref: Manufacturer's uncertainty

Item 1 Manufacturer's Concentration: 0.040 g/210L

Item 1 Manufacturer's Uncertainty: 0.0020 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in En)	Performance Statistic (En1)
E6GGZP	EC	0.041	0.0008	1008	0.46
	IR	0.040	0.0008	1008	0.00
EPNPEN	Electrochemical Fuel Cell	0.041	0.0050	992.2 mbar	0.19
EQUA3N	Fuel Cell	0.038	0.0050	991 mbar	-0.37
ERCYQB	Thermoelectrically cooled lead selenide that measures IR energy that has passed through the breath/gas sample	0.041	0.0040	1003 millibars	0.22
G8EFP9	Infrared	0.039	0.0040	1006 mbar	-0.22
J49VDK	Fuel Cell	0.038	0.0030	746 mm/Hg	-0.55
K2HRKD	EC	0.040	0.0010	931 hPas	0.00
	IR	0.039	0.0010	931 hPas	-0.45
KWPR7H	IR	0.041		905 mb	
LXDLJC	E/C	0.039	0.0012	978	-0.43
	I/R	0.038	0.0012	978	-0.86
MKLEYG	Fuel cell	0.038	0.0080	754.0 mmHg	-0.24
MX8T3F	Electro Chemical Fuel Cell	0.038	0.0050	750	-0.37
PC4PDD	Fuel Cell	0.038	0.0030		-0.55
R43C79	IR/EC	0.040	0.0020	1011 mb	0.00
RGAZJC	E/C	0.038	0.0010	1018	-0.89
	I/R	0.038	0.0012	1018	-0.86
TAHC2C	IR	0.041		932	

TABLE 1 - Item 1

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 1 Manufacturer's Concentration: 0.040 g/210L

Item 1 Manufacturer's Uncertainty: 0.0020 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> )
TQA8D3	EC	0.039	0.0010	1008	-0.45
	IR	0.039	0.0010	1008	-0.45
VKTN76	Electrochemical Fuel cell	0.040	0.0050	993	0.00
VQKTZA	IR	0.040		927	
W7NM7A	Fuel Cell	0.039	0.0030	753	-0.28
WH4GL9	IR	0.041		854 hPa Instrument	
XPX4TY	Electrochemical Fuel Cell	0.038		756	
YFTBYX	EC	0.0428	0.0010	987.6	1.25 X
	IR	0.042	0.0010	987.6	0.89
ZBBBHx	3.4 μm and 9.4 μm dual wavelength, pyroelectric	0.040	0.0036	843	0.00
ZTCHA4	EC	0.040	0.0010	1013	0.00
	IR	0.039	0.0010	1013	-0.45

TABLE 1 - Item 2

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 2 Manufacturer's Concentration: 0.360 g/210L

Item 2 Manufacturer's Uncertainty: 0.0072 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in En)	Performance Statistic (En2)
28NBEM	Infrared detector.	0.352	0.0030	1008 mbar	-1.03 X
3KRY6V	E/C	0.341	0.0050	974	-2.17 X
	IR	0.353	0.0052	974	-0.79
4CTTNY	Electrochemical sensor (fuel cell)	0.350	0.0120	991.4	-0.71
4XTU23	Fuel Cell	0.352	0.0070	745	-0.80
4Y4WPL	Infrared	0.345	0.0040	1006 mbar	-1.82 X
6HE9RW	IR	0.342		1004	
7AYPBH	Infrared	0.349	0.0030	1001 mbar	-1.41 X
7PRGTX	EC	0.359	0.0046	1010 hPas	-0.12
	IR	0.362	0.0044	1010 hPas	0.24
8W8KFQ	EC	0.332	0.0048	0934 hPas	-3.24 X
	IR	0.346	0.0050	0934 hPas	-1.60 X
97T7YU	Electrochemical Fuel Cell	0.350	0.0180	745 mm Hg	-0.52
A6RP2M	E/C	0.340	0.0050	976	-2.28 X
	I/R	0.356	0.0050	976	-0.46
B8B8UR	Infrared	0.360	0.0008	1004.3	0.00
BY3ABV	IR/EC	0.364		1004 hPa	
CAGRHR	IR	0.349	0.0020	953	-1.47 X
E6GGZP	EC	0.363	0.0044	1008	0.36
	IR	0.360	0.0044	1008	0.00
EPNPEN	Electrochemical Fuel Cell	0.355	0.0130	992.2 mbar	-0.34
EQUA3N	Fuel Cell	0.351	0.0120	991 mbar	-0.64



TABLE 1 - Item 2

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 2 Manufacturer's Concentration: 0.360 g/210L

Item 2 Manufacturer's Uncertainty: 0.0072 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> 2)
ERCYQB	Thermoelectrically cooled lead selenide that measures IR energy that has passed through the breath/gas sample	0.350	0.0040	1003 millibars	-1.21 X
G8EFP9	Infrared	0.348	0.0040	1006 mbar	-1.46 X
J49VDK	Fuel Cell	0.352	0.0050	746 mm/Hg	-0.91
K2HRKD	EC	0.338	0.0050	931 hPas	-2.51 X
	IR	0.350	0.0052	931 hPas	-1.13 X
KWPR7H	IR	0.354		905 mb	
LXDLJC	E/C	0.352	0.0046	978	-0.94
	I/R	0.347	0.0046	978	-1.52 X
MKLEYG	Fuel cell	0.358		754.0 mmHg	
MX8T3F	Electro Chemical Fuel Cell	0.349	0.0170	750	-0.60
PC4PDD	Fuel Cell	0.354	0.0030		-0.77
R43C79	IR/EC	0.358	0.0190	1011 mb	-0.10
RGAZJC	E/C	0.333	0.0052	1018	-3.04 X
	I/R	0.341	0.0052	1018	-2.14 X
TAHC2C	IR	0.357		932	
TQA8D3	EC	0.360	0.0046	1008	0.00
	IR	0.357	0.0046	1008	-0.35
VKTN76	Electrochemical Fuel cell	0.351	0.0130	993	-0.61
VQKTZA	IR	0.357		927	
W7NM7A	Fuel Cell	0.354	0.0060	753	-0.64
WH4GL9	IR	0.349		854 hPa Instrument	
XPX4TY	Electrochemical Fuel Cell	0.347		756	

TABLE 1 - Item 2

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 2 Manufacturer's Concentration: 0.360 g/210L

Item 2 Manufacturer's Uncertainty: 0.0072 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> <sup>2</sup> )
YFTBYX	EC	0.375	0.0052	987.6	1.69 X
	IR	0.371	0.0050	987.6	1.25 X
ZBBBHx	3.4 μm and 9.4 μm dual wavelength, pyroelectric	0.351		843	
ZTCHA4	EC	0.359	0.0052	1013	-0.11
	IR	0.354	0.0052	1013	-0.68

TABLE 1 - Item 3

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 3 Manufacturer's Concentration: 0.240 g/210L

Item 3 Manufacturer's Uncertainty: 0.0048 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> 3)
28NBEM	Infrared detector.	0.236	0.0030	1008 mbar	-0.71
3KRY6V	E/C	0.229	0.0050	974	-1.59 X
	IR	0.236	0.0052	974	-0.57
4CTTNY	Electrochemical sensor (fuel cell)	0.232	0.0120	991.4	-0.62
4XTU23	Fuel Cell	0.233	0.0070	745	-0.82
4Y4WPL	Infrared	0.231	0.0040	1006 mbar	-1.44 X
6HE9RW	IR	0.229		1004	
7AYPBH	Infrared	0.235	0.0030	1001 mbar	-0.88
7PRGTX	EC	0.241	0.0046	1010 hPas	0.15
	IR	0.244	0.0044	1010 hPas	0.61
8W8KFQ	EC	0.223	0.0048	0934 hPas	-2.50 X
	IR	0.232	0.0050	0934 hPas	-1.15 X
97T7YU	Electrochemical Fuel Cell	0.231	0.0120	745 mm Hg	-0.70
A6RP2M	E/C	0.226	0.0050	976	-2.02 X
	I/R	0.237	0.0050	976	-0.43
B8B8UR	Infrared	0.237	0.0008	1004.3	-0.62
BY3ABV	IR/EC	0.241		1004 hPa	
CAGRHR	IR	0.234	0.0020	953	-1.15 X
E6GGZP	EC	0.241	0.0044	1008	0.15
	IR	0.240	0.0044	1008	0.00
EPNPEN	Electrochemical Fuel Cell	0.236	0.0130	992.2 mbar	-0.29

TABLE 1 - Item 3

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 3 Manufacturer's Concentration: 0.240 g/210L

Item 3 Manufacturer's Uncertainty: 0.0048 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> 3)
EQUA3N	Fuel Cell	0.235	0.0120	991 mbar	-0.39
ERCYQB	Thermoelectrically cooled lead selenide that measures IR energy that has passed through the breath/gas sample	0.235	0.0040	1003 millibars	-0.80
G8EFP9	Infrared	0.233	0.0040	1006 mbar	-1.12 X
J49VDK	Fuel Cell	0.234	0.0050	746 mm/Hg	-0.87
K2HRKD	EC	0.227	0.0050	931 hPas	-1.88 X
	IR	0.234	0.0052	931 hPas	-0.85
KWPR7H	IR	0.238		905 mb	
LXDLJC	E/C	0.238	0.0046	978	-0.30
	I/R	0.234	0.0046	978	-0.90
MKLEYG	Fuel cell	0.238		754.0 mmHg	
MX8T3F	Electro Chemical Fuel Cell	0.232	0.0120	750	-0.62
PC4PDD	Fuel Cell	0.235	0.0030		-0.88
R43C79	IR/EC	0.239	0.0130	1011 mb	-0.07
RGAZJC	E/C	0.225	0.0052	1018	-2.12 X
	I/R	0.229	0.0052	1018	-1.55 X
TAHC2C	IR	0.239		932	
TQA8D3	EC	0.238	0.0046	1008	-0.30
	IR	0.239	0.0046	1008	-0.15
VKTN76	Electrochemical Fuel cell	0.232	0.0130	993	-0.58

TABLE 1 - Item 3

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 3 Manufacturer's Concentration: 0.240 g/210L

Item 3 Manufacturer's Uncertainty: 0.0048 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n3</sub> )
VQKTZA	IR	0.239		927	
W7NM7A	Fuel Cell	0.238	0.0060	753	-0.26
WH4GL9	IR	0.234		854 hPa Instrument	
XPX4TY	Electrochemical Fuel Cell	0.232		756	
YFTBYX	EC	0.2501	0.0052	987.6	1.43 X
	IR	0.2469	0.0050	987.6	1.00
ZBBBHx	3.4 μm and 9.4 μm dual wavelength, pyroelectric	0.235		843	
ZTCHA4	EC	0.238	0.0052	1013	-0.28
	IR	0.236	0.0052	1013	-0.57

TABLE 1 - Item 4

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

Xlab: Participant's concentration  
 Xref: Manufacturer's concentration  
 Ulab: Participant's uncertainty  
 Uref: Manufacturer's uncertainty

Item 4 Manufacturer's Concentration: 0.140 g/210L

Item 4 Manufacturer's Uncertainty: 0.0028 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in En)	Performance Statistic (En4)
28NBEM	Infrared detector.	0.138	0.0030	1008 mbar	-0.49
3KRY6V	E/C	0.133	0.0034	974	-1.59 X
	IR	0.137	0.0034	974	-0.68
4CTTNY	Electrochemical sensor (fuel cell)	0.135	0.0120	991.4	-0.41
4XTU23	Fuel Cell	0.136	0.0050	745	-0.70
4Y4WPL	Infrared	0.136	0.0040	1006 mbar	-0.82
6HE9RW	IR	0.133		1004	
7AYPBH	Infrared	0.137	0.0030	1001 mbar	-0.73
7PRGTX	EC	0.141	0.0042	1010 hPas	0.20
	IR	0.143	0.0042	1010 hPas	0.59
8W8KFQ	EC	0.132	0.0038	0934 hPas	-1.69 X
	IR	0.136	0.0038	0934 hPas	-0.85
97T7YU	Electrochemical Fuel Cell	0.134	0.0070	745 mm Hg	-0.80
A6RP2M	E/C	0.132	0.0034	976	-1.82 X
	I/R	0.137	0.0034	976	-0.68
B8B8UR	Infrared	0.137	0.0008	1004.3	-1.03 X
BY3ABV	IR/EC	0.140		1004 hPa	
CAGRHR	IR	0.138	0.0020	953	-0.58
E6GGZP	EC	0.142	0.0042	1008	0.40
	IR	0.142	0.0042	1008	0.40
EPNPEN	Electrochemical Fuel Cell	0.137	0.0050	992.2 mbar	-0.52

TABLE 1 - Item 4

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

Xlab: Participant's concentration  
 Xref: Manufacturer's concentration  
 Ulab: Participant's uncertainty  
 Uref: Manufacturer's uncertainty

Item 4 Manufacturer's Concentration: 0.140 g/210L

Item 4 Manufacturer's Uncertainty: 0.0028 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in En)	Performance Statistic (En4)
EQUA3N	Fuel Cell	0.137	0.0120	991 mbar	-0.24
ERCYQB	Thermoelectrically cooled lead selenide that measures IR energy that has passed through the breath/gas sample	0.138	0.0040	1003 millibars	-0.41
G8EFP9	Infrared	0.137	0.0040	1006 mbar	-0.61
J49VDK	Fuel Cell	0.136	0.0040	746 mm/Hg	-0.82
K2HRKD	EC	0.136	0.0032	931 hPas	-0.94
	IR	0.138	0.0032	931 hPas	-0.47
KWPR7H	IR	0.138		905 mb	
LXDLJC	E/C	0.141	0.0044	978	0.19
	I/R	0.137	0.0044	978	-0.58
MKLEYG	Fuel cell	0.137		754.0 mmHg	
MX8T3F	Electro Chemical Fuel Cell	0.134	0.0070	750	-0.80
PC4PDD	Fuel Cell	0.136	0.0030		-0.97
R43C79	IR/EC	0.141	0.0080	1011 mb	0.12
RGAZJC	E/C	0.133	0.0040	1018	-1.43 X
	I/R	0.135	0.0042	1018	-0.99
TAHC2C	IR	0.141		932	
TQA8D3	EC	0.138	0.0022	1008	-0.56
	IR	0.139	0.0022	1008	-0.28
VKTN76	Electrochemical Fuel cell	0.136	0.0050	993	-0.70

TABLE 1 - Item 4

$$E_n = \frac{(X_{lab} - X_{ref})}{\sqrt{U_{lab}^2 + U_{ref}^2}}$$

X<sub>lab</sub>: Participant's concentration  
 X<sub>ref</sub>: Manufacturer's concentration  
 U<sub>lab</sub>: Participant's uncertainty  
 U<sub>ref</sub>: Manufacturer's uncertainty

Item 4 Manufacturer's Concentration: 0.140 g/210L

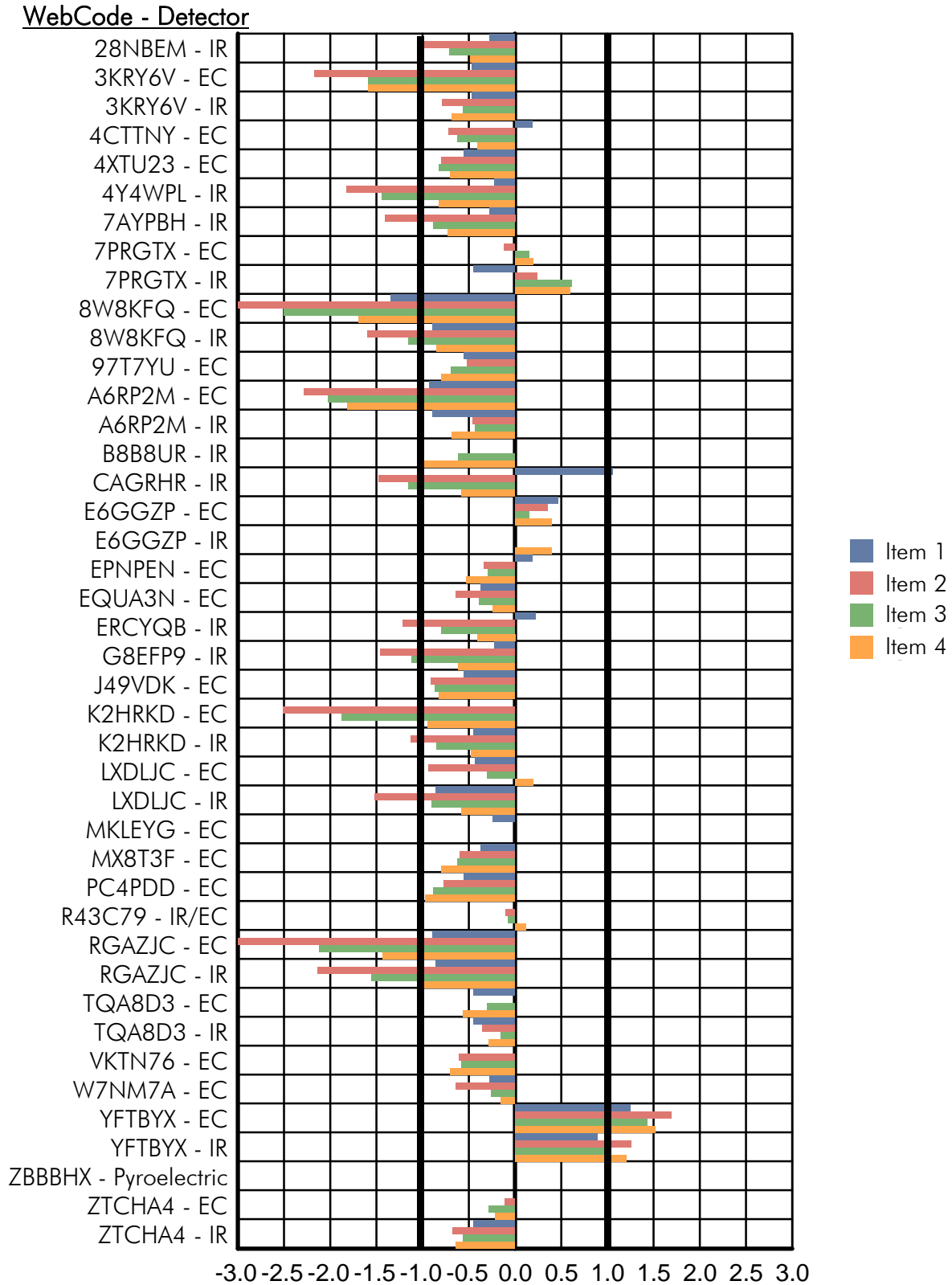
Item 4 Manufacturer's Uncertainty: 0.0028 g/210L

WebCode	Detector Type	Concentration (g/210L)	Uncertainty k=2 (g/210L)	Barometric Pressure (not used in E <sub>n</sub> )	Performance Statistic (E <sub>n</sub> )
VQKTZA	IR	0.140		927	
W7NM7A	Fuel Cell	0.139	0.0060	753	-0.15
WH4GL9	IR	0.137		854 hPa Instrument	
XPX4TY	Electrochemical Fuel Cell	0.135		756	
YFTBYX	EC	0.1474	0.0040	987.6	1.52 X
	IR	0.1457	0.0038	987.6	1.21 X
ZBBBHx	3.4 μm and 9.4 μm dual wavelength, pyroelectric	0.139		843	
ZTCHA4	EC	0.139	0.0038	1013	-0.21
	IR	0.137	0.0038	1013	-0.64



# En Results

Graph 1



# Raw Data Adjustments

TABLE 2

*List the type and amount of any adjustments made on the raw data to produce the reported concentration, such as for barometric pressure, the wet/dry offset, etc.*

WebCode	Raw Data Adjustments
28NBEM	Barometric Pressure.
4CTTNY	An adjustment was not performed because the instrument has a built-in pressure transducer. The pressure transducer automatically corrects for the altitude and applies the dry/wet offset for the selected dry gas standard.
4XTU23	Barometric Pressure : Factor of 1.020; Wet/Dry Offset : +4%
4Y4WPL	Barometric pressure.
6HE9RW	The DMT is programmed to adjust the target alcohol concentration of the dry gas based on barometric pressure and not adjust measured results.
7AYPBH	Barometric Pressure
97T7YU	Analytical value normalized for pressure (x 760/pressure) and adjusted for wet/dry offset (x 1.045).
B8B8UR	n/a
BY3ABV	NA
EPNPEN	No adjustments were made. Instrument has a built in pressure transducer to correct for altitude, and the dry/wet offset for a dry gas standard is automatically applied when the type of standard, dry gas, is selected.
EQUA3N	No adjustments were made. Instrument has a built in pressure transducer to correct for altitude, and the dry/wet offset for a dry gas standard is automatically applied when the type of standard, dry gas, is selected.
ERCYQB	Datamaster DMT has an internal barometer that adjusts atmospheric pressure for dry gas dependent on where the instrument is located. Nominal concentration is adjusted to the target concentration due the adjustment of barometric pressure
G8EFP9	Barometric pressure
J49VDK	+ 4% wet/dry offset, 760/746 adjusted for barometric pressure.
KWPR7H	Correction Factor: 1.11
MKLEYG	The instrument has a 4.5% wet/dry offset for calibration adjustments and calibration checks
MX8T3F	I took the mean of the 3 measured samples and adjusted for barometric pressure (mean x 760/750 x 1.0454=) truncated and used a UM of 5% or 0.005 (rounded), whichever is greater.
PC4PDD	4.5% Wet/Dry Offset
R43C79	None, any adjustments are automatically performed by the instrument.
TAHC2C	N/A
VKTN76	No adjustments were made. The instrument has an internal pressure transducer to correct for altitude and pressure. The dry/wet offset is automatically applied when the standard type of dry gas is selected.
VQKTZA	None

TABLE 2

WebCode	Raw Data Adjustments
W7NM7A	Raw data adjusted for wet/dry offset and normalized to 760 mmHg. $(\text{Result} \times 1.045) \times (760\text{mmHg} / \text{barometric pressure}) = \text{Reported Result}$ .
WH4GL9	The instrument used for analysis is equipped with an internal barometric pressure sensor. No manual data adjustments required.
XPX4TY	Raw data was corrected with a factor of +4.5% to account for the wet/dry offset.

# Instrument Information

TABLE 3

WebCode	Instrument used	Detector type
28NBEM	[Serial number] DataMaster DMT S/N [Serial number]	Infrared detector.
3KRY6V	[Serial number] [Serial number]	E/C IR
4CTTNY	Draeger A7510: [Serial number]	Electrochemical sensor (fuel cell)
4XTU23	Intoximeters EC/IR II	Fuel Cell
4Y4WPL	DataMaster DMT [Serial number]	Infrared
6HE9RW	DMT-G	IR
7AYPBH	DataMaster DMT [Serial number]	Infrared
7PRGTX	Draeger Alcotest 9510 [Serial number] Draeger Alcotest 9510 [Serial number]	EC IR
8W8KFQ	Draeger Alcotest 9510 [Serial number] Draeger Alcotest 9510 [Serial number]	EC IR
97T7YU	Intox EC/IR II	Electrochemical Fuel Cell
A6RP2M	[Serial number] [Serial number]	E/C I/R
B8B8UR	Intoxilyzer 9000	Infrared
BY3ABV	Draeger AlcoTest 9510	IR/EC
CAGRHR	Intoxilyzer 8000	IR
E6GGZP	Draeger Alcotest 9510 Draeger Alcotest 9510	EC IR
EPNPEN	Dräger Alcotest 7510	Electrochemical Fuel Cell
EQUA3N	Dräger Alcotest 7510	Fuel Cell
ERCYQB	Datamaster DMT Instrument [Serial number]	Thermoelectrically cooled lead selenide that measures IR energy that has passed through the breath/gas sample
G8EFP9	DataMaster DMT [Serial number]	Infrared
J49VDK	EC/IR II	Fuel Cell
K2HRKD	Draeger Alcotest 9510 [Serial number] Draeger Alcotest 9510 [Serial number]	EC IR
KWPR7H	Intoxilyzer 8000	IR
LXDLJC	[Serial number] Draeger Alcotest 9510 [Serial number] Draeger Alcotest 9510	E/C I/R
MKLEYG	Intoximeters Alco-Sensor V-XL @ Point of Arrest	Fuel cell
MX8T3F	Intoximeters, Inc. Intox EC/IR II	Electro Chemical Fuel Cell
PC4PDD	AlcoSensor VXL	Fuel Cell
R43C79	Draeger Alcotest 9510	IR/EC

TABLE 3

WebCode	Instrument used	Detector type
RGAZJC	Draeger Alcotest 9510 SN: [Serial number]	E/C
	Draeger Alcotest 9510 SN: [Serial number]	I/R
TAHC2C	Intoxilyzer 8000	IR
TQA8D3	Draeger Alcotest 9510 [Serial number]	EC
	Draeger Alcotest 9510 [Serial number]	IR
VKTN76	Draeger Alcotest 7510 [Serial number]	Electrochemical Fuel cell
VQKTZA	Intoxilyzer 8000	IR
W7NM7A	Intox EC/IR II	Fuel Cell
WH4GL9	Intoxilyzer 8000 S/N [Serial number]	IR
XPX4TY	Intoximeter EC/IR II	Electrochemical Fuel Cell
YFTBYX	Draeger Alcotest 9510 [Serial number]	EC
	Draeger Alcotest 9510 [Serial number]	IR
ZBBBHX	Intoxilyzer 8000 SN [Serial number]	3.4 $\mu\text{m}$ and 9.4 $\mu\text{m}$ dual wavelength, pyroelectric
ZTCHA4	Draeger Alcotest 9510 [Serial number]	EC
	Draeger Alcotest 9510 [Serial number]	IR

# Additional Comments

TABLE 4

WebCode	Additional Comments
28NBEM	Laboratory calibration certificates are issued with an expanded uncertainty using $K=3$ . Additionally, the certificate list an expanded uncertainty for each of the four (4) calibration standards used in the calibration process. Laboratory certificate to calibration measurements obtained from the corresponding instrument. The uncertainty provided in 1A [Table 1-Reported Results] was determined using $K=2$ . The $K=3$ expanded uncertainty is $\pm 0.004$ .
4CTTNY	The [Laboratory] report results to three decimal places in g/210L and uses a coverage factor of 3.17 ( $k=3.17$ ) representing a 99% CL for the expanded uncertainty. Result would have been reported as the following: Item 1: 0.041 (g/210L) $\pm 0.008$ ; Item 2: 0.350 (g/210L) $\pm 0.019$ ; Item 3: 0.232 (g/210L) $\pm 0.019$ ; Item 4: 0.135 (g/210L) $\pm 0.019$
4Y4WPL	Laboratory calibration certificates are issued with an expanded uncertainty using $k=3$ . Additionally, the certificate lists an expanded uncertainty for each of the four (4) calibration standards used in the calibration process. Laboratory practice is to apply the largest expanded uncertainty value from the calibration certificate to calibration measurements obtained from the corresponding instrument. The uncertainty provided in 1A [Table 1-Reported Results] was determines using $k=2$ . The $k=3$ expanded uncertainty is $\pm 0.005$ .
6HE9RW	We are currently performing wet bath calibrations and have not calculated an uncertainty of measurement for dry gas at multiple levels and feel the number of replicates during this individual test is not sufficient to perform this calculation.
7AYPBH	Laboratory calibration certificates are issued with an expanded uncertainty using $k=3$ . Additionally, the certificate lists an expanded uncertainty for each of the four (4) calibration standards used in the calibration process. Laboratory practice is to apply the largest expanded uncertainty value from the calibration certificate to calibration measurements obtained from the corresponding instrument. The uncertainty provided in 1A [Table 1-Reported Results] was determined using $k=2$ . The $k=3$ expanded uncertainty is $\pm 0.004$ .
97T7YU	Uncertainty of measurement at $k=2$ is 0.005 g/210L or 5%, whichever is greater.
BY3ABV	This laboratory has not calculated measurement uncertainty for breath alcohol calibration. IR results reported. EC results are: Item 1 0.039, Item 2 0.363, Item 3 0.237, Item 4 0.137. Reported as g/210L.
EPNPEN	The uncertainty submitted was converted from a $K=3.17$ (99%, T-distribution) to a $K=2$ coverage factor. Results would normally be reported as: $0.041 \pm 0.008$ ; $0.355 \pm 0.020$ ; $0.236 \pm 0.020$ ; $0.137 \pm 0.008$
ERCYQB	Laboratory calibration certificates are issued with an expanded uncertainty using $K=3$ . Additionally, the certificate lists an expanded uncertainty for each of the (4) calibration standards used in the calibration process. Laboratory practice is to apply the largest expanded uncertainty value from the calibration certificate to calibration measurements obtained from the corresponding instrument. The uncertainty provided in 1A [Table 1-Reported Results] was determined using $k=2$ . The $k=3$ expanded uncertainty is $\pm 0.004$ .
G8EFP9	Laboratory calibration certificates are issued with an expanded uncertainty using $k=3$ . Additionally, the certificate lists an expanded uncertainty for each of the four (4) calibration standards used in the calibration process. Laboratory practice is to apply the largest expanded uncertainty value from the calibration certificate to calibration measurements obtained from the corresponding instrument. The uncertainty provided in 1a [Table 1-Reported Results] was determined using $k=2$ . The $k=3$ expanded uncertainty is $\pm 0.004$ .
KWPR7H	[From Table 1 - Reported Results: Participant reported the following uncertainty results for Items 1-4 in units other than g/210L, which did not allow for En analysis "4.4"]

TABLE 4

WebCode	Additional Comments
MKLEYG	[From Table 1-Reported Results: Participant reported the following uncertainty results for Items 2-4 in units other than g/210L, which did not allow for En analysis "7%"]
PC4PDD	Average of 3 replicates.
R43C79	Only IR results are used for calibration purposes
TAHC2C	Uncertainty has not been established.
VKTN76	The uncertainty submitted was corrected from a K=3.17(% T Distribution) to a K=2 coverage factor. The results normally would be reported as: Item 1 0.040 +/- 0.008 g/210L; Item 2 0.351 +/- 0.020 g/210L; Item 3 0.232 +/- 0.020 g/210L; Item 4 0.136 +/- 0.008 g/210L
VQKTZA	Results are the average of five tests, truncated to the third digit. Uncertainty has not yet been established.
WH4GL9	Each Item was analyzed six times. The average results from each Item was reported to three decimal places. Uncertainty of measurement is only calculated for the calibration of the device and not for a verification of calibration, therefore there is no reported uncertainty of measurement for these Items.
XPX4TY	The uncertainty of measurement is calculated for the certification process using a coverage factor of K=3. Four concentrations of dry gas standards are used to certify the instrument for accuracy and the uncertainty of measurement is calculated for these concentrations. The Uncertainty of measurement is: 0.040 +/- 0.002 g/210L, 0.082 +/- 0.003 g/210L, 0.200 +/-0.007 g/210L and 0.300 +/- 0.011 g/210L. [From Table 1-Reported Results - Items 1-4 uncertainty: "See addl comments"]
ZBBBHx	[From Table 1 - Reported Results: Participant reported the following uncertainty results for Items 2-4 in units other than g/210L, which did not allow for En analysis "3.6%"]

# Appendix: Data Sheet

Collaborative Testing Services ~ Forensic Testing Program

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## Test No. 17-569: Breath Alcohol Calibration Verification

DATA MUST BE RECEIVED BY September 18, 2017 TO BE INCLUDED IN THE REPORT

Participant Code:

WebCode:

### Accreditation Release Statement

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB and A2LA. Please select one of the following statements to ensure your data is handled appropriately.

This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section on the last page must be completed and submitted.)

This participant's data is NOT intended for submission to ASCLD/LAB, ANAB or A2LA.

#### Items Submitted (Sample Pack BRC):

Items 1-4: 34L certified reference material dry gas cylinders

Note: Please disregard the cylinder labeling with regard to concentration.

**1a.)** As a verification of calibration, report the ethanol concentration of each cylinder and the expanded uncertainty determined during the last calibration of the instrument (Results should be reported to **three decimal places in g/210L** and use a coverage factor of 2 for expanded uncertainty).

<u>Reported Concentration (g/210L)</u>	<u>±</u>	<u>Uncertainty (k=2)</u>
Item 1: _____	±	_____
Item 2: _____	±	_____
Item 3: _____	±	_____
Item 4: _____	±	_____

Please note that it is the responsibility of the laboratory to normalize for barometric pressure and the wet/dry offset (if applicable).

**1b.) Barometric Pressure** \_\_\_\_\_

**1c.) List the type and amount of any adjustments made on the raw data to produce the reported concentration, such as for barometric pressure, the wet/dry offset etc.**

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Please return all pages of this data sheet.



Participant Code:

WebCode:

Instrument Information

**2a.) Instrument used:** \_\_\_\_\_

**2b.) Detector type:** \_\_\_\_\_

**3.) Additional Comments**

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<p><b>Return Instructions:</b> Data must be received via online data entry, fax (please include a cover sheet), or mail by <b>September 18, 2017</b> to be included in the report. Emailed data sheets are not accepted.</p> <p>QUESTION?&lt;br&gt;         TEL: +1-571-434-1925 (8 am - 4:30 pm EST)&lt;br&gt;         EMAIL: forensics@cts-interlab.com&lt;br&gt;         www.ctsforensics.com</p>	<p>Participant Code:</p> <p>ONLINE DATA ENTRY: <a href="http://www.cts-portal.com">www.cts-portal.com</a></p> <p>FAX: +1-571-434-1937</p> <p>MAIL: Collaborative Testing Services, Inc.&lt;br&gt;         P.O. Box 650820&lt;br&gt;         Sterling, VA 20165-0820 USA</p>
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**Please return all pages of this data sheet.**

Collaborative Testing Services ~ Forensic Testing Program

**RELEASE OF DATA TO ACCREDITATION BODIES**

The following Accreditation Releases will apply only to:

Participant Code:

WebCode:

for Test No. **17-569 Breath Alcohol Calibration Verification**

This release page must be completed and received by **September 18, 2017** to have this participant's submitted data included in the reports forwarded to the respective Accreditation Bodies.

Have the laboratory's designated individual complete the following steps **only if your laboratory is accredited in this testing/calibration discipline** by one or more of the following Accreditation Bodies.

**Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory**

**ASCLD/LAB** Certificate No. \_\_\_\_\_

**ANAB** Certificate No. \_\_\_\_\_

**A2LA** Certificate No. \_\_\_\_\_

**Step 2: Complete the Laboratory Identifying Information in its entirety**

Signature and Title \_\_\_\_\_

Laboratory Name \_\_\_\_\_

Location (City/State) \_\_\_\_\_

**Return Instructions**

**Accreditation Release**

*Please submit the completed Accreditation Release at the same time as your full data sheet. See Data Sheet Return Instructions on the previous page.*

*Questions? Contact us 8 am-4:30 pm EST  
Telephone: +1-571-434-1925  
email: forensics@cts-interlab.com*

**Please return all pages of this data sheet.**

CTS Test 17-569  
Item 1



7 Eastgate Dr. • P.O. Box 790 • Jacksonville, IL 62651-0790  
217-245-2183 • Fax: 217-243-7634 • www.ilmoproducts.com

## Certificate of Analysis

**Certificate ID:** 10296  
**Part #:** BAC34L000E  
**Cylinder Size:** 34L  
**Lot Number:** 15017040A1  
**Expiration:** 8/5/2019

**0.040 BAC** (For the calibration of instruments used to determine breath alcohol concentration)

**Contents:** 34 Liters @ 500 psig 70°F (21°C)

Component:	Concentration:	Accuracy:	Method:
Ethanol	103.5 ppm	+/- 0.002 or 2%	NDIR
Nitrogen	Balance	BAC (G/210L) whichever is greater	

\*NIST Standard Reference Material  
Cylinder No. CC274507 / Job No. 09160309  
Certified 362.2 µmol/mol Ethanol in Nitrogen  
for ILMO Products Co., Jacksonville, IL

Store in dry area, away from sources of heat, ignition  
and direct sunlight. Do not allow storage area to  
exceed 52 °C (125 °F).

  
Specialty Gas Lab Tech

07-07-17  
Date



CTS Test 17-569  
Item 2



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217-245-2183 • Fax: 217-243-7634 • www.ilmoproducts.com

## Certificate of Analysis

**Certificate ID:** 10297  
**Part #:** BAC34L000E  
**Cylinder Size:** 34L  
**Lot Number:** 15017360A2  
**Expiration:** 8/5/2019

**0.360 BAC ( For use in instrument calibration)**

**Contents:** 34 Liters @ 500 psig 70°F (21°C)

<b>Component:</b>	<b>Concentration:</b>	<b>Accuracy:</b>	<b>Method:</b>
Ethanol	938 ppm	+/- 0.002 or 2%	Gravimetric
Nitrogen	Balance	BAC (G/210L) whichever is greater	

\*NIST Standard Reference Material  
Cylinder No. CC274507 / Job No. 09160309  
Certified 262.2 µmol/mol Ethanol in Nitrogen  
for ILMO Products Co., Jacksonville, IL

Store in dry area, away from sources of heat, ignition  
and direct sunlight. Do not allow storage area to  
exceed 52 °C (125 °F).

Specialty Gas Lab Tech

07-07-17  
Date



CTS Test 17-569  
Item 3



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217-245-2183 • Fax: 217-243-7634 • www.ilmoproducts.com

## Certificate of Analysis

**Certificate ID:** 10298  
**Part #:** BAC34L000E  
**Cylinder Size:** 34L  
**Lot Number:** 15017240A3  
**Expiration:** 8/5/2019

0.240 BAC ( For use in instrument calibration)

**Contents:** 34 Liters @ 500 psig 70°F (21°C)

Component:	Concentration:	Accuracy:	Method:
Ethanol	625 ppm	+/- 0.002 or 2%	Gravimetric
Nitrogen	Balance	BAC (G/210L) whichever is greater	

\*NIST Standard Reference Material  
Cylinder No. CC274507 / Job No. 09160309  
Certified 262.2 µmol/mol Ethanol in Nitrogen  
for ILMO Products Co., Jacksonville, IL

Store in dry area, away from sources of heat, ignition  
and direct sunlight. Do not allow storage area to  
exceed 52 °C (125 °F).

  
Specialty Gas Lab Tech

07-07-17  
Date



CTS Test 17-569  
Item 4



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## Certificate of Analysis

**Certificate ID:** 10299  
**Part #:** BAC34L000E  
**Cylinder Size:** 34L  
**Lot Number:** 15017140A4  
**Expiration:** 8/5/2019

**0.140 BAC** (For the calibration of instruments used to determine breath alcohol concentration)

**Contents:** 34 Liters @ 500 psig 70°F (21°C)

Component:	Concentration:	Accuracy:	Method:
Ethanol	365 ppm	+/- 0.002 or 2%	NDIR
Nitrogen	Balance	BAC (G/210L) whichever is greater	

\*NIST Standard Reference Material  
Cylinder No. CC274507 / Job No. 09160309  
Certified 362.2 µmol/mol Ethanol in Nitrogen  
for ILMO Products Co., Jacksonville, IL

Store in dry area, away from sources of heat, ignition  
and direct sunlight. Do not allow storage area to  
exceed 52 °C (125 °F).

  
Specialty Gas Lab Tech

07-07-17  
Date

