Portable Breath Testing Instrument Calibration and Certification

History Page

Revision #	Effective date	History
0	10/12/2010	Original Issue
1	11/3/2015	Changes were made to sections: 2.3, 2.7.1, 2.7.1.2, 2.7.3, 2.7.3.1, 2.7.3.4, 2.7.4.2.4, 2.8.1.2, 2.9.1.1.1, and 2.9.2.1.1. Sections 2.7.5 and 2.9.3 were added. There were multiple instances of numbering changes as sections are added

2.0 Portable Breath Testing Instrument Calibration and Certification

2.1 BACKGROUND

Idaho Administrative Code, IDAPA 11.03.01 requires that each breath testing instrument have performance verifications on a schedule established by the Idaho State Police Forensic Services Laboratory. Breath testing has been in use within the State of Idaho for several decades dating back to the early 80's. The technology used within the instruments date back even further, and helps to solidify the science of alcohol testing in human expired breath. The approved portable instruments allow for the time sensitive testing of a subjects breath in a convenient, accurate, precise and timely fashion. This method is advantageous due to the quick and relatively simple methods for performing the test, as well as the non-invasive method for collecting the sample itself. The use of portable breath testing instruments within the state is a valuable tool for conducting criminal investigations for driving under the influence as well as other alcohol related crimes.

2.2 SCOPE

This method discusses the Idaho State Police Forensic Services (ISPFS) requirements for the approval of portable breath testing instruments used to perform evidentiary breath testing in the field. The requirements are such that the instrument shall be certified through an approval for use certificate and shall respond to known standards within defined criteria. The initial certifications are performed prior to being used within the state for evidentiary breath testing and if the instrument needs recertification. Approval of the instrument within the state for evidentiary breath testing concurrently approves the manufacturer as the source of the instruments.

2.3 EQUIPMENT

Alco-Sensor III/and IIIa
Lifeloc FC20/FC20BT with Idaho specific software
Premixed alcohol simulator solutions in the concentrations of ~0.040, ~0.080 and ~0.200
Breath alcohol simulators (Guth models 2100, 34C, MarkIIa, or equivalent)
Refrigerator capable of temperatures below 10º C
Incubator capable of maintaining temperature of 37º C
Label maker with vinyl coated labels or equivalent
Timer
Precision plastic screwdriver (Alco-Sensor only)
Voltmeter
Dry gas cylinders in the concentrations of 0.040, 0.080, 0.160 and 0.200
EasyCal® Station and manufacturer's ZOC software

2.4 REAGENTS

Refer to Alcohol Discipline Analytical Method 1.0 for reagent requirements.
Simulator bottle containing an acetone/water mixture

2.4.1 **Acetone solution**: add approximately 2 ml reagent grade or equivalent of acetone to approximately 500 ml of water in a simulator bottle. The amount of acetone should be such that it can be easily detected by odor upon sampling.

2.5 REFERENCE MATERIAL

Refer to Alcohol Discipline Analytical Method 1.0

2.6 SAFETY CONCERNS

Chemicals must be handled according to safety guidelines in the *Idaho State Police Forensic Services Health and Safety Manual.*

2.7 AUTHENTICATION PROCESS

2.7.1 **Lifeloc FC20/FC20BT: Initial Certification (wet bath only)**

2.7.1.1 Check the following settings within the menus of the Lifeloc to verify they are correctly set: Military time, date, calibration is set to "wet check", wet check standard is set to 0.080, the calibration lockout is set to 180-210 days, the subject ID option is set, sequence mode is "on", print format is set to short, printer type is set, the test order is Auto-Manual-Passive, Pass limit is set to 0.000, Fail limit is set to 0.001, display is set to numeric results, Trigger mode is set to "end of breath", battery status is above 90%.

2.7.1.2 On the certification checklist (BrALC Portable Instrument Certification), identify the instrument being evaluated by its serial number, the ownership agency, the date of evaluation, and if the instrument arrived with a printer.

2.7.1.3 Using wet bath breath alcohol simulators, prepare three premixed alcohol simulator solutions for testing. Use the approximate 0.040, 0.080, and 0.200 levels.

2.7.1.3.1 Heat the solutions for approximately 15 minutes to a temperature of 34 ° C (+/- 0.5 °C). The lid of the simulator should feel as warm as the jar of the simulator before proceeding.

2.7.1.3.2 Provide a steady breath through the simulator and analyze a duplicate sample of the solution at each level. The breath should be approximately 4 seconds and should continue through the sampling of the alcohol vapor.

2.7.1.3.3 Acceptance criteria for the samples at each level are +/- 5% of the target value or 0.004 whichever is greater. Duplicate samples need to be within 5% or 0.004 of each other, whichever is greater, in order to be acceptable.

2.7.1.3.3.1 Failure to meet the acceptance criteria may require the instrument to be adjusted in order to pass its initial certification.

2.7.1.3.3.2 Proceed to section 2.9 to adjust the instrument and then attempt the initial certification process again.

2.7.1.3.4 Using the Acetone/Water mixture and passive sampling with a fail threshold set to 0.001, take a sample of the vapor from the acetone/water solution. Results must be NEG.

2.7.1.3.5 Place the instrument in a refrigerator and monitor its temperature periodically. When it reaches below 10º C verify that the instrument will not allow sampling.

2.7.1.3.6 Place the instrument in an incubator and allow it to reach approximately 37º C. Take a sample from the ~0.080 simulator solution and verify that the instrument does not exceed +/- 5% of the highest initial value reported from 2.7.1.3.2.

2.7.1.3.6.1 Care should be taken not to overheat the instrument as it may dry out the fuel cell.

2.7.1.3.7 Document all of the testing results on the certification checklist.

2.7.2 **Alco-Sensor III: Initial Certification**

2.7.2.1 In the event that a new Alco-Sensor III/IIIa needs initial certification, the re-certification protocol shall suffice for its initial certification for use within the state for evidentiary breath testing.

2.7.3 **Lifeloc FC20/FC20BT: Re-Certification (wet bath only)**

2.7.3.1 When an instrument comes into the lab, document on the certification checklist at a minimum (BrALC Portable Instrument Recertification), the identity of the instrument being evaluated by its serial number, the ownership agency, the date of evaluation.

2.7.3.2 Using wet bath alcohol simulators, prepare three premixed alcohol simulator solutions for testing. Use the approximate 0.040, 0.080, and 0.200 levels.

2.7.3.2.1 Heat the solutions for approximately 15 minutes to a temperature of 34 ° C (+/- 0.5 °C). The lid of the simulator should feel as warm as the jar of the simulator before proceeding.

2.7.3.2.2 Provide a steady breath through the simulator and analyze a duplicate sample of the solution at each level. The breath should be approximately 4 seconds and should continue through the sampling of the alcohol vapor.

2.7.3.2.3 Acceptance criteria for the samples at each level are +/- 5% of the target value or 0.004 whichever is greater. Duplicate samples need to be within 5% or 0.004 of each other, whichever is greater, in order to be acceptable.

2.7.3.2.3.1 Failure to meet the acceptance criteria may require the instrument to be adjusted in order to pass its re-certification.

2.7.3.2.3.2 Proceed to section 2.9 to adjust the instrument and then attempt the re-certification process again.

2.7.3.2.4 Using a wet bath simulator filled with the Acetone/Water mixture take a sample of the vapor from the acetone/water solution. Results must be 0.000.

2.7.4 **ASIII and ASIIIa: Re-Certification**

2.7.4.1 When an instrument comes into the lab, document on the certification checklist, the identity of the instrument being evaluated by its serial number, the ownership agency, the date of evaluation, and if the instrument arrived with a printer.

2.7.4.2 Using wet bath alcohol simulators, prepare three premixed alcohol simulator solutions for testing. Use the approximate 0.040, 0.080, and 0.200 levels.

2.7.4.2.1 Heat the solutions for approximately 15 minutes to a temperature of 34 ° C (+/- 0.5 °C). The lid of the simulator should feel as warm as the jar of the simulator before proceeding.

2.7.4.2.2 Provide a steady breath through the simulator and analyze a duplicate sample of the solution at each level. The breath should be approximately 4 seconds and should continue through the sampling of the alcohol vapor.

2.7.4.2.3 Acceptance criteria for the samples at each level are +/- 5% of the target value or 0.004 whichever is greater. Duplicate samples need to be within 5% or 0.004 of each other, whichever is greater, in order to be acceptable.

2.7.4.2.3.1 Failure to meet the acceptance criteria may require the instrument to be adjusted in order to pass its re-certification.

2.7.4.2.3.2 Proceed to section 2.9 to adjust the instrument and then attempt the re-certification process again.

2.7.4.2.4 Using a wet bath simulator filled with the Acetone/Water mixture take a sample of the vapor from the acetone/water solution. Results must be 0.000.

2.7.4.2.5 Place the instrument in an incubator and allow it to reach approximately 37º C. Take a sample from the ~0.080 simulator solution and verify that the instrument does not exceed +/- 5% of the highest initial value reported from 2.7.4.2.2.

2.7.5 **Lifeloc FC20/FC20BT: Initial Certification/Recertification utilizing the EasyCal® station**

2.7.5.1 (Initial certification only) Check the following settings within the menus of the Lifeloc to verify they are correctly set: Military time, date, calibration is set to "wet check", wet check standard is set to 0.080, the calibration lockout is set to 180-210 days, the subject ID option is set, sequence mode is "on", print format is set to short, printer type is set, the test order is Auto-Manual-Passive, Pass limit is set to 0.000, Fail limit is set to 0.001, display is set to numeric results, Trigger mode is set to "end of breath", battery status is above 90%.

Note: *when connected to the EasyCal® Station, the unit automatically recognizes and switches the standards being used to "dry gas" so there is no need to manually change it to "dry" from the "wet check" default. The unit automatically switches back to 'Wet check' when detached from the EasyCal®.*

2.7.5.2 On the certification checklist (BrALC Portable Instrument Certification/Recertification), identify the instrument being evaluated by its serial number, the ownership agency, the date of evaluation, and if the instrument arrived with a printer.

2.7.5.3 Using the EasyCal® station, prepare the dry gas cylinders for use. Use the approximate 0.040, 0.080,and 0.200 levels.

2.7.5.3.1 The cylinders should be allowed to reach room temperature prior to use.

2.7.5.3.2 Attach the unit to the EasyCal® station and use the performance verification function to check the instrument using the 0.040, 0.080, and 0.200 levels in duplicate.

2.7.5.3.3 Acceptance criteria for the samples at each level are +/- 5% of the target value or 0.004 whichever is greater. Duplicate samples need to be within 5% or 0.004 of each other, whichever is greater, in order to be acceptable.

2.7.5.3.3.1 Failure to meet the acceptance criteria may require the instrument to be adjusted in order to pass its initial certification.

2.7.5.3.3.2 If the instrument fails its initial checks, proceed to section 2.9 to adjust the instrument and then attempt the initial certification process again.

2.7.5.3.4 Using a wet bath simulator filled with the Acetone/Water mixture take a sample of the vapor from the acetone/water solution. Results must be 0.000.

2.7.5.3.5 (Initial certification only) Place the instrument in a refrigerator and monitor its temperature periodically. When it reaches below 10º C verify that the instrument will not allow sampling.

2.7.5.3.6 (Initial certification only) Place the instrument in an incubator and allow it to reach approximately 37º C. Take a sample at the ~0.080 level and verify that the instrument does not exceed +/- 5% of the highest initial value reported from 2.7.5.3.2.

2.7.5.3.6.1 Care should be taken not to overheat the instrument for extended periods of time as it may dry out the fuel cell.

2.7.5.4 Using wet bath alcohol simulators, prepare two premixed alcohol simulator solutions for testing. Use the approximate 0.080 and 0.200 levels.

2.7.5.4.1 Heat the solutions for approximately 15 minutes to a temperature of 34 ° C (+/- 0.5 °C). The lid of the simulator should feel as warm as the jar of the simulator before proceeding.

2.7.5.4.2 Provide a steady breath through the simulator and analyze a single sample of the solution at each level. The breath should be approximately 4 seconds and should continue through the sampling of the alcohol vapor.

2.7.5.4.3 Acceptance criteria for the samples at each level are +/- 5% of the target value or 0.004 whichever is greater. Duplicate samples need to be within 5% or 0.004 of each other, whichever is greater, in order to be acceptable.

2.7.5.4.4 The wet bath result and dry gas results average must correlate to within +/- 5% of each other. Should the wet bath results fail to match the dry gas results within the specified criteria, please refer to the troubleshooting and maintenance.

2.7.5.5 Document all of the testing results and maintenance on the appropriate certification checklist.

2.8 INSTRUMENT ACCEPTANCE CRITERIA

2.8.1 **Acceptance**

2.8.1.1 If the instrument passes all of the requirements for certification, the instrument shall be certified in writing.

2.8.1.2 The instrument shall be sent to the user agency with a copy of the certification checklist. The laboratory certificate indicating the serial number of the instrument that is being certified for use will be made available online at the ISP website.

2.8.1.2.1 The instrument is fit for use upon the date indicated on the certification paperwork.

2.8.1.2.2 The ASIII/IIIa shall have the label placed over the adjustment screw and covered with tamper evident tape.

2.8.2 **Rejection**

2.8.2.1 If the instrument fails to pass the certification process, the instrument may be adjusted in the laboratory in order to meet the acceptance criteria.

2.8.2.2 Refer to the instrument adjustment section for instructions on how to adjust each of the instruments.

2.8.2.3 If the instrument is rejected for certification, the agency shall be notified in writing. The instrument may then be sent back to the manufacturer for service and re-evaluated by ISPFS upon completion of the manufacturer service.

2.9 INSTRUMENT ADJUSTMENT

2.9.1 **Procedure using wet bath simulators: Lifeloc FC20/FC20BT**

2.9.1.1 Fill a wet bath simulator with ~500 mL of ~0.200 alcohol performance verification solution and allow it to warm for approximately 15 minutes to a temperature of 34 °C (+/- 0.5 °C), until the lid feels as warm as the jar.

2.9.1.1.1 A different lot number of solution should be used for the adjustment process of the instrument.

2.9.1.2 Access the calibration menu option and set the calibration standard to the target value of the solution being used (~0.200).

2.9.1.3 Using a steady breath, take a sample of the alcohol simulator solution vapor to adjust the instrument to the target value of the solution. The breath should continue through the sampling process.

2.9.1.4 Return to section 2.7 to attempt the certification/re-certification process again.

2.9.2 **Procedure using wet bath simulators: Alco-Sensor III/IIIa**

2.9.2.1 Fill a wet bath simulator with ~500 mL of ~0.080 alcohol performance verification solution and allow it to warm for approximately 15 minutes to a temperature of 34 °C (+/- 0.5 °C), until the lid feels as warm as the jar.

2.9.2.1.1 A different lot number of solution should be used for the adjustment process of the instrument.

2.9.2.2 Remove the protective tamper evident covering to access the instrument adjustment screw for the Alco-Sensor III, or access the instrument adjustment menu for the ASIIIa.

2.9.2.2.1 To access the instrument adjustment menu on the ASIIIa, press and hold the set and read buttons. Release the read button as soon as the temperature is displayed, and press the read button three times quickly. When bLn is displayed, press the read button to take a blank.

2.9.2.3 Using a steady breath, take a sample of the alcohol simulator solution vapor to adjust the instrument to the target value of the solution.

2.9.2.3.1 For the ASIII, upon taking the sample, adjust the instrument to above the target value and then slowly readjust it downward back

to the target value as it climbs over the target value. Always adjust downward to the target.

2.9.2.3.2 For the newer ASIIIa, the instrument will auto adjust to the target value and is complete when the display brightens. Adjust the instrument to the target value and press the set button to accept the instrument adjustment.

2.9.2.4 Return to section 2.7 to attempt the certification/re-certification process again.

2.9.3 **Procedure using the EasyCal® Station: Lifeloc FC20/FC20BT**

2.9.3.1 Install the dry gas cylinder into the EasyCal® station. The level used for adjustment within the lab shall be the 0.160 level.

2.9.3.2 Enter the password protected calibration menu function on the EasyCal® station.

2.9.3.3 Perform a calibration adjustment on the instrument.

2.9.3.4 Return to section 2.7 to attempt the certification/re-certification process again.

2.9.4 **Rejection Documentation**

2.9.4.1 If the instrument fails its instrument adjustment process, the agency will receive written notice that the instrument in not certifiable and a manufacturer service should be suggested.

2.9.4.2 At the discretion of the scientist, ISPFS may return the instrument to the agency or send the instrument to the manufacturer for service upon documentation and agreement from the instrument owner agency.

2.10 LIFELOC MAINTENANCE AND TROUBLESHOOTING

2.10.1 The Manufacturer has provided proprietary software for the adjustment of the Lifeloc FC20/FC20BT (ZOC). Using the ZOC software, the gain of the fuel cell can be adjusted to increase the relative response of the cell. This may be necessary if the cell is getting older or has dried out due to lack of use, or from improper storage conditions. Follow the manufacturer's instruction on how to adjust the fuel cell gain the fuel cell.

2.10.2 In the event that the results from the dry gas and wet bath do not match within the specified criteria, the manufacturer's proprietary software can be used to adjust the dry gas correction factor (DGCF). Using the ZOC software, the instrument fuel cell can

be adjusted to increase the relative response of the cell to a dry gas standard. This may be necessary if the cell is getting older or has dried out due to lack of use, or from improper storage conditions. Follow the manufacturer's instruction on how to adjust the DGCF of the fuel cell.

2.11 REFERENCES AND RECOMMENDED READING

2.11.1 Idaho Administration Code, IDAPA 11.03.01, Rules Governing Alcohol Testing.

2.11.2 Caplan, Y.H., The Determination of Alcohol in Blood and Breath, Forensic Science Handbook, edited by Richard Saferstein, pp. 594-648, Prentice-Hall New Jersey, 1982.

2.11.3 Levine, B. and Caplan, Y.H., *Alcohol. in:* Principles of Forensic Toxicology, edited by Barry Levine, pp. 169-184, AACC Press, 2006.

2.11.4 Gullberg, R. (2005). Determining the Air/Water Partition Coefficient to Employ when Calibrating Forensic Breath Alcohol Test Instruments. *Can. Soc. Forensic Sci. J. , 38* (4), 205-212.

2.11.5 Idaho Statutes, 18-8004 (4). Title 18, Crimes and Punishments, Chapter 80 Motor Vehicles. Persons under the influence of alcohol, drugs or any other intoxicating substances.

2.11.6 http://www.legislature.idaho.gov/idstat/Title18/T18CH80SECT18-8004.htm