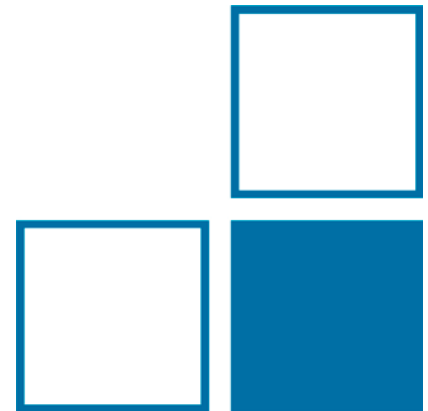


Lab equipment for type evaluation and verification tests

Regina Klüß



Test gas sources: wet gas or dry gas

		Advantages	Disadvantages
Wet gas		Similar to the natural breath	Not storable
	Bubble train	<ul style="list-style-type: none"> - Easy to construct and to use - Easy variation of substances and gas to be added/ used 	<ul style="list-style-type: none"> - Depending on empirical partition coefficients , no traceability to SI - - no variation of concentration while in use - Heating system and temperature control needed
Dry gas		Ready to use, storable	Not similar to natural breath
	compressed gas cylinders	<ul style="list-style-type: none"> - Easy to use 	<ul style="list-style-type: none"> - variations in atmospheric pressure have to be taken into account - Gas temperature = lab temperature \neq breath temperature

Equipment	Type approval tests	Verification tests
source for ethanol test gases	<ul style="list-style-type: none"> - wet gas compulsory for some tests, - Dry gas source optional - 2 sources for realizing different concentrations at one time necessary 	<ul style="list-style-type: none"> - Wet gas or dry gas according to national regulations - For efficient work, a number of sources (one for each concentration) would be sensible
Source for special test gases	Test gases needed with: <ul style="list-style-type: none"> - Carbon dioxide - -interfering substances - Varying ethanol content (mouth rest alcohol, plateau) 	Normally not needed, only if prescribed in national regulations
Means to control the gas flow	<ul style="list-style-type: none"> - different flow rates with <ul style="list-style-type: none"> - Stable flow - Varying flow 	<ul style="list-style-type: none"> - typically, only one or two different flow rates with stable flow
Means to measure gas volume	needed for: <ul style="list-style-type: none"> - tests of conditions of injection - Tests for minimum volume recognition 	<ul style="list-style-type: none"> - Needed to check the correct adjustment of minimum volume recognition

Overview –lab equipment (2)

Equipment	Type approval tests	Verification tests
Means for climate conditions	<ul style="list-style-type: none"> - Data logger for environmental conditions (T, p, %rH) - Climatic chamber for testing extreme conditions 	- Data logger for environmental conditions ((T, p, %rH)
Means for time measurement	- Needed for tests of condition of exhalation	Not needed
Means for pressure measurement	- needed for tests of back pressure of the mouth piece	Not needed
Means for electrical tests	Typically, these tests will be performed by an accredited lab (third party)	Not needed
Means for mechanical tests	Typically, these tests will be performed by an accredited lab (third party)	Not needed



**Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin**

Bundesallee 100

38116 Braunschweig

Germany

Regina Kluess

Telefon: 0049 531 592-3337

E-Mail: regina.kluess@ptb.de

www.ptb.de

