

Hodge Clemco Ltd

Air Purification & Testing



Air Quality Testing - Why?

The required quality of breathing air as stated in EN12021 is to provide information on the safe limits of potential contaminant gases within breathing air and to ensure that the life support gas of oxygen is of an adequate level.

Compressed air for breathing normally originates from a compressor system installed or operating at the place of use and there are various factors that can affect the quality and safety of this air.

- The air intake to the compressor can ingest airborne contamination from local processes and vehicle exhaust fumes which are not removed by standard breathing air filtration. Such airborne contamination may not be continuous but the pollution of the air supply may persist for hours or days.
- Malfunctioning compressors, especially reciprocating type, can produce unsafe levels of both carbon monoxide and carbon dioxide.
- Breathing air filtration has a finite life and can fail causing high levels of oil and water contamination to be present in the air.
- The performance of desiccant filters is dramatically affected by operating temperature. Infrequent validation may result in poor quality air being supplied for an extended period
- Failure of the compressed air after-cooling will result in air entering the filtration at too high a temperature. This will cause the filtration to prematurely fail and pass excess levels of oil and water.
- Malfunctioning dryers can disturb the oxygen concentration to outside safe levels within the breathing air.
- High levels of water in breathing air can freeze within RPD demand valves causing the air supply to fail.
- Insufficient air flow or pressure to the RPD will reduce the protection factor of the RPE and potentially expose the user to ingress of external contaminants.
- The effects of contaminants when breathed at elevated pressure can have a much greater effect on users than it would at normal pressure.
- Changes in the performance of compressor and filtration equipment are usually rapid in nature. Any failure affecting outlet air quality may injure users for an extended period if quality validation is infrequent.
- Odour alone is a poor indicator of air quality. An asphyxiant gas is often odourless. The limits for oil pollution are lower than the threshold detection level that most people will notice.

All employers have a duty of care to their employees to ensure that the breathing air they are supplied with is adequate for the RPD they are using and safe to breathe. The points raised above may form the basis of the risk assessment called for in the European guidance document for the selection and use of respiratory protective devices EN 529.

Air Testing Equipment



Part: BAK6527150

Our air quality test kit can be used to monitor the purity of breathing air in the low pressure range. Each kit comes with Dräger-Tubes®, tube opener, measuring device for tubes, timer, quick-connect coupling, pressure reducer, carrying case, and instruction booklet. A certificate of conformance and accuracy, and a six month limited warranty from the date of original purchase is provided.

The plug connection can easily be connected to the low-pressure compressed air supply system to be monitored. By simultaneously measuring for carbon monoxide, carbon dioxide, water content and oil, testing can be completed in as little as 5 minutes. Optionally, the values can be measured individually or simultaneously.



Part: BAK4500

The BAK4500 Safe Air Tester is the latest generation of Hodge Clemco's market leading air quality testing instruments and enables breathing-air tests to be conducted easily and quickly. This ensures complete compliance with the relevant requirements of COSHH L5.

BAK4500 Safe-Air Testers are fitted with internal lithium rechargeable batteries and also take 6 AA alkaline type batteries. The unit features a colour touch-screen, menu-driven display, making air quality testing both easy and quick to complete, with a typical test taking about 10 minutes.

The detection parameters of EN12021:2014 are met or exceeded during the automatically controlled test by the use of Draeger detector tubes to establish levels of carbon monoxide, carbon dioxide, and water. For oil the instrument can use either the Draeger Impactor or oil tube.

At the end of each test, results can be stored within the BAK4500's memory (up to 20 tests can be stored) and then downloaded via the USB cable into PC-compatible software. This software provides an easy way to retain and print test results.



Part: BAK6000

The BAK6000 instrument enables breathing-air tests to be easily and quickly carried out without the need for any chemical reagent tubes.

The BAK6000 features an intuitive touch-screen display, making air quality testing both easy and quick to complete, with a typical test taking approximately 10 minutes.

The breathing-air supply is subjected to an automatically controlled test against the requirements of EN12021 2014. The BAK6000 incorporates electronic cells for carbon monoxide, carbon dioxide, and oxygen are incorporated. Moisture levels within the breathing air are measured by a dewpoint sensor, which is specially suited to sample air quality testing, ensuring an accurate moisture reading within the standard test time. The BAK6000 also has an operating mode which allows for extended tests with live sensor readings being displayed continuously.



Part: BAK6100

The BAK6100 safe-air monitor is the ideal instrument for continuously monitoring of low pressure airline systems. Once set up the instrument will continue to monitor and data-log the air quality at user-defined intervals, validating the air quality against a range of international standards. In the UK this ensures complete compliance with the relevant requirements of COSHH.

The BAK6100 is mains powered by an adapter and in the case of a power failure has an inbuilt rechargeable battery backup system. The BAK6100 incorporates electronic cells for measuring carbon monoxide, carbon dioxide, and oxygen. Moisture levels within the breathing air are measured using a dewpoint sensor. The instrument then displays the moisture content in pressure or atmospheric dewpoint levels, as well as providing the concentration in mg/m3. It also includes digital airline pressure and ambient temperature readings. Oil measurements are completed using the Draeger Impactor which is inserted into a test-port on the instrument. The BAK6100 provides a prompt to the user whenever an oil impact test is required and a time-interval can be defined by the user in the set-up.

Air Purification Filters

Our mobile and fixed air purification filters provide high quality breathing air by filtration from a normal compressed air supply. Designed to be fitted to standard factory airlines or mobile compressors with after-coolers the filtration system removes liquid and solid particulate down to a size of 0.01 micron and then oil vapour and odour down to 0.003 p.p.m (excluding our CPF20 filter).



Part: CPF20

This is our lowest cost and universal filter unit designed to reduce pollutants in airlines supplied to air-fed helmets. The filter will remove mists (including oil mist), water vapour and particles down to 0.5 micron in size from a suitable supply of compressed air in accordance with EN12021. This unit does NOT include a carbon monoxide or carbon dioxide filter.

Inlet: Pipe plug 1" Outlet: 1/4"
 Max. Operating Pressure: 150 psi
 Weight: 9kg
 Dimensions (WDH): 190 x 300 x 540 mm



Part: BAKSAC700HDP

Our safe-air breathing-air filter is available in a wall-mounted or portable format with pre-coalescing and activated carbon filters. The units are mounted in a durable, impact-resistant polyethylene housing. This unit does NOT include a carbon monoxide or carbon dioxide filter.

Inlet: 1/4" BSP female thread; Outlet: 2 no. XF
 Weight: 5kg
 Dimensions (WDH): 280 x 162 x 430 mm
 Capacity: 707 lpm / 2 outlets



Part: BAKSAT450HD

Breathing-air filtration trolley with pre-coalescing, pressure swing dryer, hopcalite and activated carbon filter including carbon monoxide and carbon dioxide filtration. This unit requires the use of a compressor fitted with an aftercooler. Image shown with cover removed.

Inlet: QRC Claw; Outlet: 2 no. XF
 Operating Pressure: Min: 4 barg; Max: 16 barg
 Weight: 54kg
 Dimensions (WDH): 600 x 560 x 1040 mm
 Inlet Flowrate: 590 lpm / 2 outlets
 Max. Outlet Flowrate: 450 lpm at 7 barg



Part: BAKSAT450HDAC

Breathing-air filtration trolley with pre-coalescing, pressure swing dryer, hopcalite and activated carbon filter including carbon monoxide and carbon dioxide filtration. This unit has an additional BAKACT1400 aftercooler. Image shown with cover removed and without the standalone BAKACT1400 aftercooler trolley.

Inlet: QRC Claw; Outlet: 2 no. XF
 Operating Pressure: Min: 4 barg; Max: 16 barg
 Weight: 54kg
 Dimensions (WDH): 600 x 560 x 1040 mm
 Inlet Flowrate: 590 lpm / 2 outlets
 Max. Outlet Flowrate: 450 lpm at 7 barg

All units are available with multiple outlets and higher flowrates as a special order option.

Filtration Selection Chart

Model	Capacity l/min	Prefilter	Aftercooler	Coalescing	Activated carbon filter	Max Outlets	CO & CO ₂ Filtration
CPF20	566				✓	1	
BAK700HD	707	✓		✓	✓	3	
BAKSAT450HD	450	✓		✓	✓	2	✓
BAKSAT450HDAC	450	✓	✓	✓	✓	2	✓

European Breathing-Air Standards

	Standard: EN12021:2014
Odour	The gas shall be free from unsatisfactory odour or taste.
Oxygen	(21 ± 1)%
Carbon Dioxide	≤ 500 PPM
Carbon Monoxide	≤ 5 PPM
Oil	≤ 0.5 mg/ m ³
Water Airline <40Bar	Where the apparatus is used and stored at a known temperature the pressure dewpoint shall be at least 5°C below likely lowest temperature. Where the conditions of usage and storage of any compressed air supply is not known the pressure dewpoint shall not exceed -11°C.

A practical guide HSG53 (4th edition, 2013)

Do's	Don't's
Always ensure the breathing apparatus is in good working order before putting it on, even when new.	Never place the hose inlet near to potential sources of contamination, e.g. vehicle exhausts.
Always look after your supply hose during use – your life may depend on it.	Never use the equipment without the waist belt.
Always use all the straps provided, making sure they are correctly positioned and adjusted. Follow the manufacturer's instructions.	Never use a light-duty airline hose where there is any potential for crushing by vehicles or passers-by etc.
Ensure that an adequate clean air supply is available for all users.	Never keep working if the airflow rate drops or any warning devices are activated. Leave the work area immediately.
Ensure that the compressed air quality meets the minimum requirements of BS EN 12021.	
Always plan your exit from the contaminated area so you don't run out of air.	
Ensure the other PPE you need to wear is compatible with the BA.	

Air Quality Test Services

Hodge Clemco's service packages are designed to match factors affecting different customers such as the throughput involved and quality required. Work is carried out nation-wide by our team of experienced, well-equipped service engineers. Hodge Clemco's services can include:

- Equipment inspections and assessments including breathing air tests
- Detailed reports
- Proposals for future maintenance
- Supply and/or fitting of replacement parts
- Equipment upgrades
- Operator training

Frequency of Breathing-Air Tests

The purpose of periodically testing air quality is to make sure that the control measures you have put in place are delivering the air quality required.

In the UK the preface to EN12021 advises that samples should be taken and analysed at least every three months or more frequently if there has been a change in, or concerns relating to, the production process.

In the HSE guideline document Respiratory Equipment at Work (HSG53) it states you should base the frequency of such tests on a risk assessment, but again they should take place at least every three months, and more often when the quality of air cannot be assured to these levels.

For mobile breathing-air compressors, in the UK, COSHH stipulates that, the employer should ensure that wherever a compressor is located, the quality of air it supplies is not compromised by nearby contaminants. We strongly therefore recommend that for mobile compressors the air quality is tested whenever it is first moved into a new position or prevailing wind conditions change.

The final decision on frequency of tests is the responsibility of the employer and needs to not only reflect local legislation but also the task and frequency of use. It should be incorporated into their risk assessment and updated regularly to reflect results from ongoing breathing-air tests to maintain a robust control system.

Recording Breathing-Air Quality Test Results

When undertaking breathing-air quality tests, results should be retained. In the UK the regulations COSHH stipulates the information retained should include:

- the name and address of the employer responsible for the RPE;
- particulars of the equipment and of the distinguishing number or mark, together with a description sufficient to identify it, and the name of the maker;
- the date of examination and the name and signature or other acceptable means of identifying the person carrying out the examination and test;
- the condition of the equipment and details of any defect found, including for canister or filter respirators, the state of the canister and the condition of the filter;
- for self-contained compressed air/gas breathing apparatus, the pressure of air/gas in the supply cylinder; and
- for powered/power-assisted respirators and breathing apparatus, the volume flow rate to ensure that they can deliver at least the manufacturer's minimum recommended flow rate.

Records can be in paper or electronic format but should be kept readily accessible and retrievable at any reasonable time for examination by safety representatives or inspectors etc.

In the guideline document Respiratory Protective Equipment, a practical guide (HSG53) it advises results should be kept for 5 years.

Respiratory Protective Equipment at Work

Appendix 3 Quality of air for breathing apparatus

Air quality

1. Air supplied to breathing apparatus (BA) should be clean and safe to breathe, whether it is supplied via a fresh air hose or a source of compressed air.

Fresh air hose

2. You should securely anchor the inlet for fresh air hose BA in an area that is free of contaminant. This can usually be achieved by siting the inlet well away from the work area (e.g. in free air outside the building), and upwind of any local sources of airborne contamination (e.g. vehicle exhaust).

Compressed air

3. Compressed air for BA normally originates from a compressor system. The maintenance, examination and testing of compressors should be carried out according to the manufacturer's instructions. The siting of air inlets to compressors should follow the same principles as for fresh air hose. However, because compressors themselves can generate and concentrate a wide range of contaminants, you should take extra care in assuring air quality.

4. As the BA wearer's life and health depend on the air supplied by the compressor, you should ensure that the air supplied meets the quality requirements in British Standard BS EN 12021 Respiratory protective devices. Compressed air for breathing apparatus,* in addition to the pressure and airflow rate requirements of the BA manufacturer.

5. Compressors which are moved from site to site, such as those used by the emergency services or on construction sites, will require a higher standard of maintenance and should be sited so that the quality of air they provide is not compromised by nearby contaminants.

* BS EN 12021 states: 'Compressed air for breathing apparatus shall not contain any contaminants at a concentration which can cause toxic or harmful effects. In any event all contaminants shall be kept to as low a level as possible and shall be far below the national exposure limit. Combination effects of more than one contaminant shall be taken into account.' (1999) Respiratory protective equipment at work Page 48 of 59

Periodic testing of air quality

6. The purpose of periodically testing air quality is to make sure that the control measures you have put in place are delivering the air quality required by BS EN 12021. You should base the frequency of such tests on a risk assessment, but they should take place at least every three months, and more often when the quality of air cannot be assured to these levels.

7. As part of the risk assessment, if a mobile compressor is being used consideration should be given as to how often the air supply should be checked when the compressor is moved. Testing for these components may be carried out using any appropriate method, e.g. simple colour change tubes; on-line gas testers; sample collection for laboratory analysis elsewhere.

8. The supplier of your compressor or BA should be able to advise you on the best method for you. You should keep records of air quality tests for five years.



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