

## What if the System Does not meet the CSA Standard?

The CSA standard says the following about a system that does not meet the CSA Standard:

### 14.1.6

The failure of samples to meet the requirements of [Clause 14.3](#) shall constitute a failure of the system.

### 14.1.7

Compressed breathing air systems producing a sample that does not meet the requirements of [Clause 14.3](#) shall be taken out of service until the cause of the failure has been investigated and corrected. A new sample shall be submitted for complete analysis and shall meet the requirements of [Clause 14.3](#).

So, if the test results do not meet any of the air criteria, the CSA Standard says the unit should be taken out of service until the problem is corrected and the unit passes a retest. While this is conservative and clearly is protective, is it overly conservative?

It may be reasonable to keep the system in use provided the test results show a modest exceedance of the CSA test criteria. Most of the test criteria also have general occupational exposure limits. These occupational exposure limits are airborne concentrations that workers may be exposed to without adverse effect. The compressed breathing air standard recommends concentrations that are much more stringent than the general OELs. It would be difficult to explain why a compressed breathing air system needs to be taken out of the service if it provides an exposure well within the acceptable OEL.

The following table shows a comparison of compressed breathing air criteria and their respective occupational exposure limits.

Chemical	CSA Criteria	Occupational Exposure Limit
Oxygen	20-22 %	19.5 %
Carbon Monoxide	5 ppm	25 ppm
Carbon Dioxide	600 ppm	5,000 ppm
Total Hydrocarbons	5 ppm	Varies by compound
Halogenated Compounds	5 ppm	Varies by compound
Methane	10 ppm	1000 ppm (NIOSH recommendation)
Oil and Particulates	1 mg/m <sup>3</sup>	5 – 10 mg/m <sup>3</sup>

As you can see from the above table, the compressed breathing air standards are much lower than the health-based occupational exposure limit. If the carbon dioxide level was found to be 800 ppm (well above the compressed air standard but well within the occupational exposure limit), why could not the unit be used while the system was being investigated? In some cases, taking the system out of service is a severe blow to the

operation. If a product can't be painted, then it can't be shipped. If levels are still within the OEL, perhaps the system could be used with certain precautions.

1. Advise the worker and the Committee Co-Chairs.
2. Investigate the situation promptly. Do not use the fact that the system is still in operation to let the issue become less than urgent.
3. Additional testing (perhaps daily) to be conducted. This may sound extreme but testing the system daily is less expensive than taking the system out of service for many companies.
4. A compressed breathing air sample can often be analyzed further to better understand the problem. These follow-up tests can tell you if the sample had oil or dust. A high VOC result can often be tested to identify the VOCs in the sample. If the VOC is identified and well within its respective OEL, this strengthens the argument the system could be temporarily kept in use. For examples, if the sample contains 8 ppm of xylene which has an OEL of 100 ppm, it may be possible to keep using the system while the reading is being investigated.

Knowing the specific VOC (solvent) in the sample can also help track down the cause. In one case, a unit failed for high VOCs. Further analysis of the sample identified the VOC as methylene chloride – a powerful paint remover. It turns out the worker was cleaning the paint off of the hose at the end of the shift with methylene chloride and it was permeating through the hose.

The purpose of the above table is not to recommend that exposures up to the OEL can be allowed via the compressed breathing air system. Rather, it is to point out that the compressed breathing air standards are very conservative and that there may be some flexibility if a test result comes back in excess of the CSA standards but well within the OEL. It should be noted the Manitoba Workplace Safety and Health Division has allowed variances where companies are allowed to have results in excess of the CSA guideline values where a) the issue or source of contaminant was well understood, and b) where the levels were well within the OEL for that chemical.

That being said, some results are clear signs of potential danger, which may include but are not limited to:

1. Levels of oxygen below the CSA requirements;
2. Strong odours, eye or nose irritation reported by the worker;
3. Reported health effects of workers (e.g., headache, cough, dizziness);
4. Unexplained high VOC results that can not be identified by further analysis;
5. Any difficulty breathing by the worker (e.g., low air flow)