

Compressed Air in the Food and Beverage Industry



Compressed air is a critical utility commonly used in food and beverage. So, why is it frequently overlooked as a Critical Control Point?

The Quality of Compressed Air used in food manufacturing is such a critical factor to the final product consumed, that four major governing organizations have specifically identified the need for compressed air monitoring. Often looked at as a (CCP) Critical Control Point this utility known as compressed air is now finding its way into the (PRP) Pre-Requisite Program rather than just the (HACCP) Hazard Analysis and Critical Control Point plan. Compressed air has the ability to contaminate a final product with particles, water, oil or microorganisms. The (ISO) International Organization for Standardization¹, (BCAS) the British Compressed Air Society², the (BRC) British Retail Consortium³, and (SQF) the Safe Quality Food Institute⁴, all either suggest or require regular monitoring of compressed air used in the food, beverage, and packaging industries. In addition the Canadian (FSEP) Food Safety Enhancement Program⁵ has identified compressed air and gas used in processing and packaging as a potential source of contamination. However, compressed air quality is still often overlooked.

In 2012 SQF began requiring regular monitoring of compressed air used in the production process. This requirement has left food, beverage, supplement, packaging, and pet food manufacturers scrambling to learn about compressed air testing. They need to know who can offer the service, who can accurately analyze particles, oil, and microbiological contaminants low enough for typical industry standards and who can fulfill their need immediately. If unable to comply, the manufacturer will receive a deficient mark on their audit. Trace Analytics has the compressed air testing solutions. Particles, water, oil, and microorganisms are the recommended contaminants to monitor per the BCAS Food and Beverage Grade Compressed Air, Best Practice Guideline 102.

¹ ISO 8573-1 Purchase at webstore.ansi.org

² BCAS Food and Beverage Grade Compressed Air Best Practice Guideline 102 is available for purchase at bcas.org/uk

³ BRC Global Standard Purchase at brcbookshop.com

⁴ SQF Code at sqfi.com/documents

⁵ FSEP Food Safety Enhancement Program Manual at inspection.gc.ca

The BCAS Food and Beverage Grade Compressed Air Best Practice Guideline 102² is an excellent reference for the food manufacturer and its suppliers. This Best Practice Guide includes purity limits for particles, water, and total oil. We offer sampling kits for purchase or rental and our step-by-step manuals and videos make the process seamless.

The Guideline addresses the need for manufacturers to protect consumers from contaminated food and beverages. This in turn can help prevent recalls or potential legal actions due to contaminated compressed air. The Guideline is comprised of portions from the BRC Global Standard for Food Safety, Codex Alimentarius – CAC/RCP 1, EHEDG Doc. 23 (2nd Edition) Part 1, ISO 8573 1-5 and 7, ISO 22000 Food safety management systems and ISO TS 22002-1. To fully grasp the entirety of this Guideline you should obtain copies of all of these publications and read them in depth.

The BCAS Guideline identifies the four primary areas of potential contamination in compressed air – Particles, Water, Oil and Microbiological contaminants. The Guideline states that compressed air coming in Direct Contact with food shall meet ISO 8573-1:2010 Purity Class 2:2:1; Indirect Contact 2:4:2. (Section 7) See the Table below for limits. It further states that Microbiological testing of end products should not be relied upon for compressed air compliance. (Section 7.4.2)

BCAS Food and Beverage Grade Compressed Air Best Practice Guideline 102						
ISO 8573-1:2010 Purity Class	Particles			Water		Oil
	By Particle Size (maximum number of particles per m ³)			Vapor Pressure Dewpoint		Aerosol & Vapor
	0.1 - 0.5 micron	0.5 - 1.0 micron	1.0 - 5.0 micron	°C	°F	mg/m ³
Direct Contact 2:2:1	400,000	6,000	100	≤ -40	≤ -40	≤ 0.01
Indirect Contact 2:4:2	400,000	6,000	100	≤ +3	≤ +37	≤ 0.1
Microbial Contaminants	Hazard analysis shall establish the risk of contamination by microbiological contaminants from compressed air. The level of control identified as being required over microbiological contaminants in the compressed air shall be detected using the test method specified in ISO 8573-7.					
Air & Gas Specifications referenced above may be viewed and/or purchased from: BCAS - British Compressed Air Society						

According to the Guideline, compressed air quality shall be tested and verified at least twice per year, unless otherwise identified in the HACCP process or per the manufacturer’s recommendations. Additional testing is also warranted whenever maintenance work or any activity that may affect the air quality is performed on the compressed air system. (Section 8.2) Whenever maintenance is performed a representative selection of the air outlets shall be tested to confirm that the compressed air meets the relevant Purity Classes. (Annex D.4) The risk for microbiological contaminants shall be assessed per ISO 8573-7. It further states that microbiological testing of end products should not be relied upon for compressed air compliance. (Section 7.4) All measurements shall be recorded and documented. (Section 8.7)

Compressed air quality is frequently overlooked as a potential hazard during an internal risk assessment. Perhaps it is because compressed air is a colorless, odorless, and tasteless gas mixture or because many consider it to be – just air. However, contaminated compressed air can create major issues for a food manufacturer.

Primary sources of contamination of a compressed air supply include the ambient intake air and the compressor itself. At any given time the atmospheric air feeding the compressor inlet can have contaminants such as solid particles (dirt, sand,

soot, metal oxides, salt crystals), water vapor, oil vapor, and microorganisms. Careful consideration should be given to the placement of the compressor intake to avoid these contaminants as much as possible. The intake filter as a first defense should be routinely replaced according to the manufacturer's guidelines.

The compressor, if oil lubricated, can also add oil in the form of liquid, aerosol, or vapor. Any compressor that is improperly maintained can be a source of contamination.

Other sources of contamination include the system piping and air storage receivers. New piping should be tested to assure that it has been properly purged of potential contaminants such as particulates and solders or glues used during installation. Older piping can have an accumulation of water, rust and oil. When connecting new piping to an older piping distribution system, the jarring of the old piping can cause particulates (such as rust, pipe scale, dirt, metal oxides, etc.) to be loosened and introduced into the new piping. Storage receivers with excess water (vapor, liquid, or a mixture of oil and water) can become a breeding ground for microorganisms.

Potential air quality problems can arise from misuse, mishandling, inattention to maintenance, and human error. A periodic air test program can provide critical information to monitor air quality and help prevent contamination of the food supply in a timely manner. Due to the critical nature of compressed air used in the food manufacturing process, qualified personnel should be employed to properly maintain, service, and test the compressed air system.

Assuring food safety and quality is essential for the viability of any food manufacturer. The Global Food Safety Initiative was established to improve consumer trust by improving food safety through corporate responsibility and safer food supply chains.



Trace Analytics is an A2LA accredited laboratory established in 1989. We do one thing: test compressed air! We have a great team of experts ready to answer your questions and help you get started with your air quality assurance program.

For more information on how to set up an Air Quality Testing program using our AirCheck Kits™ or Microbiological Samplers to comply with SQF, the BCAS Guideline, ISO 8573, BRC or your own established criteria – Contact Trace Analytics Today!