

## POTENTIAL SOURCES OF MICROORGANISMS IN YOUR COMPRESSED AIR/GAS

You just received a microbial report of your compressed air. What does it mean and where did these microbes enter the system?

### Contaminants in the compressed air/gas system can generally be attributed to:

- The quality of the air drawn into the compressor
  - Ambient air has millions of microbes in the form of vegetative cells and spores (atmospheric air can contain up to 100 million microorganisms/m<sup>3</sup>, including bacteria, yeast and mold). These microbes with other particles and droplets are generally pulled in to generate compressed air and make their way into the system.
- The operation of the air compressor
  - The compression process raises the temperature of the air. The air is then cooled before use, which condenses water; the ideal environment for growth of bacteria, yeast, and mold. Even if a few of them encounter the final product, costly damage can occur.
- Compressed air/gas storage devices and distribution systems
  - The filtration systems that are employed in your compressed air system are designed to protect the final product from large contaminants of water, oil, rust and pipe scale. Using an inappropriate size filter will fail to remove submicron viable particles such as microorganisms.

### Contamination can be human or environmentally induced:

**Gram-positive bacteria** have been regarded as bacterial colonizers of the skin and mucus membranes (i.e. eyes, nose, and mouth).

**Gram-negative bacteria** are generally not isolated from the skin, unless contaminated from the gastrointestinal tract. They are also innately present in soil.

**Gram-positive and negative bacterial and yeast** contamination found on blinds, and on the edges of test samples can mostly be attributed to lack of proper protective equipment (PPE) and aseptic technique prior to sampling.

**Mold** contamination is most frequently related to the environment surrounding the point-of-use sampled, proper cleaning of sampling surfaces and preventative maintenance is imperative to reduce mold in the ambient air.

### Notable bacterial and fungal species isolated from industrial and manufacturing environments:

**Gram Positive Cocci (GPC):** *Staphylococcus spp.*

**Gram Positive Rods (GPR):** *Bacillus spp.*

**Gram Negative Rods (GNR):** *Proteus spp., E. coli*

**Most Prominent mold species isolated:** *Aspergillus spp.*

**Most Prominent yeast species isolated:** *Candida spp.*

\*Note: Pathogenic Gram positive and negative bacteria, such as *Listeria*, *E. coli* and microbes closely related to *Salmonella* have been recovered from condensate, oil traps and low points in compressed air lines (1).

### Recommendations:

We recommend as a part of your microbial monitoring plan, an extensive use of aseptic technique along with personal protective equipment. Aseptic technique is a requirement of ISO 8573-7:2003 (2) and should also be regarded as a general guideline to any compressed air/gas sampling.

Additionally, proper installation and maintenance of appropriate point-of-use filters (minimum of 0.1 microns) and desiccant dryers for your compressed air/gas system will eliminate contamination. Routinely test for microbial burden (CFU/m<sup>3</sup>) in your compressed air/gas to avoid microbial contamination.

1. Airborne contamination: A microbiologist's perspective. Jeffery L. Cornacki. Sanitation June/July 2014
2. ISO 8573-7:2003