Fact sheet

Microbiological contamination of food

Contamination through compressor intake air

Compressors take in ambient air to produce compressed air. Ambient air however always contains dirt and micro-organisms. This is a major concern where compressed air is used in food processing. Where the compressed air comes into direct or indirect contact with food, micro-organisms are transferred to the foodstuff surface where they grow, live and die, releasing toxins.

Silo trucks transport foodstuff such as flour or powered milk in bulk. The compressors in the vehicle used for unloading these products are often run with untreated compressed air, which means the food is easily contaminated by particles contained in the diesel exhaust air as well as by germs and water from the ambient air.

Humid compressed air as a major factor for microbiological activity

Compressed air provides an ideal environment for the growth of micro-organisms: behind the compressor, the air is normally around 10°C warmer than the ambient air, and fully saturated with water. If an oil injection cooled compressor is used, there is also some residual oil for the micro-organisms to feed on. The moisture in the air is particularly critical, as it cause dormant cells to become reproductive.

Dry, powdery foodstuff such as flour and powered milk are often conveyed by means of compressed air. Even if the air itself is sterile, the moisture contained in it can cause dormant micro-organisms to spring back to life. To prevent this, the compressed air must be dried.

Relative humidity

According to Wallhäusser, there is no mould growth below 65% relative humidity.

Mould growth relative to air humidity

Organism	Min. relative humidity
Rhizopus nigricans	93%
Trichoderma roseum	90%
Cladosporium herbarum	88%
Penicillium rugulosum	86%
Aspergillus niger	84%
- versicolor	78%
- candidus	74%
- ruber	70%

Water activity

In food science, water activity (a_w) is an important parameter describing the amount of free water contained in a foodstuff. Water activity determines the shelf life of food and the type of micro-organisms (spoilage organisms) contained in it, as different species of micro-organisms thrive at moisture levels. Microbiological growth starts at $a_w = 0.8$.

Foodstuff	Water activity a_w
Powered full fat milk	0.6
Oat flakes	0.65
Powered low fat milk	0.7
Cereal flour	0.75

Recommendation

Food producers who are aware of the problem of contamination by intake air use stationary compressor units with air drying systems to unload their silo trucks.