

Hygienic controlled air humidification

ISO 22000 HACCP

Solutions for High-pressure Humidification

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– ISO 22000 HACCP

Water as a food…...

Hygiene plays a major role in relation to the management of water.

ISO 22000 HACCP ensures, that food does not cause harm when consumed properly. Water is food and therefore the handling of this should, from our point of view, live up to the same requirements.

As a hygiene standard the ISO 22000 HACCP is the only international recognized standard for food security and thereby the handling of water.

Airtec® ISO 22000 HACCP, ISO 9001 Quality, ISO 14001 Environment ensure a humidification system where all aspects is considered in both design, handling and operation.

Risk Assessment for the processing and handling of water.
Legionella must be considered a naturally occurring environmental bacteria, which doesn't become a risk issue until propagation conditions are present.

In processing raw water propagation conditions must be avoided.

The process distinguishes between measures that are preventing growth and measure that are reducing and taking away legionella.

The bacteria issue should be handled in a suitable manor and extra care must be shown towards more sensitive groups of people such as the elderly and persons who a convalescing.

Water from a food perspective
A humidification system processes raw water to form fine water particles that are evaporated into the air and becomes air humidity. This can take place in an environment where people are located.

Within the air we inhale we are exposed to the processed raw water trough the humidity of that air. Therefore proper counselling should take place in the hygienic design and operations of the system.

Legionella
Legionella pneumophila is the most frequent cause off legionella disease with humans. Legionella has perfect propagating conditions in the temperature range from 30 – 40 °C, but can grow in the range of 20 – 50 ºC approx.
Stagnant water with a relative high content of nutrients provides the perfect conditions for making biological soil.

If the conditions for propagation are present then there will be a potential risk.
Legionella pneumophila lives in the environment primarily as intracellular parasite at amoebas. The bacteria can survive a long time extra cellular. The mechanism that legionella use as a parasite in amoebas with propagation intracellular is overall the same which is decisive for the legionella to parasite humane cells, and trough that cause the disease.

Biological soil
Biological soil is a composition of organic material and micro organisms which are growing on surfaces in aqueous environments. Amoeba and other protozoon's are a natural part of biological soil. Biological soil may help to create the growing conditions for legionella.

Raw water
Raw water quality must live up to drinking water standards corresponding to that of Danish drinking water, and supplied at a temperature of no more than 15 ºC.
Raw water supply's from surface water must be given extra attention. Bacteria have easier access to surface water than ground water.
In the handling of a raw water supply, propagation cannot be allowed anywhere along the handling system.

Limit values for Cfu

Atomised water
There are no official rules in force for humidification systems concerning the limits for bacteria.
There are German guidelines for the content of Cfu in relation to humidification in ventilation systems, described in VDI 6022.
The limits for Cfu should not exceed 1000 Cfu/ml.



Prevention of growth
- Critical control points
- Ensure that the supplied raw water has not previously been exposed to propagation conditions
- Raw water must live up to the standard of drinking water correspondent to the Danish drinking water standard
- Avoid propagation temperatures between 20 and 50 ºC
- Stagnant water
- Minimal water residence time in the system

Traceability on component level
Traceability as a risk management tool is essential to the safety of the ISO 22000 standard.
In case of contamination in the processing of water, it is important that any errors can be traced back through the processes and that proper proceedings can be implemented.

Tests and analyzes of the system
Hygienic design
In the innovative process of developing an effective hygienic design the Airtec® air humidification systems have gone through a series of systematic tests and analyzes. For several years the Airtec® systems has been constantly subject to monitoring and has been tested by leading internationally recognized laboratories. The experience from this has contributed to the design of the system and has also given us the knowledge to provide optimum counselling of our customers.

Testing of the systems in operation has pointed out critical control points in relation to: hygiene handling, construction design, operation and service of the system.

These tests and analyzes are carried out by internationally recognized laboratories to ensure a high credibility in relation to this process.

Internal and external Flow chart diagram describes the chain of processes from suppliers to stock, production, supply, installation, operation and service.

Operation
- Critical control points
- Installation
- Running the system
- Training
- Regular service check of the equipment
- Regular water analysis
- Regular monitoring of operation
- Service interval
- Use of User Manual
- Inappropriate operation
- Current audit and own control
- Disinfection procedure
- Traceability
- Authorised handling
- Logbook

Hygienic design for air humidification
Preventative Measures
All the components used in the construction of humidification systems are chosen on the basis of not being able to contribute to the propagation process. The size of hoses and fittings are dimensioned, so that less possible amount of water stays in the system for the least possible time.

The controller automatically rinses the system min. every 6. hour to minimise standing time and prevent stagnant water.
The systems high-pressure pump is controlled by a frequency inverter to ensure that water is not bypassed and re-used in the system. The pump, in contrast to many other systems, is full frequency controlled so that with a consumption of only 24 litres of water, by-passing is completely avoided.
This function is preventing heating of the water and at the same time ensures that the residual time spent in the system is as short as possible ensuring that water does not go through the same process several times and are re-used.
With hygienic design comes flow chart descriptions of internal and external handling. This means that the internal processes and handling is described and external processes is described in relation to the operation, service and maintenance. All Airtec®'s systems are built accordingly to the recommendations for hygienic design.



UV-treatment
Preventative Measures
This is a method to reduce the growth of bacteria. The product has not achieved any approval from the authority's and there is only limited documentation of it's efficiency.
UV radiation to bacteria has without doubt an effect on extracellular live Cfu. Exposure has no or limited effect on intracellular Cfu that is why the largest parts of legionella bacteria will not be affected by this treatment.

This product is likely to be chosen as an extra security, but according to the risk assessment, the RO filtration of the water in combination with the hygienic design of the humidification systems, is the fundamental part of hygiene safety.

Reverse Osmosis water treatment
Reducing Measures
The reverse osmosis principal ensure a very fine filtration of the water, which will remove both nutrients and bacteria from the system.
The RO membrane is sized to suite the water molecule so therefore no pollutant such as heavy metals, chemicals, vira or bacteria will pass trough, because all these substances are larger than a water molecule.
Oxygen - O2 and CO2 – which are gasses and smaller than the water molecule, will pass through the osmosis membrane, so that the natural oxygen in the water will be maintained.

Disinfection of the system
The system is self-cleaning and should not be disinfected unless water analysis or inappropriate operation requires it.
Disinfecting must be carried out in accordance with the procedure for disinfection, and only by authorized personnel.
If 2 consecutive tests show, that the water contains legionella in excess of the authorized limits the system must be disinfected in accordance with Airtec® procedure.

Airtec® Hygiene politics
All customers should receive a thorough counselling and advice on the bacteriological aspects of humidification systems and handling of water.
All the components used in the system are carefully selected for there ability to counteract propagation.
We recommend the use of reverse osmosis water treatment.
All Airtec® systems are built to a hygienic design.

Can a humidification system operate safely without reverse osmosis water treatment?
As long as the water temperature does not at any time exceed 20 °C, there is no risk of propagation.
The hygienic design of the Airtec® humidification system will in many cases be sufficient, but complete risk management will only be achieved by preventing and at the same time removing bacteria, combining hygienic design with reverse osmosis water treatment is the solution.
Under all circumstances all systems are subject to operation by the customer - referring to the operation procedure for the system.

Risk analyze at Legionella
Reference
The risk analyze for and analysis of Legionella is based on a report prepared by the Danish Environmental Ministry.
Flow diagram, risk analyzes and reports can be supplied by contacting Airtec®.