Humidity Group

of the HEVAC Association

CODE OF BEST PRACTICE - 1

COLD WATER HUMIDIFICATION SYSTEMS

HEVAC

HUMIDITY GROUP

HEVAC HUMIDITY GROUP CODE OF BEST PRACTICE.

HEVAC Code of Best Practice for the design, installation and maintenance of humidification systems to reduce microbial contamination risk in cold water humidification, misting and fogging systems.

1. INTRODUCTION

This Code of Best Practice has been prepared by the members of *HEVAC (Heating Ventilating and Air Conditioning Manufacturers Association)* Humidity Group to give guidance to manufacturers, suppliers, installers and operators of humidification systems.

The purpose of the guidance is to ensure that the risk of harm from the proliferation of harmful microbes that exists in all systems that contain water is reduced through good design, installation and operation. In particular, this Code of Best Practice addresses the risk presented by *Legionella pneumophila.*

This Code of Best Practice should be read alongside the following guidance and regulations:-

The Water Fittings Regulations 1999
The Provision and Use of Work Equipment Regulations 1998
The Control of Legionella Bacteria in Water Systems Approved Code of Practice & Guidance 2001 (L8) (HSC)
TM13 2000 Minimising the Risk of Legionnaires Disease (CIBSE)

2. CODE OF BEST PRACTICE

a. Design

Members of HEVAC who are manufacturers or suppliers of cold-water humidifiers, foggers and misting systems, undertake to minimise the risk of harm from the proliferation of harmful microbes that exist in all water systems through good product design, installation and maintenance guidelines.

Good product design means the incorporation of systems that address the sources of microbial growth, namely:

- Water status (stagnancy and wet surfaces)
- Temperatures that promote growth (20…45°C)
- Source of nutrients (such as material which encourage the development of microbes, airborne nutrients and biofilms).

In particular, these elements need to be given particular consideration where people, whether they are members of staff, the public or maintenance personnel, are exposed to the risk of inhalation of aerosols by direct contact with the humidifier, fogger or misting system, or from splashing, or food or product contamination.

A well-designed system will reduce the opportunity for bacteria to multiply by:

- Ensuring the cleanliness of the water supply such as filtration and ultraviolet sterilization.
- Flushing systems that empty a humidifier after use to avoid stagnation.
- Purging systems that ensure that stagnancy is avoided within the humidifier during operation and in any potential dead-leg supplying the humidifier.
- Where there is an air/water interface, the filtration of air to prevent the ingress of materials that might provide a source of nutrients for microbes.
- Avoidance in the humidifier of sections that are partially wetted during operation and after use.
- Building systems failsafe, so that failure of a safety system does not expose the user to risk, or providing alarms to warn of failure where this is not feasible.

- Building in alarms to remind users that maintenance is required.
- Designing to minimise potential risks caused by incorrect installation (for example, by building in components rather than separate supply).
- Designing to minimise maintenance requirements, and they should necessitate specialist attention only when breakdown occurs
- Designing O&M Manuals, which clearly reflect any potential risk to health, created by poor installation or maintenance and clearly describe the construction, operation, water supply and other installation requirements, maintenance requirements and parts. This should include a formalized system risk assessment.

b. Water Supply

The water supply should be from a system which has been subjected to a risk analysis and sampling in accordance with current guidelines for the control and prevention of legionellosis, including HSC ACoP L8.

It should be of potable quality and should run at below 20°C within 2 minutes of turning on the supply.

Water should be taken straight off the incoming mains supply but where a tank is used, it must comply with the Water Regulations. Consideration should be given to avoid any supply that may become stagnant due to insufficient usage due, for example, to over sizing of the tank.

c. Water Treatment

Some humidifiers require water treatment for their good operation. However, even where this is not a requirement for the humidifier, consideration should be given to potential problems caused by water quality such as:

- Calcium carbonate, (which can increase the risk of the development of Legionella. Other problems include scaling of equipment and white spots on glass and other surfaces).
- Suspended solids (problems include shadowing of microbes from UV light, build up of sediment, possible nutrient for bacteria).
- Microbes (can cause slimes and biofilms and blockages as well as increasing the risk of Legionnaires' disease).

Methods of improving water quality for humidification systems include the following:

Reverse Osmosis (removes most dissolved solids and bacteria)
Water Softening (exchanges dissolved solids that cause scale such as calcium)
Filtration (removes suspended solids and organics)
Ultra Violet light (kills bacteria in all water and surfaces it irradiates)
Chemical addition such as Ozone and chlorine dioxide (kills bacteria but care should be given to ensure residual chemical will not cause problems)

Water treatment equipment should be subject to regular inspection and maintenance according to the manufacturers instructions and site Risk Assessment.

d. Installation

A risk assessment of the equipment to be supplied and the use to which it is being put should be undertaken before specifying the component parts of the system. Only competent individuals should carry out risk assessment.

Consideration should be given to the following installation issues:

- The equipment must be accessible for inspection, cleaning and water sampling.
- Multiple power supplies to the equipment should fail safe.
- Where systems have antibacterial systems fitted that are critical to the safe operation of the equipment these should fail safe.
- A failure warning alarm should alert the user of the equipment that there is a fault.

- Drains should be arranged to prevent reflux.
- It should be possible to check that antibacterial systems (such as UV), drain and stagnancy prevention systems are working without disassembly of the equipment.
- Temperatures above 20°C and dirty ambient conditions can greatly increase the risk of contamination. Although the application has had a risk assessment by the installer, should the on-site conditions differ greatly to what was perceived, the installer should communicate to the system provider and the user the need for a further risk assessment.
- Installers of humidification systems should ensure adequate training is provided to the user on how to operate the system safely. This should be through clear instruction manuals and training.
- Upon completion on an installation, the end user must be notified that they should conduct their own risk assessment of the system, which should be included in the site Water System Risk Assessment.

e. Service & Maintenance

Suppliers and installers of humidification systems should ensure as far as possible that users have suitable maintenance arrangements in place. This requirement should be confirmed in writing after the sale and, where a service contract has been taken out with the supplier or installation company, a written notice (see appendix for an example) should be sent to the user of the system to advise them that the current service contract is about to expire.

Users must be made fully aware of the requirements for service and maintenance and a suitably trained person be responsible for routine maintenance and water sampling.

Only competent persons, as defined in the HSE's Code of Practice, should be used to clean and disinfect humidification systems.

The frequency and type of maintenance required will be specified by the manufacturer or installer of the system and must take into account the safe working duration of the systems components such as UV lamps, filters, electrical components etc.

A recommended frequency of cleaning and disinfection of the system will be specified by the manufacturer in the O&M manual. This shall be reviewed by the end user of the equipment on the basis of a risk assessment of the situation of the system in use.

The maximum recommended period between cleaning and disinfection will be no more than six months. This should be subject to site risk assessment and regular water testing.

Systems that generate an aerosol must be tested for Legionella every six months. In certain applications, such as food retailers, it is recommended the same water is also tested for E.Coli and coliform bacteria.

Where systems do not incorporate some of the design features outlined above, or where ambient temperatures exceed 20°C, or where the risk of aerosol inhalation or infection is greater, more regular sampling will be required. These might be using Dipslides for TVC, or more frequent testing for Legionella.

Persons responsible for maintenance should record who the competent persons responsible for maintenance are, water sampling frequency, tests and results, routine maintenance, cleaning and disinfection dates and details, as per the HSC's Code of Practice L8.

f.Risk Assessment and Water Testing

Risk assessments and water sampling must only be carried out by suitably trained, competent individuals. Manufacturers and suppliers of humidifiers should ensure that relevant staff are competent to carry out risk assessments and water sampling, and that staff should not undertake

such services unless they are competent. Records should be kept of training and evaluation of such staff.

Water should be sampled for Legionella bacteria at least every six months, preferably from the reservoir of the humidifier (if an ultrasonic system), or at a representative point in the humidifier otherwise.

Samples should be taken in accordance with the recommendations of the manufacturer of the test, or laboratory carrying out the test. Analysis of Legionella samples should be carried out by a UKAS accredited laboratory, which is part of the PHLS Legionella QAS scheme. Where the presence of Legionella is indicated, a review of the control measures and risk assessment should be carried out and remedial actions, such as disinfection, might be required.

For food-related applications, testing for E.Coli should be carried out in the same way, or using the same method as above or by using other proprietary tests for E.Coli.

Dipslide sampling should be carried out in accordance with the manufacturer of the test's instructions and incubated for 2 days at 30°C. Where TVC exceeds 10^3CFU/ml, a review of the control measures and risk assessment should be carried out and remedial actions, such as disinfection, might be required.

Water samples should be taken from the water in the humidifier at the point where contamination is most likely to occur, or as close as possible. Where this is not practical, a sample might be taken just prior to the humidifier, but after any pre treatment equipment or filters.

3. FURTHER INFORMATION

Additional information on this topic can be obtained from members of the HEVAC Humidity Group. Contact details are available via 0118 940 3416.

Published by the
HEVAC ASSOCIATION

The Building Services Division of
THE FEDERATION OF ENVIRONMENTAL
TRADE ASSOCIATIONS
2 Waltham Court, Milley Lane
Hare Hatch, Reading, Berks RG10 9TH

Telephone No: 0118 940 3416
Fax No: 0118 940 6258
email: info@feta.co.uk
Website: www.feta.co.uk