CODE OF PRACTICE – 2

Atmospheric Steam Humidification Systems (Isothermal)

HEVAC
HEATING | VENTILATION | AIR CONDITIONING

HUMIDITY
CONTROL GROUP

HEVAC Humidity Group
Code of Best Practice

HEVAC Code of Best Practice for the design, installation and maintenance of steam humidification systems of the atmospheric, self-generating type.

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.

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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 4th Edition) (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 self generating, atmospheric steam humidifiers undertake to minimize the risk of harm from the proliferation of harmful microbes that exist in all water systems through good product design, installation and maintenance guidelines. They also undertake to supply products which meet national electrical and gas safety regulations and guidelines, including safety labelling, Low Voltage Directive, Electro-Magnetic Compatibility and Gas Appliance Directive, as appropriate, in compliance with the requirements of CE Marking.

Good product and application design means addressing the psychrometric process to ensure the isothermal principles are followed to allow the moisture to be absorbed within the design parameters. There are external influences that should be addressed which fall into two main categories, namely Product and Application, each of which is further addressed under the categories:

- Water status
- Wet surfaces
- Non-absorbance

A well-designed system will address the product and application issues such as:

- Ensuring the water supply follows manufacturer's recommendation for the type of generator being used (i.e. Electrode boiler, resistance Heater or Gas Fired).
- Avoid dead legs in supply water pipe work.
- Flushing systems that empty a humidifier after use to avoid stagnation.
- Steam pipe work should take account of length of run, ambient temperature, capacity, material, insulation, trapping and condensate removal.
- The steam generator should be sized correctly and applied to prevent condensation on any surface.
- Drain design should take account of water volume and temperature, back-siphoning, insulation and material.
- The power supply should comply with local and national regulations (gas and/or Electric).
- Failsafe building systems, so that failure of a safety system does not expose the user or occupier of the space to risk, and/or provide alarms to warn of failure wherever feasible.
- Build-in alarms to remind users that maintenance is required.
- Design to minimise potential risks caused by incorrect installation.
- Design to minimize maintenance requirements in accordance with manufacturer's recommendations.
- Design Operating and Maintenance manuals to clearly reflect any potential risk to health, created by poor installation or maintenance. It should clearly describe the construction, operation, water supply, condensate drainage, steam distribution, power and control mechanism along with maintenance and parts requirements.

b) Water Supply

Water should be taken straight from the incoming mains supply, but where there is a tank in use, 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.

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

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c) Water Treatment

Some humidifiers can be used with optional water treatment, to enhance their performance. 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, (Can cause scaling of equipment and white spots on glass and other surfaces).
- Acidity/Alkalinity (pH) (can cause foaming or wear of metal parts).
- Chlorine (can attack stainless steel components)
- Silicon (can form an insulated barrier on hot metal surfaces)

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)

Water treatment equipment should be subject to regular inspection and maintenance according to the manufacturer's 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.

- A failure warning alarm should alert the user of the equipment that there is a fault.
- Drains should be arranged to prevent reflux and be installed in accordance with manufacturer's recommendations.
- 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 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 filters, membranes, ,electrical components etc.

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

Steam humidifiers shall take the water temperature to 100 degrees Celsius so the risk of bacteria entering the air supply is minimal. However, it is recommended that risk assessments and water sampling must be carried out by suitably trained, competent individuals. Manufacturers and suppliers of humidification equipment should ensure that relevant staff are competent to carry out risk assessments and water sampling. Records should be kept of training and evaluation of such staff.

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.

Dip slide 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 103CFU/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 pretreatment 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.

Appendix

Legionnaires disease and AI conditioning systems FETA statement

From time to time outbreaks of Legionnaires ' disease in the UK have been associated with air conditioning systems as was the case with the large outbreak in 2002 linked to a leisure complex at Barrow-in-Furness. But it is not an illness uniquely related to air conditioning equipment.

Legionnaires' disease is a rare but serious form of pneumonia and there are about 250 reported cases in the UK each year. It can only be contracted by deeply inhaling tiny droplets of water or aerosols contaminated with legionella bacteria and normally it affects only those who are susceptible to an infection of this kind through age, smoking related illness or immunosuppression. It can be fatal in 10-12% of cases.

Legionella is a naturally occurring bacteria and is harmless to humans except when it is allowed to proliferate in water in a uncontrolled way and then escape into the atmosphere as a concentrated spray or aerosol.

Since certain types of air conditioning systems can use water there is a small risk to public health in the event of poor maintenance or cleanliness allowing the water to become heavily contaminated with bacteria which then escapes into the atmosphere.

Spray humidifiers, air washers and misting systems can be a source of contamination, but it is wet cooling towers and evaporative condensers which form part of some air conditioning and refrigeration systems that potentially present the highest risk.

Cooling towers or evaporative condensers are used to reject heat from medium and large size air conditioning and refrigeration systems because they are more efficient than alternatives and the plant will use less energy.

Legionnaire's disease is not new to the UK. The first major outbreak was at a Staffordshire Hospital in 1985. A public enquiry headed by Sir John Badenock was followed by the publication of 'Guidance for the Control of Legionnaires' Disease' in 1987.

Since then the Health and Safety Executive and other regulatory and professional bodies have regularly updated and published codes of practice and guidance on controlling the risk with the most recent and authoritative being the Health and Safety Commissioning Publication "L8 'Legionnaires' disease – The control of legionella bacteria in water systems" issued in January 2013.

A legal framework exists to prosecute owners, operators and service providers who do not meet their responsibility to minimise the risk of legionellosis. A key requirement is the preparation of a risk assessment and written scheme detailing the control measures. In all cases these need to include a programme of water treatment, maintenance and cleaning of the equipment.

In summary, and despite the recent incident, the instances of an air conditioning system causing cases of Legionnaires ' disease are extremely rare and are always attributable to poor maintenance or lack of cleanliness.

HEVAC/BRA/FETA members have been at the forefront in working with the regulatory authorities to educate owners, plant operators and service providers on how to control the risk of legionellosis thus ensuring air conditioning and refrigeration systems are both efficient and safe.

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