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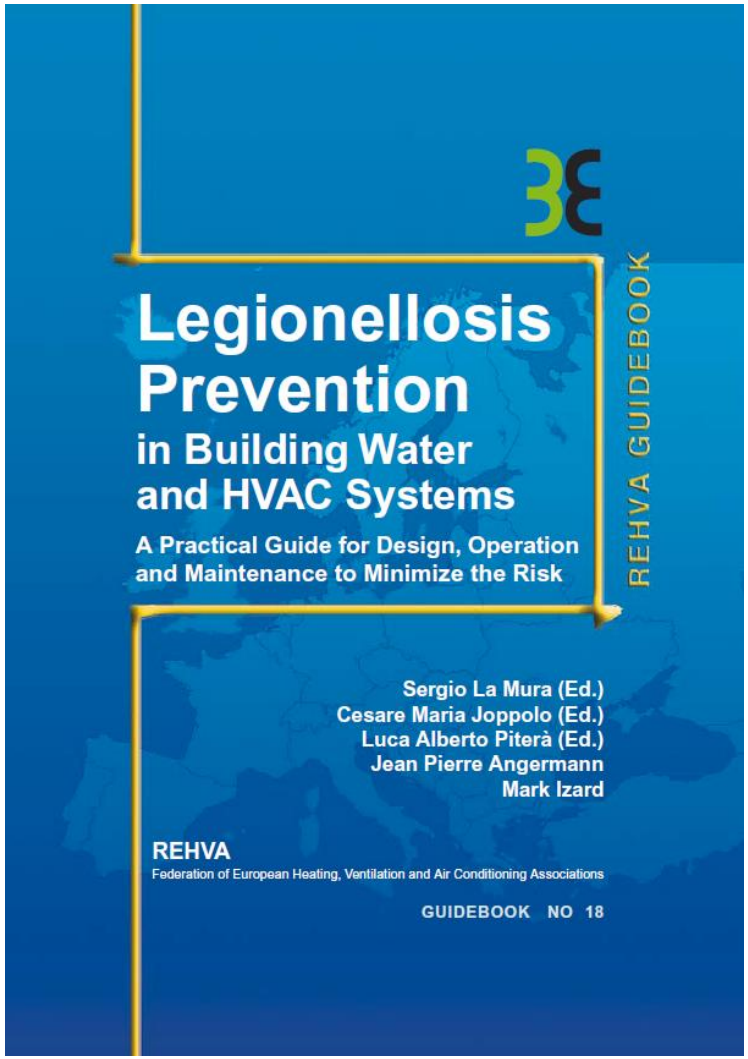
REHVA Guidebook No 18



LEGIONELLOSIS PREVENTION IN BUILDING WATER AND HVAC SYSTEMS:

A Practical Guide for Design, Operation and Maintenance to Minimize the Risk

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Legionellosis Prevention Guidebook

An abundance of literature on the theme of Legionella is available, often edited by interdisciplinary groups but on a medical-biological basis which is certainly understandable, since those are the figures that have to affront any woeful consequences for people in general in the said guidelines.

Often however there are only references to installations in which those are indicated as the origin, or rather as the amplifiers of the development of Legionella, a natural and ubiquitous phenomenon. This literature is in fact lacking in a reference text which covers both in extent and in depth the strictly installation aspects.

Legionellosis Prevention Guidebook

This Guidebook has the role of a practical guide to installation themes at the highest level of risk – themes typical for REHVA, which can be divided into:

•Air conditioning of the air (by water – humidification),

•Production of hot water for washing (fundamentally but not only hot water for washing).

•Evaporative cooling towers.

This Guidebook adopts an articulated structure for each of the three sectors identified above, covering the following four aspects

- Introduction;
- How to design a new installation;
- How to evaluate an existing installation;
- How to effect corrective modifications to an existing installation.

Legionellosis Prevention Guidebook

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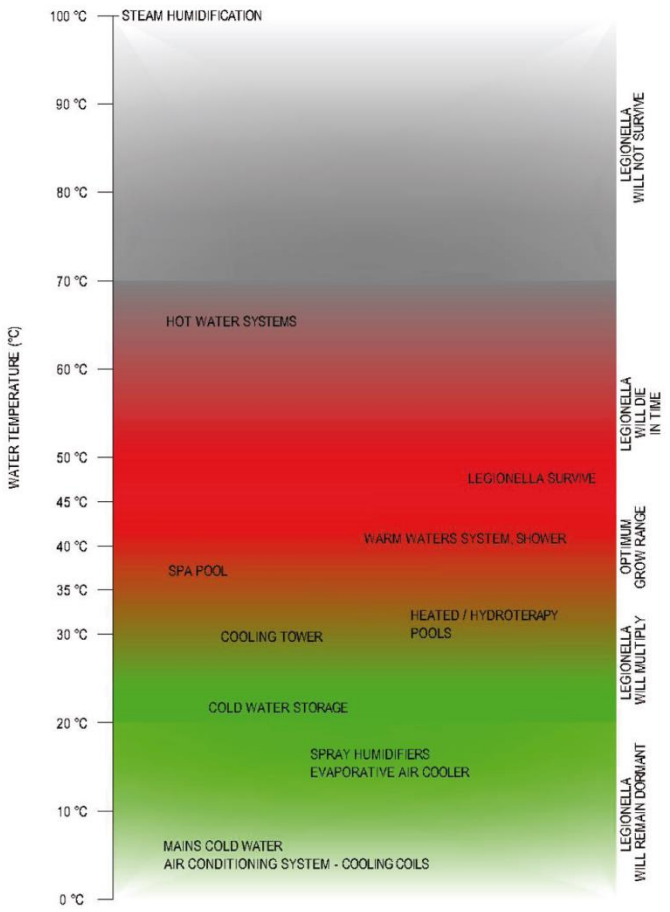
Presence / Proliferation of Legionella



Presence of the bacterium

- Legionella bacterium is present in natural and artificial aquatic environments

Proliferation

The most favourable conditions:

- a water temperature between 20°C and 45°C, where growth of Legionellae is possible;
- stagnation conditions of the water in distribution piping networks and in storage systems;
- presence of scaling and/or sediments inside piping networks;
- presence of nutrients and shields, giving eg. by amoeba and biofilm.

Air conditioning humidification

The influence that humidity has on human comfort has still not been precisely established. Conditions of comfort for people are to be found for humidity values between 30 and 60%

Type of humidification

- Adiabatic humidifier

- Steam humidifiers

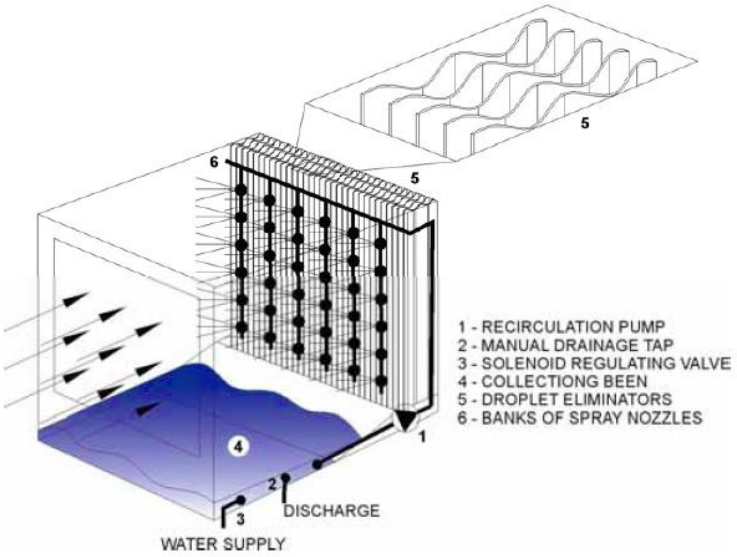


Figure 4.7. *Schematic drawing of an adiabatic washer inserted in an air handling unit.*

Hot and cold potable water hydraulic networks and installations

Situation with risk of proliferation occurs when water remains at rest for a long time (stagnation) at temperatures between 20° and 50°C…..

In

Hot Water Systems for hygienic and washing

But also in

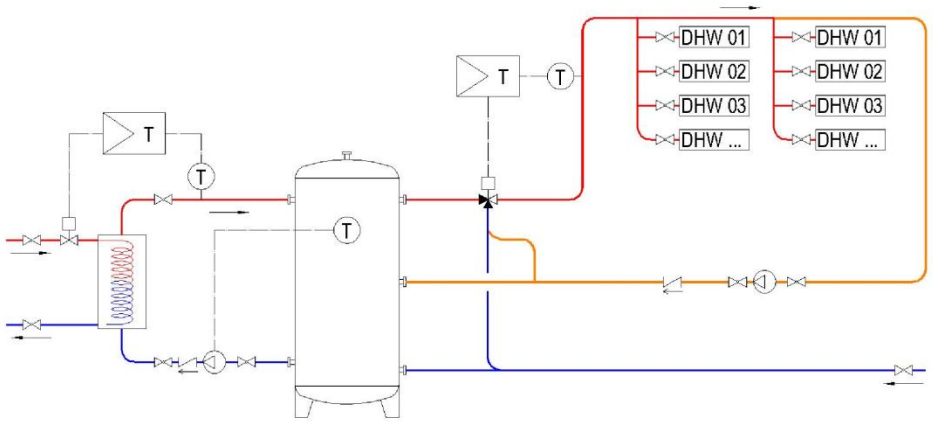
Cold Water

Temperature range above 20°C can, on the other hand, also occur in Cold Water Piping Networks

Hot and cold potable water hydraulic networks and installations

FOCUS on:

- Production of sanitary hot water with storage Tank



- Instantaneous production of sanitary hot water
- Semi-instantaneous production
- Design Expedients
- Description of water treatment techniques

Evaporative cooling towers

Evaporative cooling combines high thermal performance and good cost efficiency through low cooling temperatures which mean containment of energy and water usage, with many applications both for buildings HVAC systems and for industrial processes.

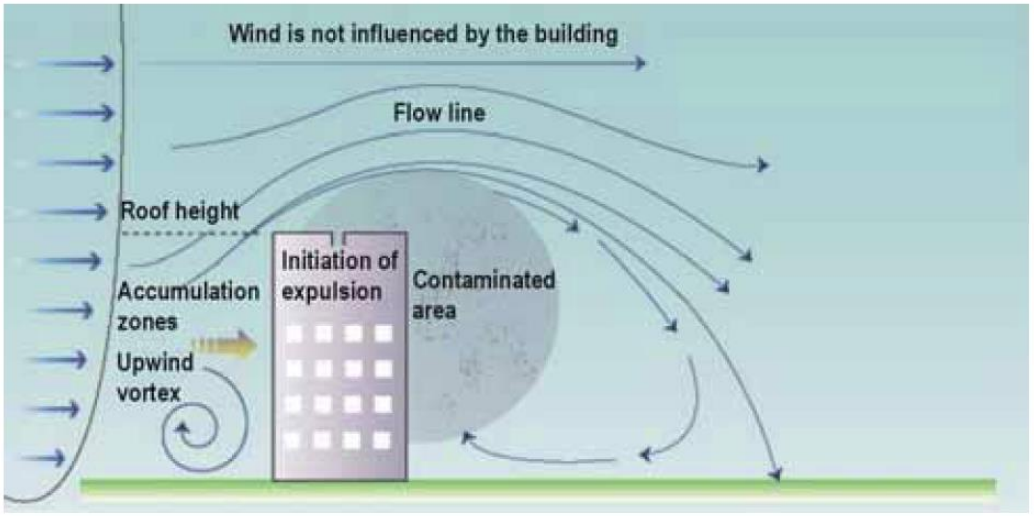


Figure 6.1. *Entrainment risk through windows in the downwind (negative pressure) side of a building with cooling tower over the roof.*

Evaporative cooling towers

FOCUS on:

- Evaporative cooling tower operation;
- Cooling Tower Geometrical Forms and Construction Types
- Design evaporative cooling stowers systems;
- Evaluation existing evaporative cooling stowers systems
- Corrective modifications to existing installations;
- Chemical treatment of the water

Management of operation and maintenance

FOCUS on:

- Conduct a hazard analysis
- Identify critical control points
- Establish critical limits for each critical control point;
- Establish a monitoring plan for critical limits at critical control points
- Establish corrective action for each critical limit
- Establish procedures to document all activities and results

Management of operation and maintenance

Action to be undertaken	Corrective measures to be applied if necessary	Fortnightly	Monthly	Quarterly	Biannually	As required	Regular Hygiene Inspection
EVAPORATIVE AND SPRAY-TYPE HUMIDIFIERS WITH RECIRCULATION							
Inspection to check for absence of contamination, damage, corrosion	Cleaning and any corrective action		X				
Bacteria count in the water of the humidifier	If the *Legionella* bacteria count is > 1.000 CFU/l in the case of, wash with detergent, rinse and dry the tank, disinfect if necessary	X					
Inspection of spray nozzles to check for absence of deposits	Cleaning or replacement of the nozzles		X				
Inspection of and check on the operation of siphons	Cleaning and possible corrective action				X		
Check on the formation of precipitates in the water collecting basin	Clean the basin		X				
Check on the pump and the state of cleanliness of the suction pipe	Clean the pumping circuit		X				
Commissioning with operating test on the bleed-off device	Recalibration of the bleed-off device				X		
Functional test of the conductivity cell	Eventual corrective action		X				
Functional test of the sterilization system	Eventual corrective action		X				
Cleaning of the humidifier in the case of prolonged shut-downs beyond 48 hours						X	
Verify hygiene conditions							X

Thank you for your attention

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