

# Advanced Thermal System Protection

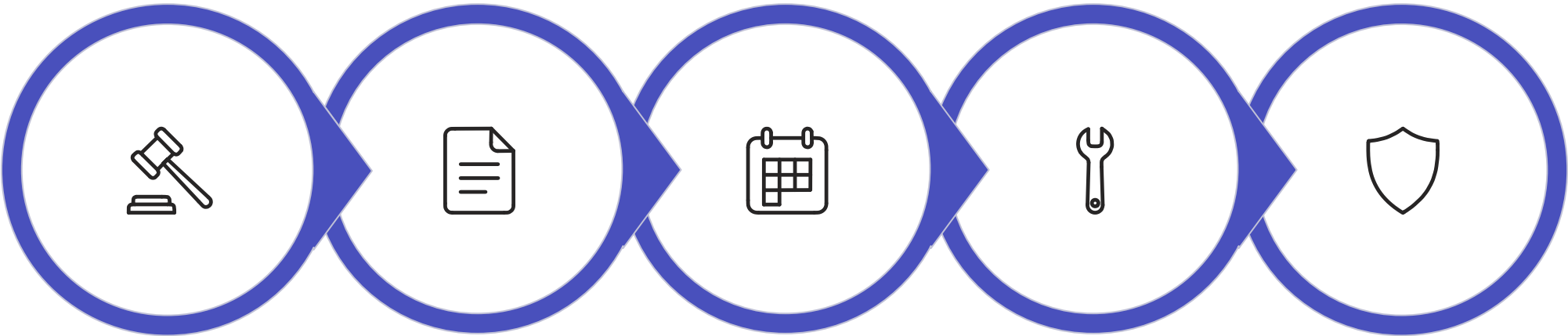
Because the protection of valuable systems requires a scientific approach, not just a chemical one



# The Legal Obligation: DMISE 26/06/2015

Many property owners are unaware that water treatment in heating systems is not an optional choice, but a compelling legal obligation established by the UNI 8065:2019 standard and the Ministerial Decree of June 26, 2015.

The law establishes diversified requirements based on the thermal power of the system, with precise technical specifications that must be met to ensure regulatory compliance and the protection of real estate assets.



Regulatory  
Obligation

UNI  
8065:2019  
Standard

Decree  
26/06/2015

Technical  
Requirements

Property  
Protection

**Systems under 100 kW**

Chemical water conditioning is always mandatory to ensure anticorrosive protection of the metallic elements of the system.

**Systems over 100 kW**

When water hardness exceeds 15°F (French Degrees), the installation of a softening system or equivalent system becomes mandatory by law.

**Technical Note for Prestigious Buildings:** In valuable properties and large residential or commercial complexes, exceeding the 100 kW threshold is the norm, not the exception. Non-compliance exposes the property not only to administrative sanctions but, more importantly, to rapid and costly degradation of real estate assets.

# The Softener Paradox: Mandatory Tolerance

The regulations require reducing water hardness to prevent scale buildup, but simultaneously set unavoidable minimum limits to prevent premature destruction of metallic piping. This delicate balance represents a technical challenge that many systems do not manage correctly.



## Optimal Residual Hardness

For domestic hot water, hardness should never fall below 15°F, ideally maintaining a range between 15°F and 25°F to ensure the protection of metallic surfaces.



## The Risk of Incorrect Calibration

A poorly calibrated or unmaintained softener that brings water to 0°-5°F produces extremely aggressive water, with devastating consequences for the system.



## The Corrosive Effect

This chemical imbalance negatively alters the Langelier Index, triggering galvanic corrosion and pitting processes that perforate heat exchangers and manifolds in extremely short times.



# Mandatory Maintenance: A Regulatory Duty



The UNI 8065 standard makes periodic maintenance of water softeners not an option, but an essential technical-legal obligation. Neglecting these systems transforms them from a protective shield into insidious catalysts for failures. This leads to the premature destruction of systems, unforeseen significant costs, and substantial legal implications.

This entails not only the premature destruction of heat exchangers, boilers, and pipes, but also the exposure of owners to significant legal and financial implications, including costly unforeseen repairs, sanctions for regulatory non-compliance, and service interruptions affecting residents or commercial activities.



## Hygienic Danger

Saturated and improperly regenerated resins become fertile ground for bacterial proliferation, with a risk of Legionella in domestic hot water systems.



## Accelerated Damage

If the corrosion inhibitor dosing system stops, softened water literally becomes "metal hungry", aggressively attacking the internal walls of the pipes with chemical violence.



## Unforeseen Costs

Lack of maintenance leads to sudden failures, early replacement of expensive components, and potential service interruptions with consequent inconvenience for occupants.

# The Italian Regulatory Framework

To operate correctly on water and heating systems, it is essential to follow the strict technical standards imposed by national authorities and standardization bodies. In-depth knowledge of these regulations forms the basis for conscious design and management.

## UNI 8065:2019 – The Reference Standard

This technical standard represents the national reference for water treatment in civil heating systems. It underlines the crucial importance of accurately balancing water hardness to prevent both limescale formation and corrosive phenomena.

- Defines optimal chemical-physical parameters
- Specifies control and maintenance frequencies
- Establishes the responsibilities of the various actors involved



Note for the professional: Excessive softening that reduces hardness below 15°F without adequate chemical stabilization can render the system non-compliant with regulations, with direct responsibility for the facility manager.

## D.M. 174/2004 – Drinking Water Safety

Ministerial Decree 174 of 2004 establishes strict requirements for materials in contact with water intended for human consumption. All treatment systems must comply with these requirements to ensure the potability of the water supplied.

- Certification of materials used
- Testing for substance release
- Compliance with legal limits for heavy metals



# The Langelier Index: The Key to Stability

The conscious design of a heating system must necessarily take into account the chemical balance of the water, quantified through the Langelier Saturation Index (LSI). This parameter predicts the behavior of water with respect to metallic materials.

The Index Formula

$$LSI = pH - pH_s$$

where  $pH_s$  is the saturation pH calculated based on temperature, calcium hardness, alkalinity, and total dissolved solids.



## LSI < 0 (Negative)

Aggressive Water: Tends to dissolve existing calcium carbonate, causing corrosion of metal pipes.

## LSI > 0 (Positive)

Scaling Water: Tends to deposit calcium carbonate, forming limescale on heat exchangers.

1

2

3

## LSI = 0 (Neutral)

Balanced Water: Optimal condition where water is in chemical equilibrium, neither corrosive nor scaling.

The Trap of Aggressive Water: The use of traditional ion exchange water softeners (salt-based) can drastically lower the Langelier Index. A strongly negative LSI value indicates extremely corrosive water that attacks noble metals such as copper, stainless steel, and brass, drastically reducing the lifespan of the system.

## Our Innovative Solution

Our advanced system retains mineral salts and does not alter their crystalline form.

This approach ensures a neutral or slightly positive LSI, preserving the integrity of the pipes and eliminating the corrosive risk.

# Protection of Manufacturer Warranties

An often underestimated aspect by facility managers concerns the warranty conditions imposed by manufacturers of latest generation condensing boilers and heat pumps. The quality of the system's filling water can completely invalidate insurance coverage.



## Contractual Limitations

Many manufacturers of thermal equipment limit or exclude the warranty if the filling water is treated exclusively with traditional salt softeners, without the addition of specific corrosion inhibitors.




## Pitting Risk

The increase in the electrical conductivity of water due to the massive release of sodium ions dramatically accelerates pitting corrosion of stainless steel and copper heat exchangers.



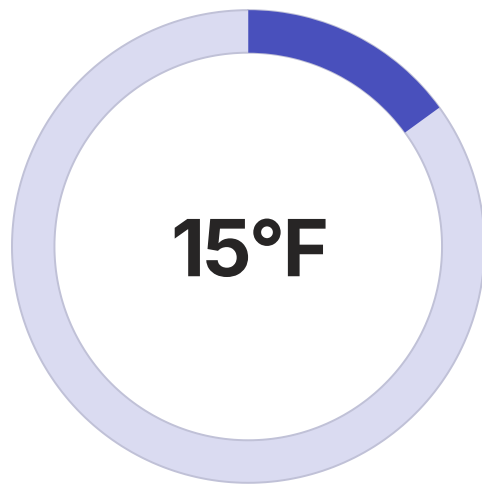
## Technical Documentation

The technical manuals of major European brands (Viessmann, Baxi, Immergas, Vaillant) clearly specify the chemical-physical parameters required in the section dedicated to filling water quality.

 **Recommendation for Designers:** Always consult the manufacturer's technical specifications before choosing the water treatment system. An incorrect choice can lead to the loss of thousands of euros in warranties and direct liability for consequent damages.

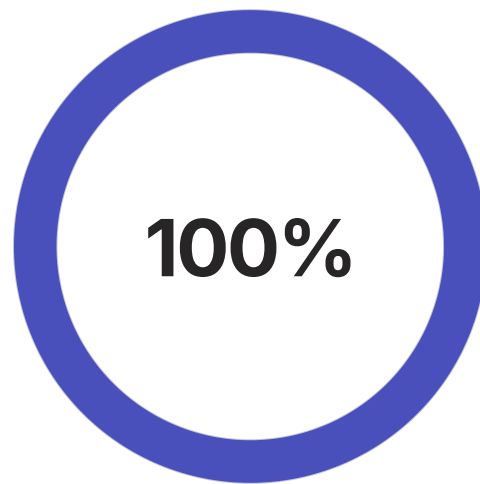
# Scientific Approach to System Protection

Effective protection of valuable thermal systems requires a multidisciplinary approach that integrates knowledge of water chemistry, metallurgy, thermodynamics, and technical regulations. Only through this holistic vision is it possible to guarantee optimal performance, extended lifespan, and legislative compliance.



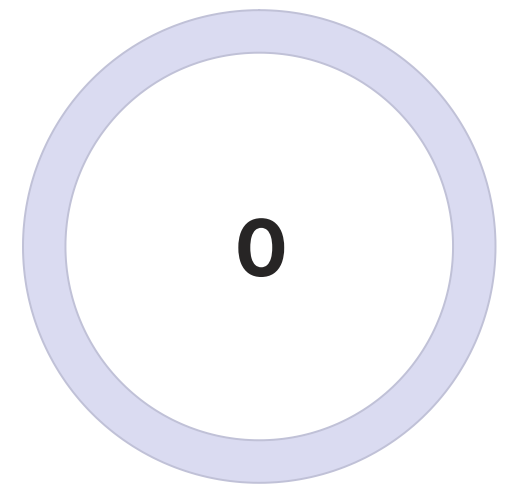
## Minimum Hardness

Safety threshold to prevent corrosion



## Compliance

Adherence to UNI 8065:2019 standards

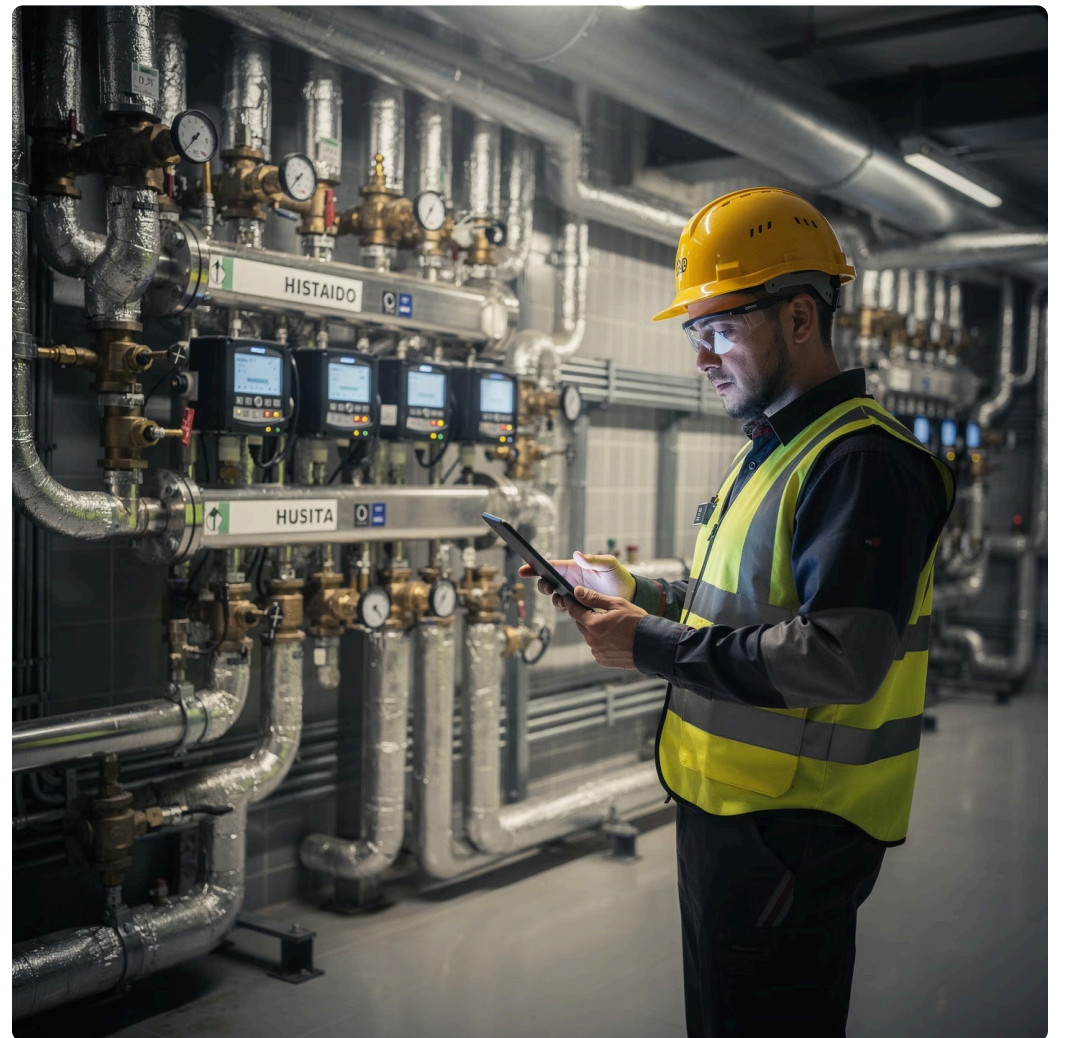


## Optimal LSI

Ideal chemical balance of water

## Advantages of the IWS Scientific Approach

- Complete protection: Prevention of both scaling and corrosion
- Guaranteed compliance: Adherence to all current regulations
- Preserved warranties: Maintenance of manufacturer coverage
- Energy efficiency: Clean heat exchangers = lower consumption
- Extended longevity: Significantly prolonged system lifespan



"True innovation in thermal system management is not about adopting the most expensive technology, but about profoundly understanding the chemical and physical mechanisms that govern the behavior of water and materials, to choose the most appropriate solution for the specific context."