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Nordic Chapter Newsletter

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Espoo's Advanced Building Energy and Indoor Climate Regulations: A Technical Guide for HVAC Professionals

Government Affairs Committee

Espoo's temperate continental climate and rapid urban development have prompted the city council to introduce local amendments to Finland's national RakMK building regulations. Effective January 1, 2025, these measures aim to accelerate the municipality's carbon neutrality target for 2030, elevate indoor environmental quality, and fortify buildings against cold-climate moisture challenges. This guide decodes the new regulatory framework, highlights HVAC design implications, and outlines how ASHRAE Nordic Chapter members can leverage their expertise to influence and implement these reforms.

1. Policy Context and Objectives

Finland's national climate strategy mandates carbon neutrality by 2035 and a 55 percent reduction in greenhouse gas emissions by 2030.

Espoo's amendments align with this roadmap while addressing local priorities:

- Accelerating building-sector decarbonization
- Ensuring healthy indoor environments in multi-family and commercial buildings
- Mitigating hygrothermal risks associated with long, humid winters

ASHRAE PRESIDENTIAL THEME 2025-2026

Bill McQuade has announced his presidential theme, workforce Healthy Buildings: Designing for life. As a part of this theme, ASHRAE has released an Indoor Environmental Quality (IEQ) video series looking at each of the challenges faced within each area under IEQ. These areas include indoor air quality, thermal comfort, water, Legionellosis, IAQ and decarbonization, acoustics, lighting, and measuring and assessing IAQ. See the link below to watch the videos! https://www.ashrae.org/technical-resources/ieq-resources/ieq-resources-videos

Exploring career opportunities with the ASHRAE job board

The ASHRAE Job Board is a premier platform for professionals in the fields of heating, ventilation, air conditioning, and refrigeration (HVAC&R). Whether you are an engineer seeking new opportunities or an employer looking for top talent, the ASHRAE Job Board offers a comprehensive and user-friendly experience. Visit: https://jobs.ashrae.org/

By embedding stricter local thresholds, Espoo enhances national standards to meet municipal sustainability targets without compromising occupant comfort.

2. Scope and Applicability

The new regulations apply to:

- New construction of residential, office, and municipal buildings
- Major renovations exceeding 40 percent of gross heated floor area
- Building extensions that increase conditioned volume by more than 30 percent

All projects must submit an energy and moisture risk assessment at the design phase, followed by a post-construction performance report to the City's Building Supervision Office.

3. Key Performance Metrics

Espoo's thresholds tighten selected RakMK values to drive high-performance outcomes:

Parameter	RakMK 2020	Espoo Amendment
Specific heating demand (kWh/m²·yr)	≤ 50	≤ 35
Primary energy demand (kWh/m²·yr)	≤ 75	≤ 60
Airtightness (n50, h^{-1})	≤ 1.0	≤ 0.5
Heat recovery efficiency (%)	≥ 70	≥ 90
Ventilation rate, residential (L/s·m²)	0.5	0.8
External wall U-value (W/m²·K)	≤ 0.17	≤ 0.13

Design teams must verify airtightness via blower-door testing and record heat recovery performance through certified laboratory tests.

4. HVAC and Ventilation Implications

Adopting higher ventilation rates and heat recovery efficiencies requires precision engineering:

- Select rotary or enthalpy plate heat exchangers certified to ≥ 90 percent total efficiency
- Optimize duct networks for pressure drops < 150 Pa while limiting in-duct noise to < 30 dB(A)
- Implement demand-controlled ventilation (DCV) leveraging CO_2, VOC, and humidity sensors
- Coordinate dynamic simulations of thermal loads, airflow, and acoustics early in design

Early integration of these strategies ensures compliance without oversizing fan power or sacrificing occupant comfort.

5. District Heating, Heat Pumps, and Renewables

Espoo's local amendments incentivize low-carbon heat solutions:

- Mandatory connection to Espoo Energy's district heating network within service areas
- Ground-source and water-source heat pumps with measured COP ≥ 4.2 earn a 7 kWh/m²·yr credit
- Voluntary solar thermal systems covering ≥ 10 percent of annual DHW load count as on-site renewables
- Photovoltaic installations integrated into façades or rooftops receive favorable energy performance weighting

This hybrid approach balances centralized low-carbon heat supply with decentralized renewable contributions.

6. Moisture Control and Indoor Climate

Long winters with freeze-thaw cycles elevate hygrothermal risk:

- Wall and roof assemblies must demonstrate resistance to 200 L/m²·h driving-rain exposure
- Continuous internal moisture monitoring via embedded sensors with dew-point alarms
- Indoor climate classification IDA 2 (per EN 16798-1), mandating operative temperatures of 20 °C–24 °C and RH 30 percent–60 percent
- BMS integration for coordinated control of ventilation, dehumidification, and heat recovery modulation

Adopting these measures ensures durable envelopes and stable indoor conditions throughout the year.

7. Incentives and Support Programs

To offset higher upfront costs, Espoo offers:

- Interest-free municipal loans up to €1 million for deep HVAC upgrades
- Grants covering 35 percent of incremental costs for certified high-efficiency heat recovery units
- Technical consultancy vouchers (€25 000) for third-party energy and moisture audits

These incentives build local contractor capacity in cold-climate HVAC technologies and speed project delivery.

8. Compliance Timeline and Enforcement

The city phases in enforcement to facilitate industry adaptation:

1. Phase I (Jan–Jun 2025): Pilot voluntary compliance; streamlined reporting for < 300 m² projects
2. Phase II (Jul 2025–Dec 2026): Mandatory design submissions; non-compliance triggers warnings
3. Phase III (Jan 2027 onward): Full enforcement with fines up to €250 000 and potential permit revocations

Early engagement with Espoo's Building Supervision Office is critical to avoid construction delays.

9. Role of ASHRAE Nordic Chapter

ASHRAE members can drive best practices and policy refinements by:

- Joining Espoo's biannual Sustainable Buildings Forum
- Contributing technical white papers on cold-climate ventilation and heat recovery
- Hosting collaborative workshops with Aalto University and LUT on hygrothermal simulations
- Advising local policymakers on emerging HVAC technologies and performance metrics

Active participation ensures that Espoo's regulations evolve in step with cutting-edge technical insights.

10. Case Study: Otaniemi Campus Envelope Retrofit

Aalto University's 1980s lecture hall in Otaniemi served as a pilot under Espoo's early voluntary program:

- Upgraded to a balanced ventilation system with a rotary heat exchanger achieving 92 percent total recovery
- Retrofitted façades with ventilated rainscreen cladding and capillary break layers validated under driving-rain tests
- Installed a GSHP system with vertical boreholes and 100 m³ thermal storage, cutting peak electrical demand by 65 percent

The retrofit delivered a 55 percent reduction in primary energy use and stabilized indoor RH within IDA 2 targets.

11. Recommendations for HVAC Practitioners

To excel under Espoo's framework, practitioners should:

- Integrate coupled thermal, airflow, and hygrothermal simulations at the conceptual stage
- Partner with accredited moisture consultants for envelope testing and risk assessment
- Specify factory-tested modular HVAC units to guarantee heat recovery performance and streamline commissioning
- Leverage digital twin tools for continuous performance verification and predictive maintenance

By adopting these strategies, HVAC professionals will deliver sustainable, resilient buildings that align with Espoo's climate ambitions and provide optimal indoor environments.

Espoo's advanced building energy and indoor climate regulations present both rigorous challenges and compelling opportunities. ASHRAE Nordic Chapter members are uniquely positioned to pioneer innovative HVAC solutions, shape future policy refinements, and lead Finland's path toward a carbon-neutral and healthy built environment.

Implementation of BACnet (ASHRAE Standard 135) as a Foundational Layer for Autonomous Building Management Systems

Rikard Strid, ASHRAE Member

Skolfastigheter i Stockholm AB (SISAB), an organization responsible for the management of 600 public schools and preschools in Stockholm, Sweden, recognized the necessity of open systems to mitigate vendor lock-in. This early strategic decision proved instrumental in establishing the structured data environment required for the successful deployment of autonomous artificial intelligence (AI) agents within physical building assets.

SISAB manages a portfolio of 600 educational properties in Stockholm, encompassing a total area of approximately 1.8 million square meters (m^2). These facilities accommodate a daily population of approximately 200,000 individuals.

Prior to this initiative, the organization faced the industry-wide challenge of managing a disparate system park comprising various proprietary control systems. This heterogeneity of technology hindered comprehensive portfolio-level optimization. A strategic decision was made to mandate that all new and existing system communication must adhere to the open standard of BACnet (ASHRAE Standard 135), moving away from siloed, proprietary

solutions. Strategic Implementation: Establishing a Common Protocol

The core objective was to secure long-term control over the building systems. The implementation was guided by three principles:

1. **Data Ownership:** Data generated by the building systems is to be owned by the facility management organization, not the vendor.
2. **System Independence**: The ability to replace individual controllers or sensors without necessitating a complete system replacement.
3. **Standardization**: The establishment of a unified naming convention and network topology.

Standardization on BACnet/IP resulted in a uniform digital infrastructure where all data points (e.g., temperature, fan speed, damper position) are accessed consistently, irrespective of the hardware manufacturer. This structured, consistent data layer is considered critical for the system's scalability and future development.

Transition from Reactive Monitoring to Proactive Management: The Building Management System (BMS)

The initial operational phase involved the deployment of a centralized Building Management System (BMS) platform. This system is fully BACnet-compliant and serves as the central control and visualization interface for the technical building systems. By aggregating millions of data points in real-time, the BMS enabled facility engineers to transition from reactive fault-finding to remote, proactive system diagnostics and oversight.Foundational Layer for Autonomous AI Agents

The subsequent development phase focused on enabling machine-based action on the standardized data set. The architecture utilized the structured data from the BMS to build an AI platform. This platform, developed in partnership with external entities, consumes the consistent data from the BMS for advanced analysis, optimization, and intelligent control.

Scalable implementation of AI in building systems necessitates structured data. An AI model requires unambiguous context to optimize a system; for example, it must distinguish whether a data point represents a classroom temperature or a pump pressure. The consistent data layer provided by the BACnet-compliant infrastructure is the prerequisite for the AI platform's operational effectiveness.

Applications and Future Development of the AI Platform

Current applications of the AI platform include:

- **Real-time Optimization**: The system utilizes internal temperature data (from the BMS) and external weather forecasts to proactively adjust heating curves. This functionality minimizes peak power consumption while maintaining occupant comfort.
- **Predictive Maintenance**: Patterns in actuator movements and other system parameters are analyzed to provide early warnings of potential component failure.

Future development areas for autonomous AI agents include:

- **Self-Correction**: Agents will be developed to cross-correlate anomalous sensor readings (e.g., carbon dioxide) with other data points (e.g., occupancy sensors) to identify and compensate for sensor malfunctions by simulating a "virtual" value until physical replacement is possible.
- **Grid Interaction**: Buildings are envisioned to operate as autonomous agents in the energy

market, buying and selling flexibility based on real-time data from the control systems.

Conclusion

The SISAB case study demonstrates that the successful path toward advanced AI implementation in buildings is contingent not upon algorithm complexity, but upon the establishment of robust, open protocols. By standardizing on BACnet and instituting a clear data structure via the BMS and a subsequent AI layer, the properties have transitioned from passive enclosures to active, data-driven platforms. This approach confirms the fundamental requirement for structured data to enable future autonomous building operations.

System Metrics

- Total Facilities: 600
- Connected Air Handling Units: 3,500
- Connected Heating Systems: 1,500
- Connected Occupancy Temperature and CO2 Sensors: 25,000

Annual Chapter Event, Lund, Sweden

On the 29th of March, the Nordic Chapter will host the ASHRAE President Bill McQuade in Lund, Sweden. During the day we will listen to presentations on indoor environment from several presenters from Lund, Greece, and Denmark. We will have lunch together and there will be an evening event at a restaurant in Lund. More information will come soon regarding schedule, registration information and prices on our homepage and in the next newsletter (January 2026). Book it in your calendar now so you don't miss it!

Upcoming Events

Date	Type of Event	Location	Event
~~Jan~~ Feb 2026	Chapter Meeting	Virtual	Chapter Meeting, will discuss the Presidential visit in April and the Chapter Event in Copenhagen, Webex link TBA
March31, 2026	**Presidential Visit**	**Lund, Sweden**	**ASHRAE President Bill McQuade will visit the Nordic Chapter in Lund, Sweden Social Event, Chapter Meeting, Technical Seminars**
~~16-17 April, 2026~~	~~Chapter Event~~	~~Copenhagen~~	~~Social Event, Chapter Meeting, Technical Seminars~~

ASHRAE Nordic Chapter Summary

ASHRAE Nordic Chapter is a local branch of ASHRAE, a global society founded in 1894. ASHRAE's mission is to advance human well-being through sustainable technology for the built environment. With more than 50,000 members from over 132 nations, ASHRAE is an engineering organization dedicated to advancing the arts and sciences of heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world. The organization contributes to shaping tomorrow's built environment through research, standards writing, publishing, certification, and continuing education. The geographic area covered by ASHRAE Nordic Chapter is Denmark (Faroe Islands and Greenland), Iceland, Norway, Finland (Åland), and Sweden.

Information from ASHRAE

Save the Date! 2026 Topical Conference:

Women in ASHRAE Leadership Symposium,
April 13-14, 2026 Los Angeles, CA
Registration is Now Open!

After a sold-out debut, the Women in ASHRAE Leadership Symposium returns bigger, bolder, and more empowering than ever!

Join us for two full days of connection, inspiration, and leadership growth with women from across the HVACR industry from students and early-career professionals to seasoned veterans. This isn't just for engineers it's for every woman making an impact on the built environment. Whether you're here to build your network, develop your leadership skills, or cheer on the next generation through the Young Women in ASHRAE EmpowerHERment Award competition YOU BELONG HERE! **2026 ASHRAE Building Decarbonization Conference, September 23-25, 2026 Seattle, WA**

YEA Developing Leader Award

- Nominations accepted until **May 1, 2026**.
- Click here to learn more and apply.