



When Winter Hits Hard, Why HVAC Design Still Follows the Data

It has been a colder-than-usual January in Albany, with many nights dropping below zero. That naturally leads to a familiar question: if it gets that cold here, why was the building not designed for it?

The answer lies in how HVAC systems are designed, what the building code requires, and how engineers balance performance, efficiency, and risk. HVAC systems are not sized based on isolated extreme events. Instead, the energy code requires heating and cooling loads to be calculated using recognized engineering methods and approved climate data, most commonly ASHRAE climate data developed in accordance with ASHRAE Standard 183. This climate data for anywhere in the world can be found here: ashrae-meteo.info

These design temperatures are statistical, not predictive. Designers most commonly use the 99.6 percent winter design condition from ASHRAE climate data. See Figure 1 below. This means that, based on decades weather data, the outdoor temperature is warmer than that value (0.1 F for Albany) for 99.6 percent of all hours in a typical year. Only about 0.4 percent of the time does the temperature fall below it. In practical terms, this equates to roughly 35 hours per year colder than the design condition. Those rare extremes are not used to size typical HVAC systems. This approach allows systems to operate efficiently and reliably for nearly all operating hours, while avoiding the long-term efficiency penalties of oversizing equipment to match infrequent weather events.

What the Code Actually Requires

The code does not mandate a specific outdoor design temperature. Instead, it requires, per ECCCNY [§C403.1.1](#): “Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ANSI/ASHRAE/ACCA Standard 183 or by approved equivalent computational procedure.” Arbitrarily choosing colder temperatures without justification is not compliant. Starting with ASHRAE

and then intentionally designing beyond it for a documented reason is. ASHRAE design conditions strike a balance. They ensure reliable performance for nearly all operating hours without the long-term penalties of over design. That balance works well for offices, schools, and most commercial buildings, where brief temperature drift during rare extreme events is acceptable.

What Clients Should Understand

- Systems are intended to meet full design conditions for almost all hours of the year, and short periods outside those conditions are expected.
- Brief deviations from setpoint do not mean the system is undersized or failing.
- When outdoor temperatures fall below the design condition, a typical building may experience minor, temporary temperature drift, often during unoccupied hours. This is an expected and acceptable outcome of designing systems for efficiency rather than rare extremes.

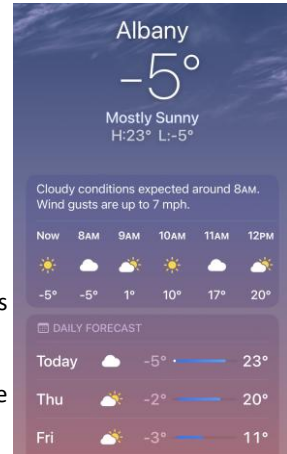
When Designing Beyond ASHRAE Is Appropriate

Some facilities demand more. A 24-hour laboratory makeup air unit with tight temperature and humidity control is a common example. In these spaces, even a small drop in outdoor temperature can disrupt humidity control, pressurization, or research and animal welfare outcomes. For laboratories and vivariums, short-term drift is often unacceptable. In those cases, designing for more extreme conditions, such as -10 F in Albany, is appropriate because the decision is intentional, documented, and driven by the facility's function. Consider adding a note similar to the following in the design documents to satisfy the code official:

Heating loads are based on ASHRAE 99.6 percent winter design conditions per ASHRAE Standard 183. For laboratory makeup air systems requiring continuous temperature and humidity control, heating capacity is extended to -10°F outdoor air to maintain required environmental conditions during extreme cold events.

The Bottom Line

Weather forecasts describe today. ASHRAE climate data describes long-term reality. Good HVAC design understands the difference, follows the code, and makes deliberate decisions when a building's function requires it. That is not over design. That is engineering.





ALBANY INTL, NY, USA (WMO: 725180)

Lat: 42.747N

Lon: 73.799W

Elev: 280

StdP: 14.55

Time zone: -5.00 (NAE)

Period: 1999-2023

Grade: A

WBAN: 14735

Annual Heating, Humidification, and Ventilation Design Conditions

Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB		MCWS/PCWD		WSF		
			99.6%			99%			0.4%		1%				
	99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB		MCWS	PCWD
1	0.1	5.4	-11.1	3.1	2.6	-6.3	4.0	7.4	27.1	22.0	24.6	21.3	7.0	290	0.517

Figure 1 - ASHRAE Climate Data for Albany NY from ashrae-meteo.info



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Mandatory Solar Power in the 2025 NYS Energy Code

The 2025 Energy Conservation Construction Code of New York State now establishes a prescriptive requirement for on-site renewable energy in **any new commercial building over 5,000SF**. This article summarizes the requirement, clarifies what qualifies as on-site renewable energy, and explains the limited code exceptions.

The Baseline Requirement

ECCCNYS Section [C405.15.1](#) states: “Buildings shall be provided with on-site renewable energy generation systems with a direct current nameplate power rating of not less than 0.75 watts per square foot multiplied by the sum of the gross conditioned floor area of all floors, not to exceed the combined gross conditioned floor area of the three largest floors.” This language is **mandatory** and self-executing. On-site renewable energy is the default compliance requirement, **not an optional strategy**. There is no discretionary language allowing substitution by preference or policy.



What Constitutes On-Site Renewable Energy

Although the code does not explicitly list eligible technologies, the structure and metrics of Section C405.15.1 make clear that **solar photovoltaic systems** are the intended and effectively exclusive compliance technology. No performance mapping or equivalency is provided for wind, geothermal, biomass, or renewable thermal systems.

Location of the On-Site System

The code does not require photovoltaic systems to be roof mounted. An on-site renewable energy system may be installed on the roof, on grade, on a canopy, or on an accessory structure, provided the system is physically located within the project site boundary and serves the building. Systems located off the parcel, even if owned by the same entity or located elsewhere on a campus, are not considered on-site and do not satisfy Section C405.15.1.

Off-Site Renewable Energy Is Not Elective

Section C405.15.2 permits off-site renewable energy only if the project qualifies for an exception to Section C405.15.1 or cannot meet the on-site requirement. Off-site renewable energy is therefore a fallback compliance path, not an alternative by choice. Owner preference, budget, security concerns, or agency policy do not create an exception under the Energy Code.

The Four Allowed Exceptions to On-Site Renewables

The Energy Code provides four and only four exceptions to the on-site renewable requirement.

1. Insufficient solar resource. The site receives less than 3.5 kilowatt hours per square meter per day of annual average solar radiation for an unshaded, optimally oriented collector. A readily available source for this data is [NREL PVWatts](#). This exception rarely applies in New York State.
2. Roof functionally unavailable. More than 80 percent of the roof area is permanently obstructed by mechanical equipment, vegetated roofs, required access pathways, or occupied roof areas. This is documented using roof plans and obstruction area calculations.
3. Excessive shading. More than 50 percent of the roof area is shaded by external objects for more than 2,500 hours per year between 8 a.m. and 4 p.m. This requires solar and shading analysis models.
4. Small buildings. Gross conditioned floor area is less than 5,000 square feet. This is documented using architectural area calculations.

These exceptions are technical and measurable. Design choice alone does not justify their use.

What Happens If an Exception Applies

If a project qualifies for any on-site exception, the renewable obligation does not disappear. Instead, off-site renewable energy procurement becomes mandatory under Section C405.15.2, with minimum energy quantities and a 15 year commitment period.

Only if off-site procurement is demonstrated to be infeasible may renewable energy credits be used, and then only at a five times multiplier, reflecting the code's intent that renewable energy credits be a last resort.

Key Takeaways

- On-site solar photovoltaic systems are a baseline requirement in the 2025 NYS Energy Code
- Systems do not have to be roof mounted but must be on the project site
- Off-site renewables are allowed only after proving an on-site exception
- Exceptions are narrow, technical, and require documentation



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What Every MEP Engineer Should Know About Asbestos

Part 2 – Important Asbestos Abatement Concepts from an MEP Perspective

The following items are based on NYS DOL 12 NYCRR Part 56 and highlight the coordination considerations MEP engineers should understand when designing and sequencing work around asbestos-containing materials.

1. Small vs. Large Asbestos Projects

Minor Project: Ten square feet or less of ACM, or twenty-five linear feet (on pipes, ducts, etc) or less.

Small Project: More than ten but less than one hundred sixty square feet of ACM, or more than twenty-five but less than two hundred sixty linear feet.

Large Project: One hundred sixty square feet or more of ACM, or two hundred sixty linear feet or more.

For MEP engineers: All asbestos work, including minor projects, requires regulated controls under NYS DOL 12 NYCRR Part 56. Project size determines the extent of those controls. Minor projects are generally performed within negative-pressure containment; however, for isolated repair activities, the use of a single glovebag may be permitted as a localized containment method. Small and large projects require progressively more extensive containment, HEPA filtration, decontamination systems, and clearance procedures. For MEP engineers, these requirements directly affect access, sequencing, and schedule, and must be coordinated with the licensed asbestos designer's abatement design.

2. Presumed Asbestos-Containing Material (PACM)

Any thermal system insulation (TSI) or suspect material must be treated as asbestos-containing unless analytical testing demonstrates otherwise. Presumption applies regardless of building age.

For MEP engineers: Pipe insulation, boiler and breeching insulation, duct insulation, fireproofing, gaskets, and similar materials must be assumed ACM unless testing confirms they are asbestos-free. Testing must be performed or presumed. Refer to Part 1 of the series in the January 2025 Sage Report for more info.

3. Asbestos-Containing Material (ACM)

Any material confirmed by laboratory analysis to contain more than one percent asbestos.

For MEP engineers: Once confirmed, ACM cannot be disturbed by MEP trades. Even minor actions such as unbolting equipment, pulling wiring, or opening ceilings can legally qualify as asbestos disturbance if ACM is impacted.

4. Trace Asbestos:

Materials containing less than 1% asbestos by weight.

For MEP engineers: Even if the material is < 1%, and does not trigger a full NYS DOL Part 56 abatement project, any work that disturbs it must comply with OSHA 29 CFR 1926.1101. Always consult with the Licensed Asbestos Project Designer about these impacts.

4. Licensed Asbestos Inspector

The licensed professional responsible for surveys, identification of suspect materials, and bulk sampling.

For MEP engineers: A general building survey is rarely sufficient. If the survey does not include the exact piping, ductwork, equipment, and spaces affected by the MEP scope, it does not protect the project. Engineers should confirm survey limits early and request targeted sampling where needed.

5. Licensed Asbestos Project Designer

The licensed professional responsible for designing asbestos abatement, including containment, decontamination, sequencing, and work practices. The licensed asbestos designer must work for a firm with an asbestos handling license.

For MEP engineers: MEP engineers are not asbestos designers unless separately licensed. Abatement design must be performed by a licensed asbestos designer and coordinated into the MEP drawings and specifications. Including abatement direction in MEP drawings is not allowed by governing authorities and subjects MEP designers to uninsurable risk.

6. Licensed Asbestos Handler

Individuals authorized to physically remove, disturb, encapsulate, or otherwise handle asbestos materials.

For MEP engineers: If a task requires asbestos to be cut, removed, or even peeled back, licensed asbestos handlers must perform that portion of the work. MEP trades may only proceed after abatement and clearance.

7. Allied Trade Certification

Certified allied trades may remove asbestos-containing materials that are integral to their specific task, including asbestos-insulated wiring, gaskets, rope seals, and boiler refractory, only when working under the control and supervision of a licensed asbestos abatement contractor and in accordance with approved work practices. Removal of other ACM requires licensed asbestos abatement and clearance. Drawings and specifications must clearly define limits of work and sequencing.

For MEP engineers: This is an important consideration because many mechanical and electrical systems cannot be safely or practically dismantled by basic asbestos handlers alone. Certified allied trades may be required to disconnect, dismantle, or remove equipment and associated ACM

8. Containment and HEPA Filtration

Containment is the sealed, negative-pressure enclosure used during abatement. HEPA-filtered air machines maintain airflow into the enclosure and prevent fiber migration. The photo at the top of this page shows a typical containment enclosure.

For MEP engineers: Containment blocks access, alters airflow, and can interfere with existing HVAC systems. HEPA exhaust paths must be coordinated to avoid re-entrainment into occupied areas or building intakes. Setting up and preparing the containment enclosure is typically the most time-consuming part of the abatement process.





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What's wrong with this picture?



This is condensate piping serving **condensing boilers**. At first glance, this looks neat, orderly, and professionally installed. Copper piping. Clean joints. Neutralizers in place. Everything supported and accessible. If you walked past this in a boiler room, nothing would immediately jump out as a problem. But there is a real issue here, and it is one that will not show up on day one.

The Hidden Problem

Condensing boilers produce acidic condensate as a direct result of flue gas condensation. That condensate has a low pH and is chemically aggressive. Copper does not tolerate that environment over time. The copper piping shown between the boiler outlet and the condensate neutralizer will slowly corrode from the inside out. This does not happen dramatically. It happens quietly. First discoloration, then pitting, then pinhole leaks. Months to a few years later, there is water on the floor and no one remembers why.

How This Happens

The project specifications include a general requirement for “condensate drain piping” to be copper. That language is standard and appropriate for **cooling coil condensate**, which is essentially clean water. What the specifications do not do is differentiate between cooling coil condensate and condensing boiler flue gas condensate. The correct material selection here is not subjective. It is clearly addressed in the **boiler installation and operation manual (IOM)**. Manufacturer requirements exist for a reason, and condensate chemistry is one of them.

What Should Have Been Done

For any major piece of equipment, especially boilers, chillers, and similar systems, the manufacturer's installation manual must be treated as a primary design document. The boiler installation and operation manual (IOM) typically lists **PVC, CPVC, or polypropylene** as acceptable materials for acidic condensate. Those materials meet the manufacturer's minimum requirements and are commonly used in many applications.

For **State projects**, however, minimum compliance is not always the right benchmark. These facilities are expected to operate for decades. Maintenance practices vary. Condensate piping often runs along the floor, where it can be stepped on, bumped, or damaged during routine work. In those conditions, **stainless steel piping with press fittings, such as Viega ProPress, may be warranted** to provide added durability and resistance to both chemical attack and physical abuse.

There is also a strong case for keeping **all boiler condensate piping the same material**, upstream and downstream of the neutralizer. If a neutralizer runs out of limestone due to lack of maintenance, acidic condensate will continue downstream. A uniform, acid-resistant piping system avoids relying on perfect maintenance to prevent failure.

The Takeaway

Always read the installation manual. Good design means more than following a generic piping schedule. It means ensuring the drawings reflect manufacturer requirements, expected operating conditions, and how the system will actually be used and maintained over time.



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UPCOMING LIVE WEBINARS AND SEMINARS

This month's lists of free live webinars and seminars are below. Each offers at least one PDH and qualifies as a *Course of Learning* – a format that includes traditional classroom-style courses or live webinars with real-time interaction with an instructor. As a reminder, New York State requires that 18 of the 36 total continuing education hours for professional engineers be completed through *Courses of Learning*.

All webinars listed below are free. The ASHRAE and ASPE meetings are in-person and have a cost of \$50 reimbursed by Sage for Sage employees.

Date	Event Name	Host / Organization	Time (ET)	Registration
February 3	Beyond Bond Strength: The Effect of Moisture	Hilti	12:00 PM	Register here
February 4	Professional Ethics for Engineers	NoonPi	12:00 PM	Register here
February 10	Anchoring Principles & Design	Hilti	12:00 PM	Register here
February 17	How to Address Data Center Designs with Low-GWP Refrigerants	Consulting-Specifying Engineer	2:00 PM	Register here
February 18	Retaining Wall Failures and How to Prevent Them	NoonPi	12:00 PM	Register here
February 19	A Survey of Hydronic Zoning Methods	Caleffi North America	1:00 PM	Register here
February 24	Fundamentals of Anchorage to Masonry	Hilti	12:00 PM	Register here
February 24	Specifying for Safety: Emergency Eyewash & Shower Equipment	Ron Blank & Assoc.	12:00 PM	Register here
February 24	Energy Conservation Applications and Design Considerations	ASHRAE Northeast Chapter	12:00 PM	Register here
February 26	Firestop: A Life Safety Issue	Hilti	12:00 PM	Register here
February 26	Firestop Special Inspections: What to Expect and How to Prepare	Ron Blank & Assoc.	12:00 PM	Register here
February 26	Critical Power: Optimizing On-Site Generators and Battery Storage	Consulting-Specifying Engineer	2:00 PM	Register here
February 19	Siphonic Roof Drains (In-Person Lunch Meeting)	ASPE Capital Region NY	11:30 AM	Register here





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February 2026

Provide CCTV and CPAS Marcy Correctional Facility, Marcy, NY

Sage Engineering has held two Office of General Services security term contracts, supporting a rapidly expanding portfolio of correctional facility security projects across New York State. The Marcy Correctional Facility project marked a major milestone for Sage as our first assignment encompassing an entire prison campus. Since then, these projects have become a major State priority, further reinforced by the recently passed [omnibus](#) legislation emphasizing staff safety, monitoring, and facility-wide security improvements.

Bid in 2025 and currently under construction, the Marcy Correctional Facility project is scheduled for completion in 2027 and carries a total construction cost of approximately \$24 million. The scope includes a comprehensive, facility-wide Closed-Circuit Television (CCTV) system with integrated audio monitoring, along with a Civilian Personal Alarm System (CPAS) designed to meet DOCCS standards and operational requirements.

The Marcy Correctional Facility includes nearly 30 buildings spanning housing, programs, medical, food service, maintenance, admin, laundry/commissary, special housing units, residential mental health housing and classrooms, processing, and indoor and outdoor recreation areas. The design provides a modern IP-based CCTV system including video and audio monitoring throughout all accessible interior and exterior areas, with appropriate exclusions for incarcerated individual bunks, toilet stalls, and shower areas. In total, the system includes approximately 2,049 cameras, a scale that has since become typical for Sage's full-facility correctional security projects.

All cameras and microphones are connected via a dedicated, stand-alone internal network and routed through building-level Electronic Equipment Racks (EERs) back to a centralized monitoring console (CMC) in the Administration Building. Video and audio are recorded continuously with a minimum 30-day retention period, which may be upgraded to 60 days as that is the current standard. That translates to approximately 1 terabyte of storage per camera, or more than 2 petabytes (2000TB) of total system storage, underscoring the size and complexity of the digital infrastructure required to support modern correctional surveillance.

The CPAS is a critical component of the project provided throughout interior and exterior areas where civilian staff may interact with incarcerated individuals. Portable transmitters allow staff to initiate alarms that are immediately displayed at the main officer desk in the Admin building, identifying the location of the staff member in distress and enabling rapid response.

For Marcy, Sage led overall project management, MEP design, CPAS design, infrastructure design, and system integration, with Cass Associates assisting with detailed security CCTV system design. That collaborative effort helped establish the technical and organizational framework that Sage has since refined and expanded on subsequent projects. Building on Marcy, Sage now delivers full security system design in-house for similar projects, supported by a trusted consultant team that includes Azar Design Co. for architectural services, Patriot Design for mechanical systems supporting Electronic Equipment Rooms and monitoring spaces, and Jade Stone Engineering for electrical power distribution. This team structure allows Sage to efficiently deliver large, complex projects while also meeting SDVOB and MWBE participation goals established under State contracts.

Sage has also developed an efficient, repeatable design process using standardized Revit templates, custom Revit families, and trained staff proficient in camera layout and security design software. This approach has improved coordination, increased design efficiency, and increased consistency across facilities with similar scale and complexity.

Following Marcy, Sage is currently in design for full-facility security upgrades at Five Points, Greene, and Upstate Correctional Facilities, and has recently been assigned additional projects at Hale Creek, Wallkill, Cape Vincent, and Ulster Correctional Facilities. Each of these projects includes a similar (or greater – 3229 in the case of Five Points) camera count and construction budget exceeding \$30 million, reflecting both the scale of the challenge and the growing role Sage plays in supporting statewide correctional security initiatives.

