



The Sage Report

A Monthly Newsletter of Insights, Projects, and Productivity

Myth vs Reality: MEP Systems in the Movies

Hollywood has given us unforgettable action scenes that take place inside buildings, but the way movies portray HVAC, plumbing, elevators, and fire protection often ignores how these systems actually work. For fun and education, here is a look at several common movie myths and the real MEP world behind them.

The HVAC Myth: Buildings as Giant Crawl Spaces

In movies, heroes routinely escape danger by **crawling through air ducts**. In reality, supply and return ducts are made of thin sheet metal, have sharp edges, screws, insulation, turning vanes, dampers, and are not designed to carry the weight of a person.

Another misconception is the idea that a villain can **release a gas into the HVAC system** and have it reach every room at the same time. Air distribution is divided into zones and filtered. Many systems recirculate only within their zone, and outside air or exhaust systems further dilute contaminants. Uniform building-wide distribution is not simple and would require intentional design and specialized equipment.

Plumbing Reality: No One is Walking Through Sewers

Movies often show characters **climbing into a sewer** through a bathroom floor drain or toilet and walking upright to another location. Building sanitary lines are only a few inches in diameter and contain waste, grease, and solids. Only municipal sewer tunnels and storm systems have human access, and those conditions are hazardous, dirty, and never as spacious as shown on screen.

Elevators: Not Escape Hatches

A favorite escape trick in films is **opening the top hatch of an elevator** from inside the cab and climbing upward into the shaft. In real buildings, the ceiling hatch is locked and cannot be opened from inside the elevator. Codes require hatches to be secured to prevent unsafe entry into the hoist way. Elevator shafts contain moving equipment, counterweights, and limited clearance. It is not a safe escape route.

Fire Protection Myths: Sprinklers and Alarms

Few movie myths are more persistent than the sprinkler system legend. Films show a candle flame, gunshot, or cigarette lighter setting off sprinklers throughout an entire building. In reality:

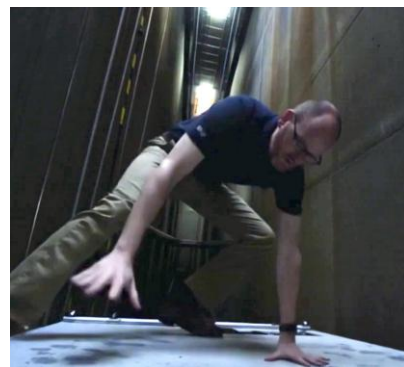
- A sprinkler activates only when the heat-sensitive element at that specific head reaches its rated temperature. Smoke alone does not activate sprinklers.
- **If one sprinkler operates, only that head flows water.** Systems open head by head unless it is a special hazard deluge system, which is used for industrial high-risk areas such as aircraft hangars or chemical facilities.
- **Pulling a fire alarm station does not release water.** It notifies occupants, signals the fire alarm panel, and may trigger selected life safety sequences such as door release or elevator recall. Water flows only when a sprinkler head opens or a system valve is activated.

Sage Corner

Welcome Joel John to Sage

Join us in welcoming **Joel John** to Sage as a **Junior Accountant**. Joel brings several years of accounting experience, most recently with The Bonadio Group in Albany, where he worked on financial reporting, payroll processing, and audit support.

He earned his B.B.A. in Accounting from Queens College and is certified in Google Project Management. Joel is sitting in the office next to Tina. Welcome aboard, Joel!



Simulated Situations – No engineers were endangered in the scenes above





Lesson Learned - Insulating Cold Water Piping

Proper insulation of chilled water, cold domestic water, and dual-temperature systems is essential for condensation control, energy efficiency, and long-term reliability. Field issues often arise not from material selection, but from how insulation systems are installed and sealed.

Fundamental Difference from Hot Water Insulation

Hot and heating hot water systems are insulated primarily to **reduce heat loss** and for **personnel protection**. Moisture is not a concern, so a vapor barrier is optional. Cold and chilled water systems, however, must be insulated to **prevent condensation**. This requires a **continuous, airtight vapor barrier** that keeps humid air from reaching the pipe surface. Any gap, tear, or puncture in that barrier allows condensation to form, leading to dripping, corrosion, or mold.

Fiberglass vs. Elastomeric (Armaflex-Type) Insulation

Both fiberglass and closed-cell elastomeric insulation can perform well when installed correctly:

Fiberglass insulation (see Figure 1) is acceptable for cold systems only when it includes a properly sealed vapor barrier jacket, such as ASJ+ or PVC jacketing. Seams must be overlapped, taped, and sealed with vapor-barrier mastic to prevent air infiltration. Even a small unsealed area can cause the insulation to become saturated over time.

Elastomeric insulation (e.g., Armaflex) has a closed-cell structure that provides an **integral vapor barrier** (see Figure 2). However, it is not foolproof. All seams, joints, and terminations must be sealed using the manufacturer's adhesive to maintain vapor integrity. Poorly glued seams or exposed edges can cause the same failures seen with fiberglass systems.

Equipment and Component Insulation

Heat exchangers, pump casings, strainers, and other components connected to chilled or cold water should also be insulated. Armaflex sheet material or pre-formed sections can be used effectively on irregular surfaces to maintain vapor continuity.

Where maintenance access is required such as **valves, unions, gauges, and strainers** consider using **removable insulation jackets** (e.g., [ValveWraps](#)). These jackets provide condensation protection while allowing access without cutting and re-sealing insulation, preserving vapor barrier integrity and reducing long-term maintenance costs.

Dual-Temperature (Two-Pipe) Systems

In dual-temperature systems that carry hot water in winter and chilled water in summer, insulation must meet the greater of the two design requirements: **Thickness** should satisfy the heating system's energy-efficiency requirements (per ASHRAE 90.1 or energy code).

Vapor barrier performance must meet chilled-water standards to prevent condensation when the system operates at low temperature.

This hybrid approach ensures proper performance year-round and is often overlooked in design and installation.

Installation Best Practices

- Seal all joints, seams, and terminations with manufacturer-approved adhesives or tapes.
- Insulate hangers and supports using vapor-barrier isolators to prevent cold bridges.
- Do not compress insulation. maintain full thickness.
- Coordinate insulation terminations with removable covers for serviceable components.
- Protect exposed insulation from UV and mechanical damage.

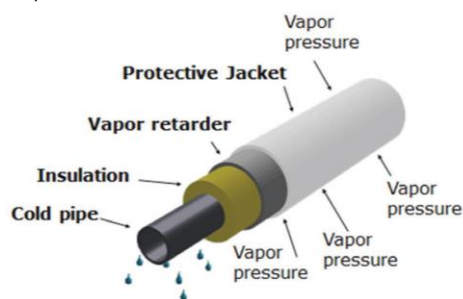


Figure 1 - Fiberglass Pipe Insulation



Figure 2 - Armacell Pipe Insulation



Figure 3 – No Sweat Valve Wraps



Firestopping and UL Systems - What Those Numbers Really Mean

Every firestop system that carries a **UL System Number** has been independently tested by Underwriters Laboratories (UL) or another nationally recognized testing laboratory. The manufacturer submits a complete assembly, specific materials, annular space, and installation method to UL for full-scale fire testing. If it passes, UL assigns it a unique identification number, such as UL System W-L-5029.

That number belongs only to the manufacturer that developed and tested it.

For example, UL System W-L-5029 is Hilti's proprietary listing. No other manufacturer may use that number.

Each system identifier is manufacturer-specific and never duplicated. If STI or 3M offer an equivalent tested configuration, it will have its own UL number with its own data sheet, fire ratings, and installation method.

A UL number represents a tested system, not a product. Each UL data sheet defines:

- The wall or floor assembly type and thickness
- The penetrating item (metal pipe, conduit, cable tray, etc.)
- The exact firestop materials tested (sealants, wraps, collars, or pillows)
- The required annular space, sealant depth, and F/T ratings
- The installation method verified by UL testing

Finding the Right System

Firestop systems are selected by matching the construction and penetration type to a tested configuration. Each manufacturer maintains a searchable UL database. A few are below:

STI Inc. [Firestop System Search & Submittals](#)

Hilti USA: [HCP System Selection Tool](#)

3M: [Fire Stop System Selector & Submittal Wizard](#)

Designers and contractors can filter by wall or floor type, penetrating material, and required fire rating. Each listing includes a UL data sheet and often a CAD detail that can be linked directly into construction drawings. In Design Documents reference specific systems as "UL System W-L-5029 (Hilti) or equal".

When Special Inspections Are Required

Special inspections of firestopping are **not** required on every project. Under BCNYS §1705.18, inspections apply only to:

- High-rise buildings
- Risk Category III or IV structures
- Group R fire areas with an occupant load over 250

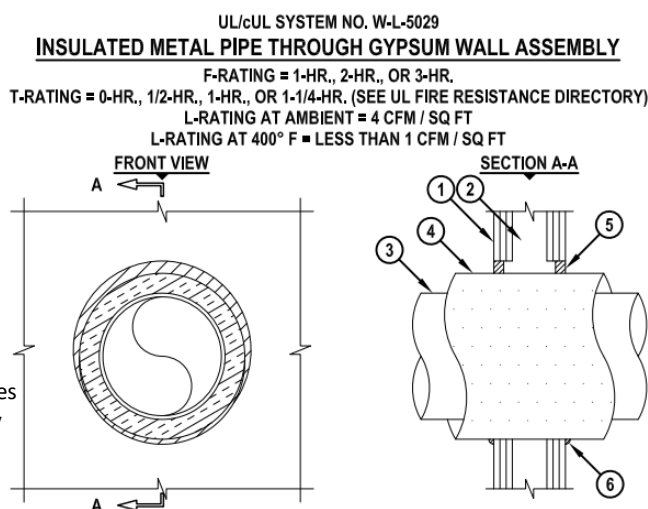
When required, inspections must follow ASTM E2174 (for penetration firestops) and ASTM E2393 (for joint systems and perimeter fire containment). These inspections are performed by an approved agency; a qualified third-party special inspection firm designated by the owner or design professional. Specifically:

BCNYS § 1705.18: "In high-rise buildings, in buildings assigned to Risk Category III or IV, or in fire areas containing Group R occupancies with an occupant load greater than 250, special inspections for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire containment systems that are tested and listed in accordance with Sections 714.4.1.2, 714.5.1.2 (penetrations)...shall be in accordance with Section 1705.18.1..."

BCNYS § 1705.18.1 "Penetration firestops. Inspections of penetration firestop systems that are tested and listed in accordance with Sections 714.4.1.2 and 714.5.1.2 shall be conducted by an approved agency in accordance with ASTM E2174."

In a Nutshell

- UL system numbers are unique to each manufacturer.
- The UL data sheet is the controlling document, follow it exactly.
- Use manufacturer websites to identify compliant systems and obtain CAD details.
- Design drawings should reference UL systems "or equal."
- Firestop submittals must include a complete schedule and UL data sheets.
- Special inspections (§1705.18) apply only to high-rise, Risk Category III/IV, or large residential buildings, performed by an approved agency.





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UPCOMING LIVE WEBINARS – November 2025

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*.

Date	Event Name	Host / Organization	Time (ET)	Registration
November 10	Approaches to Integrating Smart Digital Systems into Switchgear Design	Consulting-Specifying Engineer	2:00 PM	Register Link
November 11	What Electrical Engineers Need to Know About 2026 NEC Updates	Consulting-Specifying Engineer	2:00 PM	Register Link
November 11	Steam Optimization: The Overlooked Key to Energy Goals	Spirax Sarco	11:00 AM	Register Link
November 12	Advanced Condensing Solutions: Design Strategies for Ultra-Efficient Water Heaters and Boilers	NoonPi	12:00 PM	Register Link
November 13	Optimizing Air Compressor Efficiency with Variable Speed Drives	Compressed Air Best Practices	2:00 PM	Register Link
November 13	Accelerated Design Reviews for Architects	Bluebeam	11:00 AM	Register Link
November 17	Inside Aspirating Smoke Detection (ASD): What's Changing, What's Next, and Why It Matters	Consulting-Specifying Engineer	3:00 PM	Register Link
November 18	Breakthroughs in Hot Water Coil Heat Exchange	Price Industries	12:00 PM	Register Link
November 19	Addressing Grid Challenges in the AI Era	Consulting-Specifying Engineer	2:00 PM	Register Link
November 19	HVAC Design for a Sustainable Lab Digital Conference	Lab Design News	Multiple	Conference Registration
November 20	Working Toward Decarbonization in the HVAC Industry	Consulting-Specifying Engineer	2:00 PM	Register Link
November 20	Beyond the Field: Engineering Complete Comfort Systems for Sports Venues	Schwank	11:30 AM	Register Link
November 20	Under Pressure: Tricky PRV Projects	Celeffi	1:00 PM	Register Link

UPCOMING LOCAL SEMINARS – November 2025

Date	Event Name	Host / Organization	Time (ET)	Registration	Fee
November 14	Wastewater Energy Transfer	AEE Capital Region	11:30 AM	Register Link	\$35
November 18	Liquid Desiccants on DOAS Units	ASHRAE Northeast Chapter	12:00 PM	Register Link	\$50
November 20	Changes: New 2025 NYS Plumbing Code & 2024 NFPA 99 Standard	ASPE Capital Region	11:30 AM	Register Link	\$50

Sage will reimburse employees for the above seminars.



Replace Boiler, Various Powerhouse Equipment

Sage Team: Dan Breen, Marcus, Dave, Brandon, Mike, Luke B **Bedford Hills Correctional, Bedford Hills, NY**

Sage Engineering Associates is leading a comprehensive modernization of the Bedford Hills Correctional Facility central heating plant, which provides steam and domestic hot water for both the Bedford Hills and Taconic Correctional Facilities. The project replaces aging equipment with new high-efficiency systems, upgrades all plant controls, and integrates state-of-the-art monitoring through a new SCADA platform.

The existing heating plant includes four boilers with a total installed capacity of 2,500 boiler horsepower. These include one 300 HP Cleaver-Brooks firetube boiler, two 600 HP Cleaver-Brooks firetube boilers, and one 1,000 HP Babcock & Wilcox watertube boiler. Together, the plant serves the full heating and hot water needs of both facilities. As part of this modernization, one of the 600 HP firetube boilers will be replaced with a Cleaver-Brooks CBLE low-NOx dual-fuel boiler rated for 100 psig operation.

The project also includes a complete upgrade of the combustion and boiler control systems across the entire plant. The controls retrofit will use a single-vendor platform. Fireye Nexus, Preferred Instruments, or Cleaver-Brooks Hawk 4000, have been included as the basis of design options. The new system will provide burner management, combustion control, boiler sequencing, oxygen trim, alarm handling, trending, and full integration into a central SCADA system. Operators will be able to monitor and control the plant through a touchscreen workstation located in the control room, with remote alarm notification and data logging capability.

A new feedwater system will be installed, consisting of a packaged horizontal spray-type deaerator and surge tank assembly with stainless-steel wetted components, VFD-driven transfer and boiler feed pumps, and a factory-integrated control panel with local touchscreen display. The system will provide reliable feedwater at consistent temperature and pressure, improving boiler performance and longevity.

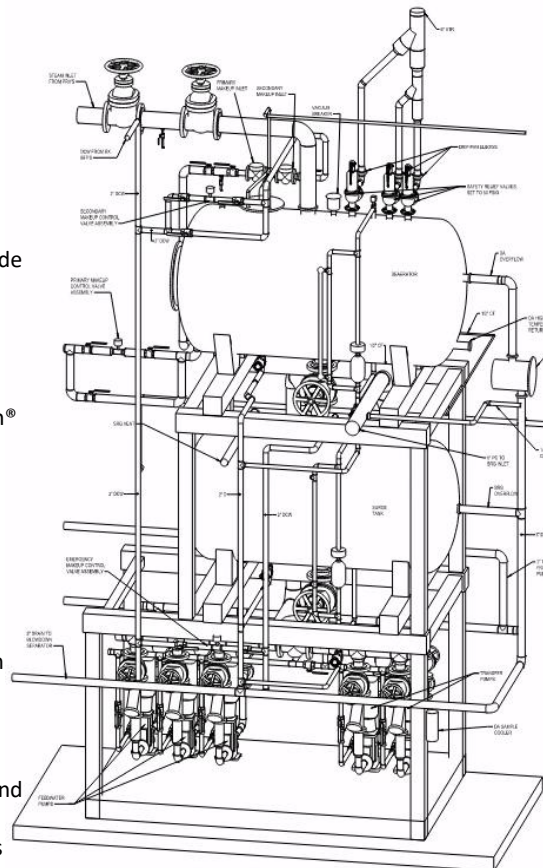
Domestic hot water production for both facilities will be consolidated into a central horizontal shell-and-tube steam-to-water system manufactured by Armstrong International. The modular Flo-Rite assembly, equipped with Brain® electronic mixing valves, maintains outlet temperature within ± 2 percent of setpoint and includes redundant controls, strainers, and safety devices. This system has been successfully applied by Sage Engineering at multiple correctional facilities across New York State.

Additional plant upgrades include a new variable-speed combustion air handling unit interlocked with the boilers to maintain proper airflow, a complete chemical treatment system with conductivity-based control, and a blowdown heat recovery unit that captures waste heat from boiler blowdown to preheat incoming makeup water.

The entire plant was modeled in Autodesk Revit. A temporary 800 HP mobile steam boiler will provide continuous service during construction to allow the work to proceed in phases. Construction is scheduled to begin in early 2026 and is expected to take approximately two years to complete. When finished, the project will deliver a modernized, fully integrated heating plant that improves energy efficiency, reliability, and safety for both the Bedford Hills and Taconic facilities. The estimated construction cost is \$6M.



Upgraded Boiler Control Panel



Revit Modeled Deaerator and Surge Tank