



ENERGY SAVINGS STRATEGIES + THE MINNESOTA ENERGY CODE

2024 MHCEA SPRING CONFERENCE

INTRODUCTIONS



Paul Riemer, PE, LEED AP BD+C

Senior Associate // Energy



Justin Thiner, PE, LEED AP BD+C

Partner // Electrical

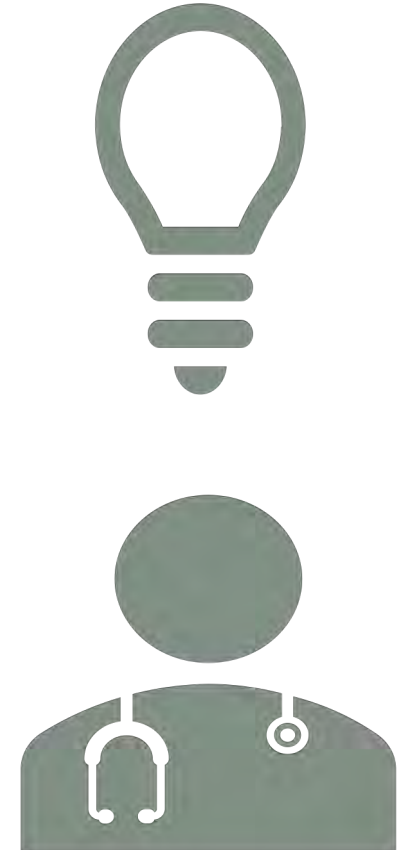


Brad Kettunen, PE, LEED AP

Senior Associate // Mechanical

TODAY'S LEARNING OBJECTIVES

- Understand a high level implications for your design projects as it relates to the new Minnesota Energy Code
- Pathways to compliance for MEP systems with the energy code
- The energy code and ASHRAE 170 compliance
- Innovative energy savings strategies for MEP systems



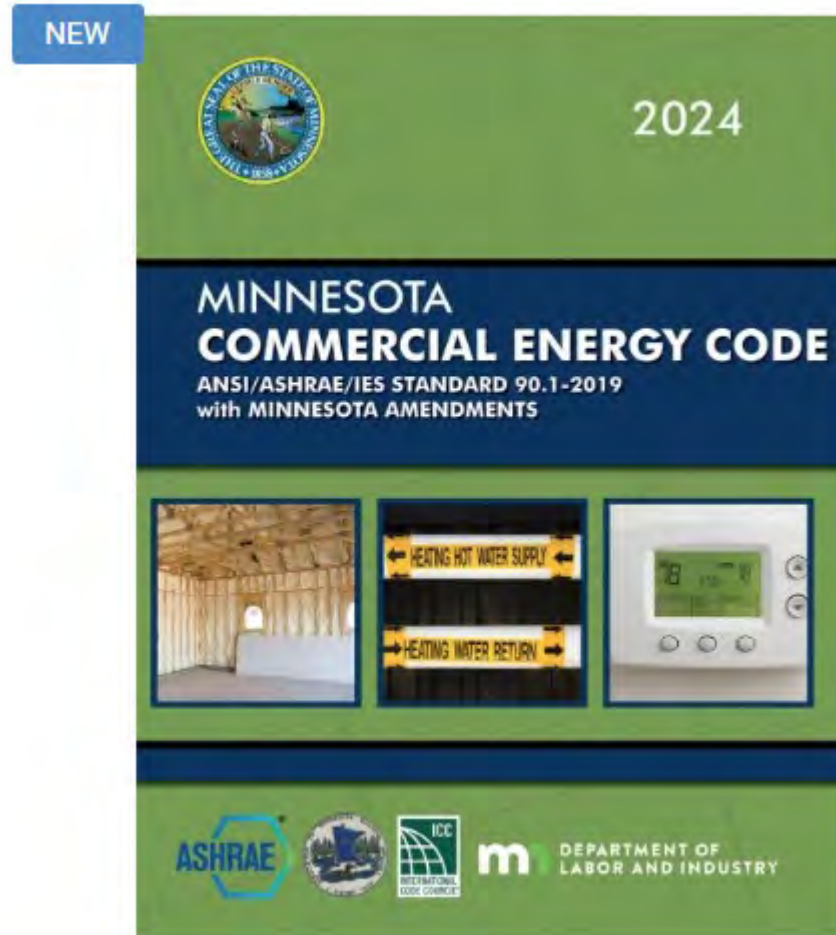
AGENDA

- Code Basics
- Envelope
- Airside Mechanical
- Waterside Mechanical / DHW / Electrification
- Electrical including Lighting and Metering



2024 MN COMMERCIAL ENERGY CODE = MN AMENDED ASHRAE 90.1-2019

effective 1/5/24



2024 MN COMMERCIAL ENERGY CODE LINKS

- Adopted per <https://dli.mn.gov/sites/default/files/pdf/1323-010524.pdf>
- **Can preorder physical book or PDF** at for \$102-\$150 for expected 6/1/24 availability <https://shop.iccsafe.org/2024-minnesota-commercial-energy-code-ansi-ashrae-ies-standard-90-1-2019-with-minnesota-amendments.html>
- **Expect free viewer** at <https://codes.iccsafe.org/> (not there as of 5/13/24)

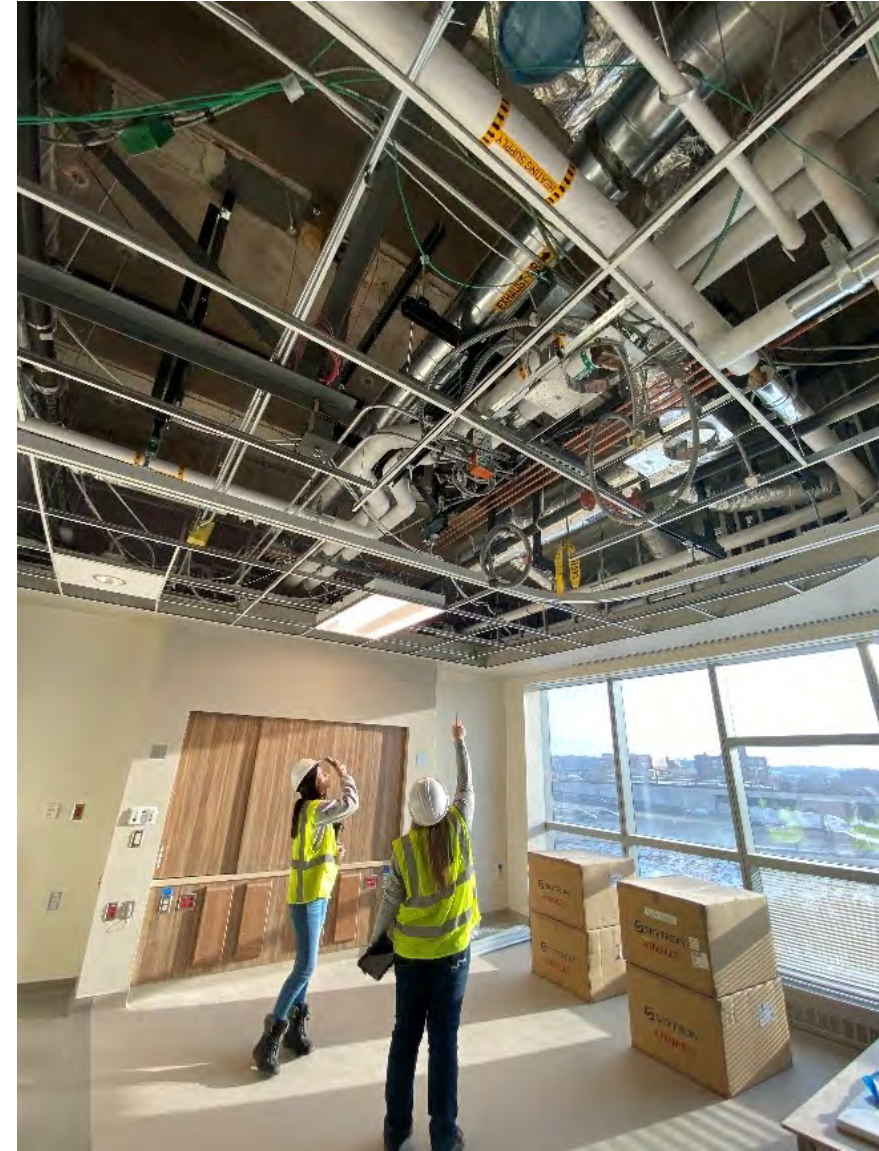
In the meantime

- ASHRAE 90.1-2019 free viewer at <https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards>
- MN Amendments at <https://www.dli.mn.gov/sites/default/files/pdf/AR4696-adopted.pdf>

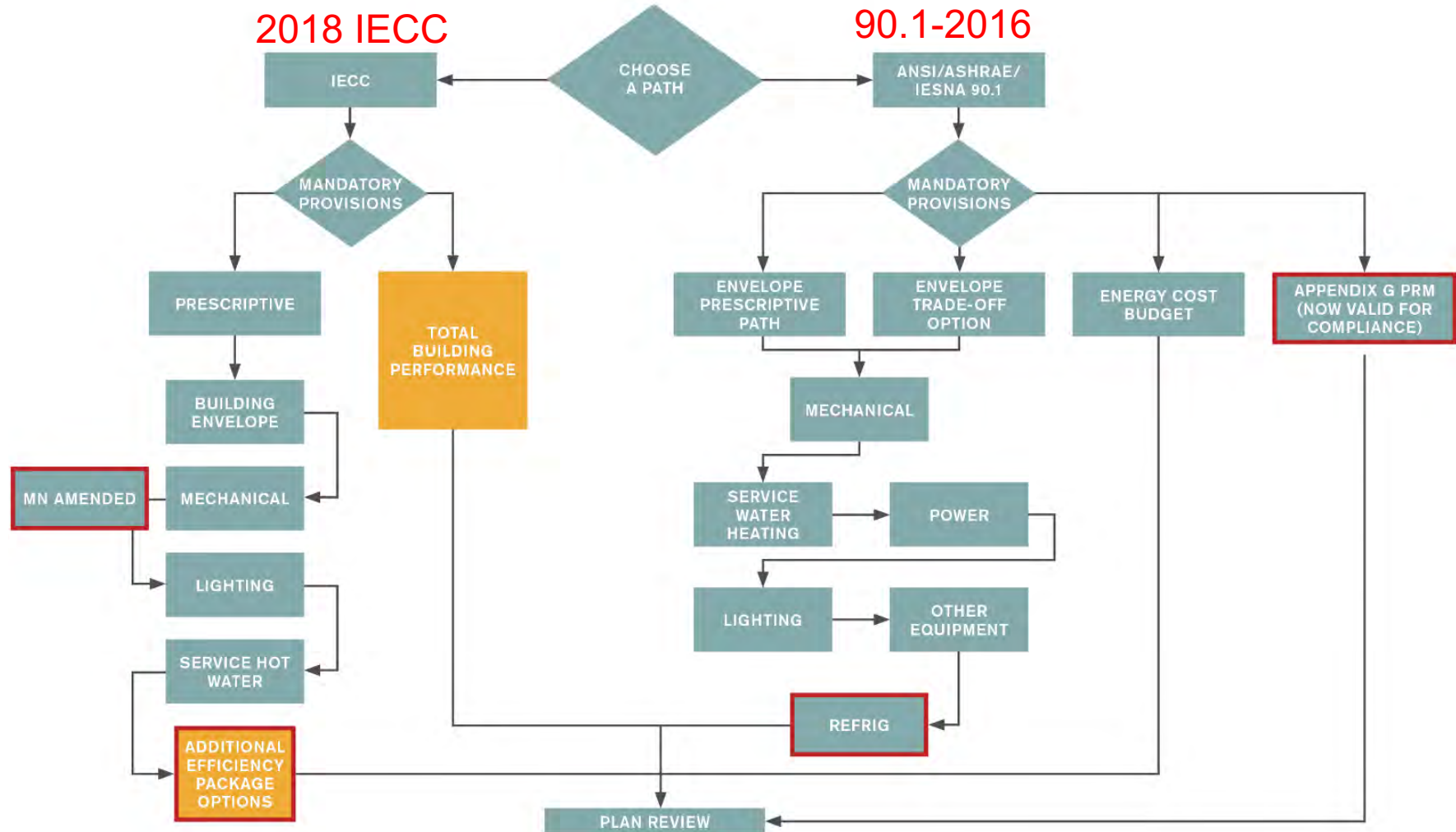
ENERGY CODE SCOPE

New construction & additions obvious, but renovations:

- Repairs & “like for like” replacements allowed
- Energy code generally does not dictate scope
- Energy code does regulate efficiency level of the chosen scope
- Changes in space conditioning triggers compliance
- If you replace window sash that triggers fenestration compliance
- Existing envelope can remain
- takes expertise to add insulation & barriers to older masonry walls

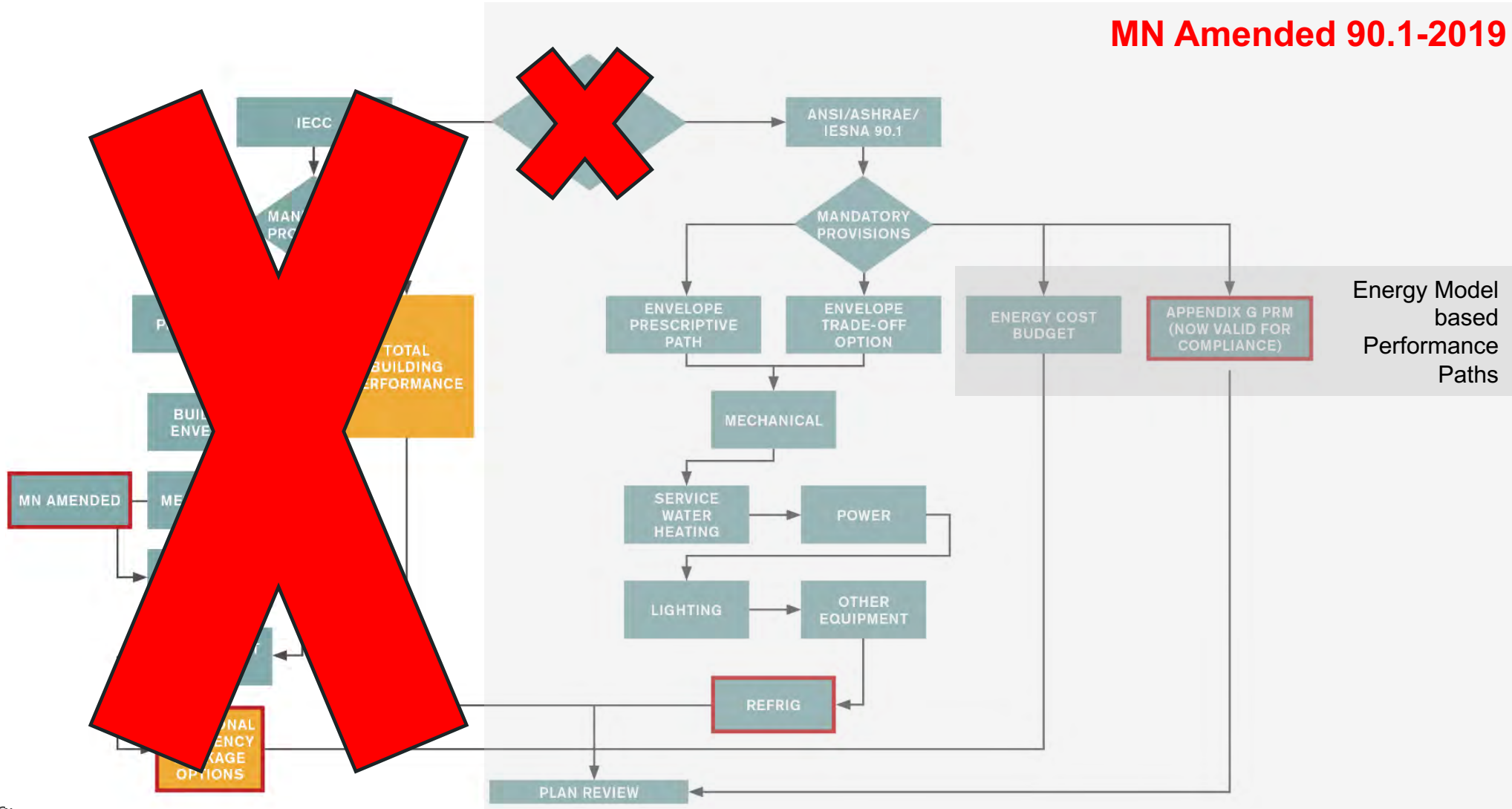


2020 MINNESOTA ENERGY CODE



2024 MINNESOTA ENERGY CODE

MN Amended 90.1-2019



DOCUMENTATION

“New COMcheckWeb”

- Has a pull down for “2024 Minnesota Commercial Energy Code”
- Not “old” COMcheckWeb and not old COMcheck desktop App
- COMcheck gives overall **green pass** or **red fail**
 - For envelope (prescriptive or tradeoff)
 - Interior Lighting & Exterior Lighting
 - But not Mechanical

ASHRAE 90.1-2019 has pdf forms

- Need to use for Performance Paths
- May need to add comments for MN Amendments

COMcheck-Web simplifies commercial and high-rise residential energy code compliance.

It performs just like [COMcheck](#), the desktop version, but you don't need to download or install any software on your computer.

[» Start COMcheck-Web](#)

Try the New COMcheck-Web!

The new version of COMcheck-Web supports commercial and high-rise residential energy code compliance while providing better user navigation and experience. All future national or state energy codes will be implemented in the new version of COMcheck-Web.

New Energy Codes

- ✓ ASHRAE 90.1-2022
- ✓ 2023 Minnesota Energy Code

New Features

- ✓ Advanced reporting
- ✓ Data Entry Wizards
- ✓ Data imports for lighting
- ✓ Project sharing
- ✓ Improved user help and guidance

Note: To login to the New COMcheck-Web application, a new login account must be set up with a valid email address from the login screen!

[» Try the New COMcheck-Web](#)

Contact: [Technical Support](#)
[Security & Privacy](#)

EXPERIENCE WITH AHJS

Requests for documentation and enforcement vary

Some past confusion on paths and documentation options

Some insist on seeing COMCheck forms while using Performance paths

Some want TI/buildout projects to follow the same code/path as previous projects in the building

Project teams can be proactive or reactive



MINNESOTA CLIMATE ZONES

5.1.4 Climate. The following counties are located in climate zone 7: Aitkin, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kittson, Koochiching, Lake, Lake of the Woods, Mahnommen, Marshall, Norman, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, and Wadena. All other counties are located in climate zone 6A.

2018 IECC



90.1 – 2016 & 2019



MN 2024 Energy Code



COMMISSIONING AND MORE

4.2.5.1 Building Systems Verification and Testing Requirements

Verification or *functional performance testing (FPT)* to confirm compliance with required provisions of this standard shall be performed on *building systems*, controls, and the *building envelope*, as required by Sections 5.9.1, 6.9.1, 7.9.1, 8.9.1, 9.9.1, 10.9.1, 11.2(d), and G1.2.1(c). Where testing is required but specific *FPT* procedures are not specified in this standard, testing shall use *generally accepted engineering standards* acceptable to the *building official*.

4.2.5.2 Building Commissioning Requirements

Commissioning shall be performed in accordance with this section and Sections 5.9.2, 6.9.2, 7.9.2, 8.9.2, 9.9.2, 10.9.2, 11.2(d), and G1.2.1(c). *Commissioning* shall use ASHRAE/IES Standard 202 or other *generally accepted engineering standards* acceptable to the *building official*. *FPT* and verification requirements for *commissioning* are as stated in Section 4.2.5.1. *Commissioning* shall also document in sufficient detail compliance of the *building systems*, controls, and *building envelope* with required provisions of this standard. *Commissioning* requirements shall be incorporated into the *construction documents*.

Exceptions to 4.2.5.2

1. *Buildings, additions, or alterations* with less than 10,000 ft² of *conditioned space* and combined heating, cooling, and *service water heating equipment* totaling less than 960,000 Btu/h in capacity.

Expect to Cx unless

<10,000 sf

and

**< 960,000 Btu/hr
combined capacity**

COMMISSIONING AND DESIGN PHASE

- Section 4.2.5.2.1 Prior to building permit issuance
 - CX agent shall manage activities prior to construction document issue
 - CX shall provide design review report
 - CX construction phase requirements shall be included in construction documents
 - CX plan shall be submitted with permit application if requested
- Sections 4.2.5.2.2 & 3
 - Required CX Documents and Activities



ENVELOPE NONRESIDENTIAL CZS 5-7

Code	90.1-2019	90.1-2019	90.1-2019
Climate Zone	5A	6A	7A
NonRes or Residence	NonRes	NonRes	NonRes
Roof			
Insulation Above Deck	R-30	R-30	R-35
	U-0.032	U-0.032	U-0.028
Wall			
Mass	R-11.4 c.i.	R-13.3 c.i.	R-15.2 c.i.
	U-0.090	U-0.080	U-0.071
Steel-Framed	R-13 + R-10 c.i.	R-13 + R-12.5 c.i.	R-13 + R-12.5 c.i.
	U-0.055	U-0.049	U-0.049
Vertical Fenestration			
Fixed U	0.36	0.34	0.29
Operable U	0.45	0.42	0.36
SHGC	Fixed 0.38	Fixed 0.34	Fixed 0.40
	Operable & Door 0.33	Operable & Door 0.33	Operable & Door 0.36

Eliminated code distinction between Metal and Non-Metal framed windows

... code keeps inching towards triple pane and/or non-metal framing for cold climates

Plus Prescriptive Limits

- 40% Window to Wall
- Orientation
 - More N & S than E &W

Key:

Same as stringency as both 90.1-2016 and 2018 IECC

More stringent than 2018 IECC

More stringent than both 90.1-2016 and 2018 IECC

WHOLE BUILDING AREA LEAKAGE TESTING



blower door testing



by 3rd party



can test big buildings in pieces



≤ 0.4 cfm/sf at 0.3 in of water



Test and reseal as needed and as feasible



MN amendment re Group
R and Group I

≤ 0.3 Cfm/sf at 0.2 in of water

Can sample test

Can use weighted average

MECHANICAL

- Equipment Efficiency Tables
- Computer rooms (like a large MPOP room)
 - Electronic data equipment power density > 20 W/sf
or
Connected design electronic data equipment load of > 10 kW
(MN amendment)
 - Used to claim exemption from Energy Code, now covered inc. by 90.4
 - Economizer requirements
- Controls, Controls, Controls
 - Keep It Simple >>>>>>> Dial It In, Reset It & Automated It
 - Occupied-Standby Controls i.e. Occupancy Sensor Setback of VAV Boxes
 - when OS required and when Std 62.1 and 170 allows
 - Prime example is conference room



AIR SIDE ECONOMIZER



6.5.1 Economizers

Each cooling *system* shall include either an *air economizer* or *fluid economizer* meeting the requirements of Sections 6.5.1.1 through 6.5.1.5.

6.5.1.1.1 Design Capacity

Air economizer systems shall be capable of and configured to modulate *outdoor air* and return air dampers to provide up to 100% of the design supply air quantity as *outdoor air* for cooling.

6.5.1.1.3 High-Limit Shutoff

All *air economizers* shall be capable of and configured to *automatically reduce outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling *energy* use. High-limit shutoff *control* types and associated *set points* for specific climate zones shall be chosen from Table 6.5.1.1.3.

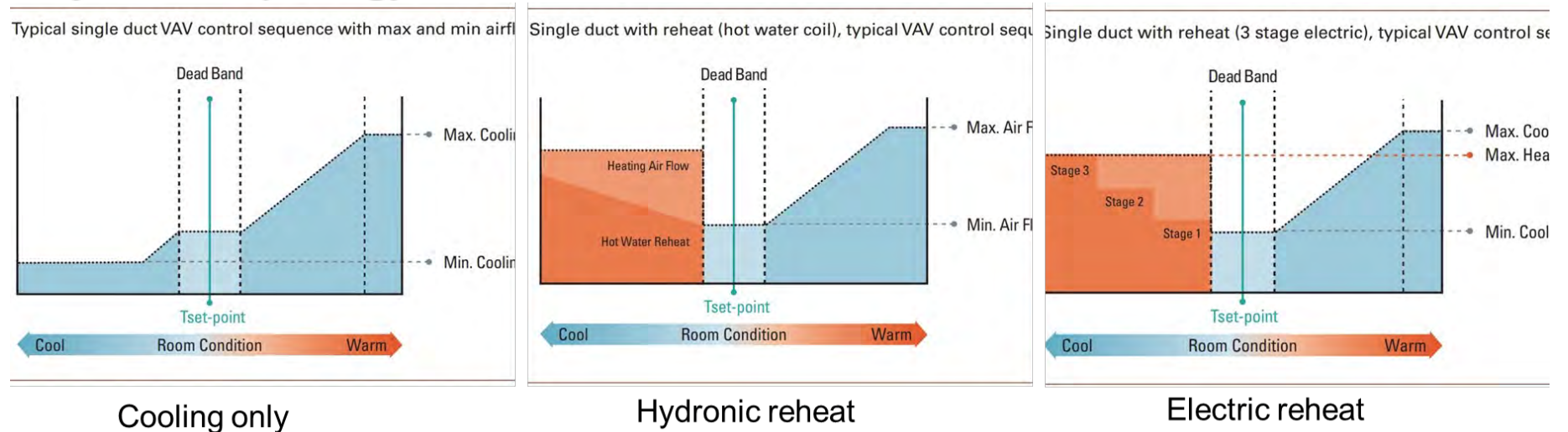
ZONE THERMOSTATIC CONTROLS

6.4.3.1.2 Dead Band

Where used to *control* both heating and cooling, zone *thermostatic controls* shall be capable of and configured to provide a temperature range or *dead band* of at least 5°F within which the supply of heating and cooling *energy* to the zone is shut off or reduced to a minimum.

Exceptions to 6.4.3.1.2

1. *Thermostats* that require *manual* changeover between heating and cooling modes.
2. Special occupancy or special applications where wide temperature ranges are not acceptable (such as retirement homes, process applications, museums, some areas of hospitals) and are approved by the *authority having jurisdiction*.



DEHUMIDIFICATION

- Limit

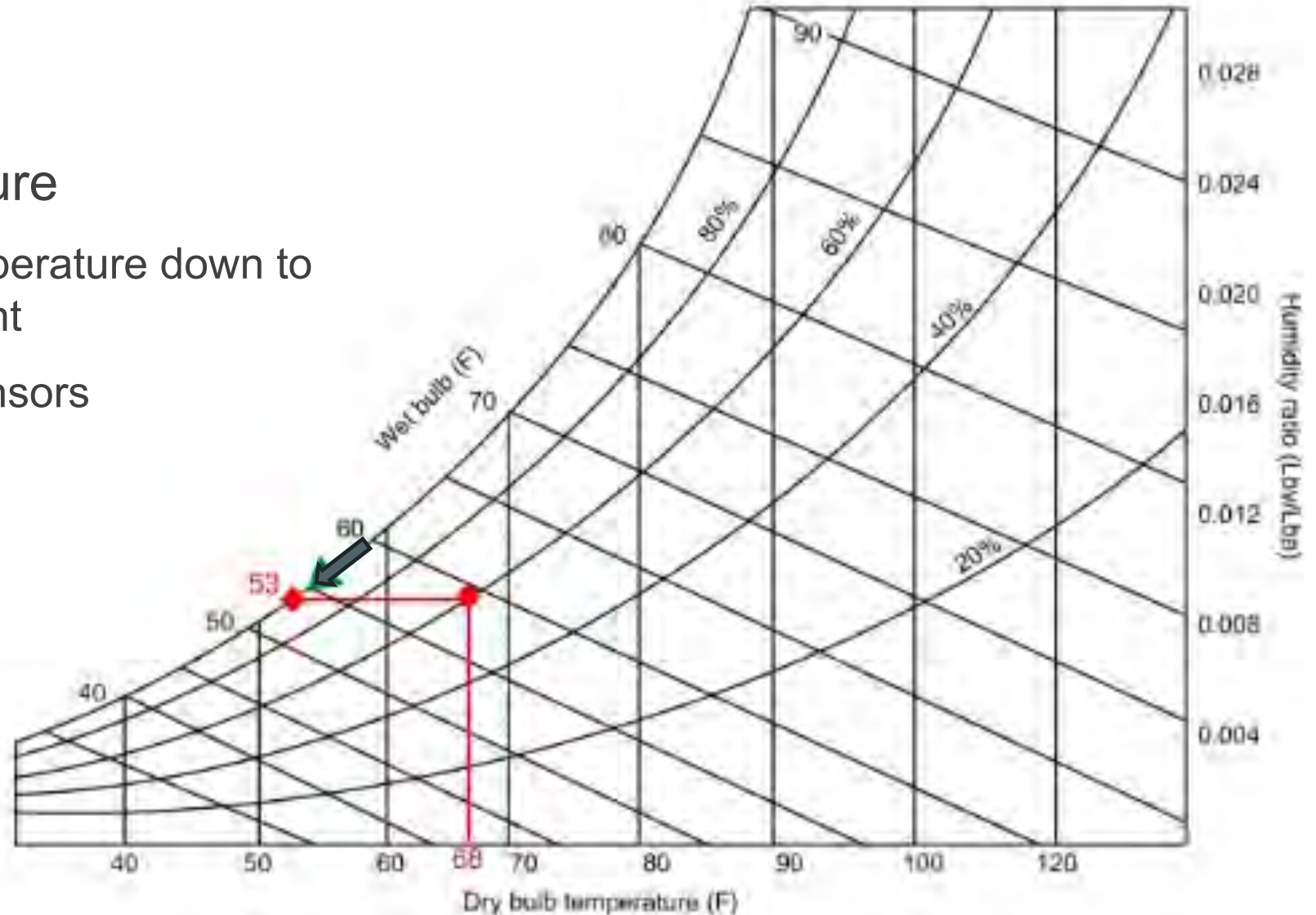
6.4.3.6 Humidification and Dehumidification Control

6.4.3.6.1 Dehumidification

Humidistatic controls shall not use mechanical cooling to reduce the humidity below the lower of a dew point of 55°F or relative humidity of 60% in the coldest zone served by the system.

DEHUMIDIFICATION

- Vary supply air temperature
 - Reset AHU leaving air temperature down to maintain 60% zone set point
 - Space relative humidity sensors
- Dedicated AHU System



HUMIDIFICATION

- Limit

6.4.3.6 Humidification and Dehumidification Control

6.4.3.6.2 Humidification

Humidistatic controls shall not use fossil fuel or electricity to produce relative humidity above 30% in the warmest zone served by the system.

- Exceptions

Exception to 6.4.3.6.1 and 6.4.3.6.2

Systems serving zones where specific humidity levels are required, such as museums and hospitals, and approved by the authority having jurisdiction or required by accreditation standards, and where humidistatic controls are capable of and configured to maintain a dead band of at least 10% relative humidity where no active humidification or dehumidification takes place.

Exception to 6.4.3.6.1, 6.4.3.6.2, and 6.4.3.4.3

Systems serving zones where humidity levels are required to be maintained with precision of not more than $\pm 5\%$ relative humidity to comply with applicable codes or accreditation standards or as approved by the authority having jurisdiction.

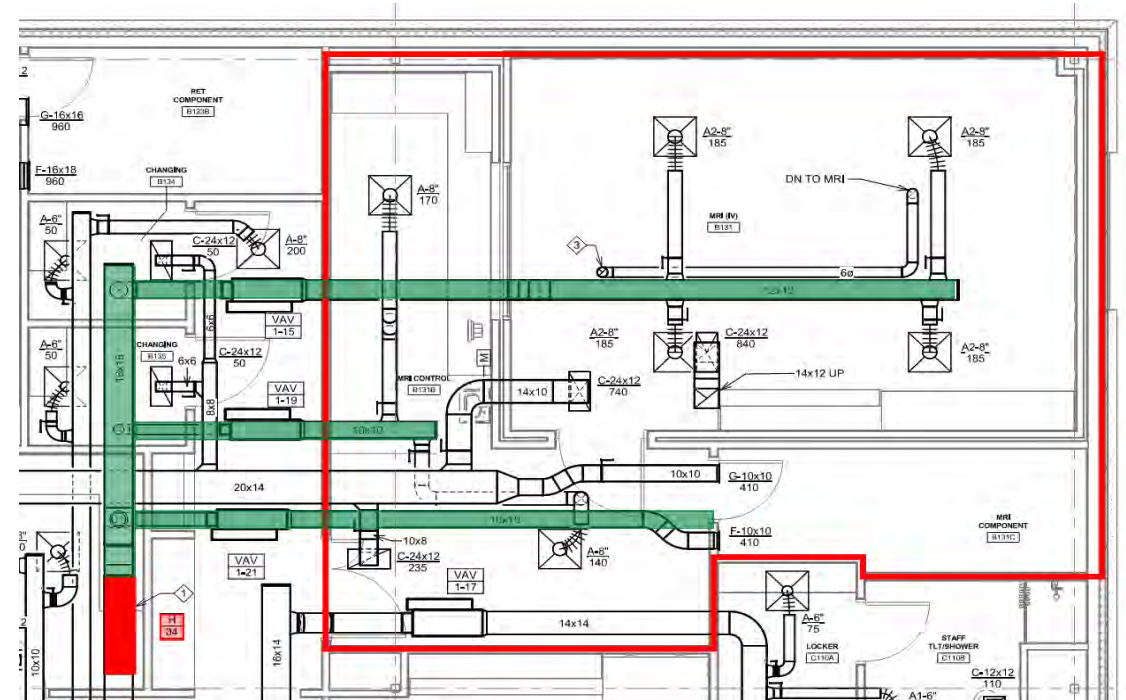
HUMIDIFICATION REQUIRED

- MRI



ENVIRONMENTAL REQUIREMENTS

1) AIR CONDITIONING IS TO PROVIDE A TEMPERATURE OF 64–71°F IN THE EXAM ROOM, 59–86°F IN THE EQUIPMENT & CONTROL ROOM. RELATIVE HUMIDITY OF 40–60% (NON-CONDENSING) IS REQUIRED EXAMINATION ROOM AND CONTROL ROOM, 40–80% (NON-CONDENSING) IN THE EQUIPMENT ROOM. THESE CONDITIONS ARE TO BE MET AT ALL TIMES; 24 HOURS A DAY, 7 DAYS A WEEK.



VESTIBULES

- Size, distance, and door operation limits
- Heating off above 45 F outside air
- Heating max 60 F
- Cooling minimum 85 F
- If supplying air – dedicated zone required
- BAS control

6.4.3.9 Heated or Cooled Vestibules

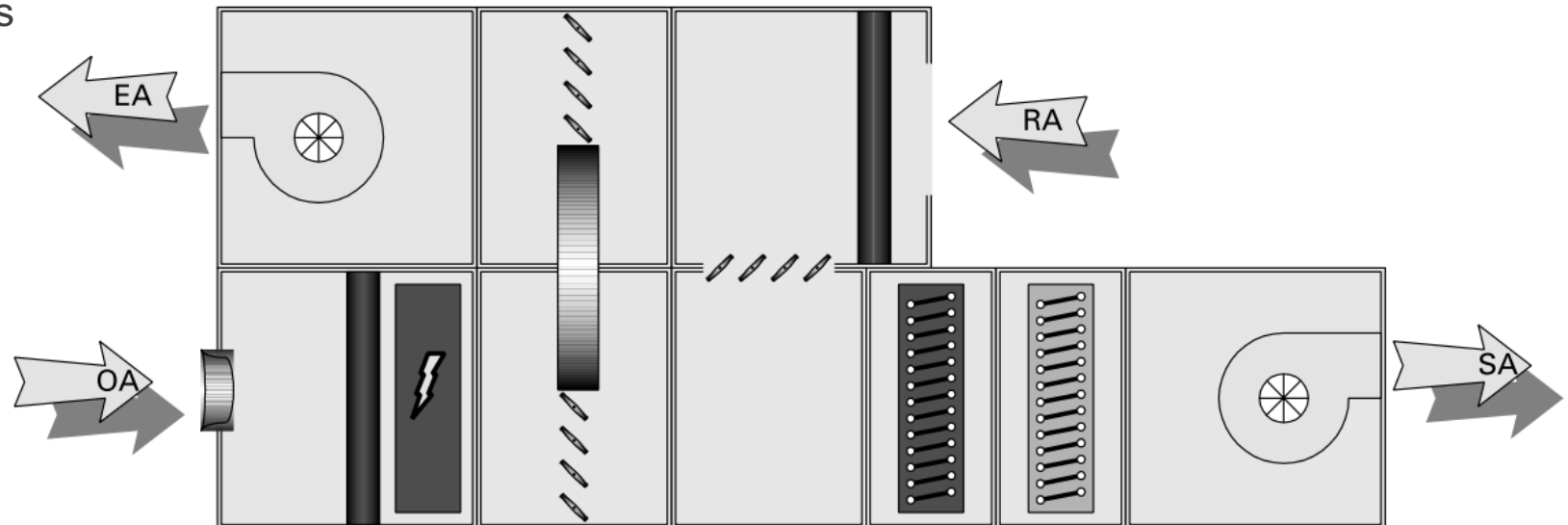
Heating for vestibules and for air curtains with integral heating shall include *automatic controls* capable of and configured to shut off the heating *system* when *outdoor air* temperatures are above 45°F. Vestibule heating and cooling *systems* shall be controlled by a *thermostat* in the vestibule capable of and configured to limit heating to a maximum of 60°F and cooling to a minimum of 85°F.

MN 2024 Energy Code Amended - PRESCRIPTIVE

6.5.6.1.2 Exhaust Air Energy Recovery Requirements for Ventilation Systems

Climate Zone	% Outdoor Air at Full Design Airflow Rate							
	≥10% & <20%	≥20% & <30%	≥30% & <40%	≥40% & <50%	≥50% & <60%	≥60% & <70%	≥70% & <80%	≥80%
	Design Supply Fan Airflow Rate, cfm							
6A	NR	≥16,000	≥5,500	≥4,500	≥3,500	≥2,000	≥1,000	≥120
7	NR	≥4,000	≥2,500	≥1,000	≥140	≥120	≥100	≥80

- 50% Enthalpy recovery ratio is required prescriptively
 - rarely achieved by run around loop between coils
 - typically requires plates or wheels



EXHAUST RECOVERY EXCEPTIONS

- 6.5.6.1.2 Exceptions

5. Where the sum of the airflow rates exhausted and relieved within 20 feet of each other is less than 75 percent of the design outdoor airflow rate, excluding exhaust air that is:
 - a. used for another energy recovery system;
 - b. not allowed by ASHRAE/ASHE Standard 170 for use in energy recovery systems with leakage potential; or
 - c. of Class 4 as defined in ASHRAE Standard 62.1.

ENERGY RECOVERY

- ASHRAE 170 Requirements
- Leakage Potential – 5% Maximum
 - Class 2 Air (restrooms, lockers, breakroom)
 - Wheel
- Restricted Exhaust
 - Infection control risk areas, isolation rooms, SPD, ER waiting, nuclear medicine, bronchoscopy...etc.
 - Plate to plate
 - Run-around pumped coils

DUCT SEALING

- Seal Class A
- All ductwork and plenum
- Fittings

6.4.4.2.1 Duct Sealing

Ductwork and all plenums with pressure class ratings shall be constructed to *Seal Class A*. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage. Pressure-sensitive tape shall not be used as the primary sealant unless it has been certified to comply with UL-181A or UL-181B by an independent testing laboratory, and the tape is used in accordance with that certification. All connections shall be sealed, including but not limited to spin-ins, taps, other branch connections, access *doors*, access panels, and duct connections to *equipment*. Sealing that would void product listings is not required. Spiral lock seams need not be sealed. All duct pressure class ratings shall be designated in the design documents.



DUCT LEAKAGE TESTING

25% of 3"wg or more
and external

6.4.4.2.2 Duct Leakage Tests

Ductwork that is designed to operate at static pressures in excess of 3 in. of water and all *ductwork* located outdoors shall be leak-tested according to industry-accepted test procedures (see [Informative Appendix E](#)). Representative sections totaling no less than 25% of the total installed duct area for the designated pressure class shall be tested. All sections shall be selected by the *building* owner or the designated representative of the *building* owner. Positive pressure leakage testing is acceptable for negative pressure *ductwork*. The maximum permitted duct leakage shall be

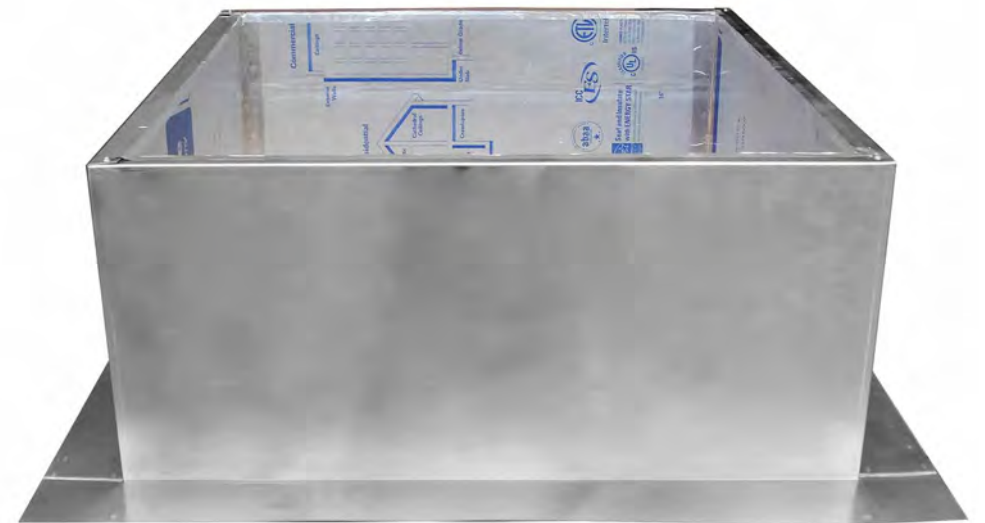
ROOF CURB INSULATION AND HEIGHT (MN AMENDMENTS)

5.5.3.1 Roof insulation. All roofs shall comply with the insulation values specified in Tables 5.5-0 through 5.5-8. Skylight curbs, mechanical curbs, and other roof curbs shall be insulated to the level of roofs with insulation entirely above the deck or R-10, whichever is less.

Exception: Historical buildings with roof slopes two units vertical in 12 units horizontal (2:12) or less.

6.1.1.3.6 Rooftop HVACR. Unless technically infeasible, new and replacement rooftop equipment shall be provided with new insulated curbs in accordance with Section 5.5.3.1. The replacement curbs shall be of sufficient height to permit the installation of insulation that complies with Tables 5.5-6 and 5.5-7 when roof replacement occurs.

- A few custom manufacturers are responding
- National manufacturers TBD



LOWER HOT WATER TEMPERATURES

- Supply temperatures $\leq 135\text{F}$
and/or
Return Temperatures $\leq 120\text{F}$
(Code for new gas boiler plants)
- Opens up
 - Condensing operation of fossil fuel boilers
 - Geothermal heat pumps
 - Heat recovery chillers between CHW and HW loops
- Bigger coils in AHUs, terminal units and FTR
- Maybe more pumping energy but net savings



WATER SIDE HEAT RECOVERY

6.5.6.2 Heat Recovery for Service Water Heating

6.5.6.2.1

Condenser heat recovery *systems* shall be installed for heating or preheating of service hot water provided all of the following are true:

- a. The facility operates 24 hours a day.
- b. The total installed heat-rejection capacity of the water-cooled *systems* exceeds 6,000,000 Btu/h of heat rejection.

6.5.6.3 Heat Recovery for Space Conditioning

Where heating water is used for space heating, a condenser heat recovery *system* shall be installed, provided all of the following are true:

- a. The building is an acute inpatient hospital, where the building or portion of a building is used on a 24-hour basis for the inpatient medical, obstetric, or surgical care for patients.
- b. The total design chilled-water capacity for the acute inpatient hospital, either air cooled or water cooled, required at cooling *design conditions* exceeds 3,600,000 Btu/h of cooling.
- c. Simultaneous heating and cooling occurs above 60°F *outdoor air temperature*.

The required heat recovery *system* shall have a cooling capacity that is at least 7% of the total design chilled-water capacity of the acute inpatient hospital at peak *design conditions*.

Don't throw out Btus.....

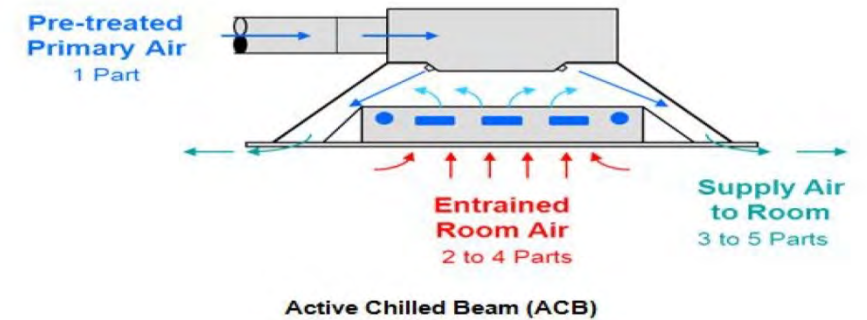
...move them to where you need them!

For a new hospital read the fine print and exceptions.

ALTERNATIVE STRATEGIES & SYSTEMS

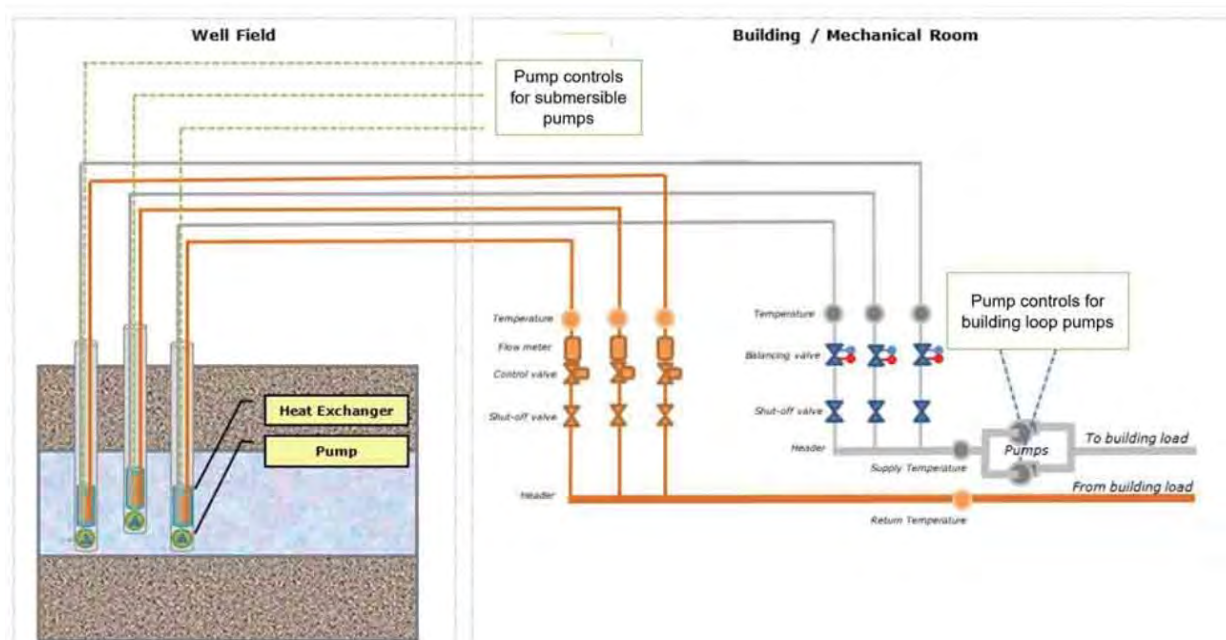
- Decouple Ventilation Loads from Space Loads
- Minimize the cool & reheat dynamic
- **Dedicated Outdoor Air System with**
 - Fan Coils
 - Water to Air Heat Pumps
 - **Active Chilled Beams**
- Can not provide “100%” outdoor air for a pandemic mode
- Limited health care space applicability
- Lose airside economizer
- Requires year-round chilled water & water side economizer
- This is an efficiency step change over VAV reheat.

Chilled Beam



GEOHERMAL INCLUDING AQUIFER

- Geothermal is most cost-effective way to electrify heating in our climate
 - COP of 3+ vs electric boiler at 1.0
 - Air to water heat pump capacity & efficiency fall off $< \sim 5F$
- Aquifers have “geothermal” energy
- MN prohibits once-through water use for cooling
 - Some small exceptions for extract and reinject
 - Might this change to allow Doublet Wells at scale?
- Heat exchangers in aquifers (Darcy)
 - Department of Health regulated



- Inflation Reduction Act expanded tax incentives for geothermal

ELECTRICAL LIGHTING

- Requirements
 - Lighting Power Density (LPD)
 - Lighting Control



ELECTRICAL LIGHTING

- Lighting Power Density (9.1.3 and 9.1.4 in ASHRAE 90.1-2019)
 - Lighting Power Density allowances are based on space type.
 - Required for new projects or alterations (alterations that include more than 20% of the overall lighting load)
 - Two Paths
 - Simple Building (Full building by usage)
 - Space-by-Space

Table 9.5.1 Lighting Power Density Allowances Using the Building Area Method

<i>Building Area Type^a</i>	<i>LPD, W/ft²</i>
Automotive facility	0.75
Convention center	0.64
Courthouse	0.79
Dining: Bar lounge/leisure	0.80
Dining: Cafeteria/fast food	0.76
Dining: Family	0.71
Dormitory	0.53
Exercise center	0.72
Fire station	0.56
Gymnasium	0.76
Health-care clinic	0.81
Hospital	0.96
Hotel/motel	0.56

ELECTRICAL LIGHTING

- Lighting Power Density
 - Space by Space Chart

Table 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method (Continued)

<i>Informative Note:</i> This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.			The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type: (1) All REQs shall be implemented. (2) At least one ADD1 (when present) shall be implemented. (3) At least one ADD2 (when present) shall be implemented.								
			Local Control (See Section 9.4.1.1[a])	Restricted to Manual ON (See Section 9.4.1.1[b])	Restricted to Partial Automatic ON (See Section 9.4.1.1[c])	Bilevel Lighting Control (See Section 9.4.1.1[d])	Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1[e] ⁶)	Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1[f] ⁶)	Automatic Partial OFF (See Section 9.4.1.1[g] [Full Off complies])	Automatic Full OFF (See Section 9.4.1.1[h])	Scheduled Shutoff (See Section 9.4.1.1[i])
Building Type Specific/Space Types ¹	LPD W/ft ²	RCR Threshold	a	b	c	d	e	f	g	h	i
Healthcare Facility											
Exam/treatment room	1.40	8	REQ			REQ	REQ	REQ		ADD2	ADD2
Imaging room	0.94	6	REQ			REQ				ADD2	ADD2
Medical supply room	0.62	6	(See "Storage Room" under "Common Space Types" for control requirements.)								
Nursery	0.92	6	REQ			REQ	REQ	REQ		ADD2	ADD2
Nurse's station	1.17	6	REQ			REQ	REQ	REQ		ADD2	ADD2
Operating room	2.26	6	REQ			REQ				ADD2	ADD2
Patient room	0.68	6	REQ			REQ	REQ	REQ		ADD2	ADD2

ELECTRICAL LIGHTING

- Lighting Power Density Exceptions
 - Emergency lighting that is automatically off during normal building operation.
 - Lighting, including exit signs, that is specifically designated as required by a health or life safety statute, ordinance, or regulation.
 - Decorative gas lighting systems.



ELECTRICAL LIGHTING

- Lighting Controls (9.4.1.1 in ASHRAE 90.1-2019)
 - Interior and Exterior Requirements
 - Numerous Charts and Exceptions



ELECTRICAL LIGHTING

- Lighting Controls Interior Lighting (9.4.1.1 in ASHRAE 90.1-2019)
 - Table 9.6.1

Table 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method (Continued)

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Building Type Specific/Space Types ¹	LPD W/m ²	RCR Threshold	a	b	c	d	e	f	g	h	i
Healthcare Facility											
Exam/treatment room	1.40	8	REQ			REQ	REQ	REQ		ADD2	ADD2
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Nurse's station	1.17	6	REQ			REQ	REQ	REQ		ADD2	ADD2
Operating room	2.26	6	REQ			REQ				ADD2	ADD2
Patient room	0.68	6	REQ			REQ	REQ	REQ		ADD2	ADD2

ELECTRICAL LIGHTING

- Lighting Controls Interior Lighting (9.4.1.1 in ASHRAE 90.1-2019)
 - Major Exceptions to lighting control that influence Healthcare spaces.
 - Exception to Automatic Full Off Requirement
 1. General lighting and task lighting in spaces where automatic shutoff would endanger the safety or security of room or building occupants.
 2. Lighting required for 24/7 operation.
 - Exception to Scheduled Shutoff Requirement
 1. Lighting in spaces where lighting is required for 24/7 continuous operation.
 2. Lighting in spaces where patient care is rendered.
 3. Lighting in spaces where automatic shutoff would endanger the safety or security of the room or building occupants.

ELECTRICAL LIGHTING

- Lighting Controls Exterior Lighting (9.4.1.4 in ASHRAE 90.1-2019)
 - All of these requirements Shall be met.
 - Lighting shall be controlled by a device that automatically turns off the lighting when sufficient daylight is available.
 - All building façade and landscape lighting shall be automatically shut off between mid-night or business closing, whichever is later, and 6 a.m. or business opening, whichever comes first, or between times established by the authority having jurisdiction.
 - Lighting not specified as façade and landscape lighting and lighting for signage shall be controlled by a device that automatically reduces the connected lighting power by at least 50% for at least one of the following conditions:
 1. From 12 midnight or within one hour of the end of business operations, whichever is later, until 6 a.m. or business opening, whichever is earlier
 2. During any period when no activity has been detected for a time of no longer than 15 minutes
 - Luminaires serving outdoor parking areas and having a rated input wattage of greater than 78 W and a mounting height of 24 ft or less above the ground shall be controlled to automatically reduce the power of each luminaire by a minimum of 50% when no activity has been detected in the area illuminated by the controlled luminaires for a time of no longer than 15 minutes. No more than 1500 W of lighting power shall be controlled together.
 - All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least ten hours.

ELECTRICAL LIGHTING

- Lighting Controls Parking Garage (9.4.1.2 in ASHRAE 90.1 -2019)
 - Lighting for parking garages Shall comply with the following requirements:
 - Parking garage lighting shall have automatic lighting shutoff per Section 9.4.1.1(i) (*Lighting control charts*).
 - Lighting power of each luminaire shall be automatically reduced by a minimum of 50% when there is no activity detected within a lighting zone for 10 minutes. Lighting zones for this requirement shall be no larger than 3600 ft².
 - Parking garage daylight transition lighting exempt per Section 9.2.3.1 shall be separately controlled to automatically reduce the lighting to no more than the general light level at night from sunset to sunrise.
 - The power to any luminaire within 20 ft of perimeter wall openings totaling at least 24 ft² shall be automatically reduced through continuous dimming in response to available daylight.

ELECTRICAL POWER

- Requirements
 - Switched outlets – Removed per Minnesota Amendment
 - Metering Still Required (8.4.3 in ASHRAE 90.1-2019)



ELECTRICAL POWER

- Metering Categories

- a. Total electrical *energy*
- b. *HVAC systems*
- c. Interior lighting
- d. Exterior lighting
- e. Receptacle circuits

Exception for 10% of load to fall outside of category



Schneider Electrical Display Graphs

ELECTRICAL POWER

- Metering Recording and Reporting
 - Loads to be recorded every 15 minutes (minimum)
 - Reported hourly, daily, monthly, and annually
 - Information saved for minimum 36 months

Buildings with BAS are required to transfer recorded information to BAS for reporting.



ELECTRICAL POWER

- Exceptions to Metering Recording and Reporting
 - *Building* less than 25,000 ft².
 - Individual tenant *spaces* less than 10,000 ft².
 - *Dwelling units*.
 - *Residential buildings* with less than 10,000 ft² of common area.
 - Critical and *Equipment* branches of NEC Article 517.



ELECTRICAL POWER

- Additional Requirements
 - As built one-line diagrams and floor plans with panel locations.
 - O+M documents
 - Energy performance of the power systems to be commissioned.



QUESTIONS?

WHAT ABOUT ...

- Plumbing Code
 - 2020 MN Plumbing code effective Dec. 17, 2021 based on 2018 UPC
 - 2024 UPC is under active consideration by ad hoc committee
- Other building codes
 - Currently based on 2018 International Codes
 - 2024 I-codes
 - under active consideration by TAGs
- Natural gas limit or ban?
 - Would take legislation
 - Current rule making authority is for “conservation”
- Other Questions?

