New Changes in Commercial Energy Code
TAG Review Worksheet

Model Code: 2022 ASHRAE 90.1

	B	C	D	E	F	I	K	N
1	To be completed by Chair						To be completed by TAG members	
2	Minnesota Code Section	ASHRAE Code Section	Subject	Current Minnesota Amend	Description of Change	Recommendation A - Accept R - Reject AM - Amend	Recommendation A - Accept R - Reject AM - Amend	Comments
3								
4				Y or N				
5								
6								
7	1.1	1.1	Purpose	N	Adds "and sites for"	Accept		
8	1323.0202	2.1	Scope	Y	Standard changed in 2022. Minnesota amends	Keep amendment		
9	1323.0202	2.2	Scope	Y	Minor changes to the 2022. Minnesota amends	Keep amendment		
10	1323.0202	2.5	Scope	Y	Minnesota amendment exempting I-1 and IRC1-4, 3 stories and placing them into 1322	Review with Residential Energy scoping		
11	1323.0202	2.6	Scope	Y	Minnesota amendment detailing a combination 1322 and 1323 building	Review with Residential Energy scoping		
12					**Start meeting #2, 4/15/2025**			
13	1323.0310.	3.1	General	Y	Minnesota amends adding Merrium-Webster Collegiate Dictionary.	Keep amendment	A	
14	1323.0310.	3.1.1	General	Y	Minnesota amends adding "terms defined in other codes"	Keep amendment	A	
15		3.2	Definition: addition	N	Minor changes to the 2022 definition	A	A	
16		3.2	Definition: air leakage	N	New definition: the uncontrolled airflow through the building envelope caused by pressure differences across the building envelope due to factors such as wind, inside and outside temperature differences, stack effect, and imbalance between supply and exhaust air systems. Air leakage can move inward (infiltration) or outward (exfiltration) through the building envelope.	A	A	
17		3.2	Definition: alteration	N	Minor changes to the 2022 Standard.	A	A	
18	1323.0320.	3.2	Definition: approved	Y	Minnesota amendment adding definition.	Keep amendment	A	
19		3.2	Definition: ceiling fan energy index (CFEI)	N	New definition: The ratio of the electric input power of a reference ceiling fan to the electric input power of the actual ceiling fan as calculated per AMCA 208 with the following modifications to the calculations for the reference fan: using an airflow constant (Q0) of 26,500 cfm, a pressure constant (P0) of 0.002700 in. of water, and a fan efficiency constant (n0) of 42%.	A	A	
20		3.2	Definition: chi-factor (x or Chi)	N	New definition: thermal transmittance of a point thermal bridge in units of Btu/(h·°F).	A	A	
21		3.2	Definition: clear-field thermal bridge	N	New definition: see thermal bridge.	A	A	
22	1323.0320.	3.2	Definition: Commercial parking facility	Y	Minnesota added a definition	Keep amendment	A	
23	1323.0320.	3.2	Definition: Computer room	Y	Minnesota amendment changing definition	Keep amendment	A	

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24		3.2	Definition: computer room energy	N	New definition: annual energy use of the data center, including all IT equipment energy, plus energy that supports the IT equipment and computer room space, calculated in accordance with industry-accepted standards defined as Total Annual Energy (see Informative Appendix E).	A	A	
25		3.2	Definition: construction drawings	N	Minor changes to the 2022 Standard.	A	A	
26		3.2	Definition: direct-expansion dedicated outdoor air system units (DX-DOAS units)	N	Definition title change from DX-dedicated outdoor air system units (DX-DOAS units). Definition is the same	A	A	
27		3.2	Definition: east-oriented	N	New definition: facing within 45 degrees of true east to the south and within less than 22.5 degrees of true east to the north in the northern hemisphere; facing within 45 degrees of true east to the north and within less than 22.5 degrees of true east to the south in the southern hemisphere.	A	A	
28		3.2	Definition: energy efficient ratio (EER)	N	minor changes to the informative note	A	A	
29		3.2	Definition: existing equipment	N	Adds "or on an existing site."	A	A	
30		3.2	Definition: existing site	N	New definition.	A	A	
31		3.2	Definition: existing system		Change to definition: a system or systems previously installed in an existing building or on an existing site.	A	A	
32		3.2	Definition: greenhouse		New definition: a space with a skylight roof ratio of 50% or more above the growing area used exclusively for horticultural production, cultivation, or maintenance by utilizing a sunlit environment. Greenhouses are spaces erected for a period of 180 days or more.	A	A	
33		3.2	Definition: heat recovery coefficient of performance (COPHR)		New definition: a ratio of the net heat recovery capacity plus the net refrigerating capacity to the total input power at any given set of rating conditions. COPHR applies to units that are operating in a manner that uses either all or only a portion of heat generated during chiller operation to heat a load, while the remaining heat, if any, is rejected to the outdoor ambient. COPHR takes into account the beneficial cooling capacity as well as the heat recovery capacity.	A	A	

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34		3.2	Definition: heating seasonal performance factor (HSPF)		Minor change in informative note: (Informative Note: HSPF2 reflects the new higher static and load line effective 1/1/2023.)	A	A	
35		3.2	Definition: high-end trim		New definition: process of setting the maximum light output of individual luminaires or groups of luminaires to support visual needs of a space, task, or area. High-end trim is also known as “institutional tuning” or “task tuning.”	A	A	
36		3.2	Definition: indoor grow		New definition: a space, other than a greenhouse, used exclusively for horticultural production, cultivation, or maintenance.	A	A	
37		3.2	Definition: infiltration		Definition deleted in the 2022 Standard	A	A	
38		3.2	Definition: installed interior lighting power	N	New definition.	A	A	
39		3.2	Definition: insulated metal panel	N	New definition.	A	A	
40		3.2	Definition: integrated part-load value (IPLV.IP)		Definition change: a single-number figure of merit based on part-load EER~~, COPC, or kW/kW~~ expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.	A	A	
41		3.2	Definition: Lighting, horticultural		New definition: electric lighting used for horticultural production, cultivation, or maintenance with either plug-in or hard-wired connections for electric power.	A	A	
42		3.2	Definition: lighting power allowance (LPA), exterior		Change in title and minor change in definition from "building to property": the maximum lighting power in watts allowed for the exterior of a property.	A	A	
43		3.2	Definition: lighting power allowance (LPA), interior		Change in title and minor change in definition from "building to property": the maximum lighting power in watts allowed for the interior of a property.	A	A	
44		3.2	Definition: linear thermal bridge		New definition: see thermal bridge	A	A	
45		3.2	Definition: lumen maintenance		New definition: a lighting control strategy that increases light source power over time to maintain light levels as sources age, dirt accumulates in luminaires, or both. Also known as “lumen depreciation compensation” or “constant lumen output.”	A	A	

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46		3.2	Definition: metal building		Definition changed. Metal building "**envelope**" is new.	A	A	
47		3.2	Definition: north oriented	N	New definiton.	A	A	
48		3.2	Definition: parking garage daylight transition zone		New definition: covered vehicle entrances and exits from buildings and parking structures not exceeding a depth of 66 ft inside the structure, or a depth as determined by ANSI/IES RP-8, and not exceeding a width of 30 ft to either side of the drive aisle centerline and not extending beyond adjacent walls.	A	A	
49	1323.0320.	3.2	Definition: parking garage section		Minnesota amended definition that now located in ASHRAE 90.1-2022. a part of a parking garage where airflow is restricted from other parts of the garage by solid walls.	Repeal amendment	Repeal	
50		3.2	Definition: photosynthetic photon efficacy (PPE)		New definition: photosynthetic photon flux emitted by a light source between 400 and 700 nm divided by its electrical input power, expressed in units of micromoles per joule as defined by ANSI/ ASABE S640-2017.	A	A	
51		3.2	Definition: point thermal bridge		New definition: see thermal bridge.	A	A	
52		3.2	Definition: property		New definition: building or site	A	A	
53		3.2	Definition: psi-factor (ψ or Psi)		New definition: thermal transmittance per unit length of a linear thermal bridge in units of Btu/(h·ft·°F).	A	A	
54		3.2	Definition: renewable energy resources		New definition: energy from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth.	A	A	
55		3.2	Definition: replacement air		Changed definition: outdoor air that is used to replace air removed from a building through an exhaust system. Replacement air may be derived from one or more of the following: makeup air, supply air, and transfer air.	A	A	

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56		3.2	Definition: residential associated HVAC zone		New definition: any HVAC zone that primarily includes nonresidential spaces designed to serve occupants of residential spaces, including but not limited to corridors, stairwells, elevator lobbies, and common restrooms, on a floor where over 75% of the gross conditioned floor area are residential spaces. This definition does not apply to HVAC zones within hospitals.	A	A	
57		3.2	Definition: roof replacement		New definition: an alteration that includes the removal of all existing layers of the roof assembly materials down to the roof deck and installing a new roof assembly above the roof deck.	A	A	
58		3.2	Definition: seasonal coefficient of performance—cooling (SCOPC)		Deleted definition: the total cooling output of an air conditioner during its normal annual usage period for cooling divided by the total electric energy input during the same period in consistent units (analogous to SEER but in I-P or other consistent units).	A	A	
59		3.2	Definition: seasonal coefficient of performance—heating (SCOPH)		Deleted definition: the total heating output of a heat pump during its normal annual usage period for heating divided by the total electric energy input during the same period in consistent units (analogous to HSPF but in I-P or other consistent units).	A	A	
60		3.2	Definition: seasonal energy efficiency ratio (SEER)		Added informative note: the total cooling output of an air conditioner during its normal annual usage period for cooling (Btu) divided by the total electric energy input during the same period (W). (Informative Note: SEER2 reflects the new higher static effective 1/1/2023.)	A	A	
61		3.2	Definition: Sidelighting effective apertature	N	Minor change.	A	A	
62		3.2	Definition: simultaneous cooling and heating coefficient of performance (COPSHC):		New definition: a ratio of the net heating capacity plus the net refrigerating capacity to the total input power at any given set of rating conditions. COPSHC applies to units that are operating in a manner that uses both the net heating and refrigerating capacities generated during operation. COPSHC takes into account the beneficial capacity as well as the heating capacity.	A	A	
63		3.2	Definition: site		New definition: an area of land that is under the control of a single owner or entity, which contains systems or equipment.	A	A	

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64		3.2	Definition: site-solar energy		Deleted definition: thermal, chemical, or electrical energy derived from direct conversion of incident solar radiation at the building site and used to offset consumption of purchased fuel or electrical energy supplies. For the purposes of applying this standard, site-solar energy shall not include passive heat gain through fenestration systems.	A	A	
65		3.2	Definition: Skylight effective aperature	N	Reference number changed under Skylight VT (5.8.2.6)	A	A	
66		3.2	Definition: south-oriented		New definition: facing within 45 degrees of true south in the northern hemisphere; facing within 45 degrees of true north in the southern hemisphere.	A	A	
67	1323.0320.	3.2	Definition: Standard	Y	Minnesota added definition: “this standard” means the Minnesota Commercial Energy Code, Minnesota Rules, 1323.	A	A	
68		3.2	Definition: structure		New definition: that which is built or constructed.	A	A	
69		3.2	Definition: thermal bridge		New definition: an element that has higher thermal conductivity than the surrounding materials, which creates a path of least resistance for heat transfer. For the purposes of determining building envelope requirements, the classifications for thermal bridges are defined as follows:	A	A	
70		3.2	Definition: clear-field thermal bridge		New definition: elements of a building envelope assembly that are distributed over the area of the assembly and addressed in determining the thermal performance of the assembly in accordance with Normative Appendix A. Examples of clear-field thermal bridges include studs, webs and face shells of masonry units, ties, tracks, plates, girts and purlins for metal building envelopes, and fasteners. Fasteners used to construct assemblies in accordance with Normative Appendix A are not considered nor separately defined as point thermal bridges.	A	A	

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71		3.2	Definition: linear thermal bridge		New definition: a length-based element associated with horizontal, vertical, or diagonal elements that penetrates the insulation in the building envelope and with length measured along the exterior surface of the building envelope. Examples of linear thermal bridges include edges of floors, balconies, columns and beams in the plane of an assembly, parapets, roof-wall-floor intersections, fenestration interfaces, shelf angles, and similar conditions not otherwise defined as a clear field thermal bridge or point thermal bridge.	A	A	
72		3.2	Definition: point thermal bridge		New definition: a discrete element that penetrates the insulation in the building envelope. Examples of point thermal bridges include a beam penetrating a wall, a column penetrating a roof or floor, and an anchor or connection used to attach an element to the building and not otherwise defined as a clear field thermal bridge or linear thermal bridge. The cross-sectional area of the point thermal bridge is measured at the outer surface of the outermost layer of insulation that is penetrated by the element.	A	A	
73		3.2	Definition: total system performance ratio (TSPR)		New definition: ratio of the sum of a building's annual heating and cooling load in kBtu to the sum of annual energy input of the building mechanical systems, where the input units are in accordance with Section L5.	A	A	
74		3.2	Definition: trim compressor		New definition: a compressor that is designated for part-load operation, handling the short-term variable trim load of end uses in addition to the fully loaded base compressors.	A	A	
75		3.2	Definition: TSPR reference building design		New definition: a computer representation of a hypothetical building design based on modifications to the proposed design in accordance with Section L4.3. This representation is used as the basis for calculating the mechanical total system performance ratio for determining alternative mechanical system performance in accordance with Section 6.6.2.	A	A	

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76		3.2	Definition: west-oriented		New definition: facing within 45 degrees of true west to the south and within less than 22.5 degrees of true west to the north in the northern hemisphere; facing within 45 degrees of true west to the north and within less than 22.5 degrees of true west to the south in the southern hemisphere.	A	A	
77		3.3	Abbreviations and Acronyms		New information: χ chi-factor, thermal transmittance of a point thermal bridge			
78		3.3	Abbreviations and Acronyms		New information: Ψ psi-factor, thermal transmittance per unit length of a linear thermal bridge			
79		3.3	Abbreviations and Acronyms		Minor change: (fan) bhp (fan) brake horsepower			
80		3.3	Abbreviations and Acronyms		Removed information: CCOPc combined coefficient of performance			
81		3.3	Abbreviations and Acronyms		New information: CEER combined energy efficiency ratio			
82		3.3	Abbreviations and Acronyms		New information: CFEI ceiling fan energy index			
83		3.3	Abbreviations and Acronyms		New information: CHW chilled water			
84		3.3	Abbreviations and Acronyms		New information: CHWST chilled-water supply temperature			
85		3.3	Abbreviations and Acronyms		New information: COPH coefficient of performance, heat pump—heating			
86		3.3	Abbreviations and Acronyms		New information: COPHR heat recovery coefficient of performance			
87		3.3	Abbreviations and Acronyms		New information: COPSHC simultaneous cooling and heating coefficient of performance			
88		3.3	Abbreviations and Acronyms		New information: CV constant volume			

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89		3.3	Abbreviations and Acronyms		New information: DOAS dedicated outdoor air system			
90		3.3	Abbreviations and Acronyms		Minor change: EER/EER2 energy efficiency ratio			
91		3.3	Abbreviations and Acronyms		New information: ER energy recovery			
92		3.3	Abbreviations and Acronyms		New information: FL full-load			
93		3.3	Abbreviations and Acronyms		New information: FPTU fan-powered terminal unit			
94		3.3	Abbreviations and Acronyms		New information: HW heating water			
95		3.3	Abbreviations and Acronyms		New information: HWST heating-water supply temperature			
96		3.3	Abbreviations and Acronyms		Minor change: HSPF/**HSPF2** heating seasonal performance factor			
97		3.3	Abbreviations and Acronyms		New information: L length of a linear thermal bridge			
98		3.3	Abbreviations and Acronyms		New information: LPA maximum lighting power allowance in watts (W)			
99		3.3	Abbreviations and Acronyms		New information: min. minimum			
100		3.3	Abbreviations and Acronyms		New information: MPF mechanical performance factor			
101		3.3	Abbreviations and Acronyms		New information: n number of occurrences a point thermal bridge			
102		3.3	Abbreviations and Acronyms		Minor change: NPLV**.IP** nonstandard part-load value			
103		3.3	Abbreviations and Acronyms		New information: OAT outdoor air temperature (dry-bulb unless wet-bulb is specified)			
104		3.3	Abbreviations and Acronyms		New information: OA outdoor air			
105		3.3	Abbreviations and Acronyms		New information: PFP parallel fan-powered			

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106		3.3	Abbreviations and Acronyms		New information: PPE photosynthetic photon efficacy			
107		3.3	Abbreviations and Acronyms		New information: PSZ-AC packaged single-zone air conditioner			
108		3.3	Abbreviations and Acronyms		New information: PSZ-HP packaged single-zone heat pump			
109		3.3	Abbreviations and Acronyms		New information: RAT return air temperature (dry-bulb unless wet-bulb is specified)			
110		3.3	Abbreviations and Acronyms		New information: SAT supply air temperature (dry-bulb unless wet-bulb is specified)			
111		3.3	Abbreviations and Acronyms		Deleted information: SCOP seasonal coefficient of performance			
112		3.3	Abbreviations and Acronyms		Minor change.SEER/SEER2 seasonal energy efficiency ratio			
113		3.3	Abbreviations and Acronyms		New information: SHW service hot water			
114		3.3	Abbreviations and Acronyms		New information: SZ single zone			
115		3.3	Abbreviations and Acronyms		New information: TDA total display area			
116		3.3	Abbreviations and Acronyms		New information: TSPR total system performance ratio			
117		3.3	Abbreviations and Acronyms		New information: TSPRp TSPR of a proposed design			
118		3.3	Abbreviations and Acronyms		New information: TSPRr TSPR of a TSPR reference building design			
119		3.3	Abbreviations and Acronyms		Deleted information: UL Underwriters Laboratories Inc.			
120		3.3	Abbreviations and Acronyms		New information: VSD variable-speed drive			

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121		4.1.1.6	Sites and New Site Systems and Equipment		New section: Sites, with or without a contiguous building or buildings, and site systems and equipment using or producing energy, such as site lighting, motors for pumps (for example, fountain pumps and water movement equipment), and transportation equipment (for example, elevators and escalators) shall comply with the standard as described in Section 4.2 for systems and equipment specifically identified in the standard.		A	
122	1323.4.1.1.6		Mixed Occupancy		Existing amendment: Each occupancy in a building more than three stories above grade will be considered separately and meet the applicable provisions of this standard. Where a building is three stories or less in height and includes both I-1, R-1, R-2, R-3, or R-4 occupancies and other occupancies, the I-1, R-1, R-2, R-3, or R-4 occupancies shall comply with Minnesota Rules, chapter 1322, and the other occupancies shall meet the applicable provisions of this standard. For the purposes of this section, fire walls and horizontal assemblies shall not define separate buildings.		A	Discussed potential scoping changes. May need to revisit.
123		4.2.1.1	New buildings	N	Minor changes to a. removed the words "section" before numbers 6-11: Sections 5, “Building Envelope”; 6, “Heating, Ventilating, and Air Conditioning”; 7, “Service Water Heating”; 8, “Power”; 9, “Lighting”; 10, “Other Equipment”; and 11, “Additional Efficiency Requirements,” or		A	
124		4.2.1.1	BPF	Y	Added language: building performance factor from Table 4.2.1.1. For building area types not listed in Table 4.2.1.1, use “All others.” Where a building has multiple building area types, the required BPF shall be equal to the area-weighted average of the building area types based on their gross floor area. **Where a project includes an existing building and an addition, the required BPF shall be equal to the area-weighted average, based on the gross floor area, of the existing building BPF determined as described in Section 4.2.1.3 and the addition BPF from Table 4.2.1.1**		A	
125	1323.4.2.1.1		BPF	Y	Minnesota amendment: BPF = building performance factor from Table 4.2.1.1. For building area types not listed in Table 4.2.1.1 use “All others.” Where a building has multiple building area types, the required BPF shall be equal to the area-weighted average of the building area types based on their gross floor area.			
126		4.2.1.1	BBREC	N	New acronym.			
127		4.2.1.1	PRE		New section: PBPnre – PBPpre			
128		4.2.1.1	PNA		Deleted section: proposed renewable energy contribution not allowed for compliance.			

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129		4.2.1.1	PBPpre		New section: proposed building performance, excluding any renewable energy system in the proposed design and including an on-site renewable energy system that meets but does not exceed the requirements of Section 10.5.1.1 modeled following the requirements for a budget building design in Table 12.5.1, row 15			
130		Table 4.2.1.1	Building Performance Factor (BPF)		Numbers in the table have changed. Delete CZs not in MN?			
131		4.2.1.1	Informative Notes		New information: 1. PBPnre = proposed building performance, no renewable energy. 2. PBPpre = proposed building performance, prescriptive renewable energy. 3. PRE = prescriptive renewable energy. 4. See Informative Appendix I for using other metrics, including site energy, source energy, and carbon emissions, in conjunction with the Normative Appendix G Performance Rating Method when approved by the rating authority.			
132		4.2.1.2	Additions to Existing Buildings.		Minor changes to a. removed the words "section" before numbers 6-11: Sections 5, “Building Envelope”; 6, “Heating, Ventilating, and Air Conditioning”; 7, “Service Water Heating”; 8, “Power”; 9, “Lighting”; 10, “Other Equipment”; and 11, “Additional Efficiency Requirements,” or		A	

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133		4.2.1.3	Alterations of Existing Building Assemblies, Systems, and Equipment	Y	New language: a. Sections 5, “Building Envelope”; 6, “Heating, Ventilating, and Air Conditioning”; 7, “Service Water Heating”; 8, “Power”; 9, “Lighting”; 10, “Other Equipment”; and 11, “Additional Efficiency Requirements,” or b. Section 12, “Energy Cost Budget Method,” or c. Normative Appendix G, “Performance Rating Method,” in accordance with Section 4.2.1.1 with the following modifications: 1. Alterations that meet the criteria in Section G3.1.4(a) shall use the BPF from Table 4.2.1.1 multiplied by 1.05. 2. All other alterations modeled following Section G3.3 shall use BPF = 1. **Exceptions to 4.2.1.3:** A building that has been specifically designated as historically significant by the adopting authority or is listed in The National Register of Historic Places or has been determined to be eligible for listing by the U.S. Secretary of the Interior need not comply with these		A + Amendments	
134	1323.4.2.1.3	4.2.1.3	Alterations of Existing Building Assemblies, Systems, and Equipment		**Minnesota amendment:** Alterations of an existing building, building system, or portion thereof shall conform to this standard as related to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this standard. Alterations shall not create an unsafe or hazardous condition or overload existing building systems. Alterations of existing buildings shall comply with the provisions of Sections 4.2.2 through 4.2.5 and one of the following: a.Section 5, “Building Envelope”; Section 6, “Heating, Ventilating, and Air Conditioning”; Section 7, “Service Water Heating”; Section 8, “Power”; Section 9, “Lighting”; and Section 10, “Other Equipment”; b.Section 11, “Energy Cost Budget Method”; or c.Normative Appendix G, “Performance Rating Method” in accordance with Section 4.2.1.1. Exception to 4.2.1.3 A historical building shall comply with this standard to the greatest extent possible without requiring alteration of elements or features determined to be historic by the historic authority having jurisdiction. Exempted components, elements, or systems shall be specifically identified on the construction documents by the designer as historic and exempt.		A + Amendments	
135		4.2.1.4	New Sites and New Site Systems and Equipment.		New section: a. Sections 6, “Heating, Ventilating, and Air Conditioning”; 7, “Service Water Heating”; 8, “Power”; 9, “Lighting”; and 10, “Other Equipment,” or b. Section 12, “Energy Cost Budget Method.”		A	

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136		4.2.1.5	Additions and Alterations to Existing Sites and Site Systems and Equipment		New section: Additions and alterations to existing sites and existing site systems and equipment shall comply with the provisions of Sections 5, 6, 7, 8, 9, and 10, or Section 11. This section shall not apply to buildings on the site where the alterations or additions are to be performed except as required by Sections 4.2.1.2 and 4.2.1.3		A	
137	1323.4.2.1.4		Change of Occupancy or Use	Y	All spaces undergoing a change in occupancy shall comply with lighting requirements of section 9 as for new construction. Spaces undergoing a change in occupancy that result in an increase in demand for either fossil fuel or electrical energy shall comply with this standard. Exceptions to 4.2.1.4: 1. A historical building shall comply with this standard to the greatest extent possible without requiring alteration of elements or features determined to be historic by the historic authority having jurisdiction. Exempted components, elements, or systems shall be specifically identified by the designer as historic and exempt. 2. Change of occupancy requirements associated with a tenant space within a multi-tenant building shall not be required to modify equipment common to multiple tenants or	Propose as 4.2.1.6		
138	1323.4.2.1.4		Change of Occupancy or Group		**Minnesota amendment:** All spaces undergoing a change in occupancy shall comply with lighting requirements of section 9 as for new construction. Spaces undergoing a change in occupancy that result in an increase in demand for either fossil fuel or electrical energy shall comply with this standard. Exceptions to 4.2.1.4: 1.A historical building shall comply with this standard to the greatest extent possible without requiring alteration of elements or features determined to be historic by the historic authority having jurisdiction. Exempted components, elements, or systems shall be specifically identified by the designer as historic and exempt. 2.Change of occupancy requirements associated with a tenant space within a multi-tenant building shall not be required to modify equipment common to multiple tenants or	State as 4.2.1.6	A	

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4				Y or N				
5								
139		4.2.4	Inspections		New section: All building construction, additions, or alterations work subject to the provisions of this standard shall remain accessible and exposed for inspection purposes until approved in accordance with the procedures specified by the building official. The building official, upon notification, shall make the inspections set forth in Section 4.2.4.1 through 4.2.4.6.		A	
140		4.2.4.1	Fenestration Inspections.		New section: Fenestration shall be inspected in accordance with the compliance path selected in Section 4.2.1 and approved documentation provided in Section 4.2.2.		A	
141		4.2.4.2	Opaque Assembly Thermal Insulation Inspections.		New section: Opaque assemblies shall be inspected in accordance with the compliance path selected in Section 4.2.1 and approved documentation provided in Section 4.2.2		A	
142		4.2.4.3	Continuous-Air-Barrier Inspections		New section: Where a continuous air barrier is installed as a component of an opaque roof, above-grade walls and below-grade walls, or floors, it shall be inspected for compliance in accordance with Section 5.8.3.1. Integration with adjoining fenestration and other continuous air barrier elements shall be in accordance with Section 5.4.3.1.		A	
143		4.2.4.4	Operable Fenestration and Door Inspections.		New section: Fenestration and door closers, inclusive of operating mechanisms, shall be installed in accordance with the manufacturer's installation instructions. Associated seals and gaskets shall be installed in accordance with the manufacturer's installation instructions and consistent with the provisions of Section 5.4.3.		A	
144		4.2.4.5	Loading-Dock Weatherseals Inspections.		New section: Loading-dock weatherseals shall be inspected for installation and to verify that the seals are in good condition.		A	
145		4.2.4.6	Other Inspections		New section: Other inspections related to mechanical, plumbing, lighting, and other equipment shall be inspected in accordance with the compliance path selected in Section 4.2.1 and approved documentation provided in Section 4.2.2, or as otherwise required by the building official.		A	
146		4.2.5	Verification, Testing, and Commissioning.		Added Informative note 1: There are additional requirements within specific sections of this standard regarding documentation, procedures, independence of providers, and reporting. Requirements in individual sections are in addition to the general requirements provided in Section 4.2.5.		A	

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147	1323.4.2.5.1.1	4.2.5.1.1	Information on Building Permit Application		**Minnesota amendment:** The following information shall be included on the construction documents as part of the building permit application: a.For systems that are required to comply with Section 4.2.5.1, the construction documents shall identify verification and testing providers; b.Verification and testing providers shall review the construction documents to verify that the relevant sensor locations, devices, and control sequences are properly specified; performance and testing criteria are included; and equipment to be tested is accessible for testing and maintenance; c.Functional performance testing and verification processes and system performance requirements shall be incorporated into the construction documents; d.Energy code compliance path (Prescriptive, Energy Cost Budget Method, Normative Appendix G); e.Insulation materials and their R-values; f.Fenestration U-factors and SHGCs; g.Area-weighted U-factor and SHGC calculations; h.Mechanical system design criteria; i.Mechanical and service water heating system and equipment types, sizes, and efficiencies;		A	
148	1323.4.2.5.1.1	4.2.5.1.1	Information on Building Permit Application		**Minnesota amendment continued:** j.Economizer description; equipment and systems controls; k.Fan motor brake horsepower for fan motors one horsepower (hp) or larger; l.Fan motor horsepower and controls; m.Duct sealing, duct sizing, duct and pipe insulation and location, terminal air or water design flow rates; n.Electrical distribution diagram(s); o.Lighting fixture schedule with wattage and control narrative; p.Locations of daylight zones on plans and provisions for functional testing of lighting controls; q.Air sealing details clearly delineating the air barrier location and showing continuity between roof, wall, foundation, around frames and sleeves, and at other similar openings; and r.Additional details as required by the building official to determine whether the work proposed will conform to this standard.		A	CEE may add items to this list.

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149		4.2.5.2	Building Commissioning Requirements		New language: 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, 12.2(e), and G1.2.1(f). 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. The commissioning provider shall have the necessary training, experience, and FPT equipment. The commissioning team shall include V&T providers. The commissioning provider shall be (a) a third-party entity not associated with the building project, (b) owner's qualified employees, or (c) an individual associated with the design firm or contractor but not directly associated with design or installation of the building systems, controls, or building envelope being commissioned.		A	
150		4.2.5.3, item a.	Activities prior to Building Occupancy		Change to reference - 4.2.5.1.		A	
151		5.1.2	New buildings		New language: Building envelope components installed in new buildings shall comply with the requirements of Section 5.2.		A	
152	NA	5.1.3	Additions to Existing Buildings.		New language: Building envelope components installed in additions shall comply with the requirements of Section 5.2.		A	

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153	5.1.3	5.1.4	Alterations to Existing Buildings (Part 1)	Y	Changes to the following and is section 5.1.3 in the 2024 MCE.: Alterations to the building envelope shall comply with the requirements of Section 5.2 for insulation, air leakage, and fenestration applicable to those specific portions of the building that are being altered. Exceptions: 3. Alterations to roof, wall, or floor cavities that are insulated to full depth with insulation having a minimum nominal value of R-3.0/in. and having either integral vapor retarder qualities or a membrane vapor retarder. The membrane vapor retarder shall prevent moisture from accumulating in the cavities and allow drying to the interior and shall be installed to separate the insulation from the conditioned space in accordance with the Minnesota Building Code. 6. Roof replacements, where the existing roof insulation is integral to or is located below the roof deck. 7. Roof replacement, provided the area of the replacement roof covering complies with the opaque element requirements for roofs in Tables 5.5-0 through 5.5-8 and Section 5.5.3.1.4.		AM	Rachel Spires will bring forward CCP to delete '22 - 5.1.4 exception #9, and rewrite #3, and propose to group. Adjust model language, and maintain amendment #9 under 5.1.3 and move under 5.1.4.1.

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154	5.1.3	5.1.4	Alterations to Existing Buildings (Part 2)	Y	8. Replacement of existing doors that separate a conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided that an existing vestibule that separates a conditioned space from the exterior shall not be removed. 8. (MN amendment to #8) Historical buildings undergoing renovations or a change of occupancy shall not be required to comply with this rules chapter for those portions or elements of the building determined by the historical authority having jurisdiction as contributing to the historic significance of the building and upon approval of the building official. Portions or components that can be modified to comply with this rules chapter without impacting the historic significance of the building shall be modified to comply to the greatest extent possible. 9. (New) Replacement of existing fenestration, provided that the area of the replacement fenestration does not exceed 25% of the total fenestration area of an existing building and that the U-factor and SHGC will be equal to or lower than before the fenestration repl.acement. 9. (MN Amendment to #9) Where insulation is provided above the roof deck, and the required R-value for a roof replacement cannot be provided because of existing structural capacity limitations or because of the thickness limitations that occur with the existing rooftop conditions, including heating, ventilation and air conditioning equipment curbs, low door or glazing heights, parapet heights, or proper roof flashing heights, the maximum insulation compatible with the available space and existing rooftop conditions shall be installed, as approved by the building official. New insulation shall have the highest R-value per inch available, and in no case shall the R-value of the roof insulation be reduced or the U-factor of the roof assembly be increased as part of the roof replacement.			Rachel Spires will bring forward CCP to delete '22 - 5.1.4 exception #9, and rewrite #3, and propose to group. Adjust model language, and maintain amendment #9 under 5.1.3 and move under 5.1.4.1.
155	NA	5.1.4.1	Roof Replacement for Roofs with Insulation Entirely Above Deck.		New section: Roof replacement for roofs with insulation entirely above deck shall comply with Section 5.5.3.1~~, shall not be required to comply with the requirements of Section 5.4.3, and shall not increase the energy use of the building. Where the insulation requirements in Section 5.5.3.1.1 cannot be met due to existing roof conditions, the roof replacement shall be constructed in accordance with approved construction documents, which shall include~~ ~~a. a roof inspection report documenting existing roof conditions and~~ ~~b. a roof design minimizing deviation from the requirements of Section 5.5.3.1.1.~~ ~~Informative Note: The proposed roof design should be prepared by an approved entity capable of determining~~ ~~whether the design complies with the requirements of Section 5.1.4.1 to the extent~~		AM	See previous note on Exception for roof insulation. Delete struck text.

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156	1323.5.1.4	5.1.5	Climate		Minnesota amendment: 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, Mahnomen, Marshall, Norman, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, and Wadena. All other counties are located in climate zone 6A.		AM	Delete model language and carry forward MN Amendment.
157	5.1.4	5.1.5.1	Climate		New content.	Delete		Delete
158	5.1.4	5.1.5.2	Climate		New content.	Delete		Delete
159	5.1.2.1	5.1.6.1	Space Conditioning Categories		Change to section number only, no technical change.	A	A	
160	5.1.2.2	5.1.6.2	Space Conditioning Categories		Change to section number only, no technical change.	A	A	
161	5.1.2.3	5.1.6.3	Space Conditioning Categories		No change to main section, but MN added amendment to the exception: Minnesota amendment in red: Exception to MCE '24 - 5.1.2.3 ('22 - 5.1.6.3) A space may be designated as either a semiheated space or an unconditioned space if approved by the building official. Unconditioned and semiheated spaces shall not be approved if there are automatic fire sprinkler systems unless those systems are designed to operate in below-freezing temperatures. Signs indicating the maximum Btu heating input for semiheated spaces that is permissible by this standard shall be posted near the main entry location of the semiheated space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or the owner's authorizing agent.		AM	Amend exception to add MN language from '24 MCE 5.1.2.3 here.
162	5.4.3	5.4.3	Air Leakage		New language: b. The exterior building envelope and the semiexterior building envelope shall have a continuous air barrier complying with Sections 5.4.3.1 and 5.4.3.2. ~~Exceptions to 5.4.3(b):~~ ~~1. Semiheated spaces in Climate Zones 0 through 6, except as required to complete the continuous air barrier of an adjacent conditioned space.~~ ~~2. Single wythe concrete masonry buildings in Climate Zone 2B.~~		AM	Delete exceptions #1&2 as struck, Chris R to draft CCP.
163	5.4.3.1	5.4.3.1	Whole-Building Air Leakage		This entire section has been changed and leak rates have reduced. Review.		TABLE	Forthcoming CCP from CEE - Russ Landry to review.

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164	5.4.3.1.1		Whole-Building Air Leakage		Minnesota Amendment: 5.4.3.1.1 Exception #4. For buildings or portions of buildings enclosing Group R or Group I occupancies, the measured air leakage shall not exceed 0.30 cfm/ft2(1.5 L/s m2) of the testing unit enclosure area at a pressure differential of 0.2 inch water gauge (50 Pa). Where multiple dwelling units or sleeping units or other occupiable conditioned spaces are contained within one building thermal envelope, each unit shall be considered an individual testing unit, and the building air leakage shall be the weighted average of all testing unit results, weighted by each testing unit's enclosure area. Units shall be tested separately with an unguarded blower door test as follows: a.Where buildings have fewer than eight testing units, each testing unit shall be tested. b.For buildings with eight or more testing units, the greater of seven units or 20 percent of the testing units in the building shall be tested, including a top floor unit, a ground floor unit, and a unit with the largest testing unit enclosure area. For each tested unit that exceeds the maximum air leakage rate, an additional two units shall be tested, including a mixture of testing unit types and locations		TABLE	Forthcoming CCP from CEE - Russ Landry to review.
165		5.4.3.1.4 (Part 1)	Measured Air Leakage.		Changed section: Where measured air leakage is used for compliance, the rate of airleakage of the building envelope shall not exceed 0.35 cfm/ft2 under a pressure differential of 75 Pa (0.30 in. of water), with this air leakage rate normalized by the sum of the above-grade and below-grade building envelope areas of the conditioned space and semiheated space and in accordance with this section. a. Whole-building pressurization testing shall be conducted in accordance with ASTM E3158. For buildings less than 10,000 ft2 of gross conditioned floor area, and that contain no more than one single-zone system, air leakage testing may be conducted in accordance with ASTM E779, ASTM E1827, or ASTM E3158. Testing shall be conducted excluding HVAC related elements and be performed by an independent thirdparty verification and testing provider in accordance with Section 4.2.5.1. b. Where a building contains both conditioned space and semiheated space, compliance shall be shown using one of the following as applicable: 1. Separately for the conditioned space and for the semiheated space, with the air leakage rate for the conditioned space normalized by the exterior building envelope area of the conditioned space and the air leakage rate for the semiheated space normalized by			

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166		5.4.3.1.4 (Part 2)	Measured Air Leakage.		(Changed section continued): 2. For the conditioned space and for the semiheated space together, with the air leakage rate for the overall space normalized by the sum of the exterior building envelope area and the semiexterior building envelope area minus the semiexterior building envelope area that separates the conditioned space from the semiheated space c. Where the measured air leakage rate exceeds 0.35 cfm/ft2 but does not exceed 0.45 cfm/ft2, a diagnostic evaluation, such as a smoke tracer or infrared imaging, shall be conducted while the building is pressurized, and any leaks noted shall be sealed if such sealing can be made without destruction of existing building components. In addition, a visual inspection of the air barrier shall be conducted, and any leaks noted shall be sealed if such sealing can be made without destruction of existing building components.An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner and shall be deemed to satisfy the requirements of this section. d. Where the measured air leakage rate exceeds 0.45 cfm/ft2, corrective actions must be made to the envelope and an additional test completed where results are 0.45 cfm/ft2 or less in order to demonstrate compliance.			

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167	5.4.3.1.2	5.4.3.2	Continuous Air Barrier Design and Installation		Changes to the following: c. The continuous air barrier shall extend over all surfaces of the building envelope and be identified in the construction documents to be continuous across the components of the below-grade areas, walls, fenestration, doors, and roofs. e. The following areas of the continuous air barrier in the building envelope shall be wrapped, sealed, caulked, gasketed, or taped in an approved manner to minimize air leakage: 1. Joints around fenestration and door frames 2. Junctions between walls and floors; between walls at building corners; between walls and roofs, including parapets and copings; and walls at foundations 3. Penetrations through the continuous air barrier in building envelope roofs, walls, and floors 4. Building assemblies used as ducts or plenums 5. Joints, seams, connections between planes, and other changes in continuous air barrier materials 6. Building and service components projecting through or attached through the continuous air barrier 7. Junctions of the continuous air barrier that separate conditioned spaces from unconditioned spaces, semiheated spaces, and areas that are not enclosed spaces		A	
168	5.4.3.2	5.4.3.3	Loading Dock Weatherseals		Minor changes: In Climate Zones 0 and 4 through 8, cargo doors and loading dock doors shall be equipped with weatherseals to restrict air leakage when vehicles are parked in the doorway.		A	
169	End of Meeting #2, 4/15/2025							
170	5.4.3.3.3	5.4.3.4.3	Vestibule Envelope		Changes to section references only: 9. Self-closing doors in buildings in Climate Zones 0, 3, and 4 that have an air curtain unit complying with Sections 6.4.3.9 and 10.4.5. 10. Self-closing doors in buildings 15 stories or less in Climate Zones 5 through 8 that have an air curtain unit complying with Sections 6.4.3.9 and 10.4.5.	Delete #3,6,9		
171	5.4.3.3.4	5.4.3.4.4	Vestibules for Large Spaces		Minor changes: Where vestibules are required under Sections 5.4.3.4 and 10.4.5, for spaces having a gross conditioned floor area for that level of the building of 40,000 ft2 and greater, and when the doors opening into and out of the vestibule are equipped with automatic, electrically driven, self-closing devices, the interior and exterior doors shall have a minimum distance between them of not less than 16 ft.	A		

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172	5.5.3	5.5.3	Opaque Elements		Changes to the following: For all opaque elements, compliance with Tables 5.5-0 through 5.5-8 for each class of construction as described in Normative Appendix A, Sections A2 through A8 shall be demonstrated by one of the following two methods: a. Providing a minimum rated R-value of insulation added to the assembly equal to or greater than the insulation minimum R-value required of each insulation component. b. Providing insulation such that the maximum U-factor, C-factor, or F-factor for the entire assembly is not exceeded as determined by one of the following: 1. Precalculated values in accordance with Normative Appendix A, Section A1.1. 2. Applicant-determined values in accordance with Normative Appendix A, Section A1.2 where such values are approved by the code official. Exceptions to 5.5.3: 1. For opaque assemblies not complying with the classes of construction as described in Normative Appendix A, Sections A2 through A8, compliance with the maximum U-factors for the “attic and other” or “wood frame and other” opaque element conditions in Tables 5.5-0 through 5.5-8 shall be demonstrated by testing or calculations representative of the designed assembly in accordance with Normative Appendix A, Section A9.1 where approved by the code official.			
173	5.5.3.1	5.5.3.1.1	Roof Insulation		Minnesota amended: 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 deck or R-10, whichever is less.~~ Exception to 5.5.3.1 Historical buildings with roof slopes two units vertical in 12 units horizontal (2:12) or less.	> Discuss. > Amend to remove references to the tables that get deleted. > Move amendment to 5.5.3.1.2		
174	5.5.3.1	5.5.3.1.2	Roof Curbs		New section: Skylight and other roof curbs shall be insulated to not less than R-5.0. Discuss and move MN amendment here: Skylight curbs, mechanical curbs, and other roof curbs shall be insulated to the level of roofs with insulation entirely above deck or R-10, whichever is less.	Discuss MN amendment		

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175	NA	5.5.3.1.3	Joints in Roof Insulation		New section: Joints in the insulation shall be installed in accordance with Section 5.8.1.10	A		
176	NA	5.5.3.1.4	Roof Solar Reflectance and Thermal Emittance		No application to MN CZs, delete.	Delete		
177	NA	5.5.3.1.5	Insulated Metal Panels		New section: The U-factor of roof assemblies that include insulated metal panels shall not be greater than the U-factors of Tables 5.5-0 through 5.5-8 for the applicable class of construction. U-factors of insulated metal panels shall be determined in accordance with Section A9.4.7.	A		
178	Tables 5.5 1-8	Tables 5.5 1-8	Building envelope requirements	N	Tables 5.5-1 thru 8	Delete 1-5 & 8. Accept 6&7 as written.		
179	5.5.3.2	5.5.3.2	Above-Grade Walls	N	Change to title and section: Above-grade walls shall comply with the insulation values specified in Tables 5.5-0 through 5.5-8. For the purposes of this provision, wall plates, tracks, headers, or bond beams are considered part of the base wall assembly. Exception to 5.5.3.2: For mass walls, where the requirement in Tables 5.5-0 through 5.5-8 is for a maximum assembly U-0.151 followed by footnote "b," concrete masonry unit (CMU) walls complying with ASTM C90 that are ungrouted or partially grouted at 32 in. or greater on center vertically and 48 in. or greater on center horizontally, shall have their ungrouted openings (e.g., cores, cells) filled with insulating material having a maximum thermal conductivity of 0.44 Btu-in./h-ft2-°F	A		
180	5.5.3.2	5.5.3.2.1	Walls That Are Both Above and Below Grade		No technical change, second set of items a&b for CZ 0 moved to 5.5.3.2.2 When a wall consists of both above-grade and below-grade portions, the entire wall for that story shall be insulated on either the exterior or the interior or be integral. a. If insulated on the interior, the wall shall be insulated to the above-grade wall requirements. b. If insulated on the exterior or integral, the below-grade wall portion shall be insulated to the below-grade wall requirements, and the above-grade wall portion shall be insulated to the above-grade wall requirements.			
181	5.5.3.2	5.5.3.2.2	Wall Solar Reflectance and Thermal Emittance	N	New section using mostly the same language pertaining to CZ-0. Delete, does not apply to MN.	Delete		

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182	NA	5.5.3.2.3	Insulated Metal Panels	N	New section: The U-factor of wall assemblies that include insulated metal panels shall not be greater than the U-factors of Tables 5.5-0 through 5.5-8 for the applicable class of construction. U-factors of insulated metal panels shall be determined in accordance with Section A9.4.7.	A		
183	5.5.3.3	5.5.3.3	Below-Grade Wall Insulation	Y	Minnesota amendment: Below-grade walls shall have a rated R-value of insulation no less than the insulation values specified in Tables 5.5-0 through 5.5-8. Walls shall be insulated on the exterior side of the wall or integral to the wall. Consider adding informative note to reference A4.1.	Accept and carry amendment forward.		
184	NA	5.5.3.4.2	Insulated Metal Panels	N	New section: The U-factor of floor assemblies that include insulated metal panels shall not be greater than the U-factors of Tables 5.5-0 through 5.5-8 for the applicable class of construction. U-factors of insulated metal panels shall be determined in accordance with Section A9.4.7.	A		
185	5.5.3.5	5.5.3.5	Slabs-on-grade	N	Amend to add informative note to refer to appendix A6?			
186		5.5.4.5	Fenestration Orientation	N	Changes to section, descriptions are now in section 3 definitions. Aw = west-oriented vertical fenestration area ~~(oriented within 45 degrees of true west to the south and within 22.5 degrees of true west to the north in the northern hemisphere; oriented within 45 degrees of true west to the north and within 22.5 degrees of true west to the south in the southern hemisphere)~~ Ae = east-oriented vertical fenestration area ~~(oriented within 45 degrees of true east to the south and within 22.5 degrees of true east to the north in the northern hemisphere; oriented within 45 degrees of true east to the north and within 22.5 and within 22.5 degrees of true east to the south in the southern hemisphere)~~			

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187	NA	5.5.5	Linear Thermal Bridges and Point Thermal Bridges	N	New section: Where thermal bridges occur as described in Sections 5.5.5.1 through 5.5.5.5, they shall a. comply with the applicable requirements of Sections 5.5.5.1 through 5.5.5.5 or b. not exceed the mitigated psi-factors and chi-factors in Table A10.1, where the psi-factors and chi-factors for the thermal bridges are determined in accordance with Normative Appendix A, Section A10. For the purposes of Section 5.5.5, linear elements that are connected to the building structure by a series of point connections shall be permitted to be characterized as linear thermal bridges or as individual point thermal bridges.Exceptions to 5.5.5: 1. Buildings located in Climate Zones 0 through 3. 2. Semiheated spaces in buildings located in Climate Zones 0 through 6. 3. Clear-field thermal bridges. 4. Thermal bridges in uninsulated assemblies. 5. Linear and point thermal bridges that have a material thermal conductivity less than 3.0 Btu·in/h·ft2·°F. 6. Alterations to existing buildings other than additions. 7. Roofs that project over exterior walls.Informative Note: For linear thermal bridges and point thermal bridges that fall under the provisions of Section 4.2 and cannot comply prescriptively with the provisions of Sections 5.5.5.1 through 5.5.5.4, projects can use			
188	NA	5.5.5.1	Roof and Wall Intersections		New section: Where a roof with insulation entirely above deck intersects an exterior wall, the intersection shall comply with Sections 5.5.5.1.1 through 5.5.5.1.3, as applicable. Blocking, nailers, and similar elements shall be permitted to interrupt insulation for securement of the roof covering, coping, flashing materials, or similar elements.			

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189	NA	5.5.5.1.1	Roof Edges	N	New section: At roof edges without parapets or overhangs, the roof insulation and the wall insulation shall comply with the following, as applicable to the location of the insulation: a. Where a wall has exterior continuous insulation, the roof insulation shall extend to the exterior of the wall insulation and the wall insulation shall extend to the roof insulation. b. Where a wall has cavity or integral insulation that represents more than 50% of the total wall insulation R-value, the roof-to-wall insulation shall comply with one of the following: 1. The cavity or integral insulation shall extend to the underside of the roof insulation. 2. The cavity or integral insulation shall extend to the under- side of the roof deck, and the roof insulation shall extend to the exterior face of the wall. The wall insulation shall be permitted to be interrupted by roof framing members. 3. Additional insulation having a rated R-value of insulation not less than R-5 shall extend inward on the underside of the roof deck for not less than 2 ft and be permitted to be interrupted by roof framing members. 4. Insulation having a rated R-value of insulation not less than R-5 shall be placed at the exterior of the roof edge and be located between the bottom plane of the roof insulation and the plane of the bottom of the roof deck. 5. The wall insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-1. 6. The roof insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-2.			
190	NA	Table 5.5.5.1.1.1	Roof Edges		New Table: Additional Wall Insulation Required for Mass Walls with Insulation on the Interior or Integral at Intersections with Roof Edges and Parapets Climate Zone- R-Value Increase- U-factor % Decrease 4 R-1.0 8% 5 R-1.0 8% 6 R-1.5 10% 7 R-1.5 10% 8 R-2.5 14%			

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191	NA	Table 5.5.5.1.1.1	Roof Edges	N	New Table: Additional Roof Insulation Required for Mass Walls with Insulation on the Interior or Integral at Intersections with Roof Edges and Parapets Climate Zone- R-Value Increase- U-factor % Decrease 4 R-7.0 24% 5 R-7.0 24% 6 R-7.0 26% 7 R-9.0 26% 8 R-9.0 26%			
192	NA	5.5.5.1.1	Roof Edges	N	New section continued: c. Where a mass wall has interior insulation that represents more than 50% of the total wall insulation Rvalue, the interior insulation shall extend to the underside of the roof deck, shall be permitted to be interrupted by framing members, and shall comply with one of the following: 1. Additional insulation having a rated R-value of insulation not less than R-5 shall extend inward on the underside of the roof deck for not less than 2 ft and be permitted to be interrupted by roof framing members. 2. Additional insulation having a rated R-value of insulation not less than R-5 shall be placed at the exterior of the roof edge and be located between the bottom plane of the roof insulation and the plane of the bottom of the roof assembly in contact with the exterior wall. 3. The wall insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-1. 4. The roof insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-2.			

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193	NA	5.5.5.1.2	Parapets	N	New section: At roof edges with parapets, the exterior wall insulation shall comply with one or more of the following as applicable to the location of the insulation and wall assembly: a. Where a wall has exterior continuous insulation, such insulation shall be applied to both vertical sides of the parapet. Informative Note: See Informative Appendix K, Figure K-2(a). b. Where a wall has cavity or integral insulation that represents more than 50% of the total wall insulation R-value, the roof to wall intersections at parapets shall comply with one of the following: 1. The wall insulation shall extend within the cavity of the parapet not less than the height of the top of the roof insulation. The wall insulation shall be permitted to be interrupted by roof framing members. 2. Additional insulation having a rated R-value of insulation not less than R-5 shall extend inward on the underside of the roof deck for not less than 2 ft and be permitted to be interrupted by roof framing members. 3. Insulation having a rated R-value of insulation not less than R-5 shall be placed at the exterior of the roof edge and be located between the bottom plane of the roof insulation and the plane of the bottom of the roof deck. 4. The wall insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in			

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194	NA	5.5.5.1.2	Parapets	N	New section continued: 5. The roof insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-2. Informative Note: See Informative Appendix K, Figure K-2(b). c. Where a mass wall has interior insulation that represents more than 50% of the total wall insulation Rvalue, the interior insulation shall extend to the underside of the roof deck, shall be permitted to be interrupted by framing members, and shall comply with one of the following: 1. Additional insulation having a rated R-value of insulation not less than R-5 shall extend inward on the underside of the roof deck for not less than 2 ft and be permitted to be interrupted by roof framing members. 2. Additional insulation having a rated R-value of insulation not less than R-5 shall be placed at the exterior of the roof edge and be located between the bottom plane of the roof insulation and the plane of the bottom of the roof assembly in contact with the exterior wall. 3. The wall insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-1. 4. The roof insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.1.1-2.			
195	NA	5.5.5.1.3	Parapets within the Field of a Roof.	N	New section: Exterior continuous insulation having a minimum rated R-value of insulation not less than R-5 shall be applied to both vertical sides of the parapet and extend from the coping at the top of the parapet to not less than the top of the roof insulation below. Informative Notes: 1. See Informative Appendix K, Figure K-3. 2. Parapets that are an integral part of a fire-resistance-rated wall, and the exterior continuous insulation applied to the parapet, shall comply with the fire resistance ratings of the building code.			
196	NA	5.5.5.2	Walls and Intermediate Floor Intersections	N	New section: At floor and exterior wall intersections, the exterior wall insulation shall comply with Sections 5.5.5.2.1 and 5.5.5.2.2 as applicable to the type of floor intersection, exterior wall assembly, and location of the exterior wall insulation.			

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197	NA	5.5.5.2.1	Walls and Intermediate Floor Intersections	N	New section: Intermediate floor edges that do not serve as balconies or floor overhangs shall comply with the following as applicable: a. Where a wall has exterior continuous insulation, such insulation shall extend continuously past the floor edge. b. Where a wall has cavity insulation that represents more than 50% of the total wall insulation R-value, the cavity insulation shall extend to the underside of the floor deck and shall be permitted to be interrupted by floor framing members and wall top and bottom plates or tracks. (Informative Note: See Informative Appendix K, Figures K-4[a] and K-4[b].) c. Where a mass wall has integral insulation that represents more than 50% of the total wall insulation Rvalue, the intermediate floor intersection shall comply with one of the following: 1. The full thickness of integral insulation shall extend past the floor edge. 2. Where the intermediate floor deck extends through the integral insulation, insulation having a rated R-value of insulation not less than R-5 shall be maintained to the full depth of the floor edge on the exterior side of the floor edge.			
198	NA	5.5.5.2.1	Walls and Intermediate Floor Intersections	N	New section continued: d. Where a mass wall has interior insulation that represents more than 50% of the total wall insulation Rvalue, the interior insulation shall extend to the underside of the floor deck, shall be permitted to be interrupted by framing members, and shall comply with one of the following: 1. Additional interior insulation having a rated R-value of insulation not less than R-5 shall cover the full depth of the floor edge. Such insulation shall be permitted to be interrupted by floor framing members. Fire safing applied to the full depth of the floor edge meets this requirement. 2. Additional insulation having a rated R-value of insulation not less than R-5 shall cover the full depth of the floor edge on the exterior side of the wall. 3. The wall insulation values in Tables 5.5-0 through 5.5-8 shall be adjusted in accordance with Table 5.5.5.2.1. Informative Note: See Informative Appendix K, Figures K-4(e) and K-4(f). e. Where mass walls have not less than 50% of the rated R-value of insulation on the exterior side of the wall and the remainder on the interior side, the insulation on the interior side of the wall shall be permitted to be interrupted by an intermediate floor.			

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199		5.5.5.2.2	Walls and Intermediate Floor Intersections		New section: The total length of mass floor assembly projections serving as balconies or floor overhangs that penetrate the building envelope shall not exceed the percentages of the total building perimeter depicted in Table 5.5.5.2.2. For this calculation, total building perimeter is the sum of the perimeters of each abovegrade floor where it intersects the exterior building envelope. Exceptions to 5.5.5.2.2: 1. Mass floor assembly projections located directly above and providing protection to a pedestrian walkway at street-level. 2. Mass floor assembly projections thermally broken with a continuous thermal spacer block not less than R-12. The thermal spacer block shall be permitted to be interrupted by			
200	NA	Table 5.5.5.2.1	Additional Wall Insulation Required for Mass Walls With Insulation on the Interior Complying with Section 5.5.5.2.1(d)(3)	N	New table: Climate Zone R-Value Increase U-factor % Decrease 4 R-1.5 13% 5 R-2.0 15% 6 R-2.5 16% 7 R-3.0 20% 8 R-4.0 25%			
201	NA	Table 5.5.5.2.2	Mass Floor Balcony or Floor Overhang Allowances	N	New table: Climate Zone Maximum Percent of Building Perimeter 4 35% 5 30% 6 20% 7 10% 8 0%			

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202	NA	5.5.5.3	Exterior Cladding Support		New Section: Shelf angles that support masonry exterior cladding shall be offset from the floor edge or primary structural frame using point connections to accommodate the full depth of any exterior continuous insulation between the support and floor or structure, exclusive of the point connections. The cross-sectional area of point connections shall not exceed 1.5 in.2/lin ft for carbon steel connections or 2.3 in.2/lin ft for stainless steel. Other cladding supports that penetrate the exterior continuous insulation shall be subject to the provisions of Section 5.5.5.5 and be mounted away from the backup construction using point connections to accommodate the full depth of any exterior continuous insulation exclusive of the point connections. Exception to 5.5.5.3: Girts in metal building walls as described in Normative Appendix A. (Informative Note: See Informative Appendix K, Figure K-5.)			
203	NA	5.5.5.4	Opaque Wall and Vertical Fenestration Intersection		New section: Vertical fenestration shall be installed in accordance with one or more of the following: a. For vertical fenestration, the outermost glazing layer shall be aligned within the thickness of or within 2 in. of either face of the continuous insulation layer. (Informative Note: See Informative Appendix K, Figures K-6[a] and K-6[b].) b. For vertical fenestration, where continuous insulation is not present, the outermost glazing layer shall be aligned within the thickness of the wall insulation layer and not more than 2 in. from the exterior side of the outermost insulation layer. (Informative Note: See Informative Appendix K, Figure K-6[c].) c. Intersections between vertical fenestration and opaque walls where the surfaces of the rough opening located between the edge of the frame of the vertical fenestration and the opaque wall insulation shall be 1. covered with a material having an R-value not less than R-3, or 2. covered with wood framing not less than 1.5 in. thick, or 3. covered with a material having a thermal conductivity of not more than 3.0 Btu·in/ h·ft2·°F. Informative Note: See Informative Appendix K, Figures K-6(d) and K-6(e). d. Intersections between vertical fenestration and opaque spandrel in a shared fenestration framing system shall have a thermal break with a thermal conductivity of 3.6 Btu·in/ h·ft2·°F or less. Exception to 5.5.5.4: Intersections between vertical fenestration and uninsulated opaque			

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204	NA	Table 5.5.5.5	Allowable Point Thermal Bridge Cross-Sectional Area		New Table: Allowable Area per Point Thermal Bridge, SI | Common Material Name 3 Carbon steel 9 Stainless steel 65 Concrete and masonry			
205	NA	5.5.5.5	Other Elements and Building Assembly Intersections		New section: Individual point thermal bridges and linear thermal bridges not addressed in Sections 5.5.5.1 through 5.5.5.4 shall comply with Equation 5.5.5.5. 347 Btu·in./(ft2·h·°F) × 0.003% × Above grade area of the building envelope ≥ (k1 × A1) + (k2 × A2) + (k3 × A3) … (5.5.5.5) where k1, k2, k3 … = thermal conductivity of material 1, material 2, material 3, etc., expressed in Btu·in./ (ft2·h·°F) for point thermal bridge material 1, material 2, material 3, etc. (e.g., concrete, carbon steel, stainless steel, wood) A1, A2, A3, … = the total cross-sectional area of point thermal bridges and linear thermal bridges of material 1, material 2, material 3, etc., expressed in ft2 Exceptions to 5.5.5.5: 1. Service penetrations, including mechanical, electrical, plumbing, telecommunications, and fire services, that pass through the opaque building envelope. 2. Insulated roof curbs and blocking. 3. Individual point thermal bridges that are less than the allowances in Table 5.5.5.5. (Informative Note: See ASHRAE Handbook—Fundamentals Appendix A, Chapter 26, or Chapter 33 for typical material thermal conductivity.)			

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206	5.6.1.1	5.6.1.1	Buildind Envelope Trade-Off Compliance Path	N	Minor changes: All components of the building envelope shown on architectural drawings or installed in existing buildings shall be modeled in the proposed design. The simulation program model fenestration and opaque building envelope types and area shall be consistent with the construction documents. Any building envelope assembly not subject to the provisions of Section 5.5.5 that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described, provided it is similar to an assembly being modeled. If not separately described, the area of a building envelope assembly shall be added to the area of an assembly of that same type with the same orientation and thermal properties.			
207		5.7.2	Permit Application Documentation		Application documents shall include, at a minimum, the type and rated R-value of insulation for each product; opaque door schedule showing the U-factor for each opaque door product as determined in accordance with Section 5.8.2; fenestration schedule showing the manufacturer, model number, orientation, area, U-factor, SHGC, and VT for each fenestration product, as determined in accordance with Section 5.8.2; air leakage details in accordance with Section 5.4.3; and point and linear thermal bridge details in the proposed building shall be represented on the compliance documents in accordance with Section 5.5.5. In addition: c. Identify air leakage compliance. Continuous air barrier compliance with whole-building pressurization testing in accordance with Section 5.4.3.1.4 or verification in accordance with Section 5.9.1.2 shall be clearly indicated on the construction documents.			
208	5.7.3.1	5.7.3.1	Record Documents	N	Change to section, language added. a. A report complying with Section 4.2.5.1.2 providing the results of continuous air barrier compliance with whole-building pressurization testing in accordance with Section 5.4.3.1.4 or verification of the building envelope in accordance with Section 5.9.1.2.			

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209	5.8.1.2	5.8.1.2	Manufacturer's Installation Instructions		Change to reference in #2: Exceptions to 5.8.1.2: 1. The R-value of compressed cavity insulation is determined in accordance with Table A9.4.3. 2. Where metal building roof or wall insulation is compressed between the steel structure and the metal roof or wall panels, the overall assembly U-factor is determined in accordance with Section A2.3, Section A3.2, or Section A9.4.6.			
210		5.8.2.3	Manufacturer's Installation Instructions		New section: Insulation materials shall be installed in accordance with the manufacturer's recommendations and in such a manner as to achieve the rated R-value of insulation.			
211	5.8.3.1	5.8.3.1	Testing, Acceptable Materials, and Assemblies.		Minor changes: Air leakage for materials or assemblies used as components of the continuous air barrier shall be determined in accordance with the test method and minimum air pressure specified in Table 5.8.3.1 and shall not exceed the maximum air leakage specified in Table 5.8.3.1 when complying with the continuous air barrier design and installation verification program in accordance with Section 5.9.1.2. Air leakage shall be determined by a laboratory accredited by a nationally recognized accreditation organization			
212	5.8.3.2	5.8.3.2	Fenestration and Doors		Minor changes: Air leakage for fenestration and doors shall be determined in accordance with the test method and minimum air pressure specified in Table 5.8.3.2 and shall not exceed the maximum air leakage specified in Table 5.8.3.2 when complying with the continuous air barrier design and installation verification program in accordance with Section 5.9.1.2. Air leakage shall be determined by a laboratory accredited by a nationally recognized accreditation organization and shall be labeled and certified by the manufacturer. Exceptions to 5.8.3.2 1. Field-fabricated fenestration and doors. 2. Metal coiling doors in semiheated spaces in Climate Zone 0 through 6 shall have an air leakage not exceeding 1.0 cfm/ft2 when tested at a pressure of at least 1.57 psf in accordance with ANSI/DASMA 105, NFRC 400, or ASTM E283. 3. Products in buildings that are tested and shown to comply with a whole-building air leakage in accordance with Section 5.4.3.1.4 ~~without using Exception 3~~.			

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5								
213	5.9.1.1	5.9.1.1	Building Envelope Performance Verification		Changes to section: The building envelope shall be verified in accordance with Sections 5.9.1.2 through 5.9.1.3 and 4.2.5.1			
214	5.9.1.2	5.9.1.2	Verification of the Design and Installation of the Continuous Air Barrier		Section has been rewritten with content added. Where verification of the design and installation of the continuous air barrier is used for compliance in Section 5.4.3.1, it shall be determined in accordance with the following: a. Requirements for a field inspection plan shall be included in the construction documents and shall include as a minimum the following: 1. Schedule for periodic inspection(s) 2. Continuous air barrier scope of work 3. List of critical inspection items 4. Inspection document requirements 5. Provisions for corrective actions when needed b. An independent third-party V&T provider in accordance with Section 4.2.5.1 shall conduct reviews and inspections as follows: 1. A design review shall be conducted to verify and document compliance with the requirements in Sections 5.4.3 and 5.8.3.2. 2. Periodic field inspection of the continuous air barrier materials and assemblies shall be conducted during construction while the continuous air barrier is still accessible for inspection and repair to verify and document compliance with the requirements of Section 5.4.3.2 and 5.8.3 and the field inspection plan. 3. Verification and FPT documentation shall comply with Section 4.2.5.1.2 and the field inspection plan.			
215	NA	5.9.1.3	Dynamic Glazing		New section: Dynamic glazing operation shall be tested for conformance with the manufacturer's installation instructions.			
216	NA	5.9.1.4	Air Curtains		New section: Air curtains shall comply with Section 10.4.5			
217	5.9.3	NA	Inspections		Section deleted: In addition to the requirements of Section 4.2.4, building envelope components and assemblies shall be inspected in accordance with Sections 5.9.3.1 through 5.9.3.4. Informative Note See Informative Appendices E and H for commissioning references and guidance.			

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218	5.9.3.1	NA	Inspection of Fenestration and Door Requirements		Section deleted: Fenestration and doors shall be inspected to verify compliance with the requirements of Sections 5.4.3.2, 5.8.2.1, 5.8.2.2, and 5.8.2.3. Where testing is required to demonstrate compliance with the air leakage requirements, it shall be conducted by an independent third party. Operation of the door and closer or operating mechanism shall be inspected for conformance with the manufacturer's instructions, and that the seals or gaskets are installed and in accordance with the manufacturer's instructions.			
219	5.9.3.2	NA	Inspection of Loading Dock Weatherseals		Section deleted: Where there is a loading dock, weatherseals shall be inspected for proper installation and to verify that the seals are in good condition.			
220	5.9.3.3	NA	Inspection of Opaque Building Envelope Air Tightness Requirements		Section deleted: Opaque roof, above-grade walls and below-grade walls, and floors, shall be subject to the following inspections during construction: a. Use of compliant materials and assemblies as indicated in Section 5.8.3.1. b. Integration with adjoining fenestration and continuous air barrier elements.			
221	5.9.3.4	NA	Fenestration Inspections		Section deleted: Fenestration shall be subject to the following inspections during construction: a. Skylights size and location in relation to the designed primary sidelighted area and secondary sidelighted area below. b. Roof monitor size and location in relation to the designed primary sidelighted area and secondary sidelighted area below. c. Dynamic glazing compliance with SHGC and U-factor in accordance with Sections 5.5.4.4.1 and 5.5.4.4.2, and testing of the operation for conformance with the manufacturer's instructions. d. Permanent fenestration projections installation and performance in accordance with Section 5.5.4.4.1 and the construction documents.			
222		6.1.1	Scope		New section: Section 6 specifies requirements for mechanical equipment and systems.			

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223	1323.6.1.1.3.6		Rooftop HVACR		Minnesota amended: 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.			
224	1323.6.1.1.4		Heating of Enclosed Commercial Parking Facilities Prohibited		Minnesota amended: Heating of enclosed commercial parking facilities is prohibited in accordance with Minnesota Statutes, section 216C.20, subdivision 3. Exceptions to 6.1.1.4 1.Parking open to the public that is accessory to private parking where the parking open to the public is less than 10 percent of the total number of spaces. 2.Vehicle showrooms for vehicle sales.			
225	1323.6.1.1.5		Prohibition of Once-Through Water Use Permits		Minnesota amended: Once-through water use permits are restricted in accordance with Minnesota Statutes, section 103G.271, subdivision 5.			
226		6.1.4.1	Alterations to Heating, Ventilating, Air Conditioning, and Refrigeration in Existing Buildings		Minor changes: New HVACR equipment as a direct replacement of existing HVACR equipment shall comply with the following sections as applicable for the equipment being replaced: i. 6.4.3.9, “Heated or Cooled Vestibules or Air Curtains with Integral Heating” p. 6.5.3.6, “Fractional Horsepower~~Kilowatt~~ Fan Motors”			
227		6.1.5	Climate		Minor changes: Climate zones shall be determined in accordance with Section 5.1.5.			
228		6.2.1	Requirements for all Compliance Paths.		Changes to section: Mechanical equipment and systems shall comply with all of the following: a. Section 6.1, “General” b. Section 6.4, “Mandatory Provisions” Exception to 6.2.1(b): When compliance is shown using Section 6.2.2(a), compliance with Section 6.4 is not required unless required in Section 6.3.2. c. Section 6.7, “Submittals” d. Section 6.8, “Minimum Equipment Efficiency Tables”			

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229		6.2.2	Additional Requirements to Comply with Section 6		Changes to section: Refrigeration equipment and systems shall comply with Section 6.5, “Prescriptive Compliance Path.” All building HVAC systems shall comply with one of the following: a. Section 6.3, “Simplified Approach Building Compliance Path for HVAC Systems” b. Section 6.5, “Prescriptive Compliance Path” c. Section 6.6.1, “Computer Room System Path” d. Section 6.6.2, “Mechanical System Performance Path” Informative Note: Section 6.3 requires all HVAC systems in the building to qualify for the simplified path. Section 6.6.2 requires all allowable systems to meet Normative Appendix L requirements. Section 6.6.2 does allow part of the building to use the Mechanical System Performance Path and part of the building to use Section 6.5 where there are excluded occupancy types or system types in Section L1.1.1.2. HVAC systems for larger computer rooms may comply with either Section 6.5, Section 6.6.1, or Section 6.6.2.			

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230		6.3.2	Criteria		Minor changes to section: c. Cooling (if any) shall be provided by a unitary packaged or split-system air conditioner that is either air cooled or evaporatively cooled, with efficiency meeting the requirements shown in Table 6.8.1-1 (air conditioners), Table 6.8.1-2 (heat pumps), or Table 6.8.1-4 (packaged terminal and room air conditioners and heat pumps) for the applicable equipment category. Cooling equipment shall also comply with Section 6.4.1.4. e. Heating (if any) shall be provided by a unitary packaged or split-system heat pump that meets the applicable efficiency requirements shown in Table 6.8.1-2 (heat pumps) or Table 6.8.1-4 (packaged terminal and room air conditioners and heat pumps), a fuel-fired furnace that meets the applicable efficiency requirements shown in Table 6.8.1-5 (furnaces, duct furnaces, and unit heaters), an electric resistance heater, or a baseboard system connected to a boiler that meets the applicable efficiency requirements shown in Table 6.8.1-6 (boilers). Heating equipment shall also comply with Section 6.4.1.4. Exception to 6.3.2 (i): Humidity control assisted by hot-gas reheat or heat from 100% site-recovered energy is permitted. j. Systems serving spaces other than residential spaces, that do not require continuous operation, with a cooling or heating capacity greater than 7000 Btu/h shall comply with Sections 6.4.3.3.1 and 6.4.3.3.2.			
231		6.3.2	Criteria		Additional changes to section: k. Systems serving residential spaces other than hotel/motel guest rooms shall comply with Sections 6.4.3.3.1 and 6.4.3.3.2 except for electric resistance heaters rated at 2 hp or less with a readily accessible manual control that lowers the set point or turns the unit off.			

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232	6.3.2	6.3.2	Criteria		Minnesota amendment: The HVAC system must meet all of the following criteria: j.Systems serving spaces other than residential spaces, that do not require continuous operation with a cooling or heating capacity greater than 7,000 Btu/h shall comply with Sections 6.4.3.3.1 and 6.4.3.3.2. k.Systems serving residential spaces other than hotel/motel guest rooms shall comply with Sections 6.4.3.3.1 and 6.4.3.3.2 except for electric resistance heaters rated at 1.5 kW or less with a readily accessible manual control that lowers the set point or turns the unit off. l. Systems serving hotel/motel guest rooms shall comply with Section 6.4.3.3.5			
233	6.3.2	6.3.2	Criteria	Y	Repeal MN amendment in s. as the references now align. s.The system shall comply with the demand control ventilation requirements in Section 6.4.3.8, occupied-standby controls in Section 6.5.3.9, and the ventilation design requirements in Section 6.5.3.8.	Repeal		
234		6.4.1.1	Minimum Equipment Efficiencies—Listed Equipment—Standard Rating and Operating Conditions.		Minor changes to secion: Equipment shown in Tables 6.8.1-1 through 6.8.1-21 shall have… c. Table 6.8.1-3, "Liquid-Chilling Packages—Minimum Efficiency Requirements" (See Section 6.4.1.2 for liquid-cooled centrifugal liquid-chilling packages that are designed to operate at nonstandard conditions.) (new) u. Table 6.8.1-21, "Ceiling Fan Efficiency Requirements"			

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235		6.4.1.2.1	Liquid-Cooled Centrifugal Chilling Package Cooling Efficiency Adjustment		Minor changes: Liquid-cooled centrifugal chiller packages not designed for cooling operation at AHRI Standard 550/590 test and rating conditions of 44.00°F leaving and 54.00°F entering chilled-liquid temperatures, and with 85.00°F entering and 94.30°F leaving condenser-liquid temperatures, shall have maximum full-load kW/ton (FL) and part-load cooling energy efficiency (IPLV.IP) rating requirements, listed in Tables 6.8.1-3 and 6.8.1-16, adjusted using the following equations: FL.IPadj = FL.IP/Kadj PLV.IPadj = IPLV.IP/Kadj Kadj = A × B FL.IP = full-load kW/ton value from Table 6.8.1-3 or 6.8.1-16 FL.IPadj = maximum full-load kW/ton rating, adjusted for nonstandard conditions IPLV.IP = IPLV.IP value from Table 6.8.1-3 or 6.8.1-16 PLV.IPadj = maximum NPLV.IP rating, adjusted for nonstandard conditions The FL.IPadj and PLV.IPadj values are only applicable for centrifugal chilling packages meeting all of the following full-load design ranges: • 36.00°F ≤ LvgEvap ≤ 70.00°F and • 60.00°F ≤ LvgCond ≤ 135.00°F and… Manufacturers shall calculate the FL.IPadj and PLV.IPadj before determining whether to label the chiller per Section 6.4.1.5. Compliance with Standard 90.1-2007, 2010, 2013, 2016, 2019, 2022, or combinations thereof, shall be labeled on chilling packages within the scope of the standard. Centrifugal chilling packages designed to operate outside of these ranges are not covered by this standard.			
236		6.4.1.2.2	Chilling Packages Employing Freeze-Protection Liquids		New section: Electrically operated chilling packages that employ freeze-protection liquids in any heat exchanger with an application cooling duty evaporator liquid leaving temperature or heating operation source liquid temperature above 32.00°F shall show efficiency compliance in accordance with the applicable requirements in Sections 6.4.1.2.2.1 through 6.4.1.2.2.4.			
237		6.4.1.2.2.1			New section: All electrically operated cooling-only air-cooled and electrically operated positive displacement liquid-cooled chilling packages shall show compliance with the cooling efficiency requirements listed in Table 6.8.1-3when applied within the operating limits of AHRI 550/590 at AHRI 550/590 standard rating conditions when tested or rated with water used as a heat transfer liquid			

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238		6.4.1.2.2			New section: All liquid-cooled electrically operated cooling-only centrifugal chilling packages shall show compliance with the cooling efficiency requirements listed in Table 6.8.1-3 when applied within the operating limits defined in AHRI 550/590 at the application rating conditions for a cooling efficiency, adjusted using Kadj as defined in Section 6.4.1.2.1, when tested or rated with water used as a heat transfer liquid.			
239		6.4.1.2.3			New section: All electrically operated air source and electrically operated positive displacement liquid source heat pump and heat recovery chilling packages shall show compliance with the cooling efficiency requirements listed in Table 6.8.1-16 when applied within the operating limits of AHRI 550/590 at AHRI 550/ 590 standard rating conditions when tested or rated with water used as a heat transfer liquid. They also shall show compliance with the heating efficiency requirements listed in Table 6.8.1-16 at one of the AHRI 550/590 standard heating rating conditions when tested or rated with water used as a heat transfer liquid. Heating-only chilling packages shall meet the efficiency requirements at one of the AHRI 550/590 heating liquid temperature rating conditions and are not required to meet the cooling efficiency requirements of Table 6.8.1-16.			
240		6.4.1.2.4			New section: All liquid-source centrifugal heat pump and heat recovery chilling packages shall show compliance with the cooling efficiency requirements listed in Table 6.8.1-16 when applied within the operating limits defined in AHRI 550/590 at the application rating conditions for cooling efficiency, adjusted using Kadj as defined in Section 6.4.1.2.1, when tested or rated with water. They also shall show compliance with the heating efficiency requirements in Table 6.8.1-16 at one of the AHRI 550/590 standard rating conditions when tested or rated with water used as a heat-transfer liquid. Heating-only chilling packages shall meet the heating efficiency requirements at one of the AHRI 550/590 heating liquid temperature rating conditions and are not required to meet the cooling efficiency requirements of Table 6.8.1-16.			
241	6.4.1.3	NA	Ceiling Fans		Section deleted: Large-diameter ceiling fans shall be rated in accordance with 10 CFR 430 Appendix U or AMCA 230. The following data shall be provided: a. Blade span (blade tip diameter) b. Rated airflow and power consumption at the maximum speed Informative Note: See Informative Appendix F for the U.S. Department of Energy requirements for U.S. applications.			

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242	6.4.1.3.1	NA	Ceiling Fans	N	Section deleted: The data provided shall meet one of the following requirements: a. It is determined by an independent laboratory. b. It is included in a database published by USDOE. c. It is certified under a program meeting the requirements of Section 6.4.1.5. Exception to 6.4.1.3.1 Ceiling fans not covered in the scope of 10 CFR Part 430			
243	Table 6.4.2.1	NA	Climatic Data Design Conditions		MN amended section: Minnesota table with design conditions.			
244	6.4.2.1.1	NA	Climatic Data Design Conditions		Minnesota amended section: Climatic data design conditions for the calculation of heating and cooling loads shall be determined by using either item 1 or 2: 1.the climatic data in Table 6.4.2.1 for the city where the building is located or the nearest city listed in Table 6.4.2.1; or 2.the weather data published as a part of ASHRAE Standard 169-2013 at www.ASHRAEmeteo.info. The weather data for the city where the building is located or for the nearest available city shall be used. The data shall be used as follows: a.design temperatures shall be rounded to the nearest whole number; b.winter design conditions shall be the mean extreme annual temperature; and c.summer conditions shall be the one percent annual cooling design conditions.			
245	1323.6.4.3.3	6.4.3.3	Off-Hour Controls		Minnesota amended section: HVAC systems shall have the off-hour controls required by Sections 6.4.3.3.1 through 6.4.3.3.5. Exceptions to 6.4.3.3 1.HVAC systems intended to operate continuously. 2.HVAC systems not serving residential spaces and having a design heating capacity and cooling capacity less than 7,000 Btu/h that are equipped with a readily accessible manual on/off control			
246	1323.6.3.3.1	6.4.3.3.1	Automatic Shutdown		Minnesota amendment: Exceptions to 6.4.3.3.1 1.Systems serving residential occupancies with controls that can start and stop the system under at least two different time schedules per week. 2.Systems serving nonresidential occupancies where heating or cooling capacity is less than 15,000 Btu/h with controls that can start and stop the system under at least two different time schedules per week.			

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247		6.4.3.3.1	Exceptions to 6.4.3.3.1:		New language: 1. Systems serving residential occupancies with controls that can start and stop the system under at least two different time schedules per week. 2. Systems serving non-residential occupancies where heating or cooling capacity is less than 15,000 Btu/h, with controls that can start and stop the system under at least two different time schedules per week			
248		6.4.3.3.2	Setback Controls		Minor changes: Heating systems shall be equipped with controls capable of and configured to automatically restart and temporarily operate the system as required to maintain zone temperatures above an adjustable heating set point at least 10°F below the occupied heating set point. Cooling systems shall be equipped with controls capable of and configured to automatically restart and temporarily operate the mechanical cooling system at the lowest practical fan speed as required to maintain zone temperatures below an adjustable cooling set point at least 5°F above the occupied cooling set point or to prevent maximum space humidity levels as required by Standard 62.1.			
249	1323.6.4.3.3.3	6.4.3.3.3	Optimum Start Controls		Minnesota amendment: Exception to 6.4.3.3.3 Residential spaces are not required to have optimum start controls.			
250		6.4.3.3.3	Optimum Start Controls		Added exception matching Minnesota amendment: Exception to 6.4.3.3.3 : Residential spaces are not required to have optimum start controls.			
251		6.4.3.3.4	Zone isolation:		Minor changes to section: HVAC systems serving zones that are intended to operate or be occupied nonsimultaneously shall be divided into isolation areas. Zones may be grouped into a single isolation area provided it does not exceed 25,000 ft2 of conditioned floor area nor include more than one story. Each isolation area shall be equipped with isolation devices capable of and configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the area. Each isolation area shall be controlled independently by a device meeting the requirements of Sections 6.4.3.3.1. For central systems and plants, controls and devices shall be provided to allow stable system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant. Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for zone isolation using logical groups of zone air terminal units serving each isolation			

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252		6.4.3.3.5.1	Guest Room HVAC Set-Point Control		Minor changes: Exceptions to 6.4.3.3.5.1: 2. Dehumidification shall be permitted to limit the space humidity levels as required by Standard 62.1 during unoccupied mode for both rented and unrented periods.			
253		6.4.3.3.5.3	Automatic Control		Section deleted: Card key card controls shall be permitted to be used to indicate occupancy.			
254		6.4.3.4.1	Stair and Elevator Shaft Vent Dampers		Change to section: Where stair and elevator shafts have vents, they shall be equipped with motorized dampers that are capable of and configured to automatically close during normal building operation and are interlocked to open as required by fire and smoke detection systems or by thermostatic control systems. Exception to 6.4.3.4.1: Nonmotorized gravity backdraft dampers are acceptable in buildings less than three stories in height and for buildings of any height located in Climate Zones 0, 1, 2, and 3.			
255	1323.6.4.3.4.2	6.4.3.4.2	Shutoff Damper Controls		Minnesota ameded the exceptions: Exceptions to 6.4.3.4.2 1.[Reserved] 2.Nonmotorized dampers are acceptable in systems with a design outdoor air intake, relief, or exhaust capacity of 300 cfm or less. Nonmotorized dampers for outdoor air intakes must be protected from direct exposure to wind.			
256	1323.6.4.3.4.5	6.4.3.4.5	Parking Garage Ventilation Systems		Minnesota has amendment that can be deleted as the 2022 language is exactly the same as the amendment.			

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257		6.4.3.8	Ventilation Controls for High-Occupancy Areas.		Changes to section: Demand control ventilation (DCV) is required for spaces larger than the floor area shown in Table 6.4.3.8 based on an occupant outdoor airflow component in cfm per 1000 ft2 and served by systems with one or more of the following: Exceptions to 6.4.3.8: 1. Multiple-zone systems without DDC of individual zones communicating with a central control panel. 2. Spaces where >75% of the space design outdoor airflow is required for makeup air that is exhausted from the space or transfer air that is required for makeup air that is exhausted from other spaces. 3. Spaces with one of the following occupancy categories as defined in ASHRAE Standard 62.1: correctional cells, daycare sickrooms, science labs, barbers, beauty and nail salons, and bowling alley seating. 4. Spaces where the requirements of ASHRAE Standard 170, applicable codes, or applicable accreditation standards do not allow the reduction of outdoor airflow. Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for CO2-based demand control ventilation and how it can be implemented while complying with ASHRAE Standard 62.1.			

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258		Table 6.4.3.8	Demand Control Ventilation (DCV) Floor Area Thresholds		New table: Occupant Outdoor Airflow Component (cfm/1000 ft2) a 100 to 199 200 to 399 ?400 100 to 199 200 to 399 ?400 Minimum Space Floor Area in ft2 where DCV Is Required Areas without Exhaust Air Energy Recovery Areas with Exhaust Air Energy Recovery b 7, 8 400 200 150 800 400 250 5A, 6A, 6B 600 250 150 1400 900 400 0A, 0B, 1B, 3A, 4A, 5B, 5C 800 400 250 2000 1000 500 2A, 2B, 4C 1100 600 300 2300 1100 600 3B, 4B 1500 700 400 5200 2350 1250 1A 2400 1100 600 5800 2600 1400 3C 7000 3000 1700 12,000 6000 3000 a. Occupant outdoor airflow component in cfm per 1000 ft2 shall be calculated as the product of default occupant density and outdoor airflow rate per occupant (Rp) as shown in ASHRAE Standard 62.1, Table 6.2.2.1.			
259		6.4.3.6	Heated or Cooled Vestibules or Air Curtains with Integral Heating		Change to title: Heating systems for vestibules and air curtain units 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.			
260		6.4.3.10.2	DDC Controls		Added informative note: ASHRAE Guideline 36 includes detailed sequences of control for monitoring zone and system demand, automatically detecting and alarming zones that are excessively driving reset logic, and readily excluding those zones from reset logic.			
261		6.4.3.12	Economizer Fault Detection and Diagnostics (FDD).		Added informative note: Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for monitoring and alarming air economizer faults for air economizers that are controlled by DDC systems.			
262	1323.6.4.4.1.2	6.4.4.1.2	Duct and Plenum Insulation.		Minnesota amendment: Exceptions to 6.4.4.1.2-2.Deleted			

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263		Table 6.5.1-1	Minimum Fan-Cooling Unit Size for which an Economizer Is		Added to table:?33,000 Btu/h Fan-cooling units located outside the building ?54,000 Btu/h All other fan-cooling-unit locations			
264		Table 6.5.1-2	Eliminate Required Economizer for Comfort Cooling by Increasing Cooling Efficiency		Changed language in the footnote: a. If a unit is rated with an annualized or part-load metric, then to eliminate the required economizer, only the annualized or part-load minimum cooling efficiency of the unit must be increased by the percentage shown. If the unit is only rated with a full-load metric like EER cooling then these must be increased by the percentage shown. To determine the efficiency required to eliminate the economizer when the unit equipment efficiency is rated with an energy-input divided by a thermal-output metric, the metric shall first be converted to COP by the efficiency improvement percentage shown. The COP shall then be converted back to the original rated metric to establish the efficiency required to eliminate the economizer. Informative Note: Some examples of annualized or part-load metrics are IPLV.IP, IEER, and SEER.			
265		6.5.1.1.2	Control Signal		Added informative note: ASHRAE Guideline 36 includes detailed sequences of control for sequencing air economizers with mechanical cooling using supply air (not mixed air) control loops.			
266		6.5.1.1.3	High-Limit Shutoff		Added informative note: Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for disabling air economizers using all options of high-limit shutoff options with compliant set points.			

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267	1323.6.5.1.1.5	6.5.1.1.5	Relief of Excess Outdoor Air		Minnesota amendment that matches the language in the 2022 ASHRAE 90.1: a. Systems shall provide one of the following means to relieve excess outdoor air during air economizer operation to prevent overpressurizing the building: 1. Return or relief fan(s) meeting the requirements of Section 6.5.3.2.4. 2. Barometric or motorized damper relief path with a total pressure drop at design relief airflow rate less than 0.10 in. of water from the occupied space to outdoors. Design relief airflow rate shall be the design supply airflow rate minus any continuous exhaust flows, such as toilet exhaust fans, whose makeup is provided by the economizer system. b. The relief air outlet shall be located so as to avoid recirculation into the building.			
268		6.5.1.2	Fluid Economizers		New informative note: Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for enabling and controlling fluid economizers in water-cooled chilled-water plants.			
269		6.5.2.1	Zone Controls		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for minimizing simultaneous heating and cooling for most types of VAV system zone air terminal units including the supply air temperature reheat limit.			
270		6.5.2.6	Ventilation Air Heating Control		New exception: Exception to 6.5.2.6: Units that heat the airstream using only series energy recovery when representative building loads or outdoor air temperature indicate that the majority of zones require cooling in Climate Zones 0A, 1A, 2A, 3A, and 4A.			
271		6.5.3.2.3	VAV Set-Point Reset		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for resetting static pressure set point based on VAV system zone damper position and other indicators of zone demand, including automatically detecting and alarming zones that are excessively driving reset logic and readily excluding those zones from reset logic.			
272		6.5.3.2.4	Return and Relief Fan Control		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for controlling building pressure using economizer relief systems such as relief dampers, relief fans, and return fans.			

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273		6.5.3.3	Multiple-Zone VAV System Ventilation Optimization Control		Minor changes to the section and new informative note: Multiple-zone VAV systems with DDC of individual zone boxes reporting to a central control panel shall include means to automatically reduce outdoor air intake flow below design rates in response to changes in system ventilation efficiency as defined by ASHRAE Standard 62.1, Normative Appendix A. Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for dynamically adjusting minimum ventilation rate set points based on ASHRAE Standard 62.1, Normative Appendix A.			
274		6.5.3.4	Parallel-Flow Fan-Powered VAV Air Terminal Control		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for both constantspeed and variable-speed parallel fan-powered VAV air terminal units.			
275		6.5.3.5	Supply Air Temperature Reset Controls		New informative note: 2. ASHRAE Guideline 36 includes detailed sequences of control for resetting supply air temperature set point on multiple zone air handling units based on both zone air terminal unit demand and outdoor air temperature.			
276	1323.6.5.3.7	6.5.3.7	Low Power Fans		Minnesota amendment that mimics a new section in the 2022 ASHRAE 90.1: Fans that are not covered by Section 6.5.3.6 and having a fan nameplate electrical input power of less than 180 W, or having a motor nameplate horsepower less than 1/12 hp, shall meet the fan efficacy requirements of Table 6.5.3.7 at one or more rating points. Exceptions to 6.5.3.7: 1. Fans in space-conditioning equipment. 2. Intermittently operating dryer exhaust duct power ventilators, domestic range hoods, and domestic range booster fans. 3. Fans in radon mitigation systems. 4. Fans not covered within the scope of the test methods referenced in Table 6.5.3.7. 5. Ceiling fans rated at or below 10 CFR 430 Appendix U			
277	Table 1323.6.5.3.7	Table 6.5.3.7	Minimum Fan Efficacy for Low-Power Fans		Minnesota amended table than mimic the same table in the 2022 ASHRAE 90.1			

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278	1323.6.5.3.8	6.5.3.8	Ventilation Design		Minnesota amendment: Ventilation Design The required minimum outdoor air rate is the larger of the minimum outdoor air rate or the minimum exhaust air rate required by Standard 62.1, Standard 62.2, Standard 170, or applicable codes or accreditation standards. Outdoor air ventilation systems shall comply with one of the following: a.Design minimum system outdoor air provided shall not exceed 135% of the required minimum outdoor air rate. b.Dampers, ductwork, and controls shall be provided that allow the system to supply no more than the required minimum outdoor air rate with a single set-point adjustment. c.The system includes exhaust air energy recovery complying with Section 6.5.6.1			
279	1323.6.5.3.9	6.5.3.9	Occupied-Standby Zone Controls		Minnesota amendment and minor change to title: Occupied-Standby Zone Controls. 2022 ASHRAE 90.1-2022 has the same language as the amendment: Also new informative note: Exception to 6.5.3.9 Informative Note: ASHRAE Guideline 36 includes detailed sequences of control for occupied standby controls of zone air terminal units.			
280		6.5.3.9.1	Occupied-Standby Control of Multiple-Zone Systems		New section: Multiple-zone systems that are capable of resetting the minimum outdoor air set point and that serve zones with occupied-standby zone controls shall reset the minimum outdoor air set point based on a zone outdoor air requirement of zero for all zones in occupied-standby mode. Informative Note: ASHRAE Guideline 36 includes sequences for this reset.			
281		6.5.4.2	Hydronic Variable Flow Systems		New informative note: ASHRAE Guideline 36 includes detailed sequences of control of variable flow hydronic systems, including resetting differential pressure set point based on control valve position.			
282		6.5.4.3	Chiller and Boiler Isolation		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for chiller and boiler flow isolation and staging.			
283		6.5.4.4	Chilled- and Hot-Water Temperature Reset Controls.		No informative note: ASHRAE Guideline 36 includes detailed sequences of control for resetting chilledwater and hot-water system temperature set points based on control valve position.			
284		6.5.5.2	Fan Speed Control		New informative note: ASHRAE Guideline 36 includes detailed sequences of control for staging and controlling variable-speed cooling tower cells and fans.			

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285	1323.6.5.6.1.1	6.5.6.1.1	Nontransient Dwelling Units		Minnesota amendment: Exceptions to 6.5.6.1.1 1.Nontransient dwelling units in Climate Zone 3C. 2.Nontransient dwelling units with no more than 750 ft2 of conditioned floor area.			
286		6.5.6.1.1	Nontransient Dwelling Units		Changes to section: Nontransient dwelling units shall be provided with outdoor air energy recovery ventilation systems. For nontransient dwelling units, energy recovery systems shall result in an enthalpy recovery ratio of at least 50% at the cooling design condition. At the heating design condition, energy recovery performance shall be as follows: a. Where active humidification is provided to spaces served by the system, energy recovery systems shall result in an enthalpy recovery ratio of at least 60%. b. Where active humidification is not provided to spaces served by the system, energy recovery systems shall result in a sensible energy recovery ratio of at least 60%. The energy recovery system shall provide the required enthalpy recovery ratio or sensible energy recovery ratio at both heating and cooling design conditions, unless one mode is not required for the climate zone by the exceptions below.			
287	1323.6.5.6.1.2	6.5.6.1.2	Spaces Other than Nontransient Dwelling Units		Minnesota amendment: Each fan system serving spaces other than nontransient dwelling units shall have an energy recovery system where the design supply fan airflow rate exceeds the value listed in Table 6.5.6.1.2, based on the climate zone and percentage of outdoor air at design airflow conditions. Exceptions to 6.5.6.1.2 6. Systems expected to operate less than 20 hours per week at the outdoor air percentage covered by Table 6.5.6.1.2			
288		6.5.6.1.2	Spaces Other than Nontransient Dwelling Units		Changed information: Each fan system serving spaces other than nontransient dwelling units shall have an energy recovery system where the design supply fan airflow rate exceeds the value listed in Tables 6.5.6.1.2-1 and 6.5.6.1.2-2, based on the climate zone and percentage of outdoor air at design airflow conditions. Table 6.5.6.1.2-1 shall be used for all ventilation systems that operate less than 8000 hours per year, and Table 6.5.6.1.2-2 shall be used for all ventilation systems that operate 8000 or more hours per year.			

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289	Table 1323.6.5.6.1.2	Table 6.5.6.1.2	Exhaust Air Energy Recovery Requirements for Ventilation Systems		Minnesota amended table: Climate Zone% Outdoor Air at Full Design Airflow Rate ≥10% and <20%≥20% and <30%≥30% and <40%≥40% and <50%≥50% and <60%≥60% and <70%≥70% and <80%≥80% Design Supply Fan Airflow Rate, cfm 6A NR ≥16,000 ≥3500 ≥4500 ≥3500 ≥2000 ≥1000 ≥120 >7 NR ≥4000 ≥2500 ≥1000 ≥140 ≥120 ≥100 ≥80			
290	1323.6.5.6.1.2.1	6.5.6.1.2.1	Minimum Enthalpy Recovery Ratio		Minnesota amendment: Energy recovery systems required by this section shall result in an enthalpy recovery ratio of at least 50 percent. A 50-percent enthalpy recovery ratio shall mean a change in the enthalpy of the outdoor air supply equal to 50 percent of the difference between the outdoor air and entering exhaust air enthalpies at design conditions. The energy recovery system shall provide the required enthalpy recovery ratio at both heating and cooling design conditions unless one mode is not required for the climate zone by Exception 6.5.6.1.2.2			

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291		6.5.6.1.2.1	Minimum Enthalpy Recovery Ratio		New section: Energy recovery systems required by this section shall result in an enthalpy recovery ratio of at least 50% at the cooling design condition. At the heating design condition, energy recovery performance shall be as follows: a. Where active humidification is provided to spaces served by the system, energy recovery systems shall result in an enthalpy recovery ratio of at least 50%. b. Where active humidification is not provided to spaces served by the system, energy recovery systems shall result in a sensible energy recovery ratio of at least 50%. The energy recovery system shall provide the required enthalpy recovery ratio or sensible energy recovery ratio at both heating and cooling design conditions unless one mode is not required for the climate zone by the exception to Section 6.5.6.1.2.			
292	1323.6.5.6.1.2.2	6.5.6.1.2.2	Provision for Air Economizer or Bypass Operation		Minnesota amended section no longer needed as 2022 ASHRAE 90-1 has same language: Provision shall be made for both outdoor air and exhaust air to bypass or control the energy recovery system to enable economizer operation as required by Section 6.5.1.1. The bypass or control shall meet the following criteria: a. For energy recovery systems where the transfer of energy cannot be stopped, bypass provision shall prevent the total airflow rate of either outdoor air or exhaust air through the energy recovery exchanger from exceeding 10% of the full design airflow rate. b. The pressure drop of the outdoor air through the energy recovery exchanger shall not exceed 0.4 in. of water; the pressure drop of the exhaust air through the energy recovery exchanger shall not exceed 0.4 in. of water. Exception to 6.5.6.1.2.2: Energy recovery systems with 80% or more outdoor air at full design airflow rate and not exceeding 10,000 cfm.			

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293		6.5.6.3	Heat Recovery for Space Conditioning		Revised section: Where heating water is used for space heating, a heatpump chiller meeting the requirements of Table 6.8.1-16 for heat recovery that uses the cooling system return water as the heat source 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, including reheat, 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. Exception to 6.5.6.3: ~~1. Buildings that provide 60% of their reheat energy from on-site renewable energy or siterecovered energy~~. ~~2.~~ Buildings in Climate Zones 5C, 6B, 7, and 8.			
294		6.6.1	Computer Rooms Systems Path.		Revised section: The Computer Room System Path is an optional path for compliance where the following conditions are met: a. HVAC systems that only serve the heating, cooling, or ventilating needs of a computer room with IT equipment load greater than 10 kW shall comply with ASHRAE Standard 90.4, Energy Standard for Data Centers. b. All other HVAC systems shall comply with the applicable requirements in Section 6.5.			

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295		6.6.2	Mechanical System Performance Path		New section: 6.6.2.1 Scope. The Mechanical System Performance Path is an optional path for compliance where the following conditions are met: a. All HVAC systems in the building that meet the criteria in Section L1.1.1 shall comply with Section 6.6.2.2. b. All other HVAC systems shall comply with one of the following: 1. HVAC systems shall comply with the applicable requirements in Section 6.5. 2. HVAC systems that only serve the heating, cooling, or ventilating needs of a computer room with IT equipment load greater than 10 kW shall be permitted to comply with ANSI/ASHRAE Standard 90.4, Energy Standard for Data Centers.			
296		Table 6.6.2.2	Mechanical Performance Factors (MPF)		New table: Building Type Climate Zone 0A 0B 1A 1B 2A 2B 3A 3B 3C 4A 4B 4C 5A 5B 5C 6A 6B 7 8			

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297		6.6.2.2	Criteria		New section: HVAC systems in new buildings, additions, or alterations shall comply with the requirements in Section L2, “Mechanical System Performance Rating Method.” The proposed design total system performance ratio (TSPRp) of the HVAC systems using this method shall be greater than or equal to the total system performance ratio of the TSPR reference building design (TSPRr) divided by the mechanical performance factor (MPF) when calculated in accordance with the following: TSPRp > TSPRr/MPF where TSPRp = proposed TSPR calculated in accordance with Normative Appendix L TSPRr = reference TSPR calculated in accordance with Normative Appendix L MPF = mechanical performance factor from Table 6.6.2.2 based on climate zone and building use type Where a building has multiple building use types, MPF shall be area weighted as follows: MPF = (A1 × MPF1 + A2 × MPF2 + … + An × MPFn)/(A1 + A2 + … + An) where MPF1, MPF2, …, MPFn = mechanical performance factors from Table 6.6.2.2 based on climate zone and building use types 1 through n A1, A2, …, An = gross conditioned floor areas for building use types 1 through n			
298		6.6.2.2	Criteria-continued		New informative note: The Mechanical System Performance Rating Method is a simplified performance trade-off approach for HVAC systems that does not require using the whole-building trade-off approaches in Section 12 or Normative Appendix G. HVAC systems that are allowed to use this approach will not need to comply with all of the prescriptive requirements in Section 6.5. For example, an HVAC system without a required outdoor air economizer can show compliance with Section 6 by demonstrating improved cooling efficiency or reduced fan energy use compared to a reference HVAC system that meets all prescriptive requirements, including outdoor air economizers. This approach does not allow HVAC system efficiency trade-offs with building envelope, plug loads, or lighting systems.			

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299		6.8.3	Piping Insulation Tables		New language: Hot-water heating, steam heating, and steam condensate piping shall be insulated to the minimum thickness required in Tables 6.8.3-1 and 6.8.3-2 and shall either utilize insulation within the thermal conductivity ranges in the tables, or, when the insulation thermal conductivity is not within the range in the tables, the following equation shall be used to calculate the minimum insulation thickness: talt = r[(1 + ttable/r) × kalt/kupper – 1] where talt = minimum insulation thickness of the alternate material, in. r = actual outside radius of pipe, in. ttable = insulation thickness listed in Table 6.8.3-1 or Table 6.8.3-2 for applicable fluid temperature and pipe size kalt = thermal conductivity of the alternate material at mean rating temperature indicated for the applicable fluid temperature, Btu·in/h·ft2·°F kupper = upper value of the thermal conductivity range listed in this table for the applicable fluid temperature, Btu·in/h·ft2·°F Exception to 6.8.3: For nonmetallic piping thicker than Schedule 80 and having thermal resistance greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is proANSI/ ASHRAE/IES Standard 90.1-2022 (I-P) 107 vided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown in the tables.			
300		Table 6.8.1-1	Electrically Operated Unitary Air Conditioners and Condensing Units-Minimum Efficiency Requirements		Minor changes to footnotes: a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. b. Single-phase, U.S. air-cooled air conditioners <65,000 Btu/h are regulated as consumer products by the U.S. Code of Federal Regulations 10 CFR 430. SEER and SEER2 values for single-phase products are set by the U.S. Department of Energy. (all the following tables to item 254 have the same footnote change)			

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301		Table 6.8.1-3	Liquid-Chilling Packages Minimum Efficiency Requirements		Changes to footnotes: c. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. d. NA means the requirements are not applicable for Path B, and only Path A can be used for compliance. e. FL is the full-load performance requirements, and IPLV.IP is for the part-load performance requirements. f. Electrically operated chilling packages employing a freeze-protection liquid in accordance with Section 6.4.1.2.2 shall be tested or rated with water for the purpose of compliance with the requirements of this table.			
302		Table 6.8.1-4	Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat		Changes to footnotes. a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.			

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303		Table 6.8.1-5	Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements		Major changes to the table and footnotes:a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. For this table, the following applies: • Appendix N = 10 CFR 430 Appendix N • ANSI Z21.47 = Section 2.39, Thermal Efficiency, ANSI Z21.47 • ANSI Z83.3 = Section 2.10, Efficiency, ANSI Z83.3 • UL 727 = Section 42, Combustion, UL 727 • UL 731 = Section 40, Combustion, UL 731 b. Compliance of multiple firing rate units shall be at the maximum firing rate. c. Et = thermal efficiency. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space. d. Ec = combustion efficiency (100% less flue losses). See test procedure for detailed discussion. e. Units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an automatic flue damper.			
304		Table 6.8.1-5	Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum Efficiency Requirements continued		f. Includes combination units with cooling capacity <65,000 Btu/h. For U.S. applications of federally covered <225,000 Btu/h products, see Informative Appendix F, Table F-4. g. 10 CFR 430 is limited to-single phase equipment that is not contained within the same cabinet with a central air conditioner whose rated cooling capacity is above 65,000 Btu/h but for the test and rating procedures are not impacted for three-phase and can be used for AFUE ratings for ASHRAE/IES Standard 90.1 three-phase products and single-phase products with a cooling capacity greater than 65,000 Btu/h.			

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305		Table 6.8.1-7	Performance Requirements for Heat Rejection Equipment—Minimum Efficiency Requirements		Minor change to footnote: d. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure			
306		Table 6.8.1-8	Electrically Operated Variable-Refrigerant-Flow Air Conditioners-Minimum Efficiency Requirements		Major changes to the table and added footnotes: a. VRF outdoor units can be combined with innumerable indoor unit combinations, which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI 1230. Informative Note: For single-phase VRF air conditioners, air-cooled systems less than 65,000 Btu/h see Informative Appendix F, Table F-1 for the U.S. Department of Energy minimum			
307		Table 6.8.1-9	Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps- Minimum Efficiency Requirements		Major changes to the table and added footnotes: a. VRF outdoor units can be combined with innumerable indoor unit combinations, which will vary by application, building type, building size, operating conditions, and comfort level goals. Selection of indoor units tested during the test is considered to be representative of commonly sold applications and is detailed in AHRI 1230. Informative Note: For single-phase VRF air conditioners, air-cooled systems less than 65,000 Btu/h see Informative Appendix F, Table F-1 for the U.S. Department of Energy minimum			
308		Table 6.8.1-15	Electrically Operated Water-Source Heat Pumps-Minimum Efficiency Requirements		Minor change to footnote: a. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. b. Single-phase, U.S. air-cooled heat pumps <65,000 Btu/h are regulated as consumer products by 10 CFR 430. SEER, SEER2, HPSF and HPSF2 values for single-phase products are set by the U.S. DOE.			

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309		Table 6.8.1-16	Heat Pump and Heat Recovery Water-Chilling Packages—Minimum Efficiency Requirements		Major changes to the title, table and footnotes: a. Cooling rating conditions are standard rating conditions defined in AHRI 550/590 (I-P), Table 4, except for liquid-cooled centrifugal chilling packages which can adjust cooling efficiency for nonstandard rating conditions using Kadj procedure in accordance with Section 6.4.1.2.1. b. Heating full-load rating conditions are at standard rating conditions defined in AHRI 550/590 (I-P), Table 4; includes the impact of defrost for air source heating ratings. c. For liquid-source heat recovery chilling packages that have capabilities for heat rejection to a heat recovery condenser and a tower condenser the COPHR applies to operation at full load with 100% heat recovery (no tower rejection). Units that only have capabilities for partial heat recovery shall meet the requirements of Table 6.8.1-3. d. For cooling operation, compliance with both the FL and IPLV is required, but only compliance with Path A or Path B cooling efficiency is required. e. For units that operate in both cooling and heating, compliance with both the cooling and heating efficiency is required. f. For applications where the chilling package is installed to operate only in heating, compliance only with the heating performance COPH is required at only one of the heating AHRI 550/590 (I-P) standard rating conditions of Low, Medium, High, or Boost. Compliance with cooling performance is not required.			

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310		Table 6.8.1-16	Heat Pump and Heat Recovery Water-Chilling Packages—Minimum Efficiency Requirements (continued)		Continued: h. For heat-pump chilling package applications where the cooling capacity is not being used for conditioning, compliance with the heating performance COPH is only required at one of the four heating AHRI 550/590 standard ratings conditions of Low, Medium, High, or Boost. Compliance with the cooling performance is required as defined in footnotes (a) and (d), except as noted in footnote (f). i. For simultaneous cooling and heating chillers applications where there is simultaneous cooling and heating, compliance with the simultaneous cooling performance heat recovery COPSHC is only required at one of the four simultaneous cooling and heating AHRI 550/ 590 (I-P) standard ratings conditions of Low, Medium, High, or Boost. Compliance with the cooling only performance is required as defined in footnotes (a) and (d). j. For heat recovery heating chilling package applications where there is simultaneous cooling and heating, compliance with the heating performance heat recovery COPHR is only required at one of the four heating AHRI 550/590 (I-P) standard ratings conditions of Low, Medium, Hot-Water 1, or Hot-Water 2. Compliance with the cooling only performance is required as defined in footnotes a and d. k. Chilling packages employing a freeze-protection liquid in accordance with Section 6.4.1.2.2 shall be tested or rated with water for the purpose of compliance with the requirements of this table.			

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311		Table 6.8.1-16	Heat Pump and Heat Recovery Water-Chilling Packages—Minimum Efficiency Requirements (continued)		l. Outdoor air entering dry-bulb (db) temperature and wet-bulb (wb) temperature. m. Source-leaving liquid temperature. • The cooling evaporator liquid flow rate used for the heating rating for a reverse cycle air-to-water heat pump shall be the flow rate determined during the full-load cooling rating. • The cooling evaporator liquid flow rate for the simultaneous cooling and heating and heat recovery liquid cooled chilling packages rating shall be the liquid flow rates from the cooling operation full load rating. • For heating-only fluid-to-fluid chiller packages, the evaporator flow rate obtained with an entering liquid temperature of 54.00°F and a leaving liquid temperature of 44.00°F shall be used. n. The size category is the full-load net refrigerating cooling mode capacity, which is the capacity of the evaporator available for cooling of the thermal load external to the chilling package. o A heat recovery condenser at its maximum load point must remove enough heat from the refrigerant to cool the refrigerant to remove all superheat energy and begin condensation of the refrigerant. A heat recovery system where only the superheat is reduced is not covered by Table 6.8.1-16 and is considered a desuperheater, and the chiller package must comply with Table 6.8.1-3.			
312		Table 6.8.1-16	Heat Pump and Heat Recovery Water-Chilling Packages—Minimum Efficiency		p. “NA” means the requirements are not applicable. q. Water-to-water heat pumps with a capacity less than 135,000 Btu/h are covered by Table 6.8.1-1			

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313		Table 6.8.1-21	Ceiling Fan Efficiency Requirements a		New table: Equipment Type Size Category Minimum Efficiencyb Test Procedurec. a. The minimum efficiency requirements at both high speed and 40% of maximum speed must be met or exceeded to comply with this standard. b. Ceiling fans are regulated in the U.S. as consumer products under 10 CFR 430. For U.S. applications of large-diameter ceiling fans, refer to Informative Appendix F, Table F-6, for the U.S. DOE minimum efficiency requirements. c. Section 13 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.			
314	Table 1323.6.8.2	Table 6.8.2	Minimum Required Duct and Plenum Insulation		Minnesota amended table: Ducts For Other Than Dwelling Unitsa, bSupply Duct Requirementsc, d Return Duct Requirementsc, d Exhaust Duct And Relief Duct Requirementsc, d, e, g			
315	Table 1323.6.8.3-1	6.8.3-1	Minimum Piping Insulation Thickness Heating and Hot-Water Systemsa,b,c,d,e		Minnesota amendment: Added footnote f.Insulation requirements do not apply to those sections of piping used as the radiant heat source for radiant heating systems			
316		Table 6.8.3-1	Minimum Piping Insulation Thickness Heating and Hot-Water Systemsa,b,c,d (Steam, Steam Condensate, Hot-Water Heating and Domestic Water Systems)		Changed footnotes:a. These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature. b. For piping smaller than 1.5 in. and located in partitions within conditioned spaces, reduction of these thicknesses by 1 in. shall be permitted (before thickness adjustment required in footnote [a]) but not to thicknesses below 1 in. c. For direct-buried heating and hot-water system piping, reduction of these thicknesses by 1.5 in. shall be permitted (before thickness adjustment required in footnote [a]) but not to thicknesses below 1 in. d. Piping that also serves service water heating systems shall comply with Section 7.4.			

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317		Table 6.8.3-2	Minimum Piping Insulation Thickness Cooling Systems (Chilled Water, Brine, and Refrigerant)a,b		Changed footnotes: a. These thicknesses are based on energy efficiency considerations only. Issues such as water vapor permeability or surface condensation sometimes require vapor retarders or additional insulation. b. For direct-buried cooling system piping, insulation is not required.			
318		7.1.1	Service Water-Heating Scope		New information: Section 7 specifies requirements for service water-heating systems and equipment.			
319		7.1.3	Additions to Existing Buildings		Minor changes: Service water-heating systems and equip- ment shall comply with the requirements of Section 7.2.			
320	1323.7.1.1.3		Alterations to Existing Buildings		Minnesota amendment to the 2016: Building service water-heating equipment installed as a direct replacement for existing building service water-heating equipment shall comply with the requirements of Section 7 applicable to the equipment being replaced. New piping, replacement piping, and existingpiping that is not undergoing replacement that is accessible within the work area shall comply with Section 7.4.3. Where alterations include replacement of storage water heaters, thenvertical pipe risers shall comply with Section 7.4.6			
321		7.1.4	Alterations to Service Water-Heating Systems and Equipment.		Change to title: Was 7.1.1.3 Alterations to Existing Buildings			
322		7.4.2	Equipment Efficiency		Minor changes: All water-heating equipment, hot-water supply boilers used solely for heating potable water, pool heaters, and hot-water storage tanks shall meet the criteria listed in Table 7.4-1. Where multiple criteria are listed, all criteria shall be met. Omission of minimum performance requirements for certain classes of equipment does not preclude use of such equipment where appropriate. Equipment not listed in Table 7.4-1 has no minimum performance requirements. Exceptions to 7.4.2: All water heaters and hot-water supply boilers having more than 140 gal of storage capacity are not required to meet the standby loss (SL) requirements of Table 7.4-1 when			

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323		7.4.3	Service Water Heating System Piping Insulation		Major changes to entire section: Service water heating system piping shall be surrounded by uncompressed insulation of the thickness shown in Table 7.4-2. When the insulation thermal conductivity is not within the range in the table, the following equation shall be used to calculate the minimum insulation thickness: talt = r[(1 + ttable/r) × kalt/kupper – 1] where talt = minimum insulation thickness of the alternate material, in. r = actual outside radius of pipe, in. ttable = insulation thickness listed in Table 7.4-2 for applicable fluid temperature and pipe size kalt = thermal conductivity of the alternate material at mean rating temperature indicated for the applicable fluid temperature, Btu·in/h·ft2·°F k upper = upper value of the thermal conductivity range listed in this table for the applicable fluid temperature, Btu·in/h·ft2·°F Exception to 7.4.3: For nonmetallic piping thicker than Schedule 80 and having thermal resistance greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown in the table. 7.4.3.1 The following piping shall be insulated per the requirements of this section: a. Recirculating system piping, including the supply and return piping			

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324		7.4.4	Service Water Heating System Piping Insulation (continued)		b. The first 8 ft of outlet piping from 1. storage water heaters, 2. hot-water storage tanks, and 3. any water heater and hot-water supply boiler containing 10 gal or more of water heated by a direct heat source, an indirect heat source, or both a direct heat source and an indirect heat source. c. The first 8 ft of branch piping connecting to recirculated, heat traced, or impedance heated piping. d. The make-up water inlet piping between heat traps (see Section 7.4.6) and the storage water heaters and the storage tank they are serving, in a nonrecirculating service water heating system. e. Hot-water piping between multiple water heaters, between multiple hot-water storage tanks, and between water heaters and hot-water storage tanks. f. Piping that is externally heated (such as heat trace or impedance heating). Exceptions to 7.4.3.1: 1. Factory-installed piping within water heaters and hot-water storage tanks tested and rated in accordance with Section 6.4.1. 2. Piping that conveys hot water that has not been heated through the use of fossil fuels or electricity. 3. For piping 1 in. or less, insulation is not required for valves or strainers.			

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325		7.4.4	Service Water Heating System Piping Insulation (continued)		4. Piping in existing buildings where alterations are made to existing service water heating systems where there is insufficient space or access to meet the requirements. 5. Insulation is not required at the point where piping passes through a framing member if it requires increasing the size of the framing member. 6. Insulation is not required on piping at the point where a vertical support of the piping is installed.			
326		Table 7.4-1	Performance Requirements for Water Heating Equipment Minimum Efficiency Requirements		Major changes to table (Table 7.8 in the 2019) and footnotes: b. Section 13 contains a complete specification, including the year version, of the referenced test procedure			
327		Table 7.4-2	Minimum Piping Insulation Thickness for Service Water Heating Systems		New table elaborating on section 7.4.3.			
328		7.4.4	Service Water-Heating System Controls		New informative note: Service water heating system control settings and operating temperatures should be determined in accordance with the ASHRAE Standard 188 building water systems water management program for the building, or with generally accepted engineering standards and guidance (e.g., ASHRAE Guideline 12).			

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329		7.5.3	Large Service Water-Heating Systems		New title and changes to entire section: New buildings with service water-heating systems with a total installed input capacity of 1,000,000 Btu/h or greater, provided by high-capacity gas-fired service water-heating equipment, shall meet either or both of the following requirements: a. Where a single unit of high-capacity gas-fired service water-heating equipment is installed, it shall have a minimum thermal efficiency (Et) of 92%. b. Multiple units of high-capacity gas-fired service water-heating equipment connected to the same service water-heating system shall have a total input capacity-weighted average thermal efficiency (Et) of at least 90%, and a minimum of 30% of the input of the high-capacity gas-fired service water-heating equipment in the service water heating-system shall have a thermal efficiency (Et) of at least 92%. High-capacity gas-fired service water-heating equipment comprises gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h and not less than 4000 Btu/h per gallon of stored water, and gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h and less than 4000 Btu/h per gallon of stored water. Exceptions to 7.5.3: 1. Water heaters installed in individual dwelling units. 2. Individual gas water heaters with input capacity not greater than 100,000 Btu/h.			

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	1323.7.5.3	7.5.3	Buildings with High-Capacity Service Water-Heating Systems		Minnesota amendment: New buildings with gas service water-heating systems with a total installed gas water-heating input capacity of 1,000,000 Btu/h or greater, shall have gas service water-heating equipment with a minimum thermal efficiency (Et) of 90%. Multiple units of gas water-heating equipment are allowed to meet this requirement if the water-heating input provided by equipment with thermal efficiency (Et) above and below 90% provides an input capacity weighted average thermal efficiency of at least 90%. Exception to 7.5.3 1.Where at least 50 percent of the annual service water-heating requirement is provided by site-solar energy or site-recovered energy. The site-solar energy or site-recovered energy used for compliance with this exception cannot be used for compliance with any other section of this standard.			
330								
331		8.1.2	New Building or Site System or Equipment		New title and language: Building power distribution equipment installed shall comply with the requirements of Section 8.2.			
332		8.1.3	Addition to Existing Systems and Equipment		New title and language: Building power distribution equip-ment installed in addition to existing buildings and existing sites shall comply with the requirements of Section 8.2.			
333		8.1.4.1			Minor changes: Alterations to building service equipment shall comply with the requirements of Section 8, as applicable to those specific portions of the building that are being altered			
334		8.1.4.2			Minor changes: Alterations to systems shall comply with the requirements of Section 8, as applicable to those specific portions that are being altered.			
335		8.1.4.3			New section: Any new equipment subject to the requirements of Section 8 that is installed in conjunction with the alterations as a direct replacement of existing equipment shall comply with the specific requirements, as applicable to that equipment.			
336	1323.8.4.2	8.4.2	Automatic Receptacle Control		Minnesota amendment deleted entire section.			
337		8.4.3.1	Monitoring		Added item f and exception language changed: f. Refrigeration systems. Exception to 8.4.3.1: Where the design load of any of the categories (b) through (f) are less than 10% of the whole-building load, these categories shall be allowed to be combined with other categories.			

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338		8.4.3.2	Recording and Reporting		Minor change to exception 5: 5. Critical equipment and life-safety branches of NFPA 70, Article 517.			
339		8.4.4	Low-Voltage Dry-Type Distribution Transformers		Changes to section: Low-voltage dry-type distribution transformers shall comply with the requirements shown in Table 8.4.4. Transformers that are not included in the definition of distribution transformers as defined in 10 CFR 431.192 have no performance requirements in this section and are listed for ease of reference as exceptions. Exception to 8.4.4: Transformers that meet any of the following exclusions in the U.S. DOE definition of "distribution transformers" found in 10 CFR 431.192: 1. Transformers with tap range of 20% or more. 2. Drive (isolation) transformer. 3. Rectifier transformer. 4. Auto-transformer. 5. Uninterruptible power supply transformer. 6. Special impedance transformer. 7. Regulating transformer. 8. Sealed and nonventilating transformer. 9. Machine-tool (control) transformer. 10. Welding transformer. 11. Grounding transformer. 12. Testing transformer.			
340		8.7.3.1	Record Documents		New requirement: a. a single-line diagram of the property electrical distribution system, b. floor plans indicating location and area served for all distribution, and c. site plans indicating location and area served for all distribution			
341		8.9.1	Verification and Testing		Changed section: Building power distribution systems and applicable equipment shall be verified and tested in accordance with this section and provisions of Section 4.2.5.1. Testing shall verify that control elements are configured and operating in accordance with applicable requirements of a. automatic receptacles controls (Section 8.4.2) and b. energy monitoring (Section 8.4.3). Verification and FPT documentation shall comply with Section 4.2.5.1			

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342		9.1.1.1	New Building or Site System or Equipment		Changes to section: Lighting equipment and systems serving the lighting needs of new buildings or new site systems and equipment shall comply with the requirements of this section as described in Section 9.2. This section shall apply to the following: a. Lighting equipment and systems serving interior spaces of buildings. b. Lighting equipment and systems serving exterior applications. Exceptions to 9.1.1.1: 1. Emergency lighting that is automatically off during normal ~~building~~ operation. 2. Lighting, including exit signs, that is specifically designated as required by a health or life safety statute, ordinance, or regulation. 3. Decorative gas lighting systems.			
343		9.1.1.2	Additions to Existing Systems and Equipment		New section: Lighting equipment and systems installed in addition to existing buildings and existing sites shall comply with the requirements of Section 9.1.1.1.			
344		9.1.1.3	Alterations to Existing Systems and Equipment		New section: The alteration of lighting equipment and systems in an interior space shall comply with Section 9.1.1.3.1. The alteration of a lighting system in an exterior application shall comply with Section 9.1.1.3.2. The maintenance of an existing lighting system to return it to working order shall not be considered an alteration. Retrofitting a luminaire for which the original lamps and ballast/driver are replaced with a new lamp/light source and driver/ballast that was not a component of the original luminaire shall be considered an alteration.			

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345		9.1.1.3.1	Alterations for Interior Building Spaces		New section: The alteration of a lighting system in an interior space shall meet one of the following requirements: a. The alteration shall comply with Section 9.2 when the total wattage of all new and retrofitted luminaires is greater than 2000 W. b. When the total wattage of all new and retrofitted luminaires is 2000 W or less, each altered space shall comply with the LPA of Tables 9.5.2.1-1 and 9.5.2.1-2 and Section 9.5.2.2, or the alteration shall result in a new wattage at least 50% below the original wattage of each altered lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Sections 9.4.1.1(a), 9.4.1.1(h), 9.4.1.1(i) as applicable to each altered space as shown in Tables 9.5.2.1-1 and 9.5.2.1-2 and Section 9.5.2.2.			
346		9.1.1.3.2	Lighting Alterations for Exterior Building Areas.		New section: The alteration of a lighting system for an exterior area shall use only the area-specific allowances in Table 9.4.2-2 and shall not use the base site allowances to determine the LPA. Additionally, the exterior alteration shall meet one of the following: a. The alteration shall comply with Section 9.2 when the total number of new and retrofitted luminaires is greater than 10 or where the combined length of new and retrofitted linear luminaires is greater than 20 linear feet. b. Where the total number of new and retrofitted luminaires is not greater than 10, or where the combined length of new and retrofitted linear luminaires is not greater than 20 linear feet of linear luminaires, the total wattage of the alteration shall be no greater than the maximum LPA permitted by Table 9.4.2-2, or the total new wattage shall be at least 50% below the total original wattage of that lighting system. Additionally, the new and retrofitted lighting shall comply with the control requirements of Section 9.4.1.4(a).			
347		9.1.2	Climate.		Minor changes and changed section number: Climate zones shall be determined in accordance with Section 5.1.5.			

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348		9.1.3	Installed Lighting Power.		Minor changes: The luminaire wattage for all interior and exterior applications shall include all power used by the luminaires, including lamps, ballasts/drivers, transformers, and control devices, except as specifically exempted in Section 9.1.1, 9.2.2.1, or 9.2.2.2. Exception to 9.1.3: If two or more independently operating lighting systems in a space are capable of being controlled to prevent simultaneous user operation, the installed interior lighting power or the installed exterior lighting power shall be based solely on the lighting system with the highest wattage.			
349		9.1.4	Interior and Exterior Luminaire Wattage		Minor changes: Exception to 9.1.4(b): Lighting power calculations for ballasts with adjustable ballast factors shall be based on the ballast factor that will be used in the space, provided that the ballast factor is not user field-changeable. c. The wattage of line-voltage lighting track and plug-in busway designed to allow the addition and/or relocation of lighting equipment without altering the wiring of the system shall be the lesser of 1. the specified wattage of the lighting equipment included in the system with a minimum of 10 W/lin ft or 2. the wattage limit of permanent current-limiting devices on the system. f. The wattage of a retrofitted luminaire shall be the manufacturer's labeled input power of the new light source plus driver. g. The wattage of all other miscellaneous lighting equipment shall be the specified wattage of the lighting equipment.			
350		9.2	Compliance Paths		Minor changes: Lighting systems and equipment shall comply with Section 9.2.1 ~~and Section 9.2.2~~			

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351		9.2.1	Requirements for All Compliance Paths.		Changes to section: Lighting systems and equipment shall comply with Sections 9.1 "General"; 9.7, "Submittals"; 9.9, "Verification, Testing, and Commissioning"; and one of the following: a. Section 9.3, "Simplified Building Method Compliance Path" or b. Section 9.4, "Mandatory Provisions", and Section 9.5.1, "Building Area Method Compliance Path" or c. Section 9.4, "Mandatory Provisions," and Section 9.5.2, "Space-by-Space Method Compliance Path" or d. Section 9.4, "Mandatory Provisions," and Section 9.6 "Alternative Compliance Path," or e. Section 9.4, "Mandatory Provisions," and Section 12, "Energy Cost Budget Method," or f. Section 9.4, "Mandatory Provisions," and Normative Appendix G, "Performance Rating Method." The installed lighting power identified in accordance with Section 9.1.3 shall not exceed the lighting power allowance developed in accordance with Section 9.2.1(a), (b), or (c).			
352		9.2.2.1	Interior Lighting Power Allowance		Minor changes: The interior lighting power allowance for a building or a separately metered or permitted portion of a building shall be determined by either Simplified Building Method described in Section 9.3, the Building Area Method described in Section 9.5.1, or the Space-by-Space Method described in Section 9.5.2. Trade-offs of lighting power allowance among portions of the building for which a different calculation method has been used for compliance are not permitted. Exception to 9.2.2.1: When using the compliance methods in Section 9.5.1 or 9.5.2 only, the lighting equipment and applications listed in Table 9.2.2.1 shall not be considered when determining the interior lighting power allowance developed in accordance with Section 9.5.1 or 9.5.2, nor shall the wattage for such lighting be included in the installed interior lighting power identified in accordance with Section 9.1.3. This exemption shall only apply when the lighting and controls are in compliance with the requirements of Table 9.2.2.1. Lighting controls noted in this table are the only required controls for this			
353		9.2.2.2	Exterior Lighting Power Allowance.		Changes to section: The exterior lighting power allowance shall be determined by a. Section 9.3.2, "Simplified Building Method of Calculating Exterior Lighting Power Allowance," when using Section 9.3 to determine the interior lighting power allowance, or b. Section 9.4.2, "Exterior Lighting Power.			

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354		9.3	Simplified Building Method Compliance Path.		Exceeption removed: ~~Exception to 9.3 Alterations involving only luminaire and lamp/ballast replacements shall be permitted to comply by reducing the installed power by a minimum of 35% for existing T12 systems, 20% for existing T8 or T5 systems, 45% for existing HID systems, and 75% for existing incandescent systems~~			
355		Table 9.2.2.1	Exceptions to Interior Lighting Power and Minimum Control Requirements		Major changes to table and table number:			
356		Table 9.3.1-1	Simplified Building Method for Office Buildings		Major changes to table			
357		Table 9.3.1-2	Simplified Building Method for Retail Buildings		Major changes to table			
358		9.3.2	Simplified Building Method of Calculating Exterior Lighting Power Allowance.		Changes to section: For all building types listed in Section 9.3, exterior areas (new and alterations) shall comply with the lighting power allowance and control requirements of Table 9.3.2.			

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359		9.4.1.1	Interior Lighting Controls		Changes to section: For each space in the building, all of the lighting control functions indicated in Tables 9.5.2.1-1 and 9.5.2.1-2, for the appropriate space type in the first column, and as described below, shall be implemented. All control functions indicated as “REQ” are mandatory and shall be implemented. If a space type has control functions indicated as “ADD1,” then at least one of those functions shall be implemented. If a space type has control functions indicated as “ADD2,” then at least one of those functions shall be implemented. For space types not listed, select a reasonably equivalent type. If using the Space-by-Space Method, the space type used for determining control requirements shall be the same space type that is used for determining the LPD allowance. a. Local control: There shall be one or more manual lighting control device that provides ON and OFF control of all lighting in the space. Each control device shall control an area (1) no larger than 2500 ft2 if the space is 10,000 ft2 and (2) no larger than 10,000 ft2 otherwise. The device installed to comply with this provision shall be readily accessible and located so that the occupants can see the controlled lighting when using the control device. Exception to 9.4.1.1(a):			

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360		9.4.1.1	Interior Lighting Controls (continued)		Continued: c. Restricted to partial automatic ON: No more than 50% of the lighting power for the general lighting shall be allowed to be automatically turned on, and none of the remaining lighting shall be automatically turned on. Offices greater than 300 ft2, shall have the following requirements: 1. Control zones for general lighting shall be limited to 600 ft2. 2. Control zones for general lighting shall be permitted to automatically turn on, up to full power upon occupancy. 3. General lighting in other unoccupied control zones shall be permitted to automatically turn on to no more than 20% of full power.d. Multilevel lighting control: The general lighting in the space shall be manually controlled with continuous dimming to 10% or less of full lighting power in addition to full ON and full OFF.e. Automatic daylight responsive controls for sidelighting: In any space where the combined input power of all general lighting completely or partially within the primary sidelighted areas is 75 W or greater, the general lighting in the primary sidelighted areas shall be controlled by photocontrols. In any space where the combined input power of all general lighting completely or partially within the primary sidelighted area and secondary sidelighted area is 150 W or greater, the general lighting in the primary sidelighted area and secondary sidelighted area shall be controlled by photocontrols. General lighting in the secondary sidelighted area shall be controlled independently of the general lighting in the primary sidelighted area.			

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361		9.4.1.1	Interior Lighting Controls (continued)		Continued: 3. When an automatic reduction control has reduced the lighting power to the unoccupied set point in accordance with Section 9.4.1.1(g), the daylight responsive control shall adjust the electric light in response to available daylight, but it shall not allow the lighting power to be above the unoccupied set point. f. Automatic daylight responsive controls for toplighting: In any space where the combined input power for all general lighting completely or partially within daylight area under skylights and daylight area under roof monitors is 75 W or greater, general lighting in the daylight area shall be controlled by photocontrols. The control system shall have the following characteristics: 3. When an automatic reduction control has reduced the lighting power to the unoccupied set point in accordance with Section 9.4.1.1(g) the daylight responsive control shall adjust the electric light in response to available daylight, but it shall not allow the lighting power to be above the unoccupied set point.g. Automatic reduction control (full OFF complies): The general lighting power in the space shall be automatically reduced by at least 50% within 20 minutes of all occupants leaving the space. In offices greater than 300 ft2, control zones for general lighting shall 1. be limited to 600 ft2 and 2. automatically reduce general lighting by at least 80% of full power within 20 minutes of all occupants leaving a control zone.			
362		9.4.1.1	Interior Lighting Controls (continued)		Continued: Exceptions to 9.4.1.1(h): The following lighting is not required to be automatically shut off: 1. Lighting required for 24/7 continuous operation. 2. Lighting in spaces where patient care is rendered. 3. General lighting and task lighting in spaces where automatic shutoff would endanger the safety or security of the room or building occupants. 4. Lighting load not exceeding 0.02 W/ft2 multiplied by the gross lighted floor area of the building. Exceptions to 9.4.1.1(i): The following lighting is not required to be on scheduled shutoff: 1. Lighting required for 24/7 continuous operation. 2. Lighting in spaces where patient care is rendered. 3. General lighting and task lighting in spaces where automatic shutoff would endanger the safety or security of the room or building occupants. 4. Lighting load not exceeding 0.02 W/ft2 multiplied by the gross lighted floor area of the			

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363		9.4.1.2	Parking Garage Lighting Control		Changes to exceptions: Exceptions to 9.4.1.2(d): 1. Parking garage daylight transition zone lighting. 2. Where permanent screens or architectural elements obstruct more than 50% of the opening. 3. Where the top of any existing adjacent structure or natural object is at least twice as high above the openings as its horizontal distance from the opening			
364		9.4.1.2	Special Applications		Minor changes to section: Special Applications. Lighting controls noted in this section are the only required controls for this equipment and these applications. Lighting exempt from interior lighting power shall be controlled in accordance with Table 9.2.2.1. Lighting using additional interior lighting power applications shall be controlled in accordance with Section 9.5.2.2. b. Guestrooms 1. All lighting and switched receptacles in guestrooms and suites in hotels, motels, boarding houses, or similar buildings shall be automatically controlled such that the power to the lighting and switched receptacles in each enclosed space will be turned off within 20 minutes after all occupants leave that space. Card key controls shall not be used to comply with this provision.			

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365		9.4.1.4	Exterior Lighting Control		Changes to section: For each surface or area, all of the lighting control functions indicated in Table 9.4.2-2 shall be implemented. Lighting for exterior applications not exempted in Section 9.1 shall meet the requirements defined here and listed in Table 9.4.2-2: a. OFF control: There shall be one or more lighting control(s) that turns off all of the lighting in the area or surface. b. Daylight OFF control: Lighting shall automatically turn off when sufficient daylight is available or within 30 minutes of sunrise. c. Scheduled OFF control: Lighting shall be automatically shut off between midnight 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. d. Scheduled light reduction control: Lighting and signage shall be controlled to automatically reduce the connected lighting power by at least 50% from midnight or within one hour of the end of business operations, whichever is later, until 6 a.m. or the beginning of business operations, whichever is earlier. e. Occupancy-sensing light reduction control: Lighting shall be controlled to automatically reduce the connected lighting power 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.			
366		9.4.2	Exterior ~~Building~~ Lighting Power		Removed all amendments:			
367		Table 9.4.2-2	Individual Lighting Power Allowances for Building Exteriors Applications		Major changes to table:			
368		9.4.3	Dwelling Units		Major changes to section: Dwelling unit lamps, luminaires, and lighting controls shall be installed to meet the provisions of Sections 9.4.3.1, 9.4.3.2, and 9.4.3.3. No other provisions of Section 9 apply to dwelling units.			

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369		9.4.3.1	Lamp and Luminaire Efficacy.		New section: At least 75% of the permanently installed luminaires shall use lamps with an efficacy of at least 75 lm/W or have a total luminaire efficacy of at least 50 lm/W.			
370		9.4.3.2	Interior Lighting Controls		New section: Fifty percent (50%) of permanently installed interior luminaires shall be controlled with dimmers or shall automatically be shut off within 20 minutes of all occupants leaving a space.			
371		9.4.3.3	Exterior Lighting Controls		New section: Permanently installed exterior luminaires dedicated to a dwelling unit shall be provided with manual controls and be automatically shut off through time of day, available daylight, or when no activity has been detected for 15 minutes. Exception to 9.4.3.3: Applications with a total rated luminaire wattage of no greater than 8 W.			
372		9.4.4	Horticultural Lighting		New section: Greenhouse horticultural lighting shall follow the requirements of Section 9.4.4.1. Indoor grow horticultural lighting shall follow the requirements of Section 9.4.4.2.			
373	1323.9.4.4		Parking lot lighting		Minnesota amendment: Parking lot lighting is regulated by the Minnesota Department of Transportation in Minnesota Rules, chapter 8885.			
374		9.4.4.1			New section: Luminaires in greenhouse buildings with at least 40 kW of connected load for horticultural lighting shall have a photosynthetic photon efficacy (PPE) of at least 1.7 µmol/J for integrated, nonserviceable luminaires, or a PPE of at least 1.7 µmol/J for lamps in luminaires with removable or serviceable lamps. Horticultural lighting in greenhouse spaces shall be controlled by a device that automatically turns off the horticultural lighting at specific programmed times.			
375		9.4.4.2			New section: Luminaires in indoor grow spaces used for horticultural lighting shall have a PPE of at least 1.9 µmol/J for integrated, nonserviceable luminaires, or a PPE of at least 1.9 µmol/J for lamps in luminaires with removable or serviceable lamps. Horticultural lighting in indoor grow spaces shall be controlled by a device that automatically turns off the horticultural lighting at specific programmed times. Exception to 9.4.4.2: Indoor grow buildings with less than 40 kW of connected load for horticultural lighting shall have a PPE of at least 1.7 µmol/J for integrated, nonserviceable luminaires, or a PPE of at least 1.7 µmol/J for lamps in luminaires with removable or serviceable lamps.			
376		9.5	Prescriptive Compliance Path.		New language: Interior lighting power shall comply with either Section 9.5.1 or 9.5.2. Lighting control requirements shall comply with Section 9.4.1 and Tables 9.5.2.1-1 and 9.5.2.1-2.			

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377		Table 9.5.1	Lighting Power Density Allowances Using the Building Area Method		Changes to the table.			
378		9.5.2	Space-by-Space Method Compliance Path		New section, no added language.			
379		9.5.2.1	Space-by-Space Method of Calculating Interior Lighting Power Allowance		Relocated from 9.6.1, minor changes: a. For each space enclosed by partitions that are 80% of the ceiling height or taller, determine the appropriate space type and the corresponding LPD allowance from Tables 9.5.2.1-1 and 9.5.2.1-2. If a space has multiple functions, where more than one space type is applicable, that space shall be broken up into smaller subspaces, each using its own space type from Tables 9.5.2.1-1 and 9.5.2.1-2. Any of these subspaces that are smaller in floor area than 20% of the original space and less than 1000 ft2 need not be broken out. Include the floor area of balconies and other projections in this calculation. c. Based on the space type selected for each space or subspace, determine the lighting power allowance of each space or subspace by multiplying the calculated area of the space or subspace by the appropriate LPD allowance determined in Section 9.5.2.1(a). For space types not listed, selection of a reasonable equivalent category shall			
380		Table 9.5.2.1-1 and Table 9.5.2.1-2	Space-by-Space Lighting Power Density Allowances and Minimum Control Requirements Using Either Method		Table moved from 9.6.1 and major changes:			

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381		9.5.2.2	Additional Interior Lighting Power		Relocated from 9.6.2 and revised language: When using the Space-by-Space Method, an increase in the interior lighting power allowance is allowed for specific lighting functions. Additional power shall be allowed only if the specified lighting is installed and controlled independently of the general lighting in accordance with Table 9.5.2.2. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose unless otherwise indicated. Lighting control requirements referenced in Section 9.5.2.2 are the only required controls for these applications. An increase in the interior lighting power allowance is permitted in the following cases: a. For each space in which lighting is installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits not exempted in Table 9.2.2.1, provided that the additional lighting power shall not exceed the value in Table 9.5.2.2. b. For lighting equipment installed in sales areas and specifically designed and directed to highlight merchandise, provided that the additional lighting power shall not exceed the value in Table 9.5.2.2. c. For spaces in which lighting is installed for the purpose of videoconferencing and the lighting in that space meets ANSI/IES/AVIXA RP-38, additional lighting power shall be allowed per Table 9.5.2.2.			
382		9.5.2.2	Exception to 9.5.2.2		New exception: Exception to 9.5.2.2: Other merchandise categories may be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the authority having jurisdiction			
383		Table 9.5.2.2	Additional lighting power		New table			

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384		9.5.2.3	Additional Interior Lighting Power Using Nonmandatory Controls.		Changed title and section: An additional lighting power allowance shall be permitted for space types with nonmandatory controls installed as identified in Table 9.5.2.3 when all mandatory controls are used according to Section 9.4. This allowance is added to the interior lighting power allowance and is calculated as follows: Additional Interior Lighting Power Allowance = Lighting Power Under Control × Control Factor where Lighting Power Under Control = the total input watts of all lamps being controlled using the control method indicated Control Factor = the value given in Table 9.5.2.3 for the corresponding space type and control method			
385		9.5.2.4	Room Geometry Adjustment		Moved from 9.6.4: Minor changes: When using the Space-by-Space Method, an adjustment of the space LPD allowance is permitted for individual spaces where room cavity ratio (RCR) calculated for the empty room is documented to be greater than the RCR threshold for that space type shown in Tables 9.5.2.1-1 and 9.5.2.1-2. RCR = 2.5 × Room Cavity Height × Room Perimeter Length/Room Area where Room Cavity Height = Luminaire Mounting Height – Workplane. For corridor/transition spaces, this adjustment is allowed when the corridor is less than 8 ft wide, regardless of the RCR. The LPD allowance for these spaces may be increased by the following amount: LPD Increase = Base Space LPD × 0.20 where Base Space LPD = the applicable LPD allowance from Tables 9.5.2.1-1 and 9.5.2.1-			
386		9.6	Alternate Compliance Path (Reserved)		No information in Section 9.6			

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387		9.9.1	Verification and Testing		Changed section: Lighting control devices and control systems shall be tested in accordance with this section and Section 4.2.5.1 to verify that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The following procedures shall be performed for the type of controls listed: d. High-End Trim and Lumen Maintenance Controls 1. The initial maximum set point for power or light output for each control group of luminaires shall be documented. 2. The tuned maximum set point for power or light output for each control group of luminaires shall be documented. 3. Measurement of high-end trim in daylight areas shall be conducted at night. 4. Where lumen maintenance controls are included, the automatic rate of increase in lighting power shall be no more than 1.0% per year. 5. The high-end trim and lumen maintenance control documentation shall show the initial and tuned set point and area for each control group and summarize the overall percentage of lighting output or power reduction from tuning. The rate of increase for lumen maintenance shall			
388		10.1.1	Scope		Minor changes: This section applies to other equipment as described in Section 10.4.			
389		10.1.2	New Building or Site System or Equipment		Change title and minor changes to section: Other equipment installed in new buildings shall comply with the requirements of Section 10.2.			
390		10.1.3	Additions to Existing Systems and Equipment		Minor changes: Other equipment installed in additions to existing buildings and existing sites shall comply with the requirements of Section 10.2.			
391		10.1.4	Alterations to Existing Service Equipment or Systems		New title			
392		10.1.4.1			Minor changes: Alterations to other building service equipment shall comply with the requirements of Section 10.2 as applicable to those specific portions of the building that are being altered.			
393		10.1.4.2			Minor changes and created a new section: Alterations to systems shall comply with the requirements of Section 10.2, as applicable to those specific portions that are being altered.			

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394		10.1.4.3			Minor changes: Any new equipment subject to the requirements of Section 10 that is installed in conjunction with the alterations as a direct replacement of existing equipment or control devices shall comply with the specific requirements applicable to that equipment or control devices.			
395		10.1.5	Climate		New section: Climate zones shall be determined in accordance with Section 5.1.5.			
396		10.2.1	Requirements for All Compliance Paths.		Added prescriptive path to list: Other equipment shall comply with Sections 10.1, “General”; 10.4, “Mandatory Provisions”; 10.5, “Prescriptive Path”, and 10.8, “Product Information.”			
397		10.4.3.1	Cab Lighting Power		New title and changes to section: For the luminaires in each elevator cab, not including power for germicidal function, signals, and displays, the sum of the lumens divided by the sum of the watts (as described in Section 9.1.4) shall be no less than 50 lm/W.Exception to 10.4.3.1: This requirement does not apply to elevators in an essential facility where special lighting needs are required.			
398		10.4.3.2	Ventilation Efficacy.		Changed title and changes to section: Cab ventilation for elevators, except elevators with air conditioning or MERV 13 or greater filters, shall have an efficacy of at least 4.0 cfm/W at maximum speed.			
399		10.4.3.3	Standby Mode.		Addition ot section: The elevator cab lighting shall be automatically de-energized in accordance with ASME A17.1/CSA B44 Requirement 2.14.7.2.2. Cab ventilation fans for elevators without air conditioning shall also be de-energized.When stopped and unoccupied with doors closed for over 15 minutes, cab interior lighting and ventilation shall be de-energized until required for operation. Exception to 10.4.3.3: Forced ventilation shall meet the requirements of ASME A17.1/CSA B44 Requirement 2.14.2.3.3			
400		10.4.3.4	Energy Use		New title and minor changes to section: New elevators shall meet the following requirements: a. Usage category as defined in ISO 25745-2 between 1 and 6. The usage category shall be in accordance with Annex B. b. The energy efficiency class shall be E or better per ISO 25745-2, Table 7.			