Labor and Industry

Adopted Permanent Rules Relating to Commercial Energy Code

1323.0001 TITLE.

This chapter is known as the Minnesota Commercial Energy Code.

1323.0005 ADMINISTRATION AND PURPOSE.

Subpart 1. **Administration.** This code shall be administered in accordance with chapter 1300.

Subp. 2. **Purpose.** The purpose of this chapter is to establish a minimum code of standards for the construction, reconstruction, alteration, and repair of buildings governing matters including design and construction standards regarding heat loss control, illumination, and climate control pursuant to Minnesota Statutes, sections 16B.59, 16B.61, and 16B.64.

1323.0010 INCORPORATION BY REFERENCE.

For purposes of this chapter, "ASHRAE Standard 90.1" means ANSI/ASHRAE/IESNA Standard 90.1-2004, ~~version PC 1/06,~~ titled Energy Standard for Buildings Except Low-Rise Residential Buildings, promulgated by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, N.E., Atlanta, GA 30329. ASHRAE Standard 90.1-2004, ~~version PC 1/06,~~ is incorporated by reference and made part of the Minnesota Commercial Energy Code, as amended in this chapter. Portions of this chapter reproduce text and tables from ASHRAE Standard 90.1. ASHRAE Standard 90.1 is not subject to frequent change and a copy of ASHRAE Standard 90.1 is available in the office of the commissioner of labor and industry.

1323.0230 SECTION 2, SCOPE.

ASHRAE Standard 90.1, Section 2, subsection 2.3, is amended to read:

2.3 Applicability. The provisions of this standard apply to structures that are not regulated by Minnesota Rules, chapter 1322.

Exceptions:

(a) Buildings that do not use either electricity or fossil fuel; and

(b) Equipment and portions of building systems that use energy primarily to provide for industrial or manufacturing processes.

1323.0320 SECTION 3.2, DEFINITIONS.

ASHRAE Standard 90.1, Section 3.2, is amended by adding the following definitions:

Demand Control Ventilation (DCV): A ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than design occupancy.

Lamp wattage, rated: The power consumption of a lamp as published in the manufacturers' literature.

R-value computation for concrete masonry block wall assembly with integral insulation: The thermal performance of a concrete masonry block wall assembly with integral insulation must be determined by one of the following methods. Foundation wall assembly R-values must exclude air film coefficients and the R-value of the surrounding soil.

(a) Thermal performance must be calculated in accordance with ASHRAE Handbook of Fundamentals isothermal planes calculation method. The calculation must be certified by a professional engineer licensed in Minnesota.

(b) Thermal performance must be measured in accordance with ASTM C 236 test procedure for thermal transmittance measurement performed by an approved laboratory as defined by Minnesota Rules, chapter 7640.

Climate zone 6: Climate zone 6 includes Anoka, Benton, Big Stone, Blue Earth, Brown, Carver, Chippewa, Chisago, Cottonwood, Dodge, Dakota, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Isanti, Jackson, Kandiyohi, La Qui Parle, Le

Sueur, Lincoln, Lyon, Martin, McLeod, Meeker, Mower, Murray, Nicollet, Nobles, Olmsted, Pipestone, Pope, Ramsey, Redwood, Renville, Rice, Rock, Scott, Sherburne, Sibley, Stearns, Steele, Stevens, Swift, Yellow Medicine, Wabasha, Waseca, Washington, Watonwan, Winona, and Wright Counties.

Climate zone 7: Climate zone 7 includes Aitkin, Becker, Beltrami, Carlton, Cass, Clay, Clearwater, Cook, Crow Wing, Douglas, Grant, Hubbard, Itasca, Kanabec, Kittson, Koochiching, Lake, Lake of the Woods, Mahnomen, Marshall, Mille Lacs, Morrison, Norman, Otter Tail, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Todd, Traverse, Wadena, and Wilkin Counties.

Northern climate zone: Climate zone 7.

Southern climate zone: Climate zone 6.

1323.0513 SECTION 5.1.3, ENVELOPE ALTERATIONS.

ASHRAE Standard 90.1, Section 5.1.3, is amended to read:

5.1.3 Envelope alterations. Alterations to the building envelope shall comply with the requirements of Section 5 for insulation, air leakage, and fenestration applicable to those specific portions of the building being altered. When the wall cavity of the building envelope is exposed due to the removal of the interior wall finish materials, the wall cavity shall be insulated to full depth, or to a depth that provides insulating values as required for new wall construction.

Exceptions:

1. The following alterations need not comply with the requirements of Section 5 for insulation, air leakage, and fenestration, provided such alterations will not increase the energy usage of the building:

(a) Installation of storm windows over existing glazing.

(b) Replacement of glazing in existing sash and frame provided the U-factor and SHGC will be equal to or lower than before the glass replacement.

(c) Alterations to roof/ceiling, wall, or floor cavities, which are insulated to full depth with insulations having a nominal value of not less than R-3.0/in.

(d) Alterations to walls and floor, where the existing structure is without framing cavities and no new framing cavities are created.

(e) Removal of less than 50 percent of a roof membrane or built-up roof covering, or the existing roof insulation is at least R-16 for buildings that are conditioned, or the existing roof insulation is at least R-10 for buildings that are semiconditioned.

(f) Replacement of existing doors that separate conditioned space from the exterior shall not require the ~~insulation~~ installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.

(g) Replacement of existing fenestration, provided, however, that the area of the replacement fenestration does not exceed 25 percent 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 replacement.

(h) Walls that are back-plastered, walls that are more than 50 percent filled with insulation, walls without framing cavities.

(i) Small openings for purposes including installing, altering, or repairing plumbing, electrical, and mechanical systems, control, and expansion joints.

2. A vapor retarder is not required if the interior finish is not removed.

1323.0543 SECTION 5.4.3, AIR LEAKAGE.

Subpart 1. **Building envelope sealing.** ASHRAE Standard 90.1, Section 5.4.3.1, is amended and subsections added to read:

5.4.3.1 Building envelope air sealing. The building envelope shall contain an air barrier consisting of a material or combination of materials to resist the passage of air into or out of the conditioned or semiconditioned space. The following areas of the building envelope shall be sealed in a

permanent manner to minimize air leakage at all edges, joints, openings, and penetrations:

(a) joints around fenestration and door frames;

(b) junctions between walls and foundations, between walls at building corners, between walls and structural floors or roofs, and between walls and roof or wall panels;

(c) openings at penetrations of utility services through walls, roofs, and floors;

(d) site-built fenestration and doors;

(e) building assemblies used as ducts or plenums;

(f) joints, seams, and penetrations of vapor retarders;

(g) across construction, control, and expansion joints;

(h) across junctions between different building assemblies; and

(i) around all other penetrations through the building envelope.

5.4.3.1.1 The air barrier shall be located between the ~~warm in winter~~ warm-in-winter surface and the winter design dew point location within the building component or assembly.

Exception: When the building component or assembly is either integrally insulated concrete or integrally insulated concrete masonry.

5.4.3.1.2 Drawings shall indicate the location of the air barrier system.

Subp. 2. **Fenestration and doors.** ASHRAE Standard 90.1, Section 5.4.3.2, is amended to read:

5.4.3.2 Fenestration and doors. Air leakage for fenestration and doors shall be determined in accordance with National Fenestration Rating Council 400 (NFRC 400) or AAMA/WDMA/CSA 101/I.S.2/A440. Air leakage shall be determined by an independent laboratory accredited by a nationally recognized accreditation organization, such as the National Fenestration

Rating Council, and shall be labeled and certified by the manufacturer. Air leakage under a pressure differential of 75 Pa (1.57 psf) shall not exceed 1.0 cfm/ft^2 for glazed swinging entrance doors and for revolving doors and 0.4 cfm/ft^2 for all other products.

Subp. 3. **Recessed lighting fixtures.** ASHRAE Standard 90.1, Section 5.4.3, is amended by adding a subsection to read:

5.4.3.5 Recessed lighting fixtures. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces by being:

1. IC-rated and labeled with enclosures that are sealed or gasketed to prevent air leakage to the ceiling cavity or unconditioned space;

2. IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 pounds per square foot (75 Pa) pressure differential with no more than 2.0 cubic feet per minute (0.944 L/s) of air movement from the conditioned space to the ceiling cavity; or

3. located inside an airtight sealed box with clearances of at least 0.5 inch (13 mm) from combustible material and three inches (76 mm) from insulation.

1323.0550 SECTION 5.5, PRESCRIPTIVE BUILDING ENVELOPE OPTION.

Subpart 1. **Roof insulation.** ASHRAE Standard 90.1, Section 5.5.3.1, is amended to read:

5.5.3.1 Roof insulation. All roofs shall comply with the insulation values specified in Tables 5.5-1 through 5.5-8. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Subp. 2. **Table 5.5-6.** ASHRAE Standard 90.1, Table 5.5-6, Building Envelope Requirements for the Southern Minnesota Climate Zone is amended to read:

TABLE 5.5-6 Building Envelope Requirements For Southern Minnesota Climate Zone (Zone 6)

	Nonresidential		Residential		Semiheated	
Opaque Elements	**Assembly Max.**	**Insulation Min. R-Value**	**Assembly Max.**	**Insulation Min. R-Value**	**Assembly Max.**	**Insulation Min. R-Value**
Roofs, Insulation						
Entirely Above Deck	U-0.043	R-23 ci	U-0.043	R-23 ci	U-0.06	R-16.6 ci
Metal Building	U-0.043	R-30	U-0.043	R-30	U-0.06	R-19
Attic and Other	U-0.027	R-30	U-0.027	R-30	U-0.06	R-19
Walls, Above Grade						
Mass	U-0.104	R-9.5 ci	U-0.09	R-11.4 ci	U-0.58	NR
Metal Building	U-0.113	R-13	U-0.057	13 + R-13	U-0.113	R-13
Steel Framed	U-0.084	R-13 ci + R-3.8 ci	U-0.064	R-13 + R-7.5 ci	U-0.124	R-13
Wood Framed and Other	U-0.089	R-13	U-0.064	R-13 + R-3.8 ci	U-0.089	R-13
Wall, Below Grade						
Below-Grade Wall	C-0.085	R-10 ci	C-0.085	R-10 ci	C-0.085	R-10 ci
Floors						
Mass	U-0.087	R-8.3 ci	U-0.064	R-12.5 ci	U-0.322	NR
Steel Joist	U-0.038	R-30	U-0.038	R-30	U-0.069	R-13
Wood Framed and Other	U-0.033	R-30	U-0.033	R-30	U-.0066	R-13

Slab-On-Grade Floors							
Unheated	F-0.520	R-10 to footing*	F-0.520	R-10 to footing*	F-0.520	R-10 to footing*
Heated	F-0.520	R-10 to footing*	F-0.520	R-10 to footing*	F-0.520	R-10 to footing*
Opaque Doors						
Swinging	U-0.700		U-0.500		U-0.700	
Non-swinging	U-0.500		U-0.500		U-1.450	
Fene-stration	**Assembly Max. U (Fixed/ Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**	**Assembly Max. U (Fixed/ Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**	**Assembly Max. U (Fixed Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**
Vertical Glazing, Percent of Wall						
0-10.0	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -1.27	$SHGC_{north}$ -NR
10.1- 20.0	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -1.27	$SHGC_{north}$ -NR
20.1- 30.0	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -1.27	$SHGC_{north}$ -NR
30.1- 40.0	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -0.57	$SHGC_{all}$ -0.39	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -0.67	$SHGC_{north}$ -0.49	U_{oper} -1.27	$SHGC_{north}$ -NR
40.1 -50.0	U_{fixed} -0.46	$SHGC_{all}$ -0.26	U_{fixed} -0.46	$SHGC_{all}$ -0.26	U_{fixed} -0.98	$SHGC_{all}$ -NR

	U_{oper} -0.47	$SHGC_{north}$ -0.47	U_{oper} -0.47	$SHGC_{north}$ -0.49	U_{oper} -1.02	$SHGC_{north}$ -NR
Skylight, Percent of Roof						
0-2.0	U_{all} -0.69	$SHGC_{all}$ -0.49	U_{all} -0.58	$SHGC_{all}$ -0.49	U_{all} -1.36	$SHGC_{all}$ -NR
Greater than 2 to 5.0	U_{all} -0.69	$SHGC_{all}$ -0.49	U_{all} -0.58	$SHGC_{all}$ -0.39	U_{all} -1.36	$SHGC_{all}$ -NR

*"To footing" means to the top of the footing if the insulation is on the exterior, or to the top of the slab if the insulation is on the interior.

Subp. 3. **Table 5.5-7.** ASHRAE Standard 90.1, Table 5.5-7, Building envelope requirements for the northern Minnesota climate zone is amended to read:

	Nonresidential		**Residential**		**Semiheated**	
Opaque Elements	**Assembly Max.**	**Insulation Min. R-Value**	**Assembly Max.**	**Insulation Min. R-Value**	**Assembly Max.**	**Insulation Min. R-Value**
Roofs, Insulation						
Entirely Above Deck	U-0.043	R-23 ci	U-0.043	R-23 ci	U-0.06	R-16.6 ci
Metal Building	U-0.043	R-23	U-0.043	R-23	U-0.06	R-16.6
Attic and Other	U-0.043	R-30	U-0.043	R-30	U-.06	R-19
Walls, Above Grade						
Mass	U-0.09	R-9.5 ci	U-0.08	R-13.3 ci R-13.0 + R-	U-0.58	NR
Metal Building	U-0.057	R-13	U-0.057	R-13 R-13 + R-13	U-0.113	R-13
Steel Framed	U-0.064	R-13 + R-3.8 ci	U-0.064	R-13 + R-7.5 ci	U-0.124	R-13

Wood Framed and Other	U-0.089	R-13	U-0.051	R-13 + R-7.5 ci	U-0.089	R-13
Walls, Below Grade						
Below-Grade Wall	C-0.085	R-10 ci	C-0.085	R-10 ci	C-0.085	R-10 ci
Floors						
Mass	U-0.087	R-8.3 ci	U-0.064	R-12.5 ci	U-0.137	R-4.2 ci
Steel Joist	U-0.038	R-30	U-0.038	R-30	U-0.052	R-19
Wood Framed and Other	U-0.033	R-30	U-0.033	R-30	U-.0066	R-13
Slab-On-Grade Floors						
Unheated	F-0.52	R-10 to footing*	F-0.52	R-10 to footing*	F-0.52	R-10 to footing*
Heated	F-0.52	R-10 to footing*	F-0.52	R-10 to footing*	F-0.52	R-10 to footing*
Opaque Doors						
Swinging	U-0.70		U-0.50		U-0.70	
Non-swinging	U-0.50		U-0.50		U-1.45	
Fene-stration	**Assembly Max. U (Fixed/ Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**	**Assembly Max. U (Fixed/ Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**	**Assembly Max. U (Fixed/ Operable)**	**Assembly Max. SHGC (All Orienta-tions/ North-Oriented)**
Vertical Glazing, Percent of Wall						
0-10.0	U_{fixed} -0.57 U_{oper} -0.67	$SHGC_{all}$ -0.49 $SHGC_{north}$ -0.64	U_{fixed} -0.57 U_{oper} -0.67	$SHGC_{all}$ -0.49 $SHGC_{north}$ -0.64	U_{fixed} -1.22 U_{oper} -1.27	$SHGC_{all}$ -NR $SHGC_{north}$ -NR

10.1- 20.0	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -1.27	$SHGC_{north}$ -NR
20.1- 30.0	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -1.27	$SHGC_{north}$ -NR
30.1- 40.0	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -0.57	$SHGC_{all}$ -0.49	U_{fixed} -1.22	$SHGC_{all}$ -NR
	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -0.67	$SHGC_{north}$ -0.64	U_{oper} -1.27	$SHGC_{north}$ -NR
40.1 -50.0	U_{fixed} -0.46	$SHGC_{all}$ -0.36	U_{fixed} -0.46	$SHGC_{all}$ -0.36	U_{fixed} -0.98	$SHGC_{all}$ -NR
	U_{oper} -0.47	$SHGC_{north}$ -0.64	U_{oper} -0.47	$SHGC_{north}$ -0.64	U_{oper} -1.02	$SHGC_{north}$ -NR
Skylight, Percent of Roof						
0-2.0	U_{all} -0.69	$SHGC_{all}$ -0.68	U_{all} -0.69	$SHGC_{all}$ -0.64	U_{all} -1.36	$SHGC_{all}$ NR
Greater than 2.1 to 5.0	U_{all} -0.69	$SHGC_{all}$ -0.64	U_{all} -0.69	$SHGC_{all}$ -0.64	U_{all} -1.36	$SHGC_{all}$ -NR

*"To footing" means to the top of the footing if the insulation is on the exterior, or to the top of the slab if the insulation is on the interior.

1323.0562 SECTION 5.6.2, COMCHECK OPTION.

ASHRAE Standard 90.1, Section 5.6, is amended by adding a subsection to read:

5.6.2 COMcheck option. Buildings shall be deemed to comply with Section 5.5 if the COMcheck computer program published by the Pacific National Laboratories demonstrates it to be in compliance with envelope requirements.

1323.0581 SECTION 5.8.1.5, SUBSTANTIAL CONTACT.

ASHRAE Standard 90.1, Section 5.8.1.5, is amended to read:

5.8.1.5 Substantial contact. Insulation shall be installed in a permanent manner and in substantial contact with either the air barrier materials or building element making up the interior surface in accordance with manufacturer's recommendations for the framing system used. Exposed flexible batt insulation installed in floor cavities and walls shall be supported in a permanent manner by supports no greater than 24 inches on center.

Exception: Insulation materials that rely on air spaces adjacent to reflective surfaces for their rated performance.

1323.0642 SECTION 6.4.2, LOAD CALCULATIONS.

ASHRAE Standard 90.1, Section 6.4.2, is deleted and replaced with the following Section 6.4.2 and Table 6.4.2:

6.4.2 Load calculations. Heating and cooling system design loads for the purpose of sizing systems and equipment shall be determined in accordance with Minnesota Mechanical Code, chapter 1346.

6.4.2.1 Outdoor design conditions. Outdoor design conditions shall be selected from Table 6.4.2.1. Locations not listed in Table 6.4.2.1 shall use those of the listed city with geographical proximity and similar climate conditions as approved by the building official.

TABLE 6.4.2.1 Outdoor Design Conditions

City	Summer Db/Wb °F	Winter Db °F
Aitkin	82/72	-24
Albert Lea	85/72	-15
Alexandria	86/70	-21
Bemidji	84/68	-24
Brainerd	86/71	-20
Cloquet	82/68	-20
Crookston	84/70	-27
Duluth	81/67	-20

13.2	Ely	82/68	-29
13.3	Eveleth	82/68	-26
13.4	Faribault	86/73	-16
13.5	Fergus Falls	86/71	-21
13.6	Grand Rapids	81/67	-23
13.7	Hibbing	82/68	-19
13.8	International Falls	83/67	-28
13.9	Litchfield	85/71	-18
13.10	Little Falls	86/71	-20
13.11	Mankato	86/72	-15
13.12	Minneapolis/St. Paul	88/72	-15
13.13	Montevideo	86/72	-17
13.14	Mora	84/70	-21
13.15	Morris	84/72	-21
13.16	New Ulm	87/73	-15
13.17	Owatonna	86/73	-16
13.18	Pequot Lakes	84/68	-23
13.19	Pipestone	85/73	-15
13.20	Redwood Falls	89/73	-17
13.21	Rochester	85/72	-17
13.22	Roseau	82/70	-29
13.23	St. Cloud	86/71	-20
13.24	Thief River Falls	82/68	-25
13.25	Tofte	75/61	-14
13.26	Warroad	83/67	-29
13.27	Wheaton	84/71	-20
13.28	Willmar	85/71	-20
13.29	Winona	88/74	-13
13.30	Worthington	84/71	-14

1323.0643 SECTION 6.4.3, CONTROLS.

Subpart 1. **Setback controls.** ASHRAE Standard 90.1, Section 6.4.3.2, is amended by adding a subsection to read:

6.4.3.2.1 Setback controls. Heating systems shall be equipped with controls that have the capacity to automatically restart and temporarily operate the system as required to maintain zone temperatures above a heating set point adjustable down to 55 degrees Fahrenheit or lower. Cooling systems shall be equipped with controls that have the capacity to automatically restart and temporarily operate the system as required to maintain zone temperatures below a cooling set point adjustable up to 90 degrees Fahrenheit or higher or to prevent high space humidity levels.

Exceptions:

(a) Radiant floor and radiant ceiling heating systems; and

(b) Spaces where constant temperature conditions must be maintained.

Subp. 2. **Optimum start controls.** ASHRAE Standard 90.1, Section 6.4.3.3.3, is amended to read:

6.4.3.3.3 Optimum start controls. Individual heating and cooling air distribution systems with a total design supply air capacity exceeding 10,000 cfm, served by one or more supply fans that are connected together into a common system, shall have optimum start controls. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint and the amount of time prior to scheduled occupancy.

Subp. 3. **Zone isolation.** ASHRAE Standard 90.1, Section 6.4.3.3.4, is amended to read:

6.4.3.3.4 Zone isolation. 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 feet^2 of conditioned floor area nor include more than one floor. Each isolation area shall be equipped with isolation devices capable of automatically shutting off the supply of conditioned air and outside air to and exhaust from the area. Each isolation area shall be controlled independently by a device meeting the requirements of Sections 6.4.3.3.1 (Automatic shutdown) and 6.4.3.3.2 (Setback controls). 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.

Subp. 4. **Freeze protection and snow/ice melting systems.** ASHRAE Standard 90.1, Section 6.4.3.8, is amended to read:

6.4.3.8 Freeze protection and snow/ice melting systems. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls capable of shutting off the systems when outdoor air temperatures are above 40 degrees Fahrenheit or when the conditions of the protected fluid will prevent freezing. ~~Snow and ice melting systems shall only be used where required for life safety.~~ Snow and ice melting systems shall include automatic controls capable of shutting off the systems when the pavement temperature is above 50 degrees Fahrenheit and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40 degrees Fahrenheit so that the potential for snow or ice accumulation is negligible.

Subp. 5. **Ventilation controls for high-occupancy areas.** ASHRAE Standard 90.1, Section 6.4.3.9, is amended to read:

6.4.3.9 Ventilation controls for high-occupancy areas. Demand control ventilation (DCV) is required for spaces larger than 500 feet^2 (46.45 m^2) and with a design occupancy for ventilation of greater than 40 people per 1,000 feet^2 (92.90 m^2) of floor area and served by systems with one or more of the following:

(a) an air-side economizer;

(b) automatic modulating control of the outdoor air damper; or

(c) a design outdoor air flow greater than 300 cfm (141.58 L/s).

Exceptions:

(a) Systems with energy recovery complying with 6.5.6.1.

(b) Multiple-zone systems without direct-digital control of individual zones communicating with a central control panel.

(c) System with a design outdoor air flow less than 1,200 cfm (566.34 L/s).

(d) Spaces where the supply air flow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (566.34 L/s).

1323.0644 SECTION 6.4.4, HVAC SYSTEM CONSTRUCTION AND INSULATION.

ASHRAE Standard 90.1, Section 6.4.4, all subsections, and Tables 6.4.4.2A and 6.4.4.2B are deleted in their entirety and replaced with the following:

6.4.4 HVAC system construction and insulation.

6.4.4.1 Insulation. Duct insulation must comply with Minnesota Rules, chapter 1346.

6.4.4.2 Duct and plenum sealing. Duct and plenum sealing must comply with Minnesota Rules, chapter 1346.

6.4.4.3 Pipe insulation. Pipe insulation must comply with Minnesota Rules, chapter 1346.

1323.0646 SECTION 6.4.6, PROHIBITION OF HEATED COMMERCIAL PARKING FACILITIES.

ASHRAE Standard 90.1, Section 6.4, is amended by adding a section to read:

6.4.6 Prohibition of heated commercial parking facilities. An enclosed structure or portion of an enclosed structure used primarily as a parking garage or ramp for three or more motor vehicles shall not be heated.

Exceptions:

(a) Parking facilities where a majority of parking spaces are within the same building structure as dwelling unit occupancies.

(b) Parking facilities used exclusively to house vehicles for public emergency, ambulance, or public utility emergency response.

(c) Parking facilities that are incidentally heated by building relief or environmental exhaust air, provided that it does not create a safety hazard.

1323.0651 SECTION 6.5.1, ECONOMIZERS.

Subpart 1. **Economizers.** ASHRAE Standard 90.1, Section 6.5.1, is amended to read:

6.5.1 Economizers. Economizers are required on cooling systems having a fan system capacity of 3,000 cfm or greater. Economizers must meet the requirements of Sections 6.5.1.1 through 6.5.1.4.

Exceptions: Economizers are not required for the systems listed below.

(a) Systems that include nonparticulate air treatment as required by Section 6.2.1 of ASHRAE Standard 62.1.

(b) Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35 degrees Fahrenheit dew point temperature to satisfy process needs.

(c) Systems that include a condenser heat recovery system complying with Section 6.5.6.2.

(d) Systems that serve spaces with a sensible cooling load at design conditions, excluding transmission and infiltration loads, that is less than or equal to transmission and infiltration losses at an outdoor temperature of 60 degrees Fahrenheit.

(e) Systems expected to operate less than 20 hours per week.

(f) Where the use of outdoor air for cooling will affect supermarket open refrigerated display casework systems.

(g) The use of outdoor air cooling may affect the operation of other systems so as to increase the overall energy consumption of the building.

(h) Energy recovery from an internal/external zone energy recovery system exceeds the energy conserved by outdoor air cooling on an annual basis.

(i) The quality of the outdoor air is so poor as to require extensive treatment of the air.

Subp. 2. **High-limit shutoff.** ASHRAE Standard 90.1, Section 6.5.1.1.3, is amended to read:

> **6.5.1.1.3 High-limit shutoff.** All air economizers shall be capable of automatically reducing outdoor air intake to the design minimum outdoor air quality when outdoor air intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table 6.5.1.1.3A, All Other Climates. High-limit shutoff control settings for these control types shall be those listed in Table 6.5.1.1.3B.

TABLE 6.5.1.1.3A High-Limit Shutoff Control Options for Air Economizers

Climate Zones	Allowed Control Types	Prohibited Control Types
~~1b, 2b, 3b, 3c, 4b, 4c,~~	Fixed Dry Bulb	Fixed Enthalpy

~~5b, 5c, 6b~~ 6, ~~7, 8~~	Differential Dry Bulb	
	Electronic Enthalpy[a]	
	Differential Enthalpy	
	Dew Point and Dry Bulb Temperature	
~~1a, 2a, 3a, 4a~~	~~Fixed Dry Bulb~~	~~Differential Dry Bulb~~
	~~Fixed Enthalpy~~	
	~~Electronic Enthalpy[a]~~	
	~~Differential Enthalpy~~	
	~~Dew Point and Dry Bulb Temperature~~	
All ~~Other Climates~~	~~Fixed Dry Bulb~~	
	~~Differential Dry Bulb~~	
	Fixed Enthalpy	
	~~Electronic Enthalpy[a]~~	
	~~Differential Enthalpy~~	
	~~Dew Point and Dry Bulb Temperature~~	

Note: [a]Electronic enthalpy controllers are devices that use a combination of humidity and dry bulb temperature in their switching algorithm.

TABLE 6.5.1.1.3B High-Limit Shutoff Control Settings for Air Economizers

Device Type	**Climate**	**Equation**	**Required High-Limit (Economizer Off When): Description**
Fixed Dry Bulb	~~1b, 2b, 3b, 3c, 4b, 4c, 5b, 5c, 6b,~~ 7~~, 8~~	~~T~~ T_{OA}~~>75°F~~	~~Outdoor air temperature exceeds 75°F~~
	~~5a, 6a, 7a~~ 6	T_{OA}>70°F	Outdoor air temperature exceeds 70°F
	All ~~Other~~ Zones	T_{OA}>65°F	Outdoor air temperature exceeds 65°F

Differential Dry Bulb	~~1b, 2b, 3b, 3c, 4b, 4c, 5a, 5b, 5c, 6a, 6b,~~ 7~~, 8~~	$T_{OA}>T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed Enthalpy	All	$h_{OA}>28$ Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	$(T_{OA}, RH_{OA})>A$	Outdoor air temperature/RH exceeds the "A" set point curve[b]
Differential Enthalpy	All	$h_{OA}>h_{RA}$	Outdoor air enthalpy exceeds return air enthalpy
Dew Point and Dry Bulb Temperature	All	$DP_{OA}>55°F$ or $T_{OA}>75°F$	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

[a]At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50 percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

[b]Set point "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40 percent relative humidity and is nearly parallel to dry bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

1323.0652 SECTION 6.5.2.1, ZONE CONTROLS.

ASHRAE Standard 90.1, Section 6.5.2.1, is amended to read:

6.5.2.1 Zone controls. Zone thermostatic controls shall be capable of operating in sequence the supply of heating and cooling energy to the zone. Such controls shall prevent:

1. reheating;

2. recooling;

3. mixing or simultaneously supplying air that has been previously mechanically heated and air that has been previously cooled, either by mechanical cooling or by economizer systems; and

4. other simultaneous operation of heating and cooling systems to the same zone.

Exceptions:

(a) Zones for which the volume of air that is reheated, recooled, or mixed is no greater than the larger of the following:

1. the volume of outdoor air required to meet the ventilation requirements of Section 6.2 of ASHRAE Standard 62.1-2004 for the zone;

2. 0.4 cfm/ft^2 of the zone conditioned floor area;

3. 30 percent of the zone design peak supply rate;

4. 300 cfm- this exception is for zones whose peak flow rate totals no more than ten percent of the total fan system flow rate; and

5. any higher rate that can be demonstrated, to the satisfaction of the authority having jurisdiction, to reduce overall system annual energy usage by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system.

(b) Zones where special pressurization relationships, cross-contamination requirements, or code-required minimum circulation rates are such that variable air volume systems are impractical.

(c) Zones where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered, including condenser heat, or site-solar energy source.

(d) Recovered energy in excess of the new energy expended in the recovery process may be used for control of temperature and humidity.

(e) New energy may be used to prevent relative humidity from rising above 60 percent or to prevent condensation on terminal units or outlets, or functioning of special equipment. New energy may be used for temperature control if minimized in accordance with this subitem.

1. Systems employing reheat and serving multiple zones, other than those employing variable air volume for temperature control, must be provided

with a control that will automatically reset the system cold-air supply to the highest temperature level that will satisfy the zone requiring the highest cooling load.

2. Single-zone reheat systems must be controlled to sequence reheat and cooling.

3. Dual duct and multizone systems, other than those employing variable air volume for temperature control, must be provided with a control that will automatically reset:

a. the cold-deck air supply to the highest temperature that will satisfy the zone requiring the highest cooling load; and

b. the hot-deck air supply to the lowest temperature that will satisfy the zone requiring the highest heating load.

4. Systems in which heated air is recooled, directly or indirectly, to maintain space temperature must be provided with a control that will automatically reset the temperature to which the supply air is heated to the lowest level that will satisfy the zone requiring the highest heating load.

5. For systems with multiple zones, one or more zones may be chosen to represent a number of zones with similar heating and cooling characteristics. A multiple zone system that employs reheating or recooling for control of not more than 5,000 cfm, or 20 percent of the total supply air of the system, whichever is less, is exempt from the supply air temperature reset requirements in subitems 1 to 4.

6. Concurrent operation of independent heating and cooling systems serving common spaces and requiring the use of new energy for heating or cooling must be minimized by:

a. providing sequential temperature control of both heating and cooling capacity in each zone; or

b. limiting the heat energy input through automatic reset control of the heating medium temperature, or energy input rate, to only that necessary to offset heat loss due to transmission and infiltration and, where applicable, to heat the ventilation air supply to the space.

1323.0653 SECTION 6.5.3, AIR SYSTEM DESIGN AND CONTROL.

Subpart 1. **Table 6.5.3.1 fan power limitation.** ASHRAE Standard 90.1, Section 6.5.3.1, Table 6.5.3.1, is amended to read:

TABLE 6.5.3.1 Fan Power Limitation

Allowable Brake Motor Power

Supply Air Volume	**Constant Volume**	**Variable Volume**
<20,000 cfm	1.2 Bhp/1000 cfm	1.7 Bhp/1000 cfm
≥20,000 cfm	1.1 Bhp/1000 cfm	1.5 Bhp/1000 cfm

Allowable Fan System Power = [Table 6.5.3.1 Fan Power Limitation x (Temperature Ratio) + Pressure Credit + Relief Fan Credit] where

Table 6.5.3.1 Fan Power Limitation = Table Value x ~~CF_{Mn} /1000~~ CFM_n/1000

Temperature Ratio = $(T_{t\text{-}stat} - T_S)/20$

Pressure Credit (hp) = Sum of [CFM_n x (SP_n - 1.0)/3718] + Sum of [CFM_{HR} x SP_{HR} /3718]

Relief Fan Credit HP (kW) = $F_R HP$ (kW) x [1 - (CFM_{RF}/CFM_n)]

~~CF_{Mn}~~ CFM_n = supply air volume of the unit with the filtering system (cfm)

CFM_{HR} = supply air volume of heat recovery coils or direct evaporative ~~humidified/cooler~~ humidifier/cooler (cfm)

CFM_{RF} = relief fan air volume at normal cooling design operation

SP_n = air pressure drop of the filtering system when filters are clean (in. w.g.)

SP_{HR} = air pressure drop of heat ~~recover~~ recovery coils or direct evaporative humidifier/cooler (in. w.g.)

$T_{t\text{-}stat}$ = room thermostat set point

T_S = design supply air temperature for the zone in which the thermostat is located

F_R = relief fan in horse power

Subp. 2. **Part-load fan power limitation.** ASHRAE Standard 90.1, Section 6.5.3.2.1, is amended to read:

6.5.3.2.1 Part-load fan power limitation. Individual VAV fans with motors 7-1/2 hp and larger shall meet one of the following:

(a) The fan shall be driven by a mechanical or electrical variable-speed drive.

(b) The fan shall be a vane-axial fan with variable-pitch blades.

(c) The fan shall have other controls and devices that will result in fan motor demand of no more than 30 percent of design wattage at 50 percent of design air volume when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

Subp. 3. **Static pressure sensor location.** ASHRAE Standard 90.1, Section 6.5.3.2.2, is amended to read:

6.5.3.2.2 Static pressure sensor location. Static pressure sensors used to control variable air volume fans shall be placed in a position such that the controller set point is optimized to maintain the minimum static pressure required for proper system operation throughout its range.

Exception: Systems with zone reset control complying with Section 6.5.3.2.3.

1323.0657 SECTION 6.5.7.2, FUME HOODS.

ASHRAE Standard 90.1, Section 6.5.7.2, is amended to read:

6.5.7.2 Fume hoods. Buildings with fume hood systems having a total exhaust rate greater than 15,000 cfm shall include at least one of the following features:

(a) Variable air volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values except when higher volumes are required to maintain safe operating conditions.

(b) Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than two degrees Fahrenheit below room set point, cooled to no cooler than three degrees Fahrenheit above room set point, no humidification added, and no simultaneous heating and cooling used for dehumidification control.

(c) Heat recovery systems to precondition makeup air from fume hood exhaust in accordance with Section 6.5.6.1 (Exhaust air energy recovery) without using any exception.

1323.0672 SECTION 6.7.2, COMPLETION REQUIREMENTS.

Subpart 1. **Drawings.** ASHRAE Standard 90.1, Section 6.7.2.1, is amended to read:

6.7.2.1 Drawings. Construction documents shall require that within 60 days after the date of system acceptance, record drawings of the actual installation be provided to the building owner or the designated representative of the building owner. Record drawings shall include as a minimum the location and performance data on each piece of equipment, general configuration of duct and pipe distribution system including sizes, and the terminal air or water design flow rates.

Subp. 2. **Manuals.** ASHRAE Standard 90.1, Section 6.7.2.2, is amended to read:

6.7.2.2 Manuals. Construction documents shall require that an operating manual and a maintenance manual be provided to the building owner or the designated representative of the building owner within 60 days after the date of system acceptance. These manuals shall be in accordance with industry-accepted standards (see Appendix E) and shall include, at a minimum, the following:

(a) Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.

(b) Operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.

(c) Names and addresses of at least one service agency.

(d) HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in programming comments.

(e) A complete narrative of how each system is intended to operate, including suggested setpoints.

Subp. 3. **HVAC system acceptance testing.** ASHRAE Standard 90.1, Section 6.7.2.4, is amended to read:

6.7.2.4 HVAC system acceptance testing. HVAC systems shall be tested and adjusted for function and performance to ensure that control elements are calibrated, and in proper working condition and that components, equipment, systems, and interfaces between systems conform to the construction documents. Acceptance testing and documentation shall be completed in accordance with Sections 7.2.9, ~~7. 2.10~~ 7.2.10, 7.2.13, and

7.2.15 of ASHRAE Guideline 0-2005, "The Commissioning Process," and the documentation shall be submitted to the building official upon request.

Exceptions:

(a) Semiconditioned spaces within buildings.

(b) Buildings complying with the HVAC provisions in Appendix A of Acceptance Requirements from "Advanced Buildings: Energy Benchmark for High Performance Buildings," 2004, New Buildings Institute and documented as required by Section 6.7.2.4.

1323.0681 SECTION 6.8, MINIMUM EQUIPMENT EFFICIENCY TABLES.

ASHRAE Standard 90.1, Table 6.8.1C, is amended to read:

TABLE 6.8.1C Water Chilling Packages - Minimum Efficiency Requirements

Equipment Type	**Size Category**	**Subcategory or Rating Condition**	**Minimum Efficiencies[a]**	**Test Procedure[b]**
Air Cooled, with Condenser, Electrically Operated	All Capacities		2.80 COP 3.05 IPLV	ARI 550/590
Air Cooled, without Condenser, Electrically Operated	All Capacities		3.10 COP 3.45 IPLV	
Water Cooled, Electrically Operated, Positive Displacement (Reciprocating)	All Capacities		4.20 COP 5.05 IPLV	ARI 550/590
Water Cooled, Electrically Operated, Positive Displacement (Rotary Screw and Scroll)	<150 tons		4.45 COP 5.20 IPLV	ARI 550/590
	≥150 tons and <300 tons		4.90 COP 5.60 IPLV	

		≥300 tons		5.50 COP 6.15 IPLV	
	Water Cooled, Electrically Operated, Centrifugal	<150 tons		5.00 COP 5.25 IPLV	ARI 550/590
		≥150 tons and <300 tons		5.55 COP 5.90 IPLV	
		≥300 tons		6.10 COP 6.40 IPLV	
	Air-Cooled Absorption Single Effect[c]	All Capacities		0.60 COP	ARI 560
	Water-Cooled Absorption Single Effect[c]	All Capacities		0.70 COP	
	Absorption Double Effect, Indirect-Fired	All Capacities		1.00 COP 1.05 IPLV	
	Absorption Double Effect, Direct-Fired	All Capacities		1.00 COP 1.00 IPLV	

[a]The chiller equipment requirements do not apply for chillers used in low-temperature applications where the design leaving fluid temperature is <40° F.

[b]Section 12 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

[c]See Section 6.9.1.

1323.0690 SECTION 6.9, WATER CHILLING PACKAGES AND ONCE-THROUGH COOLING SYSTEMS.

ASHRAE Standard 90.1, Section 6, is amended by adding a new section 6.9 and subsections to read:

6.9 Single effect absorption water chilling packages and once-through cooling systems.

6.9.1 Single effect absorption water chillers. Single effect absorption water chilling systems shall only be used when all the energy input is from waste heat or renewable energy sources.

6.9.2 Prohibition of once-through cooling systems. Once-through cooling systems as defined by Minnesota Rules, chapter 7685, are prohibited when ~~proscribed~~ prescribed by Minnesota Statutes, section 103G.271, subdivision 5.

1323.0741 SECTION 7.4.1, LOAD CALCULATIONS.

ASHRAE Standard 90.1, Section 7.4.1, is amended to read:

7.4.1 Load calculations. Service water heating system design loads for the purpose of sizing systems and equipment shall be determined in accordance with the procedures described in the ASHRAE Handbook-HVAC Applications or an equivalent computation procedure.

1323.0745 SECTION 7.4.5, POOLS.

ASHRAE Standard 90.1, Section 7.4.5, and all subsections are deleted and replaced with the following:

7.4.5 Pools.

7.4.5.1 Pool heaters. Pool heaters shall be equipped with a readily accessible on-off switch to allow shutting off the heater without adjusting the thermostat setting.

7.4.5.2 Pool covers. Heated swimming pools shall be equipped with a vapor retardant pool cover in compliance with Minnesota Rules, part 4717.1575, the Minnesota Department of Health pool cover safety standard. Pools heated to more than 90 degrees Fahrenheit shall have a pool cover with a minimum insulation value of R-12.

Exception: Pools deriving over 60 percent of the energy for heating from site-recovered energy or renewable energy source.

1323.0780 TABLE 7.8, PERFORMANCE REQUIREMENTS FOR WATER HEATING EQUIPMENT.

ASHRAE Standard 90.1, Section 7, Table 7.8, is amended to read:

TABLE 7.8 Performance Requirements for Water Heating Equipment

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required[a]
Electric Water Heaters	≤12 kW	Resistance ≥20 gal	0.97-0.00132V EF
	>12 kW	Resistance ≥20 gal	20+35 √V SL, Btu/h
	≤24 Amps and ≤250 Volts	Heat Pump	0.97-0.00132V EF
Gas Storage Water Heaters	≤75,000 Btu/h	≥20 gal	0.67-0.0019V EF
	>75,000 Btu/h	<4,000(Btu/h)/gal	80% E_t(Q/800+110 √V) SL, Btu/h
Gas Instantaneous Water Heaters	>50,000 Btu/h and <200,000 Btu/h	≥4,000(Btu/h)/gal and <2 gal	0.67-0.0019V EF
	≥200,000 Btu/h[c]	≥4,000(Btu/h)/gal and <10 gal	80% E_t
	≥200,000 Btu/h	≥4,000(Btu/h)/gal and ≥10 gal	80% E_t(Q/800+110 √V) SL, Btu/h
Oil Storage Water Heaters	≤105,000 Btu/h	≥20 gal	0.59-0.0019V EF
	>105,000 Btu/h	<4,000(Btu/h)/gal	78% E_t(Q/800+110 √V) SL, Btu/h
Oil Instantaneous Water Heaters	≤210,000 Btu/h	≥4,000(Btu/h)/gal and <2 gal	0.59-0.0019V EF
	>210,000 Btu/h	≥4,000(Btu/h)/gal and <10 gal	80% E_t
	>210,000 Btu/h	≥4,000(Btu/h)/gal and ≥10 gal	78% E_t(Q/800+110 √V) SL, Btu/h
Hot Water Supply Boilers, Gas and Oil	≥300,000 Btu/h and <12,500,000 Btu/h	≥4,000(Btu/h)/gal and <10 gal	80% E_t
Hot Water Supply Boilers, Gas		≥4,000(Btu/h)/gal and ≥10 gal	80% E_t(Q/800+110 √V) SL, Btu/h
Hot Water Supply Boilers, Oil		≥4,000(Btu/h)/gal and ≥10 gal	78% E_t(Q/800+110 √V) SL, Btu/h

Pool Heaters Oil and Gas	All		78% E_t
Heat Pump Pool Heaters	All		4.0 COP
Unfired Storage Tanks	All		R-12.5

[a]Energy factor (EF) and thermal efficiency (Et) are minimum requirements, while standby loss (SL) is maximum Btu/h based on a 70° F temperature difference between stored water and ambient requirements. In the EF equation, V is the rated volume in gallons. In the SL equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h.

~~[b]Section 12 contains a complete specification, including the year version, of the referenced test procedure.~~

[c] [b]Instantaneous water heaters with input rates below 200,000 Btu/h must comply with these requirements if the water heater is designed to heat water to temperatures 180° F or higher.

1323.0871 SECTION 8.7.1, DRAWINGS.

ASHRAE Standard 90.1, Section 8.7.1, is amended to read:

8.7.1 Drawings. Construction documents shall require that within 60 days after the date of system acceptance, record drawings of the actual installation be provided to the building owner or the designated representative of the building owner. Record drawings shall include at a minimum the following information:

(a) a single-line diagram of the building electrical distribution system; and

(b) floor plans indicating location and area served for all distribution.

1323.0872 SECTION 8.7.2, MANUALS.

ASHRAE Standard 90.1, Section 8.7.2, is amended to read:

8.7.2 Manuals. Construction documents shall require that operating and maintenance manuals be provided to the building owner or the designated representative of the building owner within 60 days after the date of system acceptance. These manuals shall include, at a minimum, the following:

(a) Submittal data stating equipment rating and selected options for each piece of equipment requiring maintenance.

(b) Operation manuals and maintenance manuals for each new piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.

(c) Names and addresses of at least one qualified service agency.

(d) A complete narrative of how each system is intended to operate.

1323.0891 SECTION 8.9.1, ELECTRICAL ENERGY DETERMINATION.

ASHRAE Standard 90.1, Section 8, is amended by adding a section to read:

8.9 Electrical energy determination.

8.9.1 Electrical energy determination. In new multifamily dwellings, the electrical energy consumed by each individual dwelling unit must be separately metered with individual metering readily accessible to the individual occupants.

Exception: Motels, hotels, college dormitories, other transient facilities, and buildings intended for occupancy primarily by persons who are 62 years of age or older or handicapped, or which contain a majority of units not equipped with complete kitchen facilities.

1323.0911 SECTION 9.1.1, LIGHTING SCOPE.

ASHRAE Standard 90.1, Section 9.1.1, is amended to read:

9.1.1 Scope. This section shall apply to the following:

(a) interior spaces of buildings;

(b) exterior building features, including facades, illuminated roofs, architectural features, entrances, exits, loading docks, and illuminated canopies; and

(c) exterior building grounds provided through the building's electrical service.

Exceptions:

(a) emergency lighting that is automatically off during normal building operation;

(b) lighting within living units;

(c) lighting that is specifically designated as required by a health or life safety statute, ordinance, or regulation; ~~and/or~~ and

(d) decorative gas lighting systems that meet the requirements of Minnesota Statutes, section 216C.19.

1323.0944 SECTION 9.4.4, EXTERIOR BUILDING GROUNDS LIGHTING.

ASHRAE Standard 90.1, Section 9.4.4, is amended to read:

9.4.4 Exterior building grounds lighting. All exterior building grounds luminaries that operate at greater than 100 watts, except parking lot lighting, shall contain lamps having a minimum efficacy of 60 lm/W unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section 9.1.1 or 9.4.5. Parking lot lighting shall be in accordance with Minnesota Rules, chapter 8885.

1323.0991 SECTION 9.9.1, COMCHECK OPTION.

ASHRAE Standard 90.1, Section 9, is amended by adding a section to read:

9.9 COMcheck option.

9.9.1 COMcheck option. Buildings shall be deemed to comply with requirements of Sections 9.5 and 9.6 if the COMcheck program published by the Pacific National Laboratories demonstrates it to be in compliance.

1323.1114 SECTION 11.1.4, COMPLIANCE.

ASHRAE Standard 90.1, Section 11.1.4, is amended to read:

11.1.4 Compliance. Compliance with Section 11 will be achieved if:

(a) all requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 are met;

(b) the design energy cost, as calculated in Section 11.3 does not exceed the energy cost budget, as calculated by the simulation program described in Section 11.2; and

(c) the energy efficiency level of components specified in the building design meet or exceed the efficiency levels used to calculate the design energy cost.

1323.1121 SECTION 11.2.1, SIMULATION PROGRAM.

ASHRAE Standard 90.1, Section 11.2.1, is amended to read:

11.2.1 Simulation program. The simulation program shall be a computer-based program for the analysis of energy consumption in buildings (a program such as, but not limited to, DOE-2 or BLAST). The simulation program shall include calculation methodologies for the building components being modeled.

1323.1132 SECTION 11.3.2, HVAC SYSTEMS.

ASHRAE Standard 90.1, Section 11, Table 11.3.2C, is amended to read:

TABLE 11.3.2C Water Chiller Types.

Individual Chiller Plant Capacity	**Electric Chiller Type**	**Fossil Fuel Chiller Type**
≤100 tons	Reciprocating	Double-effect absorption direct/indirect fired or Single-effect absorption using waste heat
>100 tons, <300 tons	Screw	Double-effect absorption, direct fired
≥300 tons	Centrifugal	Double-effect absorption, direct fired

1323.1300 SECTION 13, OTHER BUILDINGS.

ASHRAE Standard 90.1, is amended by adding a section to read:

Section 13. Other buildings.

13.1 Greenhouse structures. Greenhouse structures that require heating for cold weather protection are regulated by this section. A greenhouse structure is a structure that is used for plant growth.

13.1.1 Envelope requirements for greenhouse structures.

13.1.1.1 Foundation walls; slab-on-grade floors. Foundation walls and slab-on-grade floors must comply with the requirements of ASHRAE Standard 90.1, Section 5.

13.1.1.2 Transparent and translucent components. Transparent and translucent components are exempt from the requirements of Section 5 provided that they are either single-pane glass, twin wall polycarbonate, two-ply polyethylene or equivalent.

13.1.1.3 Coverings. Greenhouse structures must have either an exterior anti-infrared covering or internal thermal blanket that reduces nighttime radiation in compliance with this section.

13.1.1.3.1 Anti-infrared covering. The anti-infrared covering must be not less than ~~4-mil~~ 4-mil thick polyethylene greenhouse covering film that retards nighttime heat radiation from greenhouse structures and has a minimum energy saving rating of 20 percent.

13.1.1.3.2 Thermal blanket. The thermal blanket must be not less than ~~4-mil~~ 4-mil thick internally installed material used in greenhouse structures that provides both plant shading and retards nighttime radiation in greenhouse structures and has a minimum energy saving rating of 20 percent.

13.1.1.3.3 Energy saving rating. The energy saving rating shall be determined by comparing the heating energy required by similar greenhouse structures having similar plant contents; either adjusted for weather or co-located during the same heating season. A greenhouse structure covered with an anti-infrared polyethylene covering is compared to a similar structure covered with a polyethylene covering not having anti-infrared characteristics. A greenhouse structure having

an internally installed thermal blanket material is compared to a similar structure not having a thermal blanket installed.

13.1.2 Heating requirements for greenhouse structures. Mechanical components of greenhouse structures must comply with the ASHRAE Standard 90.1, Section 6. In addition, unit heating systems must be power vented or direct vented.

13.1.3 Additional requirements for greenhouse structures. Greenhouse structures must comply with the requirements of ASHRAE Standard 90.1, Sections 7, 8, 9, and 10.

13.2 Inflated structures. Inflated structures that require heating for cold weather protection are regulated by this section. An inflated structure is a structure that is air supported.

13.2.1 Envelope requirements for inflated structures. Foundation walls and slab-on-grade floors must meet the requirements of ASHRAE Standard 90.1, Section 5.

13.2.1.1 Minimum insulation. The structure membrane must have a minimum insulation value of R-12.

Exception: Inflated structures that are designed to deflate during the summer months.

13.2.2 Requirements for inflated structures. Inflated structures must comply with the requirements of ASHRAE Standard 90.1, Section 6. Air pressure controls for inflated structures must have the capability for manual and automated control with respect to outdoor wind speed.

13.2.3 Additional requirements for inflated structures. Inflated structures must comply with the requirements of ASHRAE Standard 90.1, Sections 7, 8, 9, and 10.

REPEALER. Minnesota Rules, parts 7676.0100; 7676.0200; 7676.0300; 7676.0400; 7676.0500; 7676.0600; 7676.0700; 7676.0800; 7676.0900; 7676.1000; 7676.1100; 7676.1200; 7676.1300; 7676.1400; 7676.1500; 7678.0100; 7678.0200; 7678.0300; 7678.0400; 7678.0500; 7678.0600; 7678.0700; 7678.0800; and 7678.0900, are repealed.

EFFECTIVE DATE. These amendments are effective ~~five working days after publication of the notice of adoption~~ June 1, 2009.