ANSI/ASHRAE/IES Addenda bi and bt to ANSI/ASHRAE/IESNA Standard 90.1-2007

ASHRAE ADDENDA

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

The requirements for pipe insulation contained in the ASHRAE 90.1-2007 standard are unchanged from the 90.1-1999 version of the standard. The 1999 requirements were developed, in large part, based on the work of the Pacific Northwest National Laboratories (Somasundaram and Winiarski) in 1995. Since that time, significant changes in the installed costs of pipe insulation have occurred. Also, the 90.1 SPPC has adopted new economic criteria to be used in developing standard requirements. The proposed changes incorporate these updated criteria and cost data.

The approach used in developing these proposed requirements parallels the PNNL work with the exception that the requirements have been expanded to include higher usage systems. Requirements are presented for low use (<4,400 hrs/yr) and high use (? 4,400 hrs/yr) systems. In addition, footnotes have been added to address constrained locations and to clarify the requirements for direct-buried piping.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifi-

Addendum bi to 90.1-2007

Revise the Standard as follows (I-P):

6.4.4.1.3 Piping Insulation. Piping shall be thermally insulated in accordance with Tables 6.8.3A and 6.8.3B.

Exceptions:

a. Factory-installed piping within HVAC equipment tested and rated in accordance with 6.4.1.
b. Piping that conveys fluids having a design operating temperature range between 60°F and 105°F, inclusive.
c. Piping that conveys fluids that have not been heated or cooled through the use of ~~nonrenewable energy~~ fossil fuels or electricity (such as roof and condensate drains, domestic cold water supply, natural gas piping) ~~or refrigerant liquid piping) or~~
d. Where heat gain or heat loss will not increase energy usage (such as liquid refrigerant piping).
e. In piping 1 in. or less, insulation is not required for strainers, control valves, and balancing valves.
~~d. Hot water piping between the shutoff valve and the coil, not exceeding 4 ft in length, when located in *conditioned spaces*.~~
~~e. Pipe unions in heating systems (steam, steam condensate, and hot water).~~

Delete existing Table 6.8.3 in its entirety and replace with Tables 6.8.3A and 6.8.3B

~~**TABLE 6.8.3 Minimum Pipe Insulation Thicknesses[a]**~~

~~Fluid Design Operating Temp. Range (°F)~~	~~Insulation Conductivity~~		~~Nominal Pipe or Tube Size (in.)~~				
	~~Conductivity Btu·in./(h·ft²·°F)~~	~~Mean Rating Temp. °F~~	~~<1~~	~~1 to <1-1/2~~	~~1-1/2 to <4~~	~~4 to <8~~	~~≥8~~
~~Heating Systems (Steam, Steam Condensate, and Hot Water)[b,c]~~							
~~>350~~	~~0.32-0.34~~	~~250~~	~~2.5~~	~~3.0~~	~~3.0~~	~~4.0~~	~~4.0~~
~~251-350~~	~~0.29-0.32~~	~~200~~	~~1.5~~	~~2.5~~	~~3.0~~	~~3.0~~	~~3.0~~
~~201-250~~	~~0.27-0.30~~	~~150~~	~~1.5~~	~~1.5~~	~~2.0~~	~~2.0~~	~~2.0~~
~~141-200~~	~~0.25-0.29~~	~~125~~	~~1.0~~	~~1.0~~	~~1.0~~	~~1.5~~	~~1.5~~
~~105-140~~	~~0.22-0.28~~	~~100~~	~~0.5~~	~~0.5~~	~~1.0~~	~~1.0~~	~~1.0~~
~~Domestic and Service Hot Water Systems~~							
~~105+~~	~~0.22-0.28~~	~~100~~	~~0.5~~	~~0.5~~	~~1.0~~	~~1.0~~	~~1.0~~
~~Cooling Systems (Chilled Water, Brine, and Refrigerant)[d]~~							
~~40-60~~	~~0.22-0.28~~	~~100~~	~~0.5~~	~~0.5~~	~~1.0~~	~~1.0~~	~~1.0~~
~~<40~~	~~0.22-0.28~~	~~100~~	~~0.5~~	~~1.0~~	~~1.0~~	~~1.0~~	~~1.5~~

~~a For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows: T = r{(1 + t/r)K/k - 1}where T = minimum insulation thickness (in.), r = actual outside radius of pipe (in.), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu·in.[h·ft²·°F]); and k= the upper value of the conductivity range listed in this table for the applicable fluid temperature.~~
~~b These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature.~~
~~c Piping insulation is not required between the control valve and coil on run-outs when the control valve is located within 4 ft of the coil and the pipe size is 1 in. or less.~~
~~d 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.~~

TABLE 6.8.3A Minimum Pipe Insulation Thickness Heating and Hot Water Systems[a,b,c,d] (Steam, Steam Condensate, Hot Water Heating and Domestic Water Systems)

Fluid Operating Temperature Range (°F) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (in)				
	Conductivity Btu·in./(h·ft²·°F)	Mean Rating Temperature, °F	<1	1 to <1-1/2	1-1/2 to <4	4 to <8	≥8
			Insulation Thickness (in)				
>350 °F	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350°F	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250°F	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200°F	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140°F	0.22 - 0.28	100	1.0	1.0	1.5	1.5	1.5

a For insulation outside the stated conductivity range, the minimum thickness (*T*) shall be determined as follows: $T = r\{(1 + t/r)^{K/k} - 1\}$ where T = minimum insulation thickness (in.), r = actual outside radius of pipe (in.), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu·in./h·ft2·°F); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature.

c For piping smaller than 1½" and located in partitions within *conditioned spaces*, reduction of these thicknesses by 1" shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 1".

d For direct-buried heating and hot water system piping, reduction of these thicknesses by 1.5" shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 1".

TABLE 6.8.3B Minimum Pipe Insulation Thickness Cooling Systems (Chilled Water, Brine, and Refrigerant)[a,b,c]

Fluid Operating Temperature Range (°F) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (in.)				
	Conductivity Btu·in./(h·ft²·°F)	Mean Rating Temperature, °F	<1	1 to <1-1/2	1-1/2 to <4	4 to <8	≥8
			Insulation Thickness (in)				
40 - 60°F	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
<40°F	0.20 - 0.26	50	0.5	1.0	1.0	1.0	1.5

a For insulation outside the stated conductivity range, the minimum thickness (*T*) shall be determined as follows: $T = r\{(1 + t/r)^{K/k} - 1\}$ where T = minimum insulation thickness (in.), r = actual outside radius of pipe (in.), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu·in./h·ft2·°F); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b 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.

c For direct-buried cooling system piping, insulation is not required.

Revise the Standard as follows (SI):

6.4.4.1.3 Piping Insulation. Piping shall be thermally insulated in accordance with Tables 6.8.3A and 6.8.3B.

Exceptions:

a. Factory-installed piping within HVAC equipment tested and rated in accordance with 6.4.1.
b. Piping that conveys fluids having a design operating temperature range between 16°C and 41°C, inclusive.
c. Piping that conveys fluids that have not been heated or cooled through the use of ~~nonrenewable energy~~ fossil fuels or electricity (such as roof and condensate drains, domestic cold water supply, natural gas piping), ~~or refrigerant liquid piping) or~~
d. Where heat gain or heat loss will not increase energy usage (such as liquid refrigerant piping).
e. In piping 25 mm or less, insulation is not required for strainers, control valves, or balancing valves.
~~d. Hot water piping between the shutoff valve and the coil, not exceeding 4 ft in length, when located in conditioned spaces.~~
~~e. Pipe unions in heating systems (steam, steam condensate, and hot water).~~

(Delete existing Table 6.8.3 in its entirety and replace with Tables 6.8.3A and 6.8.3B)

TABLE 6.8.3 Minimum Pipe Insulation Thickness*

Fluid Design Operating Temp. Range (°C)	Insulation Conductivity		Nominal Pipe or Tube Size (mm)				
	Conductivity (W/m·K)	Mean Rating Temp. °C	<25	25 to <40	40 to <100	100 to <200	≥200
Heating Systems (Steam, Steam Condensate, and Hot Water)†,**							
>177	0.046–0.049	121	6.4	7.6	7.6	10.2	10.2
122–177	0.042–0.046	93	3.8	6.4	7.6	7.6	7.6
94–121	0.039–0.043	66	3.8	3.8	5.1	5.1	5.1
61–93	0.036–0.042	52	2.5	2.5	2.5	3.8	3.8
41–60	0.032–0.040	38	1.3	1.3	2.5	2.5	2.5
Domestic and Service Hot-Water Systems							
41+	0.032–0.040	38	1.3	1.3	2.5	2.5	2.5
Cooling Systems (Chilled Water, Brine, and Refrigerant)††							
4–16	0.032–0.040	38	1.3	1.3	2.5	2.5	2.5
<4	0.032–0.040	38	1.3	2.5	2.5	2.5	3.8

*For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:
$T = r\{(1 + t/r)^{K/k} - 1\}$
where T = minimum insulation thickness (cm), r = actual outside radius of pipe (cm), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (W/m·K); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.
†These thicknesses are based on energy *efficiency* considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature.
**Piping insulation is not required between the control valve and coil on run-outs when the control valve is located within 1.2 m of the coil and the pipe size is 25 mm or less.
††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.
e. The table is based on steel pipe. Non-metallic pipes schedule 80 thickness or less shall use the table values. For other non-metallic pipes 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.

TABLE 6.8.3A Minimum Pipe Insulation Thickness Heating and Hot Water Systems[a,b,c,d] (Steam, Steam Condensate, Hot Water Heating and Domestic Water Systems)

Fluid Operating Temperature Range (°C) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (mm)				
	Conductivity W/(m°C)	Mean Rating Temperature, °C	<25	25 to <40	40 to <100	100 to <200	≥200
			Insulation Thickness (mm)				
>177 °C	0.046 - 0.049	121	115	125	125	125	125
122 - 177°C	0.042 - 0.046	93	80	100	115	115	115
94 -121°C	0.039 - 0.043	66	65	65	80	80	80
61 - 93°C	0.036 - 0.042	52	40	40	50	50	50
41 - 60°C	0.032 - 0.040	38	25	25	40	40	40

a For insulation outside the stated conductivity range, the minimum thickness (*T*) shall be determined as follows: $T = r\{(1 + t/r)^{K/k} - 1\}$ where T = minimum insulation thickness (mm), r = actual outside radius of pipe (mm), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (W/(m°C)); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature.

c For piping smaller than 40mm and located in partitions within *conditioned spaces*, reduction of these thicknesses by 25mm shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 25 mm.

d For direct-buried heating and hot water system piping, reduction of these thicknesses by 40mm shall be permitted (before thickness adjustment required in footnote a) but not to thickness below 25 mm.

TABLE 6.8.3B Minimum Pipe Insulation Thickness Cooling Systems (Chilled Water, Brine, and Refrigerant)[a,b,c]

Fluid Operating Temperature Range (°C) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (mm)				
	Conductivity W/(m°C)	Mean Rating Temperature, °C	<25	25 to <40	40 to <100	100 to <200	≥200
			Insulation Thickness (mm)				
4 - 16°C	0.030 - 0.039	24	15	15	25	25	25
<4°C	0.029- 0.037	10	15	25	25	25	40

a. For insulation outside the stated conductivity range, the minimum thickness (*T*) shall be determined as follows: $T = r\{(1 + t/r)^{K/k} - 1\}$ where T = minimum insulation thickness (mm), r = actual outside radius of pipe (mm.), t = insulation thickness listed in this table for applicable fluid temperature and pipe size, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (W/(m°C)); and k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b. 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.

c. For direct-buried cooling system piping, insulation is not required.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Centrifugal chillers that are not optimized to operate at standard test conditions as defined by AHRI Standard 550/590 may include design changes that hinder their ability to meet efficiency targets at standard test conditions. In the 2007 version, Tables 6.8.1H-J provided tabulated values for the modified efficiency targets for these chillers. Addendum M removed these tables and left the performance adjustment equation modified for the new units of kW/ton in the I-P version. At the time that Addendum M was being considered, it was noted that the performance adjustment equation (the k_{adj} *factor) limited the scope of the Standard by limiting the range of combinations of temperatures and flow conditions. The AHRI chiller section thereafter reformulated the adjustment equations so that more chillers can be brought under the scope of the Standard, while improving the accuracy of the adjustment and increasing the stringency of the required efficiencies. Chillers further away from standard conditions will be required to have efficiency improvement, while chillers close to standard conditions will see little change in requirements. The definition of LIFT in the adjustment equation has been changed for consistency with industry convention (leaving condenser minus leaving evaporator temperature).*

In addition, labeling requirements have been further defined, to make it simpler for determining compliance.

Based on shipped centrifugal chiller performance predictions, there is an expected efficiency improvement range of 0 to 23%, with an average of 1% improvement, depending on the performance conditions specified. Part load performance is also improved by the same new adjustment factor. It is anticipated that 10 percent more centrifugal chillers will be covered by this Standard versus Addendum M to 2007 and 52 percent more than were covered by the 2004 and 2007 versions. This proposal brings approximately 98% of the centrifugal chillers under the scope of the Standard.

As Addendum M claimed no scope improvement savings, this proposed addendum is estimated to save over 24 GWh annually worldwide. U.S. savings are an estimated 12 GWh per year, based on the average of the last 10 years of chiller shipments.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum bt to 90.1-2007

Revise the standard as follows (I-P Units)

6.4.1.2 Minimum Equipment Efficiencies—Listed Equipment—Nonstandard Conditions.

Adjusted maximum full-load kW/ton rating
= (full-load kW/ton from Table 6.8.1C)/K_{adj}
Adjusted maximum NPLV rating
= (IPLV from Table 6.8.1C)/K_{adj}

where

~~K_{adj} = 6.174722 – 0.303668(X) + 0.00629466(X)^2 – 0.000045780(X)^3~~

~~X = DTstd + LIFT~~

~~DTstd = (24 + (full-load kW/ton from Table 6.8.1C) × 6.83)/Flow~~

~~Flow = Condenser water fluid flow (gpm)/Cooling full-load capacity (tons)~~

~~LIFT = CEWT – CLWT~~

~~CEWT = Full-load condenser entering water temperature (°F)~~

~~LEWT = Full-load leaving chilled-water temperature (°F)~~

K_{adj} = A * B

where

A = 0.00000014592 * (LIFT)^4 – 0.0000346496 * (LIFT)^3 + 0.00314196 * (LIFT)^2 – 0.147199 * (LIFT) + 3.9302

LIFT = LvgCond - LvgEvap

LvgCond = Full-load condenser leaving water temperature (°F)

LvgEvap = Full-load leaving evaporator temperature (°F)

B = 0.0015 * LvgEvap + 0.934

The table adjusted full-load and NPLV values are only applicable over the following full-load design ranges:

- Minimum Leaving ~~Chiller Water~~ Evaporator Temperature: ~~36°F~~ 36°F
- Maximum Leaving Condenser ~~Entering Condenser Water~~ Temperature: ~~102°F~~ 115°F
- ~~Condenser Water Temperature Flow: 1 to 6 gpm/ton~~
- ~~X ≥ 39°F and ≤ 60°F~~
- LIFT ≥ 20°F and ≤ 80°F

Manufacturers shall calculate the adjusted maximum kW/ton and NPLV before determining whether to label the chiller per 6.4.1.5. Compliance with 90.1-2007 or -2010 or both shall be labeled on chillers within the scope of the Standard.

Example: Path A 600 ton centrifugal chiller Table 6.8.1C efficiencies as of 1/1/2010
Full Load = 0.570 kW/ton
IPLV = 0.539 kW/ton
~~CEWT = 80°F~~
~~Flow = 2.5 gpm/ton~~
~~LIFT = 80 – 42 = 38°F~~
~~CLWT = 42°F~~
~~DT = (24 + 0.570 × 6.83)/2.5 = 11.16°F~~
~~X = 38 + 11.16 = 49.16°F~~

~~K_{adj} = 6.174772 0.303668(49.16) + 0.00629466(49.16)^2 0.00004578(49.16)^3 = 1.020~~

LvgCond = 91.16°F

LvgEvap = 42°F

LIFT = 91.16 – 42 = 49.16°F

K_{adj} = A x B

A = 0.00000014592 x (49.16)^4 – 0.0000346496 x (49.16)^3 + 0.00314196 x (49.16)^2 – 0.147199 x (49.16) + 3.930 = 1.023

B = 0.0015 x 42 + 0.934 = 0.997

Adjusted full load = 0.570/(1.023 x 0.997) = 0.559 kW/ton

NPLV = 0.539/(1.023 x 0.997) = 0.528 kW/ton

Revise footnote a to Table 6.8.1C as follows:

a. The centrifugal chiller equipment requirements after adjustment per 6.4.1.2 do not apply ~~for~~to chillers ~~used in low-temperature applications~~ where the design leaving ~~water~~ evaporator temperature is < ~~40~~ 36°F

Revise the Standard as follows (SI units)

6.4.1.2 Minimum Equipment Efficiencies—Listed Equipment—Nonstandard Conditions.

Adjusted minimum full-load COP rating
= (full-load COP from Table 6.8.1C) × K_{adj}
Adjusted ~~maximum~~ minimum NPLV rating
= (IPLV from Table 6.8.1C) × K_{adj}

where

~~K_{adj} = 6.174722 0.5466024(X) + 0.020394698(X)2 0.000266989(X)3~~

~~X = DTstd + LIFT~~

~~DTstd = (0.267114 + 0.267088/(Full-load COP from Table 6.8.1C))/Flow~~

~~Flow = Condenser water~~ fluid ~~flow (L/s)/Cooling full load capacity (kW)~~

~~LIFT = CEWT CLWT (°C)~~

~~CEWT = Full load condenser entering water temperature (°C)~~

~~CLWT = Full load leaving chilled-water temperature (°C)~~

K_{adj} = A * B

where

A = 0.0000015318 x (LIFT)^4 – 0.000202076 x (LIFT)^3 + 0.0101800 x (LIFT)^2 - 0.264958 x LIFT + 3.930196

B = 0.0027 x LvgEvap (Deg C) + 0.982

LIFT = LvgCond - LvgEvap

LvgCond = Full-load condenser leaving water temperature (°C)

LvgEvap = Full-load leaving evaporator temperature (°C)

The adjusted full-load and NPLV values are only applicable for centrifugal chillers meeting all of ~~over~~ the following full-load design ranges:

- Minimum Leaving ~~Chiller-Water~~ Evaporator Temperature: 2.2°C
- Maximum Leaving Condenser ~~Entering Condenser Water~~ Temperature: 46.1°C
- ~~Condenser Water Flow: 0.036 to 0.0721 L/s·kW~~
- ~~X ≥ 21.7°C and ≤ 33.3°C~~
- LIFT ≥ 11.1°C and ≤ 44.4°C

Manufacturers shall calculate the adjusted minimum COP and NPLV before determining whether to label the chiller per 6.4.1.5. Compliance with 90.1-2007 or -2010 or both shall be labeled on chillers within the scope of the Standard.

~~Example: Path A 2110 kW centrifugal chiller~~
~~Table 6.8.1C efficiencies as of 1/1/2010~~
~~Full Load = 6.170 COP~~
~~IPLV = 6.525 COP~~
~~CEWT = 26°C~~
~~Flow = 0.05 L/s·kW~~
~~CLWT = 5.5°C~~
~~LIFT = 26 5.5 = 20.50°C~~
~~*DT* = (0.267114 + 0.267088/6.170)/0.05 = 6.208°C~~
~~*X* = 21.11 + 6.208 = 27.319°F~~
~~K_{adj} = 6.174722 – 0.5466024(27.319) + 0.020394698(27.319)^2 – 0.000266989(27.319)^3 = 1.031~~
~~Adjusted full load = 6.170 × 1.031 = 6.359 COP~~
~~NPLV =6.525 × 1.031 = 6.725 COP~~

Example: Path A 2110 kW centrifugal chiller
Table 6.8.1C efficiencies as of 1/1/2010
Full Load = 6.170 COP
IPLV = 6.525 COP
LvgCond= 26°C
LvgEvap = 5.5°C

~~LIFT = 26 5.5 = 20.50°C~~
~~LIFT = 32.2 5.5 = 26.7~~
K_{adj} = ~~6.174722 0.5466024(26.708) + 0.020394698(26.708)^2 0.000266989(26.708)^3 = 1.03747~~ A x B
A = 0.0000015318 x (26.7)^4 – 0.000202076 x (26.7)^3 + 0.0101800 x (26.7)^2 - 0.264958 x 26.7 + 3.930196 = 1.045
B = 0.0027 * 5.5 + 0.982 = 0.996
Adjusted full load COP = 6.170 x 1.045 x 0.996 = 6.423 COP
Adjusted NPLV = 6.525 x 6.473 x 1.045 x 0.996 = 6.792 COP

Revise footnote a to Table 6.8.1C as follows:

a. The centrifugal chiller equipment requirements after adjustment per 6.4.1.2 do not apply ~~for~~to chillers ~~used in low-temperature applications~~ where the design leaving fluid temperature is < ~~4.4~~ 2.2°C.

Revise Section 12 as follows

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ANSI/ASHRAE/IESNA Standard 90.1-2007	Energy Standard for Buildings Except Low-Rise Residential Buildings

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.