2011 National Energy Code of Canada for Buildings (NECB)

Errata Package (September 2015)

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Errata - National Energy Code of Canada for Buildings 2011

Issued by the Canadian Commission on Building and Fire Codes

The table that follows describes errata and editorial clarifications that apply to the National Energy Code of Canada for Buildings 2011:

- Errata are corrections to existing text.
- Editorial clarifications are provided to help users better understand the provisions of the Code.

Code pages containing errata or editorial clarifications are identified with the words "Amended Page" in the footer. Substitute the pages in your copy of the Code with the replacement pages provided.

Contact your local authority having jurisdiction to find out if these errata apply in your province or territory.

Division	Code Reference	Change	Date (Y-M-D)	Description of Change
B	3.2.2.2.(2)	erratum	2015-09-01	Reference to Table 3.2.2.2. was corrected to read "Table 3.2.3.1."
B	4.2.1.1.(1)	clarification	2015-09-01	Sentence was corrected to read "Power requirements for lighting units for internally illuminated *exit* signs …"
B	Table 4.2.1.6.	erratum	2015-09-01	Entry for "Atrium" was corrected as follows: 1st column: "first 12 m in height" and "height above 12 m" 2nd column: "1.06 per m (height)" and "0.71 per m (height)"
B	4.3.2.7.(1)	erratum	2015-09-01	Sentence was corrected to read "The factor for daylight harvesting …"
B	4.3.2.7.(2)	erratum	2015-09-01	Sentence was deleted and content was moved to Tables 4.3.2.7.A. and B. Sentences (3) to (6) were renumbered
B	Table 4.3.2.7.A.	erratum and clarification	2015-09-01	Table Note and new entry were added
B	Table 4.3.2.7.B.	erratum and clarification	2015-09-01	Existing entries were corrected and new entry was added
B	Table 4.3.2.8.	clarification	2015-09-01	Table Note was added
B	4.3.2.10.(2)	erratum	2015-09-01	Sentence was corrected to read "Except as provided in Sentence (3), the factor …"
B	4.3.2.10.(3)	erratum	2015-09-01	Sentence was added
B	Table 4.3.2.10.B.	erratum	2015-09-01	New entry was added
B	4.3.3.3.(1)	erratum	2015-09-01	Sentence was corrected
B	4.3.3.4.(1)	erratum	2015-09-01	Sentence was corrected
B	4.3.3.7.(1)	erratum	2015-09-01	Sentence was corrected to read "The factor for daylight harvesting …"
B	4.3.3.7.(2)	erratum	2015-09-01	Sentence was deleted and content was moved to Tables 4.3.2.7.A. and B. Sentences (3) to (6) were renumbered
B	4.3.3.7.(4)	erratum	2015-09-01	Sentence was corrected

Division	Code Reference	Change	Date (Y-M-D)	Description of Change
	(renumbered)			
B	Table 4.5.1.1.	errata	2015-09-01	Attribution for Sentence 4.3.2.7.(2) was deleted Attribution for Sentence 4.3.2.10.(3) was added Attribution for Sentence 4.3.3.7.(2) was deleted
B	Table 5.3.2.2.	errata	2015-09-01	Erroneous values were corrected
B	Table 5.3.2.4.	errata	2015-09-01	"%" was added to BaV_{18} values for HVAC Systems 17 and 18
B	Table 5.3.2.7.	errata	2015-09-01	Erroneous values were corrected
B	Table 5.3.2.8.A. to 5.3.2.8.AA.	errata	2015-09-01	Erroneous values were corrected
B	Table 6.2.2.1.	erratum	2015-09-01	Entry for component "Gas-fired, 22–117 kW" was correctly reinstated Performance requirement for "Oil-fired, instantaneous: ≤ 61.5 kW" was corrected to read "EF ≥ 0.59 – $0.0005V_m$"
B	6.2.6.1.(1)	erratum	2015-09-01	Word "and" at the end of Clause (a) was replaced with "or"
B	6.2.6.2.(1)	erratum	2015-09-01	Word "and" at the end of Clause (a) was replaced with "or"
B	A-4.3.2.3.(2)	erratum	2015-09-01	Second paragraph was added
B	A-4.3.3.7.(4)	erratum	2015-09-01	Appendix Note was added
B	Table A-5.2.2.8.(1)	erratum	2015-09-01	Equation for "Dew-point and dry-bulb temperatures" was corrected to read "DP_{oa} > 13°C or …"

3.2.2. Above-ground Components of the Building Envelope

3.2.2.1. Vestibules

1) Except as provided in Sentence (3), a door that separates *conditioned space* from the exterior shall be protected with an enclosed vestibule whose doors opening into and out of the vestibule are equipped with self-closing devices.

2) Except for doors equipped with power operators in barrier-free entrances, vestibules required in Sentence (1) shall be designed so that users passing through the vestibule are not required to open the interior and exterior doors at the same time.

3) A vestibule is not required for an exterior door that
a) is a revolving door,
b) is used primarily to facilitate vehicular movement or material handling,
c) is intended to be used as a service, emergency *exit*, or stairwell *exit* door only,
d) is intended to be used as a seasonal use door, such as a door leading to a patio,
e) opens directly from a *dwelling unit*,
f) opens directly from a retail space less than 200 m² in area or from a space less than 150 m² for other uses, or
g) is located in a *building* less than 5 *storeys* in *building height* in any area that has fewer than 3500 heating degree-days (°C) as listed in Appendix C of Division B of the NBC.

3.2.2.2. Thermal Characteristics of Above-ground Opaque Building Assemblies

1) Except as provided in Sentences (2) and (3) and in Sentence 3.2.1.3.(1), the *overall thermal transmittance* of above-ground *opaque building assemblies* shall be not more than that shown in Table 3.2.2.2. for the *building* or part thereof enclosed by the *opaque building assembly*, for the applicable heating-degree day category. (See Appendix A.)

Table 3.2.2.2.
Overall Thermal Transmittance of Above-ground Opaque Building Assemblies
Forming Part of Sentences 3.2.2.2.(1) and (2)

Above-ground *Opaque Building Assembly*	Heating Degree-Days of *Building* Location,[1] in Celsius Degree-Days					
	Zone 4:[2] < 3000	Zone 5:[2] 3000 to 3999	Zone 6:[2] 4000 to 4999	Zone 7A:[2] 5000 to 5999	Zone 7B:[2] 6000 to 6999	Zone 8:[2] ≥ 7000
	Maximum *Overall Thermal Transmittance*, in W/(m²·K)					
Walls	0.315	0.278	0.247	0.210	0.210	0.183
Roofs	0.227	0.183	0.183	0.162	0.162	0.142
Floors	0.227	0.183	0.183	0.162	0.162	0.142

Notes to Table 3.2.2.2.:
(1) See Sentence 1.1.4.1.(1).
(2) See Appendix A.

2) The *overall thermal transmittance* of portions of a *foundation* wall that are above ground, where the top of a *foundation* wall is less than 0.4 m above the adjoining ground level, shall be not more than that shown in Table 3.2.3.1.

3) Where radiant heating cables or heating or cooling pipes or membranes are embedded in the surface of an above-ground *opaque building assembly*, this assembly shall have an *overall thermal transmittance* no greater than 80% of that required by Sentence (1). (See Appendix A.)

3.2.2.3. Thermal Characteristics of Fenestration

1) For the purposes of this Article, use of the term "*fenestration*" does not include doors, which are covered in Article 3.2.2.4.

2) Except as provided in Sentences (3) and 3.2.1.3.(1), the *overall thermal transmittance* of *fenestration*, shall be not more than that shown in Table 3.2.2.3. for the applicable heating-degree-day category, as determined in accordance with Article 3.1.1.5.

3) *Skylights* whose *overall thermal transmittance* exceeds the values shown in Table 3.2.2.3. are permitted, provided that

a) the total area of such *skylights* does not exceed 2% of the gross roof area calculated in accordance with Article 3.1.1.6., and
b) the *overall thermal transmittance* of such *skylights* is not more than 3.4 W/(m²·K).

(See Appendix A.)

Table 3.2.2.3.
Overall Thermal Transmittance of Fenestration
Forming Part of Sentences 3.2.2.3.(2) and (3)

Component	Heating Degree-Days of *Building* Location,(1) in Celsius Degree-Days					
	Zone 4:(2) < 3000	Zone 5:(2) 3000 to 3999	Zone 6:(2) 4000 to 4999	Zone 7A:(2) 5000 to 5999	Zone 7B:(2) 6000 to 6999	Zone 8:(2) ≥ 7000
	Maximum *Overall Thermal Transmittance*, in W/(m²·K)					
All *fenestration*	2.4	2.2	2.2	2.2	2.2	1.6

Notes to Table 3.2.2.3.:
(1) See Sentence 1.1.4.1.(1).
(2) See A-Table 3.2.2.2. in Appendix A.

3.2.2.4. Thermal Characteristics of Doors and Access Hatches

1) Except as provided in Sentences (2), (4) and 3.2.1.3.(1), the *overall thermal transmittance* of doors shall be not more than that shown in Table 3.2.2.4. for the applicable heating-degree-day category, as determined in accordance with Article 3.1.1.5.

Table 3.2.2.4.
Overall Thermal Transmittance of Doors
Forming Part of Sentence 3.2.2.4.(1)

Component	Heating Degree-Days of *Building* Location,(1) in Celsius Degree-Days					
	Zone 4:(2) < 3000	Zone 5:(2) 3000 to 3999	Zone 6:(2) 4000 to 4999	Zone 7A:(2) 5000 to 5999	Zone 7B:(2) 6000 to 6999	Zone 8:(2) ≥ 7000
	Maximum *Overall Thermal Transmittance*, in W/(m²·K)					
All doors	2.4	2.2	2.2	2.2	2.2	1.6

Notes to Table 3.2.2.4.:
(1) See Sentence 1.1.4.1.(1).
(2) See A-Table 3.2.2.2. in Appendix A.

2) Doors need not comply with Sentence (1) where

a) their total area does not exceed 2% of the gross wall area calculated in accordance with Article 3.1.1.6., and
b) their *overall thermal transmittance* does not exceed 4.4 W/(m²·K).

Part 4
Lighting

Section 4.1. General

4.1.1. General

4.1.1.1. Scope

1) This Part is concerned with lighting components and systems for the applications listed in Article 4.1.1.2.

4.1.1.2. Application

1) Except as provided in Sentence (2), this Part applies to lighting components and systems that are connected to the *building*'s electrical service. (See Appendix A.)

2) This Part does not apply to the following lighting systems:
a) emergency lighting that is automatically off during normal hours of *building* operation,
b) lighting within *dwelling units*, and
c) lighting in *buildings* or parts of *buildings* and in certain exterior spaces associated with the *building* where it can be shown that the nature of the *occupancy* makes it impractical to apply these requirements (see Appendix A).

4.1.1.3. Compliance

1) Compliance with this Part shall be achieved by following
a) the prescriptive path described in Section 4.2.,
b) the trade-off path described in Section 4.3., or
c) the performance path described in Section 4.4. (see A-3.1.1.3.(1)(c) in Appendix A).
(See Appendix A.)

4.1.1.4. Definitions

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

Section 4.2. Prescriptive Path

4.2.1. Interior Lighting Power

4.2.1.1. Exit Signs

1) Power requirements for lighting units for internally illuminated *exit* signs shall conform to CAN/CSA-C860, "Internally Lighted Exit Signs."

4.2.1.2. Fluorescent Lamp Ballasts

1) Fluorescent lamp ballasts shall conform to CSA C654, "Fluorescent Lamp Ballast Efficacy Measurements."

2) Electronic fluorescent lamp ballasts that are not within the scope of CSA C654, "Fluorescent Lamp Ballast Efficacy Measurements," shall conform to NEMA ANSI C82.11, "High-Frequency Fluorescent Lamp Ballasts."

4.2.1.3. Limits to Installed Interior Lighting Power

(See Appendix A.)

1) The *installed interior lighting power* described in Article 4.2.1.4. shall not exceed the value of the *interior lighting power allowance* determined using

a) the *building* area method described in Article 4.2.1.5., or
b) the space-by-space method described in Article 4.2.1.6.

2) The individual power allowances in each space of the *building* do not have to be met, provided the total *installed interior lighting power* is not exceeded.

3) Only one of the methods described in Sentence (1) shall be selected for use within the same *building*.

4.2.1.4. Determination of the Installed Interior Lighting Power

1) Except as provided in Sentences (4) and (5), the *installed interior lighting power* shall include all power used by the luminaires, including lamps, ballasts, transformers, and control devices.

2) The determination of the *installed interior lighting power* shall include

a) connected lighting power for both permanently installed *interior lighting* and supplemental *interior lighting* provided by movable or plug-in luminaires, and
b) in cases where two or more independently operating lighting systems in a space are controlled to prevent simultaneous operation, the lighting system with the highest wattage.

(See Appendix A.)

3) Luminaire wattage to be included in *installed interior lighting power* shall be determined in accordance with the following criteria:

a) except as provided in Clause (b), the wattage of luminaires shall be the design operating input wattage of the lamp/auxiliary combination based on values provided by a recognized testing laboratory or, in the absence of such information, the maximum labeled wattage of the luminaire shall be used (see Appendix A),
b) the wattage of luminaires with ballasts designed for multiple wattages shall be the maximum labeled wattage of the luminaire,
c) for line-voltage lighting track and plug-in busway designed to allow the addition and/or relocation of luminaires without altering the wiring of the system, the wattage shall be
   i) the specified wattage of the luminaires included in the system with a minimum of 98 W/m,
   ii) the wattage limit of the system's circuit breaker, or
   iii) the wattage limit of other permanent current-limiting device(s) on the system,
d) the wattage of low-voltage lighting track, cable conductor, rail conductor, and other flexible lighting systems that allow the addition and/or relocation of luminaires without altering the wiring of the system shall be the specified wattage of the transformer supplying the system, and
e) the wattage of all other miscellaneous lighting equipment shall be the specified wattage of the lighting equipment.

4) Lighting for the following functions, spaces or equipment need not be included in the calculation of *installed interior lighting power*:

a) display or accent lighting that is an essential element for the function it performs in galleries, museums, and monuments,
b) lighting that is integral to equipment or instrumentation and is installed by its manufacturer,
c) lighting specifically designed for use only during medical or dental procedures,

b) the allowed lighting power density (LPD) for each *enclosed space* shall be determined using Table 4.2.1.6. for the exact space type or a space type that most closely represents the proposed use of each space,
c) the lighting power allowance for each *enclosed space* shall be calculated by multiplying the floor area determined in Clause (a) by the allowed LPD determined in Clause (b), and
d) the *interior lighting power allowance* for the entire *building* shall be calculated by summing the lighting power allowances of all *enclosed spaces* determined in Clause (c).

Table 4.2.1.6.
Lighting Power Density Using the Space-by-Space Method
Forming Part of Sentences 4.2.1.6.(1) and 4.3.3.2.(1)

Common Space Types(1)	
Space Types	Lighting Power Density, W/m^2
Atrium	
first 12 m in height	1.06 per m (height)
height above 12 m	0.71 per m (height)
Audience seating area – permanent	
for auditorium	8.5
for performing arts *theatre*	26.2
for motion picture *theatre*	12.3
Classroom/lecture/training	13.3
Conference area/meeting/multi-purpose	13.2
Corridor/transition area	
≥ 2.4 m wide	7.1
< 2.4 m wide	8.4
Dining area	
for bar lounge/leisure dining	14.1
for family dining	9.6
other	7.0
Dressing/fitting room for performing arts *theatre*	4.3
Electrical/Mechanical area	13.4
Food preparation area	10.7
Laboratory	
for classrooms	17.2
for medical/industrial/research	23.6
Lobby	
for elevator	6.9
for performing arts *theatre*	21.5
for motion picture *theatre*	5.6
other	9.7
Locker room	9.8
Lounge/recreation area	9.4
Office	
enclosed	11.9
open plan	11.0

Table 4.2.1.6. (Continued)

Common Space Types(1)	
Space Types	Lighting Power Density, W/m²
Sales area	18.1
Stairway	7.4
Storage area	6.8
Washroom	10.5
Workshop	17.1
Building-Specific Space Types(1)	
Space Types	Lighting Power Density, W/m²
Automotive – *repair garage*	7.2
Bank – banking activity area and offices	14.9
Convention centre	
audience seating	8.8
exhibit space	15.6
Courthouse/Police station/Penitentiary	
courtroom	18.5
confinement cell	14.8
judges' chambers	12.6
penitentiary – audience seating	4.6
penitentiary – classroom	14.4
penitentiary – dining	11.5
Dormitory – living quarters	4.1
Fire station	
engine room	6.0
sleeping quarters	3.4
Gymnasium/Fitness centre	
fitness area	9.8
gymnasium – audience seating	4.6
play area	12.9

Table 4.3.2.6.B.
Number of Operational Hours of the Building During Nighttime, $t_{night,i}$, for Various Start and End Times
Forming Part of Sentences 4.3.2.6.(2) and (3)

Operation Start Time	Operation End Time																							
	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 p.m.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.	12 a.m.
	$t_{night,i}$, in h/a																							
12 a.m.	250	500	750	1,000	1,250	1,465	1,595	1,637	1,637	1,637	1,637	1,637	1,637	1,637	1,637	1,637	1,670	1,757	1,871	2,021	2,236	2,486	2,736	2,986
1 a.m.	-	250	500	750	1,000	1,215	1,345	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,420	1,507	1,621	1,771	1,986	2,236	2,486	2,736
2 a.m.	-	-	250	500	750	965	1,095	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,137	1,170	1,257	1,371	1,521	1,736	1,986	2,236	2,486
3 a.m.	-	-	-	250	500	715	845	887	887	887	887	887	887	887	887	887	920	1,007	1,121	1,271	1,486	1,736	1,986	2,236
4 a.m.	-	-	-	-	250	465	595	637	637	637	637	637	637	637	637	637	670	757	871	1,021	1,236	1,486	1,736	1,986
5 a.m.	-	-	-	-	-	215	345	387	387	387	387	387	387	387	387	387	420	507	621	771	986	1,236	1,486	1,736
6 a.m.	-	-	-	-	-	-	131	173	173	173	173	173	173	173	173	173	205	292	407	556	771	1,021	1,271	1,521
7 a.m.	-	-	-	-	-	-	-	42	42	42	42	42	42	42	42	42	75	162	276	425	640	890	1,140	1,390
8 a.m.	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	33	120	234	383	598	848	1,098	1,348
9 a.m.	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	33	120	234	383	598	848	1,098	1,348
10 a.m.	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	33	120	234	383	598	848	1,098	1,348
11 a.m.	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	33	120	234	383	598	848	1,098	1,348
12 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	33	120	234	383	598	848	1,098	1,348
1 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	33	120	234	383	598	848	1,098	1,348
2 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	33	120	234	383	598	848	1,098	1,348
3 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33	120	234	383	598	848	1,098	1,348
4 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	120	234	383	598	848	1,098	1,348
5 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87	201	350	566	816	1,066	1,316
6 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	114	263	479	729	979	1,229
7 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	149	364	614	864	1,114
8 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	215	465	715	965
9 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250	500	750
10 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250	500
11 p.m.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250

4.3.2.7. Determination of Factor for Daylight Harvesting

1) The factor for daylight harvesting, $F_{DL,i}$, shall be calculated using the following equation:

$$F_{DL,i} = 1 - C_{DL,sup,i} \cdot C_{DL,ctrl,i} \cdot C_{EL,ctrl,i}$$

where

$C_{DL,sup,i}$ = daylight supply factor determined in accordance with Sentences (3) and (4),
$C_{DL,ctrl,i}$ = daylight system control factor determined in accordance with Sentence (5), and
$C_{EL,ctrl,i}$ = daylight-dependent control factor for electric lighting determined in accordance with Sentence (6).

2) For spaces where *sidelighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be determined in accordance with Article 4.3.2.8.

3) For spaces where *toplighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be determined in accordance with Article 4.3.2.9.

4) The daylight system control factor, $C_{DL,ctrl,i}$, shall be selected from Table 4.3.2.7.A.

5) The daylight-dependent control factor for electric lighting, $C_{EL,ctrl,i}$, shall be selected from Table 4.3.2.7.B.

Table 4.3.2.7.A.
Daylight System Control Factor, $C_{DL,ctrl,i}$
Forming Part of Sentences 4.3.2.7.(5) and 4.3.3.7.(5)

Daylight System Control	$C_{DL,ctrl,i}$ (1)
Manual	0.5
Automatic	0.86
None	1

Note to Table 4.3.2.7.A.:

(1) The daylight system control factor accounts for the effect of shading on daylight availability.

Table 4.3.2.7.B.
Daylight-Dependent Control Factor for Electric Lighting, $C_{EL,ctrl,i}$
Forming Part of Sentences 4.3.2.7.(6) and 4.3.3.7.(6)

Daylight-Dependent Control System	$C_{EL,ctrl,i}$
Automatic dimming	1
Automatic bi-level switching (multi-level photocontrol with at least two control levels)	0.99
Automatic switching (on/off)	0.82
Manual	0.51
None	0

4.3.2.8. Determination of the Daylight Supply Factor for Sidelighting

1) For spaces where *sidelighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be calculated using the following equation:

$$C_{DL,sup,i} = \tau_{eff,i} \cdot C_{DL,sup,raw,i} \cdot f_{obst,i}$$

where

$\tau_{eff,i}$ = effective luminous transmittance of the *fenestration* providing *sidelighting* calculated in accordance with Sentence (2),

$C_{DL,sup,raw,i}$ = raw daylight supply factor for the rough opening (opening without *fenestration*) calculated in accordance with Sentence (3), and

$f_{obst,i}$ = factor to account for horizontal obstructions calculated in accordance with Sentence (4).

2) The effective luminous transmittance of the *fenestration* providing *sidelighting*, $\tau_{eff,i}$, shall be calculated using the following equation:

$$\tau_{eff,i} = \tau_{D65,i} \cdot k_{1,i} \cdot k_{2,i} \cdot k_{3,i}$$

where

$\tau_{D65,i}$ = luminous transmittance of the glazing for standard illuminant D65,

$k_{1,i}$ = factor to account for framing defined as the ratio of glazed area to overall area of the opening including area of framing,

$k_{2,i}$ = factor to account for dirt accumulation (if unknown, value shall be set to 0.8), and

$k_{3,i}$ = factor to account for non-perpendicular light incidence (if unknown, value shall be set to 0.85).

3) The raw daylight supply factor for the rough opening, $C_{DL,sup,raw,i}$, shall be determined using Table 4.3.2.8.

4) The factor to account for horizontal obstructions, $f_{obst,i}$, shall be calculated using the following equation:

$$\text{For } \gamma_{obst,i} < 60^{o}, f_{obst,i} = \cos(1.5 \cdot \gamma_{obst,i}), \text{ and}$$
$$\text{For } \gamma_{obst,i} \geq 60^{o}, f_{obst,i} = 0$$

where

$\gamma_{obst,i}$ = angle from the centre of the *fenestration* to the top of the horizontal obstruction, in degrees.

Table 4.3.2.8.
Raw Daylight Supply Factors for Rough Opening, $C_{DL,sup,raw,i}$
Forming Part of Sentence 4.3.2.8.(3)

Design Illuminance, in lx(1)	Orientation of *Fenestration* Providing *Sidelighting*(2)			
	North	East	South	West
	$C_{DL,sup,raw,i}$			
300	0.72	0.72	0.74	0.73
500	0.59	0.62	0.66	0.64
750	0.50	0.55	0.60	0.57
1000	0.44	0.49	0.55	0.52

Notes to Table 4.3.2.8.:

(1) See Appendix A.

(2) See A-4.3.2.3.(2) in Appendix A.

4.3.2.9. Determination of the Daylight Supply Factor for Toplighting

1) For spaces where *toplighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be determined using Table 4.3.2.9.A.

2) The mean daylight factor for *toplighting*, D_i, shall be calculated using the following equation:

$$D_i = \tau_{D65,i} \cdot k_{skyl,1,i} \cdot k_{skyl,2,i} \cdot k_{skyl,3,i} \cdot \frac{\sum A_{Rb,i}}{A_{RG,i}} \cdot \eta_{R,i}$$

where

$\tau_{D65,i}$ = luminous transmittance of the roof glazing for standard illuminant D65,

$k_{skyl,1,i}$ = factor to account for framing defined as the ratio of glazed area to overall area of the opening including area of framing (if unknown, value shall be set to 0.7),
$k_{skyl,2,i}$ = factor to account for dirt accumulation (if unknown, value shall be set to 0.9),
$k_{skyl,3,i}$ = factor to account for non-perpendicular light incidence (if unknown, value shall be set to 0.85),
$A_{Rb,i}$ = area of the openings providing *toplighting* (area of rough opening), in m²,
$A_{RG,i}$ = area of the space, in m², and
$\eta_{R,i}$ = utilization factor determined using Table 4.3.2.9.B.

3) The room cavity ratio, RCR, shall be calculated using the following equation:

$$\mathrm{RCR} = \frac{5 \cdot \mathrm{H} \cdot (\mathrm{L} + \mathrm{W})}{[\mathrm{L} \cdot \mathrm{W}]}$$

where
H = height of the space, in m,
L = length of the space, in m, and
W = width of the space, in m.

Table 4.3.2.9.A.
Daylight Supply Factors for Toplighting, $C_{DL,sup,i}$
Forming Part of Sentence 4.3.2.9.(1)

Design Illuminance, in lx	Classification of the Daylighting Supply		
	Low (2% ≤ D_i < 4%)(1)	Medium (4% ≤ D_i < 7%)(1)	Good (D_i ≥ 7%)(1)
	$C_{DL,sup,i}$		
300	0.81	0.86	0.88
500	0.75	0.82	0.85
750	0.67	0.77	0.82
1000	0.59	0.73	0.79

Note to Table 4.3.2.9.A.:
(1) See Sentence (2) to calculate the mean daylight factor for *toplighting*, D_i. For D_i < 2%, $C_{DL,sup,i}$ = 0.

Table 4.3.2.9.B.
Utilization Factor, $\eta_{R,i}$, as a Function of Room Cavity Ratio, RCR
Forming Part of Sentence 4.3.2.9.(2)

RCR(1)	Utilization Factor,(2) $\eta_{R,i}$
0	1.00
0.5	0.98
1	0.95
1.5	0.89
2	0.84
2.5	0.79
3	0.74
4	0.65
5	0.57
6	0.52
7	0.47
8	0.41
9	0.35
10	0.29

Notes to Table 4.3.2.9.B.:

(1) See Sentence (3) to calculate the room cavity ratio, RCR.

(2) The utilization factors are derived based on room reflectances of 70 pc (ceiling cavity)/50 pw (walls)/20 pf (floor cavity).

4.3.2.10. Determination of Factors for Occupancy Control and Personal Control

1) The factor for occupancy control, $F_{occ,i}$, shall be calculated using the following equation:

$$F_{occ,i} = 1 - C_{A,i} \cdot C_{occ,ctrl,i}$$

where

$C_{A,i}$ = factor to account for the relative absence of occupants in the space determined using Table 4.3.2.10.A., and

$C_{occ,ctrl,i}$ = factor to account for the occupancy-sensing mechanism determined using Table 4.3.2.10.B.

2) Except as provided in Sentence (3), the factor for personal control, $F_{pers,i}$, shall be calculated using the following equation:

$$F_{pers,i} = 1 - C_{pers,ctrl,i}$$

where

$C_{pers,ctrl,i}$ = factor to account for personal control determined using Table 4.3.2.10.A.

3) Where the lighting design does not include personal controls, the factor for personal control, $F_{pers,i}$, shall be set to 1.

Table 4.3.2.10.A.
Factors for Relative Absence of Occupants and Personal Control According to Space Type
Forming Part of Sentences 4.3.2.10.(1) and (2) and 4.3.3.10.(1)

Common Space Types		
Space Types	Factors	
	Relative Absence of Occupants, $C_{A,i}$	Personal Control, $C_{pers,ctrl,i}$
Atrium		
first 13 m in height	0	0
height above 13 m	0	0
Audience seating area – permanent		
for auditorium	0.3	0
for performing arts *theatre*	0	0
for motion picture *theatre*	0	0
Classroom/lecture/training	0.5	0
Conference area/meeting/multi-purpose	0.5	0
Corridor/transition area		
≥ 2.4 m wide	0	0
< 2.4 m wide	0	0
Dining area		
for bar lounge/leisure dining	0	0
for family dining	0	0
other	0	0
Dressing/fitting room for performing arts *theatre*	0.4	0
Electrical/Mechanical area	0.9	0
Food preparation area	0	0
Laboratory		
for classrooms	0.4	0.1
for medical/industrial/research	0	0
Lobby		
for elevator	0	0
for performing arts *theatre*	0	0
for motion picture *theatre*	0	0
other	0	0
Locker room	0.5	0
Lounge/recreation area	0	0
Office		
enclosed	0.3	0.1
open plan	0.2	0.1
Sales area	0	0
Stairway	0	0
Storage area	0.6	0
Washroom	0.5	0
Workshop	0	0

Table 4.3.2.10.A. (Continued)

Building-Specific Space Types		
Space Types	Factors	
	Relative Absence of Occupants, $C_{A,i}$	Personal Control, $C_{pers,ctrl,i}$
Transportation		
air/train/bus – baggage area	0	0
airport – concourse	0	0
seating area	0	0
terminal – ticket counter	0	0
Warehouse		
fine material storage	0.5	0
medium/bulky material	0.5	0
medium/bulky material with permanent shelving that is > 60% of *ceiling height*	0.5	0

Table 4.3.2.10.B.
Factor to Account for Occupancy-Sensing Mechanism, $C_{occ,ctrl,i}$
Forming Part of Sentences 4.3.2.10.(1) and 4.3.3.10.(1)

Occupancy-Sensing Mechanism	$C_{occ,ctrl,i}$
Automatic	0.67
Manual	0.30
None	0

4.3.3. Interior Lighting Energy Allowance

4.3.3.1. Determination of Interior Lighting Energy Allowance

1) The *interior lighting* energy allowance, ILEA, in (W·h)/a, which is the maximum allowed annual energy consumption of all *interior lighting* complying with the prescriptive lighting power densities determined using the space-by-space method in Article 4.2.1.6. and with the prescriptive lighting controls in Subsection 4.2.2., shall be calculated using the following equation:

$$\mathrm{ILEA} = \sum_{i=1}^{N} E_{i,\mathrm{prescriptive}}$$

where

i = counter for spaces,

N = total number of spaces in the proposed *building*, and

$E_{i,\mathrm{prescriptive}}$ = annual energy consumption for lighting in a space, in (W·h)/a, calculated in accordance with Sentence (2).

2) The annual energy consumption for lighting in each space, $E_{i,\mathrm{prescriptive}}$, in (W·h)/a, shall be calculated using the following equation:

$$E_{i,\mathrm{prescriptive}} = \mathrm{LPD}_i \cdot [A_{DL,i} \cdot (t_{eff,day,DL,i} + t_{eff,night,i}) + A_{NDL,i} \cdot (t_{eff,day,NDL,i} + t_{eff,night,i})]$$

where

LPD_i = lighting power density for the space, in W/m², determined in accordance with Article 4.3.3.2.,

$A_{DL,i}$ = daylighted area, in m², determined in accordance with Article 4.3.3.3.,

$A_{NDL,i}$ = non-daylighted area, in m², determined in accordance with Article 4.3.3.4.,

$t_{eff,day,DL,i}$ = effective annual daytime operational time in daylighted area, in h/a, determined in accordance with Article 4.3.3.5.,

$t_{eff,day,NDL,i}$ = effective annual daytime operational time in non-daylighted area, in h/a, determined in accordance with Article 4.3.3.5., and

$t_{eff,night,i}$ = effective annual nighttime operational time, in h/a, determined in accordance with Article 4.3.3.5.

4.3.3.2. Determination of Lighting Power Density

1) The lighting power density for a space, LPD_i, shall be determined using Table 4.2.1.6.

4.3.3.3. Determination of Daylighted Area

1) The daylighted area of a space, $A_{DL,i}$, in m², shall be identical to that for the proposed *building* as determined in Article 4.3.2.3.

4.3.3.4. Determination of Non-Daylighted Area

1) The non-daylighted area of a space, $A_{NDL,i}$, in m², shall be identical to that for the proposed *building* as determined in Article 4.3.2.4.

4.3.3.5. Determination of Effective Annual Operational Times

1) The effective annual daytime operational time of the daylighted area, $t_{eff,day,DL,i}$, in h/a, shall be calculated using the following equation:

$$t_{eff,day,DL,i} = t_{day,i} \cdot F_{DL,i} \cdot F_{occ,i} \cdot F_{pers,i}$$

where

$t_{day,i}$ = annual operational time of space during daytime, in h, determined in accordance with Article 4.3.3.6.,

$F_{DL,i}$ = factor for daylight harvesting determined in accordance with Article 4.3.3.7.,

$F_{occ,i}$ = factor for occupancy control determined in accordance with Article 4.3.3.10., and

$F_{pers,,i}$ = factor for personal control determined in accordance with Article 4.3.3.10.

2) The effective annual daytime operational time of the non-daylighted area, $t_{eff,day,NDL,i}$, in h/a, shall be calculated using the following equation:

$$t_{eff,day,NDL,i} = t_{day,i} \cdot F_{occ,i} \cdot F_{pers,i}$$

where

$t_{day,i}$ = annual operational time of space during daytime, in h, determined in accordance with Article 4.3.3.6.,

$F_{occ,i}$ = factor for occupancy control determined in accordance with Article 4.3.3.10., and

$F_{pers,,i}$ = factor for personal control determined in accordance with Article 4.3.3.10.

3) The effective annual nighttime operational time, $t_{eff,night,i}$, in h/a, shall be calculated using the following equation:

$$t_{eff,night,i} = t_{night,i} \cdot F_{occ,i} \cdot F_{pers,i}$$

where

$t_{night,i}$ = annual operational time of the space during nighttime, in h, determined in accordance with Article 4.3.3.6.,

$F_{occ,i}$ = factor for occupancy control determined in accordance with Article 4.3.3.10., and

$F_{pers,,i}$ = factor for personal control determined in accordance with Article 4.3.3.10.

4.3.3.6. Determination of Operational Times

1) Annual operational times, $t_{day,i}$ and $t_{night,i}$, shall be determined in accordance with Article 4.3.2.6.

4.3.3.7. Determination of Factor for Daylight Harvesting

1) The factor for daylight harvesting, $F_{DL,i}$, shall be determined using the following equation:

$$F_{DL,i} = 1 - C_{DL,sup,i} \cdot C_{DL,ctrl,i} \cdot C_{EL,ctrl,i}$$

where

$C_{DL,sup,i}$ = daylight supply factor determined in accordance with Sentences (3) and (4),

$C_{DL,ctrl,i}$ = daylight system control factor determined in accordance with Sentence (5), and

$C_{EL,ctrl,i}$ = daylight-dependent control factor for electric lighting determined in accordance with Sentence (6).

2) For spaces where *sidelighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be determined in accordance with Article 4.3.2.8.

3) For spaces where *toplighting* is the primary daylight supply, the daylight supply factor, $C_{DL,sup,i}$, shall be determined in accordance with Article 4.3.2.9.

4) The daylight system control factor, $C_{DL,ctrl,i}$, shall be set to the daylight system control factor for "manual" stated in Table 4.3.2.7.A. (See Appendix A.)

5) The daylight-dependent control factor for electric lighting, $C_{EL,ctrl,i,}$ shall be determined using Table 4.3.2.7.B. based on the minimum requirement for the applicable space according to the prescriptive path.

4.3.3.8. Reserved

4.3.3.9. Reserved

4.3.3.10. Determination of Factors for Occupancy Control and Personal Control

1) The factor for occupancy control, $F_{occ,i}$, , shall be calculated using the following equation:

$$F_{occ,i} = 1 - C_{A,i} \cdot C_{occ,ctrl,i}$$

where

$C_{A,i}$ = factor to account for the relative absence of occupants in the space determined using Table 4.3.2.10.A., and

$C_{occ,ctrl,i}$ = factor to account for the occupancy-sensing mechanism determined using Table 4.3.2.10.B. based on the minimum requirement for the applicable space according to the prescriptive path.

2) The factor for personal control, $F_{pers,i}$, shall be set to 1.

Section 4.4. Performance Path

(See A-1.1.2.1. in Appendix A.)

4.4.1. General

4.4.1.1. Scope

1) Where the lighting system does not comply with the requirements of Section 4.2. or 4.3., it shall comply with Part 8.

Section 4.5. Objective and Functional Statements

4.5.1. Objective and Functional Statements

4.5.1.1. Attributions to Acceptable Solutions

1) For the purpose of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objective and functional statements attributed to the acceptable solutions in this Part shall be the objective and functional statements listed in Table 4.5.1.1. (See A-1.1.3.1.(1) in Appendix A.)

Table 4.5.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 4
Forming Part of Sentence 4.5.1.1.(1)

Acceptable Solutions	Functional Statements and Objectives(1)
4.2.1.1. Exit Signs	
(1)	[F94-OE1.1]
4.2.1.2. Fluorescent Lamp Ballasts	
(1)	[F94,F98-OE1.1]
(2)	[F94,F98-OE1.1]
4.2.1.3. Limits to Installed Interior Lighting Power	
(1)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.2.1.4. Determination of the Installed Interior Lighting Power	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.2.1.5. Calculation of Interior Lighting Power Allowance Using the Building Area Method	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
(5)	[F94-OE1.1]
4.2.1.6. Calculation of Interior Lighting Power Allowance Using the Space-by-Space Method	
(1)	[F94-OE1.1]
4.2.2.1. Automatic Lighting Shut-off Controls	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]

Table 4.5.1.1. (Continued)

Acceptable Solutions	Functional Statements and Objectives(1)
(3)	[F94-OE1.1]
4.2.2.2. Lighting Controls in Enclosed Spaces	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.2.2.3. Additional Requirements for Lighting Controls	
(1)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
(5)	[F94-OE1.1]
(6)	[F94-OE1.1]
(7)	[F94-OE1.1]
(8)	[F94-OE1.1]
4.2.2.4. Automatic Daylighting Controls for Toplighting	
(1)	[F94-OE1.1]
4.2.2.5. Determination of Daylighted Area Under Skylights	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
4.2.2.6. Determination of Daylighted Area Under Rooftop Monitors	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
4.2.2.7. Calculation of Skylight Effective Aperture	
(1)	[F94-OE1.1]
4.2.2.8. Automatic Daylighting Controls for Primary Sidelighted Areas	
(1)	[F94-OE1.1]
4.2.2.9. Determination of Primary Sidelighted Areas	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
4.2.2.10. Calculation of Sidelighting Effective Aperture	
(1)	[F94-OE1.1]
4.2.3.1. Exterior Lighting	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
4.2.4.1. Requirements	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(4)	[F94-OE1.1]

Table 4.5.1.1. (Continued)

Acceptable Solutions	Functional Statements and Objectives(1)
4.3.1.3. Compliance	
(1)	[F94-OE1.1]
4.3.2.1. Determination of Installed Interior Lighting Energy	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
4.3.2.2. Determination of Lighting Power Density	
(1)	[F94-OE1.1]
4.3.2.3. Determination of Daylighted Area	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
4.3.2.4. Determination of Non-Daylighted Area	
(1)	[F94-OE1.1]
4.3.2.5. Determination of Effective Annual Operational Times	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.3.2.6. Determination of Operational Times	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
4.3.2.7. Determination of Factor for Daylight Harvesting	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
(5)	[F94-OE1.1]
4.3.2.8. Determination of the Daylight Supply Factor for Sidelighting	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
(4)	[F94-OE1.1]
4.3.2.9. Determination of the Daylight Supply Factor for Toplighting	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.3.2.10. Determination of Factors for Occupancy Control and Personal Control	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.3.3.1. Determination of Interior Lighting Energy Allowance	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]

Table 4.5.1.1. (Continued)

Acceptable Solutions	Functional Statements and Objectives[1]
4.3.3.2. Determination of Lighting Power Density	
(1)	[F94-OE1.1]
4.3.3.3. Determination of Daylighted Area	
(1)	[F94-OE1.1]
4.3.3.4. Determination of Non-Daylighted Area	
(1)	[F94-OE1.1]
4.3.3.5. Determination of Effective Annual Operational Times	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]
(3)	[F94-OE1.1]
4.3.3.7. Determination of Factor for Daylight Harvesting	
(1)	[F94-OE1.1]
(4)	[F94-OE1.1]
(5)	[F94-OE1.1]
4.3.3.10. Determination of Factors for Occupancy Control and Personal Control	
(1)	[F94-OE1.1]
(2)	[F94-OE1.1]

Note to Table 4.5.1.1.:

(1) See Parts 2 and 3 of Division A.

5.3.1.3. Compliance

1) HVAC systems with an HVAC trade-off index, $HVAC_{TOI}$, greater than or equal to 0, as calculated in accordance with Subsection 5.3.2., shall be deemed to comply with this Section.

5.3.1.4. Definition

1) For the purposes of this Section, "total degree-days" (TDD) shall mean the sum of heating degree-days (HDD) below 18°C and cooling degree-days (CDD) above 13°C.

5.3.2. Compliance Calculation

5.3.2.1. HVAC Trade-off Index

1) The HVAC trade-off index, $HVAC_{TOI}$, for a specific HVAC system shall be calculated using the following equation:

$$\mathrm{HVAC_{TOI}} = \sum_{i=1}^{32} \left(\alpha_i \cdot \mathrm{ToV_i} + \beta_i \cdot \mathrm{ToV_i^2}\right) \cdot \gamma_i - \sum_{i=1}^{32} \left(\alpha_i \cdot \mathrm{BaV_i} + \beta_i \cdot \mathrm{BaV_i^2}\right) \cdot \gamma_i$$

where

- i = counter for number of components included in proposed *building*'s HVAC system,
- α_i = first order weighting factor linking the component efficiency variations of component i to the system efficiency variations, determined as per Article 5.3.2.5.,
- β_i = second order weighting factor linking the component efficiency variations of component i to the system efficiency variations, determined as per Article 5.3.2.5.,
- ToV_i = trade-off value of component i for the proposed *building*, determined as per Article 5.3.2.3.,
- BaV_i = base value for component i for the reference *building*, determined as per Article 5.3.2.4., and
- γ_i = factor to determine components to be included, determined as per Article 5.3.2.2. for the given HVAC system.

5.3.2.2. Determination of Components to Be Included, γi

1) The value of the component factor, γ_i, to be used in the equation in Sentence 5.3.2.1.(1) shall be taken from Table 5.3.2.2.

Table 5.3.2.2.
Component Factors, γ_i, for Trade-off Calculations
Forming Part of Sentences 5.3.1.1.(1) and 5.3.2.2.(1)

Trade-off Value(1)	HVAC System ID(2)																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	γ_i Factor(3)																										
ToV_1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
ToV_2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
ToV_3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_5	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_6	1	0	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ToV_7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_{10}	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ToV_{11}	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1
ToV_{12}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ToV_{13}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
ToV_{14}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1
ToV_{15}	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0
ToV_{16}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
ToV_{17}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{18}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1
ToV_{19}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
ToV_{20}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{21}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{22}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{23}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{24}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{25}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{26}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{27}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{28}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{29}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{30}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1
ToV_{31}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1
ToV_{32}	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1

Notes to Table 5.3.2.2.:

(1) See Table 5.3.2.3. for a description of these values.

(2) See Table 5.3.1.1. for a description of each system.

(3) Only components with $\gamma_i = 1$ are to be included for a given HVAC system.

Table 5.3.2.4.
Base Values, BaV_i
Forming Part of Sentence 5.3.2.4.(1)

BaV_i	HVAC System ID (1)																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
BaV_1	60.00%	60.00%	44.00%	54.55%	60.00%	49.09%	60.00%	49.09%	60.00%	60.00%	49.09%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	65.00%	65.00%	65.00%	43.64%	60.00%	65.00%	54.55%	54.55%	60.00%
BaV_2	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%	91.67%
BaV_3	38%	37.50%	31%	31.25%	37.50%	25%	37.50%	25%	30%	37.50%	25%	37.50%	37.50%	37.50%	37.50%	37.50%	37.50%	37.50%	37.50%	37.50%	37.50%	31.25%	37.50%	37.50%	31.25%	31.25%	37.50%
BaV_4	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
BaV_5	0.5	0.2	0.943	0.943	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.943	0.5	0.5	0.943	0.943	0.5
BaV_6	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557	0.557
BaV_7	4	4	1.3	2	4	3	4	3	6	4	3	4	4	2	2	2	2	2	6	6	6	1.3	2	6	2	2	2
BaV_8	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.2932	3.29	3.29	3.29	3.29	3.29	3.2932	3.2932	3.2932	3.2932	3.29	3.2932	3.2932	3.2932	3.29
BaV_9	1	1	0	0.6	1	0.6	1	0.6	1.5	1	0.6	1	1	0.6	0.6	0.6	0.6	0.6	1.5	1.5	1.5	0.6	0.6	1.5	0.6	0.6	0.6
BaV_{10}	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
BaV_{11}	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
BaV_{12} (2)	See Table 5.2.12.1. for performance efficiency of *boiler/furnace*/heat pump of base system.																										
BaV_{13}	See Table 5.2.12.1. for performance efficiency of chiller/direct expansion/heat pump of base system.																										
BaV_{14}	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
BaV_{15}	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
BaV_{16}	0	0.8	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BaV_{17}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BaV_{18}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	420.17%	420.17%	0	0	0	0	0	0	0	0	0
BaV_{19}	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
BaV_{20}	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
BaV_{21}	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
BaV_{22}	40	40	40	40	40	40	40	40	40	40	40	40	40	60	40	40	40	60	60	40	40	40	40	40	40	40	40
BaV_{23}	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
BaV_{24}	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
BaV_{25}	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
BaV_{26}	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
BaV_{27}	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
BaV_{28}	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
BaV_{29}	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
BaV_{30}	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
BaV_{31}	0.8	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.5
BaV_{32}	0.8	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Notes to Table 5.3.2.4.:

(1) See Table 5.3.1.1. for a description of each system.

(2) BaV_{12} shall not be a gas-fired *unit heater* < 117.23 kW.

5.3.2.5. Determination of Weighting Factor Linking the Component Efficiency Variation to the System Efficiency Variation, α_i and β_i

1) The first order weighting factor linking the component efficiency variations of component i to the system efficiency variations, α_i, shall be calculated using the following equation:

$$\alpha_i = \alpha 1_i + \alpha 2_i \cdot XDD_i + \alpha 3_i \cdot XDD_i^2$$

where

$\alpha 1_i$ = constant coefficient value for weighting factor for the HVAC system of the proposed *building*, α_i, determined as per Article 5.3.2.8.,

$\alpha 2_i$ = first order coefficient value for weighting factor for the HVAC system of the proposed *building*, α_i, determined as per Article 5.3.2.8.,

$\alpha 3_i$ = second order coefficient value for weighting factor for the HVAC system of the proposed *building*, α_i, determined as per Article 5.3.2.8., and

XDD_i = climatic parameter relevant to component i for the HVAC system of the proposed *building*, determined as per Article 5.3.2.6.

2) The second order weighting factor linking the component efficiency variations of component i to the system efficiency variations, β_i, shall be calculated using the following equation:

$$\beta_i = \beta 1_i + \beta 2_i \cdot XDD_i + \beta 3_i \cdot XDD_i^2$$

where

$\beta 1_i$ = constant coefficient value for weighting factor for the HVAC system of the proposed *building*, β_i, determined as per Article 5.3.2.8.,

$\beta 2_i$ = first order coefficient value for weighting factor for the HVAC system of the proposed *building*, β_i, determined as per Article 5.3.2.8.,

$\beta 3_i$ = second order coefficient value for weighting factor for the HVAC system of the proposed *building*, β_i, determined as per Article 5.3.2.8., and

XDD_i = climatic parameter relevant to component i for the HVAC system of the proposed *building*, determined as per Article 5.3.2.6.

5.3.2.6. Determination of Climatic Parameter Relevant to the Component, XDD_i

1) The climatic parameters relevant to component i, XDD_i, to be used in the equation in Article 5.3.2.5., shall be those specified in Tables 5.3.2.8.A. to 5.3.2.8.AA.

5.3.2.7. Determination of Trade-off Value of Component, ToV_i

1) As indicated in Table 5.3.2.3., the values for ToV_5, ToV_6, ToV_{15}, ToV_{16}, and ToV_{27} to ToV_{32}, to be used in the equation in Sentence 5.3.2.1.(1), shall be taken from Table 5.3.2.7. for the applicable control type and HVAC system.

Table 5.3.2.7.
ToV_i Based on Control Type and HVAC System
Forming Part of Sentence 5.3.2.7.(1)

ToV_i	HVAC System ID(1)																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ToV_5																											
Supply OA Reset	0.9344	0.3490	0.9180	0.9180	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9344	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Warmest	1.0000	0.4253	0.7303	0.7303	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Constant > 15°C	0.8623	0.3228	0.9181	0.9181	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8623	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Constant ≤ 15°C	0.5000	0.2000	0.9400	0.9400	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.9400	0.5000	0.5000	0.9400	0.9400	0.5000
ToV_6																											
Forward curve with vanes	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570	0.5570
VSD	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040	0.6040
Airfoil with inlet vanes	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660	0.3660
Riding fan curve	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070	0.2070
ToV_{15}																											
Dual DBT	0.8000	0.8000	0.8500	0.8500	0.8500	0.8000	0.8500	0.8500	0.8500	0.8000	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Enthalpy	0.8000	0.8000	0.9000	0.9000	0.9000	0.8000	0.9000	0.9000	0.9000	0.8000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Dual Enthalpy	0.8005	0.8000	0.9500	0.9500	0.9500	0.8000	0.9500	0.9500	0.9500	0.8000	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Fixed	0.7612	0.8007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Dry Bulb	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
ToV_{16}																											
Fraction of hourly	0.8435	0.8000	0.0000	0.0000	0.8500	0.8500	0.8500	0.8500	0.8500	0.8000	0.8500	0.8500	0.8500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DCV Return	0.9091	0.8511	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.8493	0.9000	0.9000	0.9000	0.2602	0.2602	0.2602	0.1200	0.1200	0.1200	0.1200	0.1200	0.9000	0.1200	0.1172	0.9000	0.9000	0.9000
DCV Supply	0.9059	0.8510	0.8800	0.8800	0.8800	0.8800	0.8800	0.8800	0.8800	0.8493	0.8800	0.8800	0.8800	0.2408	0.2408	0.2408	0.1100	0.1100	0.1100	0.1100	0.1100	0.8800	0.1100	0.1088	0.8800	0.8800	0.8800
DCV,frac hourly,Return	0.9299	0.8511	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.8493	0.9300	0.9300	0.9300	0.2602	0.2602	0.2602	0.1200	0.1200	0.1200	0.1200	0.1200	0.9300	0.1200	0.1172	0.9300	0.9300	0.9300
Fixed	0.0000	0.8000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ToV_{27}																											
Demand-only	0.8555	0.7971	0.8913	0.8992	0.8473	0.7971	0.8252	0.8420	0.8478	0.7818	0.7785	0.7816	0.8019	0.9857	0.9588	0.9588	0.9600	0.9600	0.8000	1.0200	1.0200	0.9500	1.0719	1.0964	0.8651	0.8634	1.0719
Standby	0.7954	0.7849	0.7831	0.7816	0.7859	0.7834	0.7915	0.7904	0.7864	0.7818	0.7785	0.7816	0.7980	0.7715	0.7709	0.7709	0.7700	0.7700	0.6216	0.7700	0.7700	0.7754	0.7851	0.7665	0.7911	0.7912	0.7851
Snap zone	0.8066	0.7869	0.8517	0.8567	0.8026	0.7857	0.7991	0.8029	0.8021	0.8498	0.8510	0.8485	0.8009	0.9060	0.8939	0.8939	0.8900	0.8900	0.7743	0.8800	0.8800	0.8841	1.0089	0.8988	0.8683	0.8662	1.0089
Scheduled	0.7975	0.7854	0.7856	0.7844	0.7877	0.7841	0.7927	0.7921	0.7904	0.7861	0.7835	0.7859	0.7984	0.7750	0.7765	0.7765	0.7800	0.7800	0.6216	0.7800	0.7800	0.7789	0.7868	0.7710	0.7930	0.7930	0.7868
Snap outdoor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
ToV_{28}																											
Demand-only	0.8021	0.8165	0.7453	0.7594	0.8011	0.8011	0.0037	0.8011	0.8011	0.8120	0.8011	0.8096	0.8357	0.8000	0.7686	0.7686	0.8100	0.8100	0.8000	0.8000	0.8000	0.7453	0.8505	0.7901	0.7594	0.7594	0.8505
Standby	0.7924	0.8148	0.6875	0.7236	0.7627	0.7627	0.0000	0.7627	0.7627	0.8109	0.7627	0.8084	0.8253	0.7960	0.7631	0.7631	0.8000	0.8000	0.6216	0.8000	0.8000	0.6875	0.7715	0.7893	0.7236	0.7236	0.7715
Snap zone	0.8051	0.8231	0.7102	0.7355	0.7799	0.7799	0.0085	0.7799	0.7799	0.8109	0.7799	0.8084	0.8271	0.7742	0.7651	0.7651	0.8100	0.8100	0.7588	0.8000	0.8000	0.7102	0.7736	0.7907	0.7355	0.7355	0.7736
Scheduled	0.8026	0.8203	0.7549	0.7913	0.7731	0.7731	0.0051	0.7731	0.7731	0.8158	0.7731	0.8135	0.8341	0.8000	0.7506	0.7506	0.8100	0.8100	0.6216	0.7900	0.7900	0.7549	0.7534	0.7862	0.7913	0.7913	0.7534
Snap outdoor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000

Table 5.3.2.7. (Continued)

ToV_i	HVAC System ID[1]																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ToV_{29}																											
Fixed	0.7914	0.7990	0.7831	0.7821	0.7945	0.7945	0.7945	0.7945	0.7945	0.7995	0.7945	0.7945	0.7913	0.7908	0.7666	0.7666	0.7700	0.7700	0.7792	0.7900	0.7900	0.7831	0.7666	0.7911	0.6200	0.6188	0.7666
Scheduled	0.7974	0.7996	0.7958	0.7954	0.7982	0.7982	0.7982	0.7982	0.7982	0.7999	0.7982	0.7982	0.7985	0.7978	0.7686	0.7686	0.7700	0.7700	0.7912	0.8000	0.8000	0.7958	0.7938	0.7973	0.7433	0.7372	0.7938
Load reset	0.8675	0.8154	0.9077	0.9177	0.8544	0.8544	0.8544	0.8544	0.8544	0.8008	0.8544	0.8544	0.8311	1.0477	1.0298	1.0298	1.0300	1.0300	0.8453	1.0500	1.0500	0.9077	1.0405	1.1301	1.2211	1.2297	1.0405
OA Reset, min 140°F	0.7996	0.7999	0.7994	0.7994	0.7998	0.7998	0.7998	0.7998	0.7998	0.8000	0.7998	0.7998	0.8001	0.7993	0.7900	0.7900	0.7900	0.7900	0.7975	0.8000	0.8000	0.7994	0.7995	0.7993	0.7924	0.7905	0.7995
OA Reset, min >140°F	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
ToV_{30}																											
Fixed	0.7774	0.7940	0.7680	0.7606	0.8035	0.8035	0.7829	0.7952	0.7693	0.7966	0.8035	0.8035	0.7757	0.8000	0.7734	0.7734	0.8000	0.8000	0.8000	0.7800	0.7800	0.7680	0.7842	0.7834	0.7606	0.7606	0.7842
Scheduled	0.7884	0.7967	0.7796	0.7740	0.8000	0.8000	0.7910	0.7979	0.7834	0.7981	0.8000	0.8000	0.7876	0.8040	0.7868	0.7868	0.8400	0.8000	0.8020	0.7900	0.7900	0.7796	0.7929	0.7911	0.7740	0.7740	0.7929
Load reset	0.8333	0.8080	0.7942	0.8014	0.8035	0.8035	0.8266	0.8558	0.8360	0.8041	0.8035	0.8035	0.8324	0.8223	0.8405	0.8405	0.8000	0.8000	0.8006	0.8000	0.8000	0.7942	0.8218	0.8006	0.8014	0.8014	0.8218
OA Reset, 44°F to 58°F	0.8170	0.8043	0.8136	0.8168	0.8035	0.8035	0.8125	0.7995	0.8223	0.8024	0.8035	0.8035	0.8182	0.8169	0.8173	0.8173	0.8400	0.8000	0.8028	0.8100	0.8100	0.8136	0.8075	0.8136	0.8168	0.8168	0.8075
OA Reset, 44°F to 54°F	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
ToV_{31}																											
VSD, valve reset	0.8123	0.8034	0.5197	0.5131	0.5114	0.5040	0.5071	0.5102	0.5027	0.8016	0.5046	0.5016	0.5101	0.5180	0.5179	0.5179	0.5000	0.5000	0.5211	0.5095	0.5095	0.5174	0.5104	0.5117	0.5810	0.8795	0.5104
Two speed, .67	0.8110	0.8026	0.5183	0.5119	0.5102	0.5033	0.5063	0.5092	0.5020	0.8011	0.5041	0.5011	0.5090	0.5150	0.5143	0.5143	0.5000	0.5000	0.5167	0.5076	0.5076	0.5162	0.5082	0.5094	0.5733	0.8718	0.5082
VSD, fixed	0.8122	0.8034	0.5197	0.5130	0.5113	0.5039	0.5070	0.5101	0.5026	0.8016	0.5045	0.5016	0.5099	0.5180	0.5179	0.5179	0.5000	0.5000	0.5200	0.5095	0.5095	0.5174	0.5103	0.5117	0.5810	0.8795	0.5103
Two speed, .5	0.8113	0.8027	0.5197	0.5126	0.5105	0.5031	0.5064	0.5098	0.5020	0.8011	0.5036	0.5011	0.5086	0.5183	0.5182	0.5182	0.5000	0.5000	0.5171	0.5096	0.5096	0.5174	0.5094	0.5119	0.5817	0.8801	0.5094
Constant	0.8000	0.8000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.8000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.8000	0.5000
ToV_{32}																											
VSD, valve reset	0.8068	0.8017	0.8623	0.5604	0.9000	0.9000	0.9000	0.9000	0.9000	0.8009	0.9000	0.5008	0.5075	0.5189	0.5067	0.5067	0.5442	0.5200	0.9000	0.9000	0.9000	0.8623	0.5101	0.5036	0.5604	0.8604	0.5101
Two speed, .67, valve reset	0.8053	0.8013	0.8593	0.5577	0.8000	0.8000	0.8000	0.8000	0.8000	0.8006	0.8000	0.5006	0.5055	0.5150	0.5052	0.5052	0.5058	0.5000	0.8000	0.8000	0.8000	0.8593	0.5092	0.5018	0.5577	0.8577	0.5092
VSD, fixed	0.8022	0.8005	0.8544	0.5533	0.7000	0.7000	0.7000	0.7000	0.7000	0.8003	0.7000	0.5003	0.5025	0.5180	0.5025	0.5025	0.5058	0.4900	0.7000	0.7000	0.7000	0.8544	0.5076	0.5014	0.5533	0.8533	0.5076
Two speed, .5, fixed	0.8000	0.8000	0.8500	0.5490	0.6000	0.6000	0.6000	0.6000	0.6000	0.8000	0.6000	0.5000	0.5000	0.5183	0.5000	0.5000	0.5000	0.5000	0.6000	0.6000	0.6000	0.8500	0.5061	0.5000	0.5490	0.8490	0.5061
Constant	0.8000	0.8000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.8000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.8000	0.5000	0.5000	0.5000	0.8000	0.5000

Note to Table 5.3.2.7.:

(1) See Table 5.3.1.1. for a description of each system.

5.3.2.8. Coefficient Values: $\alpha 1_i$, $\alpha 2_i$, $\alpha 3_i$, $\beta 1_i$, $\beta 2_i$ and $\beta 3_i$

1) The coefficient values of $\alpha 1_i$, $\alpha 2_i$, $\alpha 3_i$, $\beta 1_i$, $\beta 2_i$ and $\beta 3_i$ to be used for weighting α_i and β_i in Article 5.3.2.5. shall be selected from Tables 5.3.2.8.A. to 5.3.2.8.AA. for the given HVAC type and component.

Table 5.3.2.8.A.
Coefficient Values for System Type HVAC-1 (Built-up Variable-Volume)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	9.901E-01	-1.418E-04	5.710E-09	-5.191E-01	7.037E-05	-2.626E-09
ToV_2	HDD	6.994E-01	-1.013E-04	4.055E-09	-2.670E-01	3.687E-05	-1.362E-09
ToV_3	HDD	6.087E-01	-5.513E-05	7.352E-10	-5.244E-01	4.324E-05	-2.153E-10
ToV_4	HDD	2.916E-01	-2.712E-05	3.972E-10	-1.264E-01	1.095E-05	-8.620E-11
ToV_5	HDD	-2.175E-01	1.610E-04	-1.976E-08	1.081	-3.448E-04	2.887E-08
ToV_6	TDD	1.034E-01	3.422E-05	-3.997E-09	8.110E-01	-2.076E-04	1.353E-08
ToV_7	HDD	-6.404E-02	1.180E-05	-6.096E-10	1.976E-03	-4.923E-07	3.046E-11
ToV_8	HDD	1.630E-02	-3.774E-06	2.417E-10	-1.695E-03	3.890E-07	-2.471E-11
ToV_9	HDD	-7.726E-02	9.584E-06	-3.300E-10	4.849E-03	-1.126E-06	6.597E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	7.748E-01	2.129E-06	3.763E-09	0.000E+00	0.000E+00	0.000E+00
ToV_{13}	HDD	7.436E-02	3.208E-06	-1.108E-09	-4.464E-03	-2.334E-07	7.026E-11
ToV_{14}	TDD	1.121E-01	-1.661E-04	1.652E-08	-4.322E-01	1.884E-04	-1.581E-08
ToV_{15}	CDD	9.952E+01	-4.686E-01	4.601E-04	-6.365E+01	3.051E-01	-3.031E-04
ToV_{16}	TDD	-1.162	2.174E-05	6.845E-09	1.299	-1.210E-06	-7.954E-09
ToV_{17}	TDD	2.683E-02	-2.529E-05	5.176E-09	-2.884E-02	2.113E-05	-3.502E-09
ToV_{18}	CDD	-1.193E-02	8.378E-05	-1.197E-07	1.624E-02	-2.165E-05	2.748E-08
ToV_{19}	TDD	8.839E-02	-2.099E-05	1.345E-09	-6.071E-03	1.452E-06	-9.134E-11
ToV_{20}	CDD	2.707E-05	5.515E-06	-7.092E-09	7.653E-06	-2.892E-07	3.201E-10
ToV_{21}	HDD	-1.786E-04	-1.742E-08	1.282E-12	1.948E-07	-4.486E-11	4.202E-15
ToV_{22}	CDD	4.463E-05	-1.355E-06	1.643E-09	-1.699E-08	-7.296E-10	1.243E-12
ToV_{23}	TDD	4.106E-02	9.931E-06	-8.282E-10	-2.157E-02	-6.029E-06	5.106E-10
ToV_{24}	CDD	-1.101E-02	3.037E-04	-3.664E-07	6.831E-03	-1.741E-04	2.094E-07
ToV_{25}	HDD	2.783E-02	7.041E-06	-5.352E-10	-1.049E-02	-2.671E-06	1.989E-10
ToV_{26}	CDD	-3.722E-03	1.520E-04	-1.593E-07	1.207E-03	-5.516E-05	5.264E-08
ToV_{27}	HDD	-1.315E+02	4.822E-02	-3.904E-06	7.979E+01	-2.898E-02	2.342E-06
ToV_{28}	CDD	-2.175E-01	1.610E-04	-1.976E-08	1.081E+00	-3.448E-04	2.887E-08
ToV_{29}	HDD	4.091E+01	-1.309E-02	9.272E-07	-2.317E+01	7.633E-03	-5.442E-07
ToV_{30}	CDD	-5.601	1.325E-02	1.281E-05	3.552	-4.414E-03	-1.343E-05
ToV_{31}	TDD	-1.337E+02	5.146E-02	-4.393E-06	8.327E+01	-3.183E-02	2.717E-06
ToV_{32}	CDD	-2.499	3.264E-02	-5.483E-05	1.481	-1.638E-02	2.938E-05

Table 5.3.2.8.B.
Coefficient Values for System Type HVAC-2 (Constant-Volume Reheat)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	1.056E-01	6.472E-05	-4.633E-09	-5.498E-02	-3.464E-05	2.427E-09
ToV_2	HDD	8.163E-02	4.215E-05	-3.026E-09	-3.239E-02	-1.562E-05	1.097E-09
ToV_3	HDD	-4.940E-02	1.079E-04	-7.375E-09	4.175E-02	-9.438E-05	6.424E-09
ToV_4	HDD	-2.366E-02	5.118E-05	-3.498E-09	9.902E-03	-2.229E-05	1.516E-09
ToV_5	HDD	-7.300	2.709E-03	-1.905E-07	1.341E+01	-4.390E-03	3.102E-07
ToV_6	HDD	0.000E+00	0.000E+00	0.000E+00	0	0	0
ToV_7	TDD	-5.647E-03	-3.978E-06	3.110E-10	1.397E-04	1.221E-07	-1.194E-11
ToV_8	HDD	-4.605E-03	8.683E-06	1.055E-09	2.840E-04	-1.434E-07	2.357E-11
ToV_9	TDD	8.107E-03	-1.272E-05	8.605E-10	-4.623E-04	7.435E-07	-6.313E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	1.316E-01	6.881E-05	-1.510E-09	0	0	0
ToV_{13}	CDD	1.222E-04	8.323E-05	-8.026E-08	-1.560E-05	-5.208E-06	5.047E-09
ToV_{14}	CDD	1.106E-02	-4.160E-04	3.781E-07	-5.515E-02	3.455E-04	-5.038E-07
ToV_{15}	CDD	4.047E-02	-1.114E-04	1.153E-07	-2.852E-02	1.121E-04	-1.284E-07
ToV_{16}	HDD	2.196E-01	2.635E-04	-1.315E-08	-8.540E-02	-8.557E-05	4.056E-09
ToV_{17}	TDD	4.191E-03	-1.814E-06	1.484E-10	-7.536E-03	3.569E-06	-2.980E-10
ToV_{18}	CDD	-6.578E-03	1.874E-05	-2.457E-08	1.045E-02	-1.299E-05	1.584E-08
ToV_{19}	HDD	2.258E-03	-3.063E-07	3.070E-11	-3.251E-04	9.954E-08	-8.482E-12
ToV_{20}	CDD	-1.069E-04	2.890E-06	-3.909E-09	8.046E-06	-1.693E-07	2.212E-10
ToV_{21}	HDD	-1.774E-05	-1.622E-08	8.948E-13	-7.747E-08	3.934E-11	-2.793E-15
ToV_{22}	CDD	-1.692E-05	-1.817E-07	1.999E-10	2.462E-07	-1.141E-09	1.196E-12
ToV_{23}	HDD	6.748E-03	3.902E-06	-2.193E-10	-3.131E-03	-2.628E-06	1.744E-10
ToV_{24}	CDD	-4.563E-03	7.544E-05	-8.301E-08	3.542E-03	-4.686E-05	5.218E-08
ToV_{25}	HDD	3.178E-03	3.566E-06	-2.302E-10	-7.954E-04	-1.505E-06	1.028E-10
ToV_{26}	CDD	1.332E-03	1.549E-05	-7.931E-09	-8.998E-04	-1.828E-06	-3.276E-09
ToV_{27}	HDD	1.558E+03	-5.753E-01	4.737E-05	-9.846E+02	3.638E-01	-2.996E-05
ToV_{28}	CDD	3.413E+02	-1.981	2.604E-03	-2.090E+02	1.216	-1.598E-03
ToV_{29}	HDD	-1.908E+02	7.177E-02	-5.991E-06	1.189E+02	-4.445E-02	3.708E-06
ToV_{30}	CDD	-4.347E+01	2.082E-01	-1.998E-04	2.733E+01	-1.273E-01	1.212E-04
ToV_{31}	HDD	-6.502E+01	2.664E-02	-2.398E-06	4.072E+01	-1.648E-02	1.488E-06
ToV_{32}	CDD	-8.128E+01	2.300E-01	3.748E-06	5.081E+01	-1.408E-01	-5.348E-06

Table 5.3.2.8.C.
Coefficient Values for System Type HVAC-3 (Packaged Single Duct – Single Zone)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	5.393	-1.342E-03	8.829E-08	-3.757	9.121E-04	-5.917E-08
ToV_2	HDD	2.530	-6.215E-04	4.057E-08	-8.585E-01	2.017E-04	-1.284E-08
ToV_3	HDD	5.390	-1.322E-03	8.694E-08	-5.396	1.299E-03	-8.468E-08
ToV_4	HDD	2.142	-5.267E-04	3.471E-08	-8.890E-01	2.146E-04	-1.401E-08
ToV_5	CDD	0	0	0	0	0	0
ToV_6	TDD	0	0	0	0	0	0
ToV_7	HDD	-9.246E-01	2.561E-04	-1.777E-08	1.100E-01	-3.387E-05	2.461E-09
ToV_8	HDD	9.111E-03	2.817E-06	-2.710E-10	-9.343E-04	-2.914E-07	2.801E-11
ToV_9	TDD	6.605E-01	-1.570E-04	9.931E-09	-1.082	2.738E-04	-1.830E-08
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	-1.010E-04	-1.546E-08	1.323E-12	3.347E-06	5.214E-10	-4.518E-14
ToV_{12}	HDD	5.515E-01	5.070E-05	1.327E-09	0	0	0
ToV_{13}	CDD	1.711E-01	6.202E-04	-6.974E-07	-1.975E-02	-4.929E-05	5.393E-08
ToV_{14}	CDD	-6.346E-01	-5.991E-03	5.907E-06	4.213E+01	-4.154E-01	5.656E-04
ToV_{15}	CDD	-8.754E-02	2.693E-03	-4.217E-06	4.996E-02	-1.537E-03	2.406E-06
ToV_{16}	TDD	-1.539E-01	6.627E-05	-5.186E-09	-8.397E-02	4.508E-05	-2.136E-09
ToV_{17}	TDD	1.570E-01	-1.239E-05	1.254E-09	-6.438E-01	2.388E-04	-1.325E-08
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	1.643E-01	-3.981E-05	2.644E-09	-1.058E-02	2.581E-06	-1.723E-10
ToV_{20}	HDD	0	0	0	0	0	0
ToV_{21}	HDD	-2.581E-04	-2.918E-08	2.725E-12	-1.628E-07	1.411E-10	-1.327E-14
ToV_{22}	HDD	0	0	0	0	0	0
ToV_{23}	HDD	2.777E-01	-5.930E-05	3.909E-09	-1.504E-01	3.183E-05	-2.110E-09
ToV_{24}	HDD	0	0	0	0	0	0
ToV_{25}	HDD	1.110E-01	-1.142E-05	3.796E-10	-5.110E-02	7.041E-06	-3.243E-10
ToV_{26}	HDD	0	0	0	0	0	0
ToV_{27}	HDD	-1.055E+02	3.558E-02	-2.600E-06	6.674E+01	-2.214E-02	1.609E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	4.114E+01	-1.423E-02	1.095E-06	-1.952E+01	7.151E-03	-5.615E-07
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	1.077E+01	-2.434E-03	9.330E-08	-9.600E+00	2.408E-03	-9.454E-08
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.D.
Coefficient Values for System Type HVAC-4 (Built-up Single Duct – Single Zone)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	3.621	-8.684E-04	5.674E-08	-2.018	4.703E-04	-3.031E-08
ToV_2	HDD	2.255	-5.362E-04	3.480E-08	-8.091E-01	1.850E-04	-1.175E-08
ToV_3	HDD	4.044	-9.642E-04	6.369E-08	-4.103	9.638E-04	-6.329E-08
ToV_4	HDD	1.636	-3.931E-04	2.602E-08	-6.951E-01	1.648E-04	-1.085E-08
ToV_5	HDD	0	0	0	0	0	0
ToV_6	TDD	0	0	0	0	0	0
ToV_7	HDD	-5.100E-01	1.383E-04	-9.527E-09	4.024E-02	-1.226E-05	8.814E-10
ToV_8	HDD	4.486E-02	-9.555E-06	5.563E-10	-4.359E-03	9.014E-07	-5.121E-11
ToV_9	HDD	-8.794E-01	2.285E-04	-1.559E-08	1.697E-01	-5.054E-05	3.605E-09
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	-1.010E-04	-1.546E-08	1.323E-12	3.347E-06	5.214E-10	-4.518E-14
ToV_{12}	HDD	3.497E-01	7.645E-05	3.286E-10	0	0	0
ToV_{13}	CDD	-1.746E-02	4.978E-04	-5.986E-07	1.162E-03	-3.098E-05	3.761E-08
ToV_{14}	CDD	4.533E-03	-9.111E-04	6.524E-07	2.126E-01	-1.466E-03	2.261E-06
ToV_{15}	CDD	-2.157E-03	1.111E-03	-1.850E-06	1.231E-03	-6.342E-04	1.056E-06
ToV_{16}	TDD	-2.081E-01	7.970E-05	-6.027E-09	1.001E-02	4.903E-06	1.164E-09
ToV_{17}	HDD	5.850E-01	-2.102E-04	1.861E-08	-1.011E+00	4.188E-04	-2.897E-08
ToV_{18}	CDD	-4.141E-03	2.010E-04	-3.120E-07	2.951E-03	-1.331E-04	2.071E-07
ToV_{19}	HDD	1.643E-01	-3.981E-05	2.644E-09	-1.058E-02	2.581E-06	-1.723E-10
ToV_{20}	CDD	-2.000E-03	4.048E-05	-5.655E-08	1.734E-04	-2.617E-06	3.424E-09
ToV_{21}	HDD	-2.259E-04	-1.247E-08	1.924E-12	-1.270E-07	1.750E-09	-2.841E-12
ToV_{22}	CDD	3.926E-04	-1.237E-05	1.656E-08	1.255E-07	2.215E-08	-2.757E-11
ToV_{23}	HDD	6.915E-02	2.439E-06	-4.383E-10	-7.812E-03	-2.248E-04	3.357E-07
ToV_{24}	CDD	-4.602E-01	6.888E-03	-1.015E-05	3.684E-01	-5.083E-03	7.492E-06
ToV_{25}	HDD	7.374E-03	1.510E-05	-1.322E-09	2.935E-03	-7.490E-06	6.309E-10
ToV_{26}	CDD	-2.444E-02	7.238E-04	-9.663E-07	8.460E-03	-2.647E-04	3.529E-07
ToV_{27}	HDD	-6.871E+01	2.301E-02	-1.645E-06	4.311E+01	-1.418E-02	1.009E-06
ToV_{28}	CDD	-2.588	2.648E-02	-3.939E-05	1.618	-1.216E-02	1.829E-05
ToV_{29}	HDD	3.432E+01	-1.152E-02	8.760E-07	-1.720E+01	6.014E-03	-4.642E-07
ToV_{30}	CDD	9.650E-01	1.850E-02	-4.427E-05	-7.779E-01	-6.278E-03	2.037E-05
ToV_{31}	HDD	8.335E+01	-2.131E-02	9.241E-07	-8.105E+01	2.100E-02	-9.152E-07
ToV_{32}	CDD	-1.204	1.956E-02	-3.214E-05	8.722E-01	-1.096E-02	2.046E-05

Table 5.3.2.8.E.
Coefficient Values for System Type HVAC-5 (Packaged Variable-Volume)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	1.064	-1.657E-04	7.699E-09	-5.519E-01	8.166E-05	-3.597E-09
ToV_2	HDD	7.067E-01	-1.036E-04	4.424E-09	-2.550E-01	3.324E-05	-1.187E-09
ToV_3	HDD	5.712E-01	-6.057E-05	1.585E-09	-4.974E-01	5.053E-05	-1.178E-09
ToV_4	HDD	2.756E-01	-3.038E-05	8.552E-10	-1.200E-01	1.274E-05	-3.227E-10
ToV_5	HDD	-2.352	7.462E-04	-6.323E-08	2.558	-7.491E-04	5.900E-08
ToV_6	TDD	1.433E-01	2.396E-05	-3.383E-09	8.452E-01	-2.341E-04	1.633E-08
ToV_7	HDD	-7.266E-02	1.421E-05	-7.880E-10	2.508E-03	-6.348E-07	4.032E-11
ToV_8	TDD	1.247E-02	-2.122E-06	1.188E-10	-1.092E-03	1.680E-07	-8.915E-12
ToV_9	HDD	-7.160E-02	9.407E-06	-3.599E-10	4.055E-03	-8.213E-07	4.250E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	7.743E-01	-3.772E-05	7.511E-09	0	0	0
ToV_{13}	CDD	-2.869E-03	4.625E-04	-4.802E-07	2.160E-04	-4.259E-05	4.487E-08
ToV_{14}	CDD	-1.629E-03	-2.096E-02	2.680E-05	-2.687	8.055E-02	-1.050E-04
ToV_{15}	CDD	4.487E-02	1.014E-03	-1.730E-06	-2.987E-02	-5.425E-04	9.406E-07
ToV_{16}	CDD	5.112E-02	-8.787E-04	1.246E-06	1.399E-01	1.522E-04	-3.367E-07
ToV_{17}	HDD	-7.159E-02	2.079E-05	1.411E-09	8.584E-02	-3.018E-05	4.846E-10
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	8.405E-02	-2.198E-05	1.519E-09	-6.172E-03	1.672E-06	-1.155E-10
ToV_{20}	CDD	0	0	0	0	0	0
ToV_{21}	HDD	-1.361E-04	-2.355E-08	1.494E-12	1.831E-07	-5.568E-11	6.314E-15
ToV_{22}	CDD	0	0	0	0	0	0
ToV_{23}	HDD	3.757E-02	8.326E-06	-6.224E-10	-2.159E-02	-4.304E-06	3.204E-10
ToV_{24}	CDD	0	0	0	0	0	0
ToV_{25}	HDD	3.075E-03	1.394E-05	-1.072E-09	2.350E-03	-6.494E-06	5.026E-10
ToV_{26}	CDD	0	0	0	0	0	0
ToV_{27}	HDD	-1.158E+02	4.298E-02	-3.525E-06	7.109E+01	-2.611E-02	2.136E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	8.243E+01	-2.329E-02	1.571E-06	-4.837E+01	1.386E-02	-9.382E-07
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	-1.084E+02	4.162E-02	-3.537E-06	1.076E+02	-4.098E-02	3.484E-06
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.F.
Coefficient Values for System Type HVAC-6 (Packaged Constant-Volume with Reheat)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	1.483E-01	6.315E-05	-4.016E-09	-1.082E-01	-3.629E-05	2.138E-09
ToV_2	HDD	8.323E-02	3.714E-05	-2.385E-09	-3.585E-02	-1.275E-05	7.567E-10
ToV_3	HDD	-8.690E-02	1.757E-04	-1.310E-08	1.276E-01	-2.842E-04	2.106E-08
ToV_4	HDD	-2.111E-02	4.507E-05	-3.375E-09	7.907E-03	-1.937E-05	1.441E-09
ToV_5	HDD	-6.007	1.794E-03	-1.433E-07	4.309	-1.209E-03	9.720E-08
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-3.253E-03	-6.307E-06	4.677E-10	-1.913E-04	3.695E-07	-3.223E-11
ToV_8	CDD	-4.930E-05	1.669E-07	3.253E-10	1.183E-05	-3.454E-08	-2.053E-11
ToV_9	TDD	1.045E-02	-1.475E-05	1.079E-09	8.945E-05	6.322E-07	-5.178E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	1.730E-01	4.688E-05	1.476E-10	0	0	0
ToV_{13}	CDD	3.902E-02	-2.666E-05	1.100E-07	-3.679E-03	2.764E-06	-1.026E-08
ToV_{14}	CDD	-3.404E-01	-2.601E-03	2.375E-06	-3.802E-01	7.796E-03	-7.608E-06
ToV_{15}	TDD	6.290E-02	-1.284E-05	8.209E-10	8.475E-02	-2.106E-05	1.634E-09
ToV_{16}	CDD	-1.528E-01	1.748E-04	-1.592E-07	1.856E-01	-2.105E-04	1.908E-07
ToV_{17}	HDD	1.174E-02	2.316E-06	-1.882E-10	-7.262E-03	-2.832E-06	2.423E-10
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	8.883E-05	4.331E-07	-2.476E-11	-1.442E-04	4.481E-08	-4.675E-12
ToV_{20}	HDD	0	0	0	0	0	0
ToV_{21}	HDD	-1.484E-05	-2.189E-08	1.455E-12	-1.692E-07	8.482E-11	-6.909E-15
ToV_{22}	HDD	0	0	0	0	0	0
ToV_{23}	HDD	8.955E-03	4.263E-06	-2.527E-10	-4.675E-03	-2.454E-06	1.485E-10
ToV_{24}	HDD	0	0	0	0	0	0
ToV_{25}	HDD	3.057E-03	4.545E-06	-3.391E-10	-2.082E-04	-2.114E-06	1.672E-10
ToV_{26}	HDD	0	0	0	0	0	0
ToV_{27}	HDD	1.385E+03	-5.045E-01	4.093E-05	-8.758E+02	3.193E-01	-2.591E-05
ToV_{28}	HDD	0	0	0	0	0	0
ToV_{29}	HDD	-1.938E+01	5.662E-03	-4.365E-07	1.198E+01	-3.435E-03	2.637E-07
ToV_{30}	HDD	0	0	0	0	0	0
ToV_{31}	HDD	-9.513E+01	3.982E-02	-3.671E-06	9.504E+01	-3.944E-02	3.642E-06
ToV_{32}	HDD	0	0	0	0	0	0

Table 5.3.2.8.G.
Coefficient Values for System Type HVAC-7 (Built-up Ceiling Bypass VAV)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	8.222E-01	2.970E-05	-5.090E-09	-3.731E-01	-2.864E-05	3.222E-09
ToV_2	TDD	5.342E-01	3.149E-05	-4.232E-09	-1.722E-01	-1.711E-05	1.756E-09
ToV_3	TDD	6.343E-01	3.856E-05	-5.443E-09	-5.555E-01	-2.894E-05	4.257E-09
ToV_4	HDD	3.124E-01	1.396E-05	-2.300E-09	-1.306E-01	-7.279E-06	1.052E-09
ToV_5	HDD	-2.547	9.705E-04	-8.080E-08	2.121	-7.253E-04	5.847E-08
ToV_6	TDD	1.149E-01	1.091E-07	-5.699E-10	-1.570E-01	3.999E-06	3.915E-10
ToV_7	HDD	-9.819E-02	8.394E-06	-1.297E-10	5.537E-03	-8.423E-07	3.090E-11
ToV_8	HDD	-1.286E-04	8.970E-08	-7.675E-12	0	0	0
ToV_9	TDD	-1.047E-01	-4.125E-07	5.928E-10	1.465E-02	-1.711E-06	3.232E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	1.720E-01	7.896E-05	-4.458E-10	0	0	0
ToV_{13}	CDD	-3.661E-03	2.696E-04	-2.928E-07	1.855E-04	-1.653E-05	1.806E-08
ToV_{14}	CDD	6.104E-02	-1.381E-03	1.432E-06	3.051E-01	-2.621E-03	3.185E-06
ToV_{15}	CDD	6.455E-02	-1.863E-04	1.893E-07	-5.147E-02	2.516E-04	-3.084E-07
ToV_{16}	TDD	-1.041E-01	-1.321E-04	6.305E-09	8.402E-02	1.923E-04	-1.058E-08
ToV_{17}	TDD	9.872E-03	-5.204E-06	8.383E-10	0	0	0
ToV_{18}	CDD	-1.227E-02	3.578E-05	-4.900E-08	1.490E-02	4.668E-07	-1.280E-11
ToV_{19}	HDD	3.567E-02	-7.431E-06	4.886E-10	-2.462E-03	5.283E-07	-3.486E-11
ToV_{20}	CDD	2.557E-04	2.142E-06	-3.296E-09	-1.958E-05	-5.894E-08	8.578E-11
ToV_{21}	HDD	-6.359E-05	-1.595E-08	4.112E-13	-1.533E-09	1.158E-11	4.539E-16
ToV_{22}	CDD	1.202E-05	-8.257E-07	9.051E-10	1.080E-07	-1.304E-09	2.330E-12
ToV_{23}	HDD	5.890E-03	9.099E-06	-4.693E-10	2.546E-04	-6.274E-06	3.557E-10
ToV_{24}	CDD	-9.148E-03	2.180E-04	-2.458E-07	6.389E-03	-1.291E-04	1.437E-07
ToV_{25}	HDD	2.066E-02	1.270E-07	1.773E-10	-9.436E-03	6.197E-07	-1.237E-10
ToV_{26}	CDD	-3.632E-03	1.084E-04	-1.162E-07	1.642E-03	-4.079E-05	4.186E-08
ToV_{27}	HDD	-2.881E+02	1.070E-01	-8.829E-06	1.783E+02	-6.597E-02	5.442E-06
ToV_{28}	CDD	3.344E+02	-4.381E-03	-1.223E-03	-2.077E+02	3.396E-03	7.606E-04
ToV_{29}	HDD	3.007E+01	-5.373E-03	2.208E-07	-1.745E+01	3.160E-03	-1.280E-07
ToV_{30}	CDD	-1.454E+01	9.178E-02	-1.156E-04	9.240	-5.436E-02	6.821E-05
ToV_{31}	HDD	-4.732E+01	1.939E-02	-1.737E-06	4.740E+01	-1.911E-02	1.718E-06
ToV_{32}	CDD	4.854E-03	-1.145E-04	1.399E-07	-3.860E-03	1.366E-04	-1.623E-07

Table 5.3.2.8.H.
Coefficient Values for System Type HVAC-8 (Packaged Ceiling Bypass VAV)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	7.978E-01	4.992E-05	-7.594E-09	-4.467E-01	-5.052E-05	5.976E-09
ToV_2	HDD	4.700E-01	2.262E-05	-3.824E-09	-1.594E-01	-1.330E-05	1.682E-09
ToV_3	HDD	6.557E-01	6.146E-05	-7.406E-09	-8.491E-01	-8.100E-05	9.510E-09
ToV_4	HDD	2.031E-01	2.343E-05	-2.677E-09	-8.446E-02	-1.153E-05	1.246E-09
ToV_5	CDD	-7.431E-01	2.331E-03	-1.372E-06	4.944E-01	-6.858E-04	-3.577E-07
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-9.519E-02	6.127E-06	3.865E-11	7.321E-03	-1.288E-06	6.466E-11
ToV_8	TDD	-7.990E-04	1.169E-06	-9.829E-11	1.483E-04	-1.475E-07	1.260E-11
ToV_9	TDD	-8.558E-02	-4.754E-06	8.003E-10	1.698E-02	-2.317E-06	9.504E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	2.633E-01	4.700E-05	1.555E-09	0	0	0
ToV_{13}	CDD	3.961E-03	2.519E-04	-2.235E-07	-4.352E-04	-2.316E-05	2.089E-08
ToV_{14}	CDD	-2.163E-01	-1.052E-02	1.220E-05	-2.095	3.757E-02	-4.358E-05
ToV_{15}	CDD	5.483E-02	3.584E-04	-6.336E-07	-3.501E-02	-1.730E-04	3.204E-07
ToV_{16}	TDD	-8.945E-02	6.825E-06	2.078E-10	5.717E-02	5.296E-06	1.004E-10
ToV_{17}	TDD	2.380E-02	-1.433E-05	2.433E-09	0	0	0
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	TDD	1.217E-02	-1.745E-06	1.151E-10	-6.141E-04	1.548E-07	-1.329E-11
ToV_{20}	CDD	0	0	0	0	0	0
ToV_{21}	HDD	-2.311E-04	5.267E-09	9.226E-14	-7.186E-08	1.159E-10	-1.097E-14
ToV_{22}	CDD	0	0	0	0	0	0
ToV_{23}	HDD	5.858E-02	-8.969E-07	-4.966E-12	-2.805E-02	-9.674E-07	1.137E-10
ToV_{24}	CDD	0	0	0	0	0	0
ToV_{25}	HDD	3.873E-02	9.323E-07	-2.054E-10	-1.135E-02	-1.519E-06	1.798E-10
ToV_{26}	CDD	0	0	0	0	0	0
ToV_{27}	HDD	-2.355E+02	8.467E-02	-6.679E-06	1.456E+02	-5.205E-02	4.099E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	-6.889E+01	2.207E-02	-1.651E-06	4.353E+01	-1.373E-02	1.022E-06
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	1.240E+01	1.805E-03	-6.965E-07	-1.091E+01	-1.894E-03	6.953E-07
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.I.
Coefficient Values for System Type HVAC-9 (Powered Induction Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	4.878E-01	8.605E-05	-9.450E-09	-2.268E-01	-5.398E-05	5.460E-09
ToV_2	HDD	3.157E-01	8.448E-05	-8.668E-09	-9.729E-02	-4.517E-05	4.261E-09
ToV_3	HDD	2.322E-01	1.308E-04	-1.146E-08	-2.417E-01	-1.511E-04	1.313E-08
ToV_4	HDD	8.689E-02	4.960E-05	-4.335E-09	-3.601E-02	-2.282E-05	1.975E-09
ToV_5	CDD	-3.064E-01	-4.662E-03	1.180E-05	1.933E-01	5.848E-03	-1.182E-05
ToV_6	HDD	-2.953E-01	1.095E-04	-6.389E-09	8.592E-01	-3.929E-05	-1.292E-09
ToV_7	TDD	-2.936E-02	-7.923E-07	2.590E-10	1.041E-03	-1.360E-07	4.068E-12
ToV_8	TDD	2.129E-02	-1.533E-06	2.355E-12	-2.373E-03	2.522E-07	-8.702E-12
ToV_9	TDD	-1.978E-02	-5.433E-06	5.152E-10	2.190E-03	-4.865E-07	2.863E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	2.761E-01	1.127E-04	-1.736E-09	0	0	0
ToV_{13}	CDD	-1.750E-03	3.500E-04	-3.827E-07	5.604E-05	-2.131E-05	2.346E-08
ToV_{14}	CDD	3.063E-02	-1.257E-03	1.096E-06	3.085E-01	-2.488E-03	3.154E-06
ToV_{15}	CDD	9.516E-02	2.924E-04	-5.892E-07	-6.393E-02	-8.288E-05	2.237E-07
ToV_{16}	TDD	-8.388E-01	7.779E-05	-2.999E-09	1.033	-1.105E-04	5.565E-09
ToV_{17}	HDD	1.807E-02	-1.101E-05	1.750E-09	9.586E-04	3.111E-06	-8.355E-10
ToV_{18}	CDD	-2.240E-02	9.584E-05	-1.352E-07	3.381E-02	-3.851E-05	4.871E-08
ToV_{19}	HDD	1.368E-02	-8.411E-07	4.565E-11	-7.932E-04	4.714E-08	-2.600E-12
ToV_{20}	CDD	-1.070E-04	4.842E-06	-7.190E-09	1.271E-05	-3.051E-07	4.540E-10
ToV_{21}	HDD	-7.004E-05	5.477E-09	-4.724E-13	3.038E-08	-9.813E-12	8.149E-16
ToV_{22}	CDD	3.615E-06	-1.459E-06	1.757E-09	3.828E-07	-2.245E-09	2.668E-12
ToV_{23}	HDD	2.578E-02	-3.253E-06	2.617E-10	-1.576E-02	2.348E-06	-1.875E-10
ToV_{24}	CDD	-1.006E-02	3.686E-04	-4.597E-07	5.788E-03	-2.090E-04	2.642E-07
ToV_{25}	HDD	2.437E-02	-6.063E-06	5.751E-10	-1.177E-02	3.482E-06	-3.292E-10
ToV_{26}	CDD	-1.357E-02	2.666E-04	-3.351E-07	7.350E-03	-1.162E-04	1.484E-07
ToV_{27}	HDD	-6.079E+01	2.953E-02	-2.465E-06	3.761E+01	-1.808E-02	1.506E-06
ToV_{28}	CDD	-3.864E+01	2.682E-01	-4.121E-04	2.488E+01	-1.705E-01	2.618E-04
ToV_{29}	HDD	5.019E+01	-8.801E-03	5.117E-07	-2.997E+01	5.283E-03	-3.074E-07
ToV_{30}	CDD	-6.583	3.866E-02	-4.167E-05	4.332	-2.124E-02	2.177E-05
ToV_{31}	HDD	2.089E+02	-4.504E-02	8.176E-07	-2.071E+02	4.484E-02	-8.101E-07
ToV_{32}	CDD	-3.344E-03	-1.105E-04	1.367E-07	4.399E-03	1.567E-04	-1.893E-07

Table 5.3.2.8.J.
Coefficient Values for System Type HVAC-10 (Built-up Multi-zone System)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	1.870E-02	5.182E-05	-3.479E-09	-9.328E-03	-2.816E-05	1.878E-09
ToV_2	HDD	1.318E-02	3.655E-05	-2.508E-09	-4.070E-03	-1.470E-05	1.018E-09
ToV_3	HDD	-6.491E-02	7.977E-05	-4.725E-09	5.448E-02	-6.943E-05	4.108E-09
ToV_4	HDD	-3.089E-02	3.776E-05	-2.239E-09	1.293E-02	-1.638E-05	9.713E-10
ToV_5	HDD	-2.159E-01	2.962E-04	-3.925E-08	1.697E-01	-1.789E-04	2.531E-08
ToV_6	HDD	3.339E-03	4.953E-06	-3.376E-10	-4.294E-03	-6.408E-06	4.370E-10
ToV_7	TDD	-5.965E-04	-2.807E-06	1.910E-10	9.063E-06	6.843E-08	-5.665E-12
ToV_8	HDD	1.067E-04	-1.315E-06	2.710E-09	-9.235E-06	1.328E-07	-2.710E-10
ToV_9	TDD	1.152E-02	-9.837E-06	5.540E-10	-1.678E-03	9.237E-07	-6.323E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	9.748E-02	5.979E-05	-1.349E-09	0	0	0
ToV_{13}	CDD	3.195E-03	2.676E-05	-1.564E-08	-2.055E-04	-1.690E-06	1.003E-09
ToV_{14}	CDD	-2.229E-03	-1.674E-04	1.094E-07	-3.062E-02	-9.381E-05	2.644E-07
ToV_{15}	CDD	-1.250E+00	-8.957E-04	2.820E-06	1.439E+00	1.315E-03	-3.711E-06
ToV_{16}	CDD	6.453E+01	-1.167E-01	-1.494E-04	-3.819E+01	6.865E-02	9.339E-05
ToV_{17}	TDD	3.507E-02	-6.682E-06	5.376E-10	-3.642E-02	7.064E-06	-5.906E-10
ToV_{18}	CDD	-4.530E-03	1.820E-05	-2.474E-08	7.022E-03	-1.703E-05	2.299E-08
ToV_{19}	HDD	2.922E-04	2.348E-07	-8.663E-12	-2.737E-05	-1.120E-08	2.688E-13
ToV_{20}	CDD	3.675E-05	1.232E-06	-1.501E-09	-1.312E-06	-7.084E-08	8.680E-11
ToV_{21}	HDD	-6.470E-06	-9.404E-09	5.587E-13	-2.383E-08	9.670E-12	-7.386E-16
ToV_{22}	CDD	-1.758E-05	-3.812E-08	-1.095E-11	1.247E-07	-7.219E-10	1.020E-12
ToV_{23}	HDD	3.116E-03	2.395E-06	-1.294E-10	-1.761E-03	-1.304E-06	6.853E-11
ToV_{24}	CDD	-1.244E-03	4.225E-05	-4.898E-08	1.440E-03	-2.956E-05	3.664E-08
ToV_{25}	HDD	3.620E-04	2.451E-06	-1.692E-10	1.288E-04	-1.050E-06	7.637E-11
ToV_{26}	CDD	4.739E-04	9.260E-06	-1.756E-09	-9.103E-05	-3.023E-06	-6.868E-10
ToV_{27}	HDD	-1.317E+02	4.993E-02	-4.193E-06	8.120E+01	-3.054E-02	2.565E-06
ToV_{28}	CDD	3.249E+02	-2.072	2.792E-03	-1.991E+02	1.274	-1.716E-03
ToV_{29}	HDD	4.628E+02	-8.723E-02	-4.083E-07	-2.892E+02	5.471E-02	2.399E-07
ToV_{30}	CDD	-1.235E+02	6.502E-01	-7.212E-04	7.764E+01	-4.055E-01	4.499E-04
ToV_{31}	HDD	-4.936E+02	2.326E-01	-2.369E-05	3.083E+02	-1.450E-01	1.478E-05
ToV_{32}	CDD	1.718E+02	-2.283	4.335E-03	-1.071E+02	1.427	-2.709E-03

Table 5.3.2.8.K.
Coefficient Values for System Type HVAC-11 (Packaged Multi-zone System)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, TOV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	-8.081E-02	1.145E-04	-7.763E-09	5.649E-02	-7.703E-05	5.235E-09
ToV_2	HDD	-2.260E-02	5.837E-05	-3.930E-09	3.936E-03	-2.140E-05	1.428E-09
ToV_3	HDD	-6.772E-02	1.062E-04	-6.975E-09	8.699E-02	-1.403E-04	9.218E-09
ToV_4	HDD	-1.372E-02	3.116E-05	-2.015E-09	3.906E-03	-1.303E-05	8.341E-10
ToV_5	HDD	-2.050	9.159E-04	-7.327E-08	1.445	-6.064E-04	4.908E-08
ToV_6	HDD	-9.075E-03	1.035E-05	-7.250E-10	1.137E-02	-1.324E-05	9.254E-10
ToV_7	HDD	3.741E-03	-6.231E-06	4.283E-10	-4.174E-05	1.408E-07	-1.054E-11
ToV_8	HDD	-7.059E-04	4.144E-07	-3.425E-11	0	0	0
ToV_9	HDD	6.722E-03	-1.054E-05	6.836E-10	-4.034E-04	4.882E-07	-2.968E-11
ToV_{10}	HDD	3.528E-05	8.906E-09	-3.073E-13	-5.241E-07	-1.206E-10	3.838E-15
ToV_{11}	HDD	8.406E-05	2.253E-08	-7.955E-13	-1.306E-06	-3.401E-10	1.174E-14
ToV_{12}	HDD	1.411E-01	4.567E-05	-2.464E-10	0	0	0
ToV_{13}	CDD	2.818E-02	-4.650E-05	1.111E-07	-2.650E-03	4.457E-06	-1.034E-08
ToV_{14}	CDD	-2.215E-01	-1.402E-03	1.061E-06	-1.837E-01	4.989E-03	-4.405E-06
ToV_{15}	CDD	6.548E-02	1.643E-05	-8.414E-08	-3.758E-02	-7.632E-06	4.567E-08
ToV_{16}	TDD	-1.542E-01	1.247E-05	-2.139E-09	1.675E-01	-6.771E-06	1.964E-09
ToV_{17}	TDD	3.507E-02	-6.682E-06	5.376E-10	-3.642E-02	7.064E-06	-5.906E-10
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	2.292E-05	3.717E-07	-2.021E-11	-1.128E-05	-1.907E-08	9.329E-13
ToV_{20}	CDD	0	0	0	0	0	0
ToV_{21}	HDD	-4.578E-05	-9.532E-09	2.583E-13	1.133E-08	2.020E-12	-1.046E-16
ToV_{22}	CDD	0	0	0	0	0	0
ToV_{23}	HDD	1.224E-02	3.339E-06	-1.153E-10	-6.440E-03	-1.982E-06	7.467E-11
ToV_{24}	CDD	0	0	0	0	0	0
ToV_{25}	HDD	8.224E-03	2.288E-06	-7.793E-11	-2.870E-03	-9.395E-07	3.513E-11
ToV_{26}	CDD	0	0	0	0	0	0
ToV_{27}	HDD	-1.256E+02	4.782E-02	-4.032E-06	7.741E+01	-2.923E-02	2.465E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	-3.454E+00	3.051E-03	-2.827E-07	2.149E+00	-1.878E-03	1.744E-07
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	-1.945E+02	7.474E-02	-6.383E-06	1.942E+02	-7.429E-02	6.350E-06
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.L.
Coefficient Values for System Type HVAC-12 (Constant-Volume Dual-Duct System)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	2.809E-02	4.947E-05	-3.240E-09	-1.353E-02	-2.722E-05	1.771E-09
ToV_2	HDD	1.976E-02	3.494E-05	-2.365E-09	-6.625E-03	-1.408E-05	9.670E-10
ToV_3	HDD	-5.901E-02	7.798E-05	-4.536E-09	4.938E-02	-6.781E-05	3.933E-09
ToV_4	HDD	-2.538E-02	3.588E-05	-2.039E-09	9.987E-03	-1.536E-05	8.635E-10
ToV_5	HDD	-1.737	7.545E-04	-6.075E-08	1.225	-5.003E-04	4.080E-08
ToV_6	HDD	3.985E-03	4.840E-06	-3.239E-10	-5.190E-03	-6.227E-06	4.146E-10
ToV_7	TDD	-2.620E-03	-2.145E-06	1.408E-10	1.699E-04	7.837E-09	-1.105E-12
ToV_8	CDD	1.310E-04	-1.475E-06	3.572E-09	-1.674E-05	1.966E-07	-4.395E-10
ToV_9	TDD	1.097E-02	-9.728E-06	5.477E-10	-1.819E-03	9.951E-07	-7.320E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	1.062E-01	5.704E-05	-1.104E-09	0	0	0
ToV_{13}	CDD	3.592E-03	2.438E-05	-1.195E-08	-2.345E-04	-1.512E-06	7.277E-10
ToV_{14}	CDD	6.876E-05	-1.946E-04	1.508E-07	-1.134E-01	6.869E-04	-1.018E-06
ToV_{15}	CDD	3.957E-02	2.210E-05	-8.250E-08	-2.293E-02	-9.824E-06	4.344E-08
ToV_{16}	HDD	9.318E-02	-1.681E-04	9.694E-09	-1.135E-01	2.049E-04	-1.181E-08
ToV_{17}	HDD	9.610E-03	-1.529E-06	1.281E-10	-8.286E-03	1.647E-06	-1.267E-10
ToV_{18}	CDD	-4.517E-03	1.786E-05	-2.349E-08	7.266E-03	-1.787E-05	2.295E-08
ToV_{19}	TDD	3.147E-04	1.872E-07	-3.771E-12	-3.055E-05	-8.975E-09	4.496E-14
ToV_{20}	CDD	2.795E-04	-3.483E-07	7.617E-10	-2.697E-05	9.402E-08	-1.490E-10
ToV_{21}	HDD	-4.301E-06	-1.029E-08	6.312E-13	-6.910E-09	3.755E-12	-2.860E-16
ToV_{22}	CDD	-1.092E-05	-7.944E-08	5.173E-11	3.597E-08	-1.692E-10	1.540E-13
ToV_{23}	HDD	1.283E-03	3.122E-06	-1.893E-10	-5.780E-04	-1.780E-06	1.081E-10
ToV_{24}	CDD	1.052E-03	1.995E-05	-9.561E-09	-5.530E-04	-1.066E-05	3.427E-09
ToV_{25}	HDD	4.445E-03	7.875E-07	-1.631E-11	-2.372E-03	-3.689E-08	-1.591E-11
ToV_{26}	CDD	1.807E-03	8.597E-06	-6.999E-09	-8.637E-04	-2.452E-06	2.072E-09
ToV_{27}	HDD	-1.354E+02	5.131E-02	-4.308E-06	8.357E+01	-3.143E-02	2.638E-06
ToV_{28}	CDD	4.180E+02	-2.603	3.439E-03	-2.569E+02	1.604	-2.119E-03
ToV_{29}	HDD	4.225E+00	-3.157E-04	4.577E-08	-2.629E+00	2.120E-04	-2.962E-08
ToV_{30}	CDD	7.948E-01	-5.590E-04	5.846E-07	-1.013E-01	6.233E-05	-5.891E-08
ToV_{31}	HDD	-3.723E+02	1.688E-01	-1.670E-05	3.717E+02	-1.682E-01	1.666E-05
ToV_{32}	CDD	-3.193E+02	1.818	-2.205E-03	3.194E+02	-1.814	2.201E-03

Table 5.3.2.8.M.
Coefficient Values for System Type HVAC-13 (Variable-Volume Dual-Duct System)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	1.150	-1.349E-04	5.613E-09	-6.091E-01	7.052E-05	-2.971E-09
ToV_2	HDD	7.295E-01	-6.905E-05	2.049E-09	-2.563E-01	1.806E-05	-1.901E-10
ToV_3	HDD	7.210E-01	2.285E-05	-5.507E-09	-6.124E-01	-2.668E-05	5.266E-09
ToV_4	HDD	3.238E-01	1.837E-05	-3.238E-09	-1.340E-01	-1.082E-05	1.618E-09
ToV_5	HDD	7.510E+00	-2.359E-03	1.699E-07	-4.192E+00	1.484E-03	-1.136E-07
ToV_6	HDD	9.410E-01	-1.270E-04	6.012E-09	-5.640E-01	7.085E-05	-3.167E-09
ToV_7	HDD	-7.759E-02	1.115E-05	-5.072E-10	2.628E-03	-4.826E-07	2.365E-11
ToV_8	TDD	-3.155E-02	1.431E-05	-1.095E-09	4.020E-03	-1.767E-06	1.342E-10
ToV_9	HDD	-9.937E-02	7.158E-07	4.788E-10	8.736E-03	-9.093E-07	1.869E-11
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	8.284E-01	-5.213E-05	9.213E-09	0	0	0
ToV_{13}	CDD	1.696E-03	2.908E-04	-2.540E-07	-1.657E-04	-1.771E-05	1.563E-08
ToV_{14}	CDD	-8.460E-03	-1.128E-03	6.762E-07	-3.587E-01	4.060E-03	-6.259E-06
ToV_{15}	CDD	-6.417E-03	1.668E-03	-2.781E-06	4.545E-03	-9.585E-04	1.600E-06
ToV_{16}	HDD	-1.524	2.954E-04	-2.237E-08	1.820	-3.447E-04	2.654E-08
ToV_{17}	TDD	-2.038E+00	9.356E-04	-9.906E-08	3.238E+00	-1.528E-03	1.700E-07
ToV_{18}	CDD	-1.330E-02	9.797E-05	-1.492E-07	2.668E-02	-1.073E-04	1.667E-07
ToV_{19}	HDD	4.429E-02	-7.023E-06	3.575E-10	-2.539E-03	3.757E-07	-1.791E-11
ToV_{20}	CDD	1.954E-03	-4.897E-07	3.155E-11	-4.789E-05	3.395E-07	-6.082E-10
ToV_{21}	HDD	-2.307E-04	2.027E-08	-1.864E-12	-2.199E-07	6.267E-11	-3.779E-15
ToV_{22}	CDD	4.098E-05	-1.385E-06	1.331E-09	-1.849E-07	1.014E-10	1.444E-12
ToV_{23}	HDD	8.535E-02	-1.962E-04	2.793E-07	-4.893E-02	1.166E-04	-1.649E-07
ToV_{24}	CDD	1.303E-02	1.150E-04	-5.115E-08	-1.121E-02	-2.567E-05	-2.806E-08
ToV_{25}	HDD	8.580E-02	-1.641E-05	1.291E-09	-3.808E-02	8.084E-06	-6.307E-10
ToV_{26}	CDD	-1.880E-03	1.394E-04	-1.139E-07	2.914E-04	-4.640E-05	2.981E-08
ToV_{27}	HDD	-2.537E+03	9.475E-01	-7.891E-05	1.585E+03	-5.918E-01	4.929E-05
ToV_{28}	CDD	1.945E+02	-1.393	2.039E-03	-1.179E+02	8.490E-01	-1.244E-03
ToV_{29}	HDD	1.803E+01	-8.304E-03	8.669E-07	-9.045	4.715E-03	-5.133E-07
ToV_{30}	CDD	-8.741	3.161E-02	-1.009E-05	5.679	-1.736E-02	3.308E-06
ToV_{31}	HDD	-1.598E+02	5.006E-02	-3.270E-06	1.595E+02	-4.965E-02	3.246E-06
ToV_{32}	CDD	-2.043E+01	6.136E-02	-2.551E-06	2.020E+01	-5.591E-02	-2.242E-06

Table 5.3.2.8.N.
Coefficient Values for System Type HVAC-14 (Two-Pipe Fan Coil with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	6.073	-1.501E-03	9.844E-08	-2.904	6.869E-04	-4.398E-08
ToV_2	HDD	4.094	-9.937E-04	6.450E-08	-1.374	3.126E-04	-1.954E-08
ToV_3	HDD	9.735E-01	-2.641E-04	1.832E-08	-8.611E-01	2.325E-04	-1.598E-08
ToV_4	HDD	4.915E-01	-1.382E-04	9.683E-09	-2.164E-01	6.042E-05	-4.153E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-1.235	3.546E-04	-2.507E-08	1.266E-01	-3.991E-05	2.941E-09
ToV_8	CDD	-1.584E-03	3.860E-05	-5.840E-08	2.247E-04	-3.992E-06	5.934E-09
ToV_9	TDD	-1.676E-01	4.289E-05	-2.869E-09	0	0	0
ToV_{10}	HDD	2.737E-03	-3.171E-07	1.047E-11	-4.746E-05	6.008E-09	-2.252E-13
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	3.352E-01	1.833E-04	-9.068E-09	0	0	0
ToV_{13}	CDD	-1.620E-02	7.191E-04	-9.036E-07	1.032E-03	-4.463E-05	5.637E-08
ToV_{14}	CDD	-2.573E-02	-7.202E-04	6.714E-10	2.072	-1.609E-02	2.370E-05
ToV_{15}	CDD	-4.588E-03	5.339E-04	-8.672E-07	5.023E-03	-3.266E-04	5.278E-07
ToV_{16}	TDD	-4.168E+00	1.747E-03	-1.338E-07	3.097E+00	-1.345E-03	1.291E-07
ToV_{17}	TDD	1.691E-01	-1.552E-05	-8.251E-10	-5.117E-01	2.164E-04	-1.557E-08
ToV_{18}	CDD	-1.187E-03	5.354E-05	-7.073E-08	7.859E-04	-3.544E-05	4.681E-08
ToV_{19}	HDD	0	0	0	0	0	0
ToV_{20}	TDD	8.153E-02	-2.155E-05	1.463E-09	-4.378E-03	1.219E-06	-8.655E-11
ToV_{21}	HDD	-1.330E-03	2.957E-07	-1.960E-11	6.444E-07	-1.963E-10	1.538E-14
ToV_{22}	TDD	-1.205E-03	2.469E-07	-1.529E-11	0	0	0
ToV_{23}	HDD	3.914E-01	-8.600E-05	5.643E-09	-2.209E-01	4.891E-05	-3.218E-09
ToV_{24}	TDD	3.847E-01	-8.117E-05	5.141E-09	-2.146E-01	4.885E-05	-3.298E-09
ToV_{25}	HDD	2.990E-01	-7.189E-05	4.963E-09	-1.221E-01	3.014E-05	-2.106E-09
ToV_{26}	TDD	3.165E-01	-7.263E-05	4.790E-09	-1.221E-01	3.014E-05	-2.106E-09
ToV_{27}	HDD	0	0	0	0	0	0
ToV_{28}	HDD	4.217E+02	-1.530E-01	1.238E-05	-2.616E+02	9.528E-02	-7.722E-06
ToV_{29}	HDD	0	0	0	0	0	0
ToV_{30}	HDD	3.152E+02	-1.115E-01	8.772E-06	-1.919E+02	6.822E-02	-5.375E-06
ToV_{31}	HDD	0	0	0	0	0	0
ToV_{32}	HDD	8.098E+00	-4.308E-03	5.082E-07	-4.620E+00	3.504E-03	-4.522E-07

Table 5.3.2.8.O.
Coefficient Values for System Type HVAC-15 (Four-Pipe Fan Coil with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	2.074	-4.534E-04	2.768E-08	-1.173	2.554E-04	-1.554E-08
ToV_2	HDD	1.062	-1.269E-04	1.933E-09	-3.312E-01	2.471E-06	3.643E-09
ToV_3	HDD	3.527E-01	-9.250E-05	6.381E-09	-3.250E-01	8.189E-05	-5.438E-09
ToV_4	HDD	1.909E-01	-4.275E-05	2.817E-09	-8.581E-02	1.933E-05	-1.283E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-1.579E-01	3.406E-05	-2.080E-09	-3.380E-03	4.886E-07	1.164E-12
ToV_8	CDD	1.514E-03	3.564E-05	-6.032E-08	-2.103E-04	-3.240E-06	5.650E-09
ToV_9	TDD	-6.588E-02	1.267E-05	-7.320E-10	-6.860E-04	7.036E-07	-6.757E-11
ToV_{10}	HDD	9.073E-04	-9.233E-08	5.477E-12	-1.202E-05	1.001E-09	-5.598E-14
ToV_{11}	HDD	5.464E-04	-7.905E-08	4.948E-12	-7.667E-06	1.003E-09	-5.960E-14
ToV_{12}	HDD	4.078E-01	1.027E-04	-4.119E-09	0	0	0
ToV_{13}	CDD	-4.235E-03	3.061E-04	-3.480E-07	2.635E-04	-1.912E-05	2.187E-08
ToV_{14}	CDD	1.901E-02	-1.099E-03	1.079E-06	-6.409E-01	2.574E-03	-2.956E-06
ToV_{15}	CDD	-7.610E-03	2.752E-04	-4.789E-07	5.236E-03	-1.645E-04	2.842E-07
ToV_{16}	TDD	-5.439E+00	2.454E-03	-1.873E-07	2.040E+01	-9.429E-03	8.332E-07
ToV_{17}	HDD	-5.228E-02	1.668E-05	-1.969E-09	-9.866E-02	7.655E-05	-5.376E-09
ToV_{18}	CDD	1.356E-02	4.980E-04	-7.950E-07	-1.164E-02	-2.318E-04	3.821E-07
ToV_{19}	HDD	1.449E-02	9.114E-07	-1.738E-10	2.242E-03	-5.849E-07	3.882E-11
ToV_{20}	CDD	2.311E-03	-1.543E-05	2.387E-08	-1.850E-04	1.391E-06	-2.154E-09
ToV_{21}	HDD	-1.176E-03	2.586E-07	-1.774E-11	3.923E-06	-1.152E-09	8.234E-14
ToV_{22}	CDD	3.691E-05	-1.502E-06	2.031E-09	-9.582E-08	3.256E-10	-3.339E-13
ToV_{23}	HDD	1.912E-01	-3.365E-05	2.378E-09	-9.545E-02	1.605E-05	-1.163E-09
ToV_{24}	CDD	-6.448E-03	3.547E-04	-5.053E-07	3.848E-03	-2.110E-04	3.053E-07
ToV_{25}	HDD	1.419E-01	-1.923E-05	1.115E-09	-4.868E-02	5.684E-06	-3.047E-10
ToV_{26}	CDD	1.335E-02	3.334E-05	-3.139E-08	-8.041E-03	9.821E-06	-2.012E-08
ToV_{27}	HDD	-6.304E+01	2.142E-02	-1.560E-06	3.931E+01	-1.311E-02	9.505E-07
ToV_{28}	CDD	5.747	-6.462E-02	1.196E-04	-3.442	4.434E-02	-8.073E-05
ToV_{29}	HDD	-3.873E+01	1.350E-02	-1.004E-06	2.438E+01	-8.230E-03	6.070E-07
ToV_{30}	CDD	1.976	-1.306E-02	2.907E-05	-1.196	1.270E-02	-2.498E-05
ToV_{31}	HDD	7.866E+00	-2.360E-03	1.783E-07	-5.550E+00	1.952E-03	-1.518E-07
ToV_{32}	CDD	6.765	-1.130E-02	-1.092E-05	-6.879	1.875E-02	7.273E-07

Table 5.3.2.8.P.
Coefficient Values for System Type HVAC-16 (Three-Pipe Fan Coil with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	2.074	-4.534E-04	2.768E-08	-1.173	2.554E-04	-1.554E-08
ToV_2	HDD	1.062	-1.269E-04	1.933E-09	-3.312E-01	2.471E-06	3.643E-09
ToV_3	HDD	3.527E-01	-9.250E-05	6.381E-09	-3.250E-01	8.189E-05	-5.438E-09
ToV_4	HDD	1.909E-01	-4.275E-05	2.817E-09	-8.581E-02	1.933E-05	-1.283E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-1.579E-01	3.406E-05	-2.080E-09	-3.380E-03	4.886E-07	1.164E-12
ToV_8	CDD	1.514E-03	3.564E-05	-6.032E-08	-2.103E-04	-3.240E-06	5.650E-09
ToV_9	TDD	-6.588E-02	1.267E-05	-7.320E-10	-6.860E-04	7.036E-07	-6.757E-11
ToV_{10}	HDD	9.073E-04	-9.233E-08	5.477E-12	-1.202E-05	1.001E-09	-5.598E-14
ToV_{11}	HDD	5.464E-04	-7.905E-08	4.948E-12	-7.667E-06	1.003E-09	-5.960E-14
ToV_{12}	HDD	4.078E-01	1.027E-04	-4.119E-09	0	0	0
ToV_{13}	CDD	-4.235E-03	3.061E-04	-3.480E-07	2.635E-04	-1.912E-05	2.187E-08
ToV_{14}	CDD	1.901E-02	-1.099E-03	1.079E-06	-6.409E-01	2.574E-03	-2.956E-06
ToV_{15}	CDD	-7.610E-03	2.752E-04	-4.789E-07	5.236E-03	-1.645E-04	2.842E-07
ToV_{16}	TDD	-5.439E+00	2.454E-03	-1.873E-07	2.040E+01	-9.429E-03	8.332E-07
ToV_{17}	HDD	-5.228E-02	1.668E-05	-1.969E-09	-9.866E-02	7.655E-05	-5.376E-09
ToV_{18}	CDD	1.356E-02	4.980E-04	-7.950E-07	-1.164E-02	-2.318E-04	3.821E-07
ToV_{19}	HDD	1.449E-02	9.114E-07	-1.738E-10	2.242E-03	-5.849E-07	3.882E-11
ToV_{20}	CDD	2.311E-03	-1.543E-05	2.387E-08	-1.850E-04	1.391E-06	-2.154E-09
ToV_{21}	HDD	-1.176E-03	2.586E-07	-1.774E-11	3.923E-06	-1.152E-09	8.234E-14
ToV_{22}	CDD	3.691E-05	-1.502E-06	2.031E-09	-9.582E-08	3.256E-10	-3.339E-13
ToV_{23}	HDD	1.912E-01	-3.365E-05	2.378E-09	-9.545E-02	1.605E-05	-1.163E-09
ToV_{24}	CDD	-6.448E-03	3.547E-04	-5.053E-07	3.848E-03	-2.110E-04	3.053E-07
ToV_{25}	HDD	1.419E-01	-1.923E-05	1.115E-09	-4.868E-02	5.684E-06	-3.047E-10
ToV_{26}	CDD	1.335E-02	3.334E-05	-3.139E-08	-8.041E-03	9.821E-06	-2.012E-08
ToV_{27}	HDD	-6.304E+01	2.142E-02	-1.560E-06	3.931E+01	-1.311E-02	9.505E-07
ToV_{28}	CDD	5.747	-6.462E-02	1.196E-04	-3.442	4.434E-02	-8.073E-05
ToV_{29}	HDD	-3.873E+01	1.350E-02	-1.004E-06	2.438E+01	-8.230E-03	6.070E-07
ToV_{30}	CDD	1.976	-1.306E-02	2.907E-05	-1.196	1.270E-02	-2.498E-05
ToV_{31}	HDD	7.866E+00	-2.360E-03	1.783E-07	-5.550E+00	1.952E-03	-1.518E-07
ToV_{32}	CDD	6.765	-1.130E-02	-1.092E-05	-6.879	1.875E-02	7.273E-07

Table 5.3.2.8.Q.
Coefficient Values for System Type HVAC-17 (Water-Loop Heat Pump with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	4.582	-9.278E-04	5.569E-08	-2.095	3.860E-04	-2.204E-08
ToV_2	HDD	2.996	-5.866E-04	3.440E-08	-9.112E-01	1.503E-04	-7.830E-09
ToV_3	HDD	5.673E-01	-1.337E-04	9.006E-09	-4.776E-01	1.108E-04	-7.390E-09
ToV_4	HDD	2.438E-01	-5.440E-05	3.439E-09	-9.278E-02	1.866E-05	-1.037E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-9.799E-01	2.456E-04	-1.599E-08	9.777E-02	-2.710E-05	1.808E-09
ToV_8	CDD	-2.233E-05	5.752E-06	-8.228E-09	-4.587E-05	-5.083E-07	7.413E-10
ToV_9	TDD	-9.851E-02	1.939E-05	-1.069E-09	-1.371E-02	6.507E-06	-6.446E-10
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	-7.573E-01	3.358E-04	-1.637E-08	0	0	0
ToV_{13}	CDD	7.516E-03	2.307E-03	-3.108E-06	-2.808E-03	-1.898E-04	2.550E-07
ToV_{14}	CDD	3.386E-02	-2.184E-03	2.331E-06	-2.496E-01	-2.724E-04	1.942E-06
ToV_{15}	CDD	5.029E-04	-8.618E-06	1.620E-08	-7.102E-04	1.204E-05	-2.301E-08
ToV_{16}	TDD	-2.155E+00	2.825E-03	-2.473E-07	-1.194E+01	-4.332E-03	6.498E-07
ToV_{17}	HDD	2.547E-01	-3.202E-05	9.371E-12	-5.744E-01	2.333E-04	-1.589E-08
ToV_{18}	CDD	2.921E-02	-1.029E-05	1.080E-09	-1.209E-05	-8.127E-07	2.725E-11
ToV_{19}	HDD	0	0	0	0	0	0
ToV_{20}	TDD	4.629E-03	-8.833E-07	4.960E-11	-2.498E-04	5.181E-08	-3.186E-12
ToV_{21}	TDD	0	0	0	0	0	0
ToV_{22}	TDD	-6.163E-03	1.413E-06	-8.588E-11	1.240E-06	-6.577E-10	5.001E-14
ToV_{23}	HDD	0	0	0	0	0	0
ToV_{24}	HDD	1.326	-2.811E-04	1.674E-08	-6.351E-01	1.244E-04	-6.990E-09
ToV_{25}	HDD	0	0	0	0	0	0
ToV_{26}	HDD	8.224E-01	-1.137E-04	5.677E-09	-2.721E-01	3.303E-05	-1.546E-09
ToV_{27}	HDD	0	0	0	0	0	0
ToV_{28}	HDD	4.858E-01	-1.167E-04	7.432E-09	2.486	-5.883E-04	3.706E-08
ToV_{29}	HDD	0	0	0	0	0	0
ToV_{30}	HDD	-2.556E+02	7.417E-02	-4.229E-06	1.584E+02	-4.584E-02	2.620E-06
ToV_{31}	HDD	0	0	0	0	0	0
ToV_{32}	HDD	-1.258E+02	4.047E-02	-2.753E-06	1.221E+02	-3.892E-02	2.642E-06

Table 5.3.2.8.R.
Coefficient Values for System Type HVAC-18 (Ground-Source Heat Pump with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	1.172	-2.596E-04	1.781E-08	-6.738E-01	1.520E-04	-1.049E-08
ToV_2	HDD	9.950E-01	-2.418E-04	1.714E-08	-4.575E-01	1.169E-04	-8.450E-09
ToV_3	HDD	9.282E-01	-1.926E-04	1.241E-08	-8.421E-01	1.747E-04	-1.115E-08
ToV_4	HDD	3.636E-01	-6.409E-05	3.690E-09	-1.610E-01	2.736E-05	-1.502E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-1.016E-01	2.348E-05	-1.782E-09	3.032E-03	-1.124E-06	1.232E-10
ToV_8	CDD	2.592E-02	-1.482E-04	2.151E-07	-4.363E-03	2.709E-05	-3.651E-08
ToV_9	TDD	-2.068E-01	4.830E-05	-3.427E-09	4.883E-02	-1.734E-05	1.496E-09
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	6.517E-02	4.928E-05	-9.741E-10	0	0	0
ToV_{13}	CDD	2.315E-02	1.169E-03	-1.549E-06	-1.996E-03	-9.458E-05	1.245E-07
ToV_{14}	CDD	0	0	0	0	0	0
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	TDD	-8.332	5.611E-03	-3.203E-07	2.279E+01	-2.220E-02	1.401E-06
ToV_{17}	HDD	3.534E-01	-4.841E-05	6.904E-10	-5.066E-01	1.963E-04	-1.156E-08
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	0	0	0	0	0	0
ToV_{20}	TDD	7.034E-03	-1.314E-06	1.019E-10	-2.123E-04	9.483E-09	-8.756E-13
ToV_{21}	TDD	0	0	0	0	0	0
ToV_{22}	HDD	-3.769E-02	6.271E-06	-4.263E-10	1.412E-04	-2.642E-08	1.742E-12
ToV_{23}	HDD	0	0	0	0	0	0
ToV_{24}	HDD	4.202	-5.307E-04	3.898E-08	-1.807	1.936E-04	-1.499E-08
ToV_{25}	HDD	0	0	0	0	0	0
ToV_{26}	HDD	3.079	-4.361E-04	3.215E-08	-9.669E-01	1.335E-04	-1.020E-08
ToV_{27}	HDD	0	0	0	0	0	0
ToV_{28}	HDD	1.534E+03	-3.921E-01	2.710E-05	-9.407E+02	2.405E-01	-1.662E-05
ToV_{29}	HDD	0	0	0	0	0	0
ToV_{30}	HDD	3.243E+03	-1.546	1.590E-04	-2.023E+03	9.648E-01	-9.924E-05
ToV_{31}	HDD	0	0	0	0	0	0
ToV_{32}	HDD	-7.632E+02	1.856E-01	-1.235E-05	7.784E+02	-1.885E-01	1.255E-05

Table 5.3.2.8.S.
Coefficient Values for System Type HVAC-19 (Induction Unit – Two-Pipe)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	2.235	-3.719E-04	1.766E-08	-1.072	1.566E-04	-6.312E-09
ToV_2	HDD	1.688	-2.845E-04	1.388E-08	-6.175E-01	9.089E-05	-3.836E-09
ToV_3	TDD	1.770	-2.034E-04	6.895E-09	-1.590	2.148E-04	-9.799E-09
ToV_4	TDD	8.778E-01	-1.090E-04	4.152E-09	-4.056E-01	6.107E-05	-3.095E-09
ToV_5	HDD	1.587E+01	-4.604E-03	3.069E-07	-1.038E+01	3.019E-03	-2.009E-07
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-1.450E-01	3.620E-05	-2.354E-09	4.672E-03	-1.420E-06	1.015E-10
ToV_8	CDD	-1.189E-02	2.084E-04	-2.958E-07	1.229E-03	-2.179E-05	3.085E-08
ToV_9	TDD	-1.677E-01	2.405E-05	-1.016E-09	1.157E-02	-2.783E-06	1.702E-10
ToV_{10}	HDD	1.709E-03	-1.997E-07	8.529E-12	-2.557E-05	2.942E-09	-1.261E-13
ToV_{11}	HDD	4.842E-04	-1.177E-08	-1.846E-12	-7.526E-06	1.248E-10	3.406E-14
ToV_{12}	HDD	8.206E-01	2.897E-05	1.435E-09	0	0	0
ToV_{13}	CDD	-3.248E-03	1.435E-04	-4.404E-08	2.493E-04	-9.644E-06	3.658E-09
ToV_{14}	CDD	1.329E-02	-4.318E-04	-3.246E-07	-1.256E-01	-9.393E-04	1.856E-06
ToV_{15}	CDD	-1.793E-03	5.917E-05	-6.434E-08	1.023E-03	-3.377E-05	3.672E-08
ToV_{16}	HDD	-1.664	1.117E-03	-1.399E-08	6.880	-4.768E-03	4.812E-08
ToV_{17}	TDD	-4.602E-02	1.109E-06	5.328E-09	0	0	0
ToV_{18}	CDD	-2.660E-04	5.774E-06	-4.296E-09	1.760E-04	-3.822E-06	2.843E-09
ToV_{19}	HDD	4.914E-02	-1.140E-05	7.593E-10	-2.337E-03	5.034E-07	-3.197E-11
ToV_{20}	CDD	4.379E-03	6.356E-05	-9.493E-08	-3.138E-04	-2.438E-06	3.297E-09
ToV_{21}	HDD	-5.402E-04	1.263E-08	1.958E-12	-2.380E-07	1.053E-10	-7.491E-15
ToV_{22}	CDD	-1.591E-04	-1.524E-06	1.853E-09	-3.324E-08	1.341E-09	-1.744E-12
ToV_{23}	HDD	2.061E-01	-2.009E-05	6.955E-10	-1.247E-01	1.508E-05	-7.078E-10
ToV_{24}	CDD	5.759E-02	3.850E-04	-4.821E-07	-3.469E-02	-1.985E-04	2.520E-07
ToV_{25}	HDD	8.037E-02	8.616E-06	-1.374E-09	-2.009E-02	-6.964E-06	8.254E-10
ToV_{26}	CDD	-1.409E-03	5.388E-04	-7.183E-07	7.464E-03	-2.491E-04	3.357E-07
ToV_{27}	HDD	-2.764E+01	8.230E-03	-4.637E-07	2.050E+01	-5.882E-03	3.302E-07
ToV_{28}	CDD	1.748E+01	-1.207E-01	1.788E-04	-1.186E+01	8.661E-02	-1.280E-04
ToV_{29}	HDD	-2.563E+01	9.394E-03	-7.330E-07	1.900E+01	-6.621E-03	5.087E-07
ToV_{30}	CDD	-5.080E+02	1.831	-9.579E-04	3.168E+02	-1.139	5.957E-04
ToV_{31}	HDD	7.675E+01	-2.567E-02	1.903E-06	-7.384E+01	2.509E-02	-1.867E-06
ToV_{32}	CDD	1.084E-01	1.539E-03	-2.013E-06	-6.434E-02	-1.010E-03	1.337E-06

Table 5.3.2.8.T.
Coefficient Values for System Type HVAC-20 (Induction Unit – Four-Pipe)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	4.095E-01	6.140E-05	-8.922E-09	-1.652E-01	-5.042E-05	5.982E-09
ToV_2	HDD	2.494E-01	6.358E-05	-8.104E-09	-5.361E-02	-4.232E-05	4.513E-09
ToV_3	TDD	1.538E-01	1.282E-04	-1.172E-08	-1.857E-01	-1.006E-04	9.607E-09
ToV_4	TDD	7.403E-02	6.032E-05	-5.536E-09	-4.425E-02	-2.363E-05	2.267E-09
ToV_5	HDD	5.607	-1.190E-03	5.869E-08	-3.419	7.397E-04	-3.613E-08
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-3.733E-02	5.425E-06	-2.140E-10	1.385E-03	-3.543E-07	2.229E-11
ToV_8	HDD	4.194E-02	-2.728E-06	-1.053E-10	-3.988E-03	1.661E-07	1.904E-11
ToV_9	TDD	-1.700E-02	-7.554E-06	7.610E-10	1.794E-03	-3.685E-07	1.735E-11
ToV_{10}	HDD	3.173E-04	4.203E-08	-2.701E-12	-4.173E-06	-6.138E-10	3.973E-14
ToV_{11}	HDD	3.197E-04	-3.018E-08	2.171E-12	-4.828E-06	5.034E-10	-3.706E-14
ToV_{12}	HDD	2.645E-01	1.453E-04	-5.844E-09	0	0	0
ToV_{13}	CDD	2.172E-04	2.218E-04	-2.300E-07	-3.344E-05	-1.376E-05	1.433E-08
ToV_{14}	CDD	-1.100E-02	-7.443E-04	4.797E-07	-2.606E-02	-6.473E-04	7.638E-07
ToV_{15}	CDD	-1.793E-03	5.917E-05	-6.434E-08	1.023E-03	-3.377E-05	3.672E-08
ToV_{16}	HDD	-3.983E-01	4.258E-04	6.137E-09	1.824	-1.905E-03	-2.558E-08
ToV_{17}	TDD	-4.602E-02	1.109E-06	5.328E-09	0	0	0
ToV_{18}	CDD	-1.253E-02	-3.304E-05	6.623E-08	1.615E-02	9.996E-05	-1.692E-07
ToV_{19}	HDD	2.403E-02	-4.825E-06	3.572E-10	-2.897E-03	8.946E-07	-6.991E-11
ToV_{20}	CDD	-1.048E-04	2.533E-06	-3.321E-09	1.052E-05	-1.402E-07	1.707E-10
ToV_{21}	HDD	-1.704E-04	-9.785E-09	7.242E-13	7.055E-08	8.153E-10	-1.293E-12
ToV_{22}	CDD	2.143E-05	-9.001E-07	1.030E-09	-1.021E-07	7.375E-10	-6.946E-13
ToV_{23}	HDD	4.946E-02	2.143E-06	-2.115E-10	-2.695E-02	-1.437E-06	1.490E-10
ToV_{24}	CDD	2.526E-03	1.253E-04	-1.255E-07	-2.674E-03	-5.728E-05	4.967E-08
ToV_{25}	HDD	2.314E-02	6.259E-06	-5.800E-10	-6.276E-03	-3.348E-06	3.149E-10
ToV_{26}	CDD	-1.343E-02	1.766E-04	-2.094E-07	7.467E-03	-8.139E-05	9.681E-08
ToV_{27}	HDD	-4.337	2.086E-03	-1.821E-07	2.970	-1.138E-03	9.751E-08
ToV_{28}	CDD	6.128E+02	-8.931	1.734E-02	-3.842E+02	5.610	-1.089E-02
ToV_{29}	HDD	-1.035E+01	4.751E-03	-4.421E-07	6.420	-2.649E-03	2.433E-07
ToV_{30}	CDD	-4.301E+01	3.311E-01	-4.985E-04	2.701E+01	-2.036E-01	3.068E-04
ToV_{31}	HDD	7.414E-01	2.245E-04	-3.022E-08	1.982E-01	-2.018E-04	2.832E-08
ToV_{32}	CDD	1.260E-03	-8.149E-05	8.297E-08	-4.513E-04	9.251E-05	-1.018E-07

Table 5.3.2.8.U.
Coefficient Values for System Type HVAC-21 (Induction Unit – Three-Pipe)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	4.095E-01	6.140E-05	-8.922E-09	-1.652E-01	-5.042E-05	5.982E-09
ToV_2	HDD	2.494E-01	6.358E-05	-8.104E-09	-5.361E-02	-4.232E-05	4.513E-09
ToV_3	TDD	1.538E-01	1.282E-04	-1.172E-08	-1.857E-01	-1.006E-04	9.607E-09
ToV_4	TDD	7.403E-02	6.032E-05	-5.536E-09	-4.425E-02	-2.363E-05	2.267E-09
ToV_5	HDD	5.607	-1.190E-03	5.869E-08	-3.419	7.397E-04	-3.613E-08
ToV_6	HDD	0	0	0	0	0	0
ToV_7	HDD	-3.733E-02	5.425E-06	-2.140E-10	1.385E-03	-3.543E-07	2.229E-11
ToV_8	HDD	4.194E-02	-2.728E-06	-1.053E-10	-3.988E-03	1.661E-07	1.904E-11
ToV_9	TDD	-1.700E-02	-7.554E-06	7.610E-10	1.794E-03	-3.685E-07	1.735E-11
ToV_{10}	HDD	3.173E-04	4.203E-08	-2.701E-12	-4.173E-06	-6.138E-10	3.973E-14
ToV_{11}	HDD	3.197E-04	-3.018E-08	2.171E-12	-4.828E-06	5.034E-10	-3.706E-14
ToV_{12}	HDD	2.645E-01	1.453E-04	-5.844E-09	0	0	0
ToV_{13}	CDD	2.172E-04	2.218E-04	-2.300E-07	-3.344E-05	-1.376E-05	1.433E-08
ToV_{14}	CDD	-1.100E-02	-7.443E-04	4.797E-07	-2.606E-02	-6.473E-04	7.638E-07
ToV_{15}	CDD	-1.793E-03	5.917E-05	-6.434E-08	1.023E-03	-3.377E-05	3.672E-08
ToV_{16}	HDD	-3.983E-01	4.258E-04	6.137E-09	1.824	-1.905E-03	-2.558E-08
ToV_{17}	TDD	-4.602E-02	1.109E-06	5.328E-09	0	0	0
ToV_{18}	CDD	-1.253E-02	-3.304E-05	6.623E-08	1.615E-02	9.996E-05	-1.692E-07
ToV_{19}	HDD	2.403E-02	-4.825E-06	3.572E-10	-2.897E-03	8.946E-07	-6.991E-11
ToV_{20}	CDD	-1.048E-04	2.533E-06	-3.321E-09	1.052E-05	-1.402E-07	1.707E-10
ToV_{21}	HDD	-1.704E-04	-9.785E-09	7.242E-13	7.055E-08	8.153E-10	-1.293E-12
ToV_{22}	CDD	2.143E-05	-9.001E-07	1.030E-09	-1.021E-07	7.375E-10	-6.946E-13
ToV_{23}	HDD	4.946E-02	2.143E-06	-2.115E-10	-2.695E-02	-1.437E-06	1.490E-10
ToV_{24}	CDD	2.526E-03	1.253E-04	-1.255E-07	-2.674E-03	-5.728E-05	4.967E-08
ToV_{25}	HDD	2.314E-02	6.259E-06	-5.800E-10	-6.276E-03	-3.348E-06	3.149E-10
ToV_{26}	CDD	-1.343E-02	1.766E-04	-2.094E-07	7.467E-03	-8.139E-05	9.681E-08
ToV_{27}	HDD	-4.337	2.086E-03	-1.821E-07	2.970	-1.138E-03	9.751E-08
ToV_{28}	CDD	6.128E+02	-8.931	1.734E-02	-3.842E+02	5.610	-1.089E-02
ToV_{29}	HDD	-1.035E+01	4.751E-03	-4.421E-07	6.420	-2.649E-03	2.433E-07
ToV_{30}	CDD	-4.301E+01	3.311E-01	-4.985E-04	2.701E+01	-2.036E-01	3.068E-04
ToV_{31}	HDD	7.414E-01	2.245E-04	-3.022E-08	1.982E-01	-2.018E-04	2.832E-08
ToV_{32}	CDD	1.260E-03	-8.149E-05	8.297E-08	-4.513E-04	9.251E-05	-1.018E-07

Table 5.3.2.8.V.
Coefficient Values for System Type HVAC-22 (Packaged Terminal AC – Split)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	9.141E-01	1.967E-04	-2.046E-08	-6.265E-01	-1.543E-04	1.531E-08
ToV_2	HDD	4.106E-01	1.072E-04	-1.082E-08	-1.325E-01	-4.551E-05	4.317E-09
ToV_3	HDD	9.997E-01	1.993E-04	-2.129E-08	-9.853E-01	-2.191E-04	2.256E-08
ToV_4	HDD	3.922E-01	8.111E-05	-8.650E-09	-1.591E-01	-3.760E-05	3.851E-09
ToV_5	CDD	0	0	0	0	0	0
ToV_6	TDD	0	0	0	0	0	0
ToV_7	HDD	-1.701E-01	-1.450E-05	2.347E-09	2.225E-02	-8.095E-07	-1.281E-10
ToV_8	HDD	9.456E-03	1.394E-06	-1.927E-10	-9.557E-04	-1.549E-07	2.074E-11
ToV_9	TDD	1.130E-01	2.518E-05	-2.703E-09	-2.090E-01	-3.299E-05	3.854E-09
ToV_{10}	HDD	0	0	0	0	0	0
ToV_{11}	HDD	-4.499E-06	-9.547E-09	7.550E-13	1.654E-07	3.184E-10	-2.619E-14
ToV_{12}	HDD	-2.439E-02	1.288E-04	-1.195E-10	0	0	0
ToV_{13}	CDD	1.711E-01	6.202E-04	-6.974E-07	-1.975E-02	-4.929E-05	5.393E-08
ToV_{14}	CDD	1.520E-01	-3.538E-02	4.494E-05	-1.224E+01	2.064E-01	-2.708E-04
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	TDD	-1.821E-01	6.815E-05	-5.092E-09	-8.239E-02	4.291E-05	-1.818E-09
ToV_{17}	HDD	0	0	0	0	0	0
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	7.333E-02	-5.725E-06	3.435E-10	-5.205E-03	5.793E-07	-3.970E-11
ToV_{20}	HDD	0	0	0	0	0	0
ToV_{21}	HDD	-2.581E-04	-2.918E-08	2.725E-12	-1.628E-07	1.411E-10	-1.327E-14
ToV_{22}	HDD	0	0	0	0	0	0
ToV_{23}	HDD	1.070E-01	-7.168E-06	7.136E-10	-6.523E-02	6.874E-06	-6.790E-10
ToV_{24}	HDD	0	0	0	0	0	0
ToV_{25}	HDD	6.490E-02	7.023E-08	1.484E-11	-2.383E-02	-3.340E-08	-2.068E-11
ToV_{26}	HDD	0	0	0	0	0	0
ToV_{27}	HDD	-4.234E+01	1.437E-02	-1.035E-06	2.588E+01	-8.531E-03	6.088E-07
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	-3.427E+01	8.525E-03	-5.422E-07	2.294E+01	-5.518E-03	3.477E-07
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	8.120E+00	-3.713E-03	2.010E-07	-6.886E+00	3.673E-03	-2.011E-07
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.W.
Coefficient Values for System Type HVAC-23 (Radiant (In-floor, Ceiling) with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	1.217	-2.560E-04	1.526E-08	-6.299E-01	1.286E-04	-7.521E-09
ToV_2	HDD	8.508E-01	-1.796E-04	1.073E-08	-3.174E-01	6.504E-05	-3.817E-09
ToV_3	HDD	1.043	-2.206E-04	1.324E-08	-8.986E-01	1.875E-04	-1.116E-08
ToV_4	HDD	4.952E-01	-1.052E-04	6.320E-09	-2.122E-01	4.449E-05	-2.650E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-1.750E-01	3.955E-05	-2.404E-09	1.252E-02	-3.605E-06	2.537E-10
ToV_8	CDD	3.905E-02	-3.387E-05	9.739E-08	-3.849E-03	3.358E-06	-9.557E-09
ToV_9	TDD	-2.410E-01	5.141E-05	-3.014E-09	3.800E-02	-1.088E-05	7.603E-10
ToV_{10}	HDD	4.783E-04	3.962E-08	-5.924E-12	-7.084E-06	-5.313E-10	8.309E-14
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	-3.925E-01	3.730E-04	-2.326E-08	0	0	0
ToV_{13}	CDD	-6.223E-03	1.458E-04	-1.929E-07	4.106E-04	-9.328E-06	1.232E-08
ToV_{14}	CDD	5.563E-02	-5.493E-04	7.112E-07	-1.866	1.219E-02	-1.579E-05
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	TDD	-1.341	7.014E-04	-5.257E-08	4.146	-2.470E-03	1.915E-07
ToV_{17}	HDD	1.370E-02	-2.437E-06	1.205E-10	-9.687E-02	4.640E-05	-3.539E-09
ToV_{18}	CDD	-3.913E-03	1.322E-04	-2.101E-07	2.808E-03	-8.513E-05	1.364E-07
ToV_{19}	HDD	9.710E-02	-1.691E-05	8.772E-10	-3.572E-03	3.772E-07	-8.364E-12
ToV_{20}	CDD	-6.421E-04	3.355E-05	-4.226E-08	3.261E-05	-1.971E-06	2.475E-09
ToV_{21}	HDD	-2.248E-04	-2.432E-09	9.839E-13	4.464E-07	-1.580E-10	1.332E-14
ToV_{22}	CDD	8.993E-05	-2.475E-06	3.551E-09	2.054E-07	4.464E-10	-1.982E-12
ToV_{23}	HDD	2.297E-02	1.622E-05	-1.538E-09	-6.488E-03	-1.105E-05	1.014E-09
ToV_{24}	CDD	-2.214E-02	4.412E-04	-6.165E-07	1.187E-02	-2.216E-04	3.080E-07
ToV_{25}	HDD	1.025E-01	-1.618E-05	1.011E-09	-5.382E-02	1.093E-05	-7.503E-10
ToV_{26}	CDD	-2.331E-02	3.494E-04	-4.558E-07	1.101E-02	-1.489E-04	1.895E-07
ToV_{27}	HDD	-3.416E+01	1.224E-02	-9.389E-07	2.149E+01	-7.402E-03	5.605E-07
ToV_{28}	CDD	2.803	-1.542E-02	2.488E-05	-1.884	1.465E-02	-2.247E-05
ToV_{29}	HDD	1.665	-9.328E-05	-6.208E-09	2.136	-7.403E-04	5.650E-08
ToV_{30}	CDD	-1.478	3.624E-02	-7.039E-05	7.358E-01	-1.658E-02	3.490E-05
ToV_{31}	HDD	5.865E+01	-1.239E-02	2.086E-07	-5.720E+01	1.237E-02	-2.218E-07
ToV_{32}	CDD	4.711	-3.213E-02	5.215E-05	-5.008	4.067E-02	-6.393E-05

Table 5.3.2.8.X.
Coefficient Values for System Type HVAC-24 (Active Chilled Beams with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	3.276E-01	-4.201E-06	-2.388E-09	-1.656E-01	-1.451E-06	1.575E-09
ToV_2	HDD	2.997E-01	-7.079E-06	-2.176E-09	-1.291E-01	2.169E-07	1.285E-09
ToV_3	HDD	3.118E-01	5.169E-06	-2.321E-09	-2.735E-01	-5.956E-06	2.197E-09
ToV_4	HDD	1.580E-01	-2.234E-06	-6.858E-10	-7.213E-02	1.847E-06	2.346E-10
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-1.400E-02	1.108E-06	4.662E-12	2.511E-04	-4.937E-08	3.289E-12
ToV_8	TDD	-4.105E-03	4.128E-06	-3.623E-10	2.653E-04	-3.888E-07	4.124E-11
ToV_9	HDD	-2.650E-02	1.134E-06	2.331E-11	1.735E-03	-4.893E-07	4.206E-11
ToV_{10}	HDD	5.726E-04	-1.408E-09	-7.508E-14	-7.822E-06	3.091E-11	-1.039E-16
ToV_{11}	HDD	4.987E-04	-7.287E-08	5.027E-12	-7.506E-06	1.134E-09	-7.871E-14
ToV_{12}	HDD	4.850E-01	1.300E-04	-5.199E-09	0	0	0
ToV_{13}	CDD	-1.751E-03	2.509E-04	-2.709E-07	1.320E-04	-1.582E-05	1.720E-08
ToV_{14}	CDD	-2.420E-02	-7.855E-04	5.762E-07	6.983E-01	-4.724E-03	5.601E-06
ToV_{15}	CDD	8.237E-03	7.981E-05	-1.332E-07	-5.528E-03	-4.103E-05	6.977E-08
ToV_{16}	HDD	3.201	-3.991E-05	3.380E-08	-1.608E+01	1.704E-03	-2.790E-07
ToV_{17}	TDD	2.255E-01	-5.303E-05	2.928E-09	-1.977E-01	7.434E-05	-3.931E-09
ToV_{18}	CDD	-1.110E-02	-3.656E-05	7.065E-08	1.351E-02	1.088E-04	-1.809E-07
ToV_{19}	HDD	3.317E-02	-7.340E-06	5.469E-10	-3.729E-03	1.207E-06	-9.603E-11
ToV_{20}	CDD	1.216E-05	1.200E-06	-1.120E-09	5.953E-06	-8.911E-08	8.623E-11
ToV_{21}	HDD	-2.536E-04	-2.869E-09	5.204E-13	-2.648E-07	1.947E-10	-1.523E-14
ToV_{22}	CDD	-1.294E-05	-7.538E-07	8.847E-10	2.041E-07	-1.045E-09	1.161E-12
ToV_{23}	HDD	7.996E-02	-4.893E-06	3.118E-10	-2.988E-02	-3.482E-05	5.489E-08
ToV_{24}	CDD	-9.030E-03	2.096E-04	-2.464E-07	7.466E-03	-1.273E-04	1.495E-07
ToV_{25}	HDD	7.766E-02	-9.411E-06	6.939E-10	-3.336E-02	4.936E-06	-3.735E-10
ToV_{26}	CDD	2.039E-03	1.055E-04	-1.311E-07	-1.563E-03	-3.809E-05	4.814E-08
ToV_{27}	HDD	-3.042	1.573E-03	-1.368E-07	2.445	-9.104E-04	7.562E-08
ToV_{28}	CDD	-4.220E+01	1.665E-01	-1.079E-04	2.755E+01	-1.063E-01	6.916E-05
ToV_{29}	HDD	-1.038E+01	4.568E-03	-4.095E-07	6.453	-2.534E-03	2.224E-07
ToV_{30}	CDD	-4.257E+01	3.295E-01	-4.976E-04	2.675E+01	-2.026E-01	3.061E-04
ToV_{31}	HDD	3.389E+00	-8.148E-04	6.090E-08	-2.118E+00	7.342E-04	-5.606E-08
ToV_{32}	CDD	1.909E+02	-1.048	1.236E-03	-1.902E+02	1.050	-1.238E-03

Table 5.3.2.8.Y.
Coefficient Values for System Type HVAC-25 (Unit Heater)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	-9.258E-03	3.040E-06	-2.298E-10	7.138E-03	-2.344E-06	1.772E-10
ToV_2	HDD	-1.382E-02	4.539E-06	-3.432E-10	7.459E-03	-2.449E-06	1.852E-10
ToV_3	HDD	0	0	0	0	0	0
ToV_4	HDD	0	0	0	0	0	0
ToV_5	HDD	0	0	0	0	0	0
ToV_6	TDD	0	0	0	0	0	0
ToV_7	HDD	-9.434E-04	3.098E-07	-2.342E-11	6.374E-04	-2.093E-07	1.582E-11
ToV_8	HDD	0	0	0	0	0	0
ToV_9	HDD	0	0	0	0	0	0
ToV_{10}	HDD	1.696E-05	-2.683E-09	1.142E-13	-2.314E-07	3.414E-11	-1.250E-15
ToV_{11}	HDD	7.709E-04	-1.507E-07	8.659E-12	-1.945E-06	3.330E-10	-1.679E-14
ToV_{12}	HDD	3.802E-01	1.803E-04	-1.077E-08	0	0	0
ToV_{13}	CDD	0	0	0	0	0	0
ToV_{14}	CDD	0	0	0	0	0	0
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	HDD	0	0	0	0	0	0
ToV_{17}	HDD	0	0	0	0	0	0
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	4.826E-02	1.022E-05	-1.459E-09	1.804E-02	-6.710E-06	5.204E-10
ToV_{20}	CDD	0	0	0	0	0	0
ToV_{21}	HDD	-5.768E-03	1.253E-06	-7.666E-11	1.260E-05	-3.370E-09	2.252E-13
ToV_{22}	CDD	0	0	0	0	0	0
ToV_{23}	HDD	1.107E+00	-2.036E-04	1.122E-08	-5.661E-01	9.919E-05	-5.261E-09
ToV_{24}	CDD	0	0	0	0	0	0
ToV_{25}	HDD	7.705E-01	-1.393E-04	7.484E-09	-2.527E-01	4.123E-05	-1.996E-09
ToV_{26}	CDD	0	0	0	0	0	0
ToV_{27}	HDD	-1.123E+02	4.050E-02	-3.188E-06	7.059E+01	-2.511E-02	1.966E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	-1.325E+00	9.671E-04	-8.326E-08	3.330E+00	-1.178E-03	8.775E-08
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	-1.719E+00	1.032E-03	-8.674E-08	4.718E+00	-1.606E-03	1.190E-07
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.Z.
Coefficient Values for System Type HVAC-26 (Unit Ventilator)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha 1_i$	$\alpha 2_i$	$\alpha 3_i$	$\beta 1_i$	$\beta 2_i$	$\beta 3_i$
ToV_1	HDD	1.836E-02	-3.115E-06	1.388E-10	-9.958E-03	1.492E-06	-5.265E-11
ToV_2	HDD	3.239E-02	-1.005E-05	7.028E-10	-1.643E-02	5.399E-06	-3.827E-10
ToV_3	HDD	0	0	0	0	0	0
ToV_4	HDD	0	0	0	0	0	0
ToV_5	HDD	0	0	0	0	0	0
ToV_6	TDD	0	0	0	0	0	0
ToV_7	HDD	-3.278E-03	1.034E-06	-7.366E-11	4.597E-04	-1.931E-07	1.501E-11
ToV_8	HDD	0	0	0	0	0	0
ToV_9	HDD	0	0	0	0	0	0
ToV_{10}	HDD	-1.215E-05	7.457E-09	-6.740E-13	3.046E-07	-1.504E-10	1.309E-14
ToV_{11}	HDD	7.704E-04	-1.530E-07	8.917E-12	-2.335E-06	4.670E-10	-2.711E-14
ToV_{12}	HDD	3.945E-01	1.757E-04	-1.044E-08	0	0	0
ToV_{13}	CDD	0	0	0	0	0	0
ToV_{14}	CDD	0	0	0	0	0	0
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	HDD	8.327E-03	-2.685E-06	2.359E-10	-6.380E-03	2.455E-06	-2.209E-10
ToV_{17}	HDD	0	0	0	0	0	0
ToV_{18}	CDD	0	0	0	0	0	0
ToV_{19}	HDD	4.763E-02	1.084E-05	-1.507E-09	1.813E-02	-6.749E-06	5.230E-10
ToV_{20}	CDD	0	0	0	0	0	0
ToV_{21}	HDD	-5.520E-03	1.191E-06	-7.274E-11	1.166E-05	-3.136E-09	2.110E-13
ToV_{22}	CDD	0	0	0	0	0	0
ToV_{23}	HDD	1.091E+00	-2.026E-04	1.132E-08	-5.588E-01	9.963E-05	-5.406E-09
ToV_{24}	CDD	0	0	0	0	0	0
ToV_{25}	HDD	8.829E-01	-1.824E-04	1.123E-08	-3.222E-01	6.738E-05	-4.248E-09
ToV_{26}	CDD	0	0	0	0	0	0
ToV_{27}	HDD	-1.191E+02	4.288E-02	-3.372E-06	7.471E+01	-2.656E-02	2.078E-06
ToV_{28}	CDD	0	0	0	0	0	0
ToV_{29}	HDD	-1.670E+00	9.820E-04	-8.044E-08	3.477E+00	-1.153E-03	8.289E-08
ToV_{30}	CDD	0	0	0	0	0	0
ToV_{31}	HDD	-4.231E+00	1.921E-03	-1.571E-07	4.509E+00	-1.556E-03	1.181E-07
ToV_{32}	CDD	0	0	0	0	0	0

Table 5.3.2.8.AA.
Coefficient Values for System Type HVAC-27 (Radiation with Optional Make-up Air Unit)
Forming Part of Sentences 5.3.2.6.(1) and 5.3.2.8.(1)

Trade-off Values for Component i, ToV_i	Climatic Parameter for Component i, XDD_i	Coefficient Values					
		$\alpha1_i$	$\alpha2_i$	$\alpha3_i$	$\beta1_i$	$\beta2_i$	$\beta3_i$
ToV_1	HDD	1.217	-2.560E-04	1.526E-08	-6.299E-01	1.286E-04	-7.521E-09
ToV_2	HDD	8.508E-01	-1.796E-04	1.073E-08	-3.174E-01	6.504E-05	-3.817E-09
ToV_3	HDD	1.043	-2.206E-04	1.324E-08	-8.986E-01	1.875E-04	-1.116E-08
ToV_4	HDD	4.952E-01	-1.052E-04	6.320E-09	-2.122E-01	4.449E-05	-2.650E-09
ToV_5	HDD	0	0	0	0	0	0
ToV_6	HDD	0	0	0	0	0	0
ToV_7	TDD	-1.750E-01	3.955E-05	-2.404E-09	1.252E-02	-3.605E-06	2.537E-10
ToV_8	CDD	3.905E-02	-3.387E-05	9.739E-08	-3.849E-03	3.358E-06	-9.557E-09
ToV_9	TDD	-2.410E-01	5.141E-05	-3.014E-09	3.800E-02	-1.088E-05	7.603E-10
ToV_{10}	HDD	4.783E-04	3.962E-08	-5.924E-12	-7.084E-06	-5.313E-10	8.309E-14
ToV_{11}	HDD	0	0	0	0	0	0
ToV_{12}	HDD	-3.925E-01	3.730E-04	-2.326E-08	0	0	0
ToV_{13}	CDD	-6.223E-03	1.458E-04	-1.929E-07	4.106E-04	-9.328E-06	1.232E-08
ToV_{14}	CDD	5.563E-02	-5.493E-04	7.112E-07	-1.866	1.219E-02	-1.579E-05
ToV_{15}	CDD	0	0	0	0	0	0
ToV_{16}	TDD	-1.341	7.014E-04	-5.257E-08	4.146	-2.470E-03	1.915E-07
ToV_{17}	HDD	1.370E-02	-2.437E-06	1.205E-10	-9.687E-02	4.640E-05	-3.539E-09
ToV_{18}	CDD	-3.913E-03	1.322E-04	-2.101E-07	2.808E-03	-8.513E-05	1.364E-07
ToV_{19}	HDD	9.710E-02	-1.691E-05	8.772E-10	-3.572E-03	3.772E-07	-8.364E-12
ToV_{20}	CDD	-6.421E-04	3.355E-05	-4.226E-08	3.261E-05	-1.971E-06	2.475E-09
ToV_{21}	HDD	-2.248E-04	-2.432E-09	9.839E-13	4.464E-07	-1.580E-10	1.332E-14
ToV_{22}	CDD	8.993E-05	-2.475E-06	3.551E-09	2.054E-07	4.464E-10	-1.982E-12
ToV_{23}	HDD	2.297E-02	1.622E-05	-1.538E-09	-6.488E-03	-1.105E-05	1.014E-09
ToV_{24}	CDD	-2.214E-02	4.412E-04	-6.165E-07	1.187E-02	-2.216E-04	3.080E-07
ToV_{25}	HDD	1.025E-01	-1.618E-05	1.011E-09	-5.382E-02	1.093E-05	-7.503E-10
ToV_{26}	CDD	-2.331E-02	3.494E-04	-4.558E-07	1.101E-02	-1.489E-04	1.895E-07
ToV_{27}	HDD	-3.416E+01	1.224E-02	-9.389E-07	2.149E+01	-7.402E-03	5.605E-07
ToV_{28}	CDD	2.803	-1.542E-02	2.488E-05	-1.884	1.465E-02	-2.247E-05
ToV_{29}	HDD	1.665	-9.328E-05	-6.208E-09	2.136	-7.403E-04	5.650E-08
ToV_{30}	CDD	-1.478	3.624E-02	-7.039E-05	7.358E-01	-1.658E-02	3.490E-05
ToV_{31}	HDD	5.865E+01	-1.239E-02	2.086E-07	-5.720E+01	1.237E-02	-2.218E-07
ToV_{32}	CDD	4.711	-3.213E-02	5.215E-05	-5.008	4.067E-02	-6.393E-05

Section 5.4. Performance Path

(See A-1.1.2.1. in Appendix A.)

5.4.1. General

5.4.1.1. Scope

1) Subject to the limitations stated in Article 5.4.1.2., where the heating, ventilating and air-conditioning system does not comply with the requirements of Section 5.2. or 5.3., it shall comply with Part 8.

5.4.1.2. Limitations

1) Notwithstanding use of the performance path, all HVAC appliances and equipment shall comply with the applicable appliance or equipment energy efficiency act or, in the absence of such an act or where the appliance or equipment is not covered by such an act, with the applicable performance standard.

2) This Section does not apply to back-up HVAC systems, which shall comply with Sentence 5.1.1.3.(2).

Section 5.5. Objective and Functional Statements

5.5.1. Objective and Functional Statements

5.5.1.1. Attributions to Acceptable Solutions

1) For the purpose of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objective and functional statements attributed to the acceptable solutions in this Part shall be the objective and functional statements listed in Table 5.5.1.1. (See A-1.1.3.1.(1) in Appendix A.)

Table 5.5.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 5
Forming Part of Sentence 5.5.1.1.(1)

Acceptable Solutions	Functional Statements and Objectives(1)
5.2.2.2. Provision for Balancing	
(1)	[F95,F99-OE1.1]
5.2.2.3. Duct Sealing	
(1)	[F91,F99-OE1.1]
(2)	[F91,F99-OE1.1]
(5)	[F91,F99-OE1.1]
5.2.2.4. Leakage Testing of Ducts	
(1)	[F91,F99-OE1.1]
(2)	[F91,F99-OE1.1]
5.2.2.5. Duct and Plenum Insulation	
(1)	[F92,F93-OE1.1]
(4)	[F93-OE1.1]
(6)	[F92,F93-OE1.1]
5.2.2.6. Protection of Duct Insulation	
(1)	[F92,F93,F95-OE1.1]
(2)	[F92,F93,F95-OE1.1]

Part 6
Service Water Heating Systems

Section 6.1. General

6.1.1. General

6.1.1.1. Scope

1) This Part is concerned with the systems used to heat *service water*.

6.1.1.2. Application

1) This Part applies to *service water* heating systems.

6.1.1.3. Compliance

1) Except as provided in Sentence (2), compliance with this Part shall be achieved by following

a) the prescriptive path described in Section 6.2.,
b) the trade-off path described in Section 6.3., or
c) the performance path described in Section 6.4. (see A-3.1.1.3.(1)(c) in Appendix A).

(See Appendix A.)

2) Back-up systems shall comply with the prescriptive requirements stated in Section 6.2.

6.1.1.4. Definitions

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

Section 6.2. Prescriptive Path

6.2.1. System Design

6.2.1.1. Regulations

1) *Service water* heating systems shall be designed in accordance with the relevant provincial, territorial or municipal *building* regulations or, in the absence of such regulations, or where *service water* heating systems are not covered by such regulations, with the National Plumbing Code of Canada 2010.

6.2.2. Water Heating Equipment and Storage Vessels

6.2.2.1. Equipment Efficiency

1) Storage-type and non-storage-type *service water* heaters and pool heaters shall comply with the performance requirements stated in Table 6.2.2.1. (See Appendix A.)

Table 6.2.2.1.
Service Water Heating Equipment Performance Standards
Forming Part of Sentences 5.2.12.3.(1), 6.2.2.1.(1), 6.2.2.4.(2), 6.2.2.5.(1), 6.3.2.5.(1) and 6.3.2.6.(1)

Storage-Type and Non-Storage-Type (Instantaneous) Service Water Heaters							
Component	Input	Capacity, L	V_t, L (US gal.)	Input/V_t, W/L (Btu/h/US gal.)	Standard	Rating Conditions	Performance Requirement(1)
Electric	≤ 12 kW	50 – 270	—	—	CAN/CSA-C191	See standard	SL ≤ 35 + 0.20V (top inlet) SL ≤ 40 + 0.20V (bottom inlet)
	—	> 270 and ≤ 454					SL ≤ (0.472V) − 38.5 (top inlet) SL ≤ (0.472V) − 33.5 (bottom inlet)
	> 12 kW	> 454			ANSI Z21.10.3/CSA 4.3(2)	Δt = 44.4°C (80°F)	E_t ≥ 98% EF ≥ 0.98
Heat pump water heaters	≤ 24 A and ≤ 250 V	—	—	—	CAN/CSA-C745	—	EF ≥ 2.1
Gas-fired	< 22 kW	—	—	—	CAN/CSA-P.3	—	EF ≥ 0.67 − 0.0005V
	22 – 117 kW		—	—	ANSI Z21.10.3/CSA 4.3	—	E_t ≥ 80%
	> 117 kW		—	< 310 (4000)		Δt = 50°C (90°F)	
			< 37.8 (10)	≥ 310 (4000)		—	E_t ≥ 80%(3)
			≥ 37.8 (10)			Δt = 50°C (90°F)	E_t ≥ 77%(3)
Oil-fired, instantaneous	≤ 61.5 kW(4)	—	—	—	DOE 10 CFR, Part 430, Subpart B, Appendix E	—	EF ≥ 0.59 − 0.0005 V_m
	Others	—	—	< 310 (4000)	ANSI Z21.10.3/CSA 4.3	Δt = 50°C (90°F)	E_t ≥ 78%(3) SL ≤ 1.3 + 95/V_t(2)
			< 37.8 (10)	≥ 310 (4000)		—	E_t ≥ 80%(3)
			≥ 37.8 (10)			Δt = 50°C (90°F)	E_t ≥ 77% SL ≤ 2.3 + 67/V_t(2)
Oil-fired, storage-type	≤ 30.5 kW	≤ 190	—	—	CAN/CSA-B211	—	EF ≥ 0.55
		> 190			DOE 10 CFR, Part 430, Subpart B, Appendix E		
	> 30.5 kW	> 190	—	< 310 (4000)	ANSI Z21.10.3/CSA 4.3	Δt = 50°C (90°F)	EF ≥ 0.55
			< 37.8 (10)	≥ 310 (4000)		—	EF ≥ 0.55
			≥ 37.8 (10)			Δt = 50°C (90°F)	EF ≥ 0.55 SL ≤ 2.3 + 67/V_t(2)
Pool Heaters							
Component	Input	Capacity, L	V_t, L (US gal.)	Input/V_t, W/L (Btu/h/US gal.)	Standard	Rating Conditions	Performance Requirement(1)
Gas-fired(2)	< 117.2 kW	—	—	—	ANSI Z21.56/CSA 4.7	—	E_t ≥ 78%
Oil-fired	—						E_t ≥ 78%(3)

Notes to Table 6.2.2.1.:

(1) The symbols and abbreviations used in this column have the following meanings:

V_t = tank storage volume, in L, as measured according to the referenced standard
SL = *standby losses,* in %/h or in W, depending on standard
E_t = *thermal efficiency* with 38.9°C (70°F) water temperature difference
EF = *energy factor*, in %/h
V = storage volume, in L, as specified by the manufacturer

6.2.4.3. Maintaining Temperature of Hot Service Water

1) Heating elements installed along *service water* heating system pipes to maintain the water temperature shall incorporate automatic controls that maintain the temperature of the hot water within the range required for the intended use.

6.2.5. Systems with More Than One End Use Design Temperature

6.2.5.1. Remote or Booster Heaters

1) Where less than 50% of the total design flow of a *service water* heating system has a design discharge temperature higher than 60°C, separate remote heaters or booster heaters shall be installed for those portions of the system with a design temperature higher than 60°C. (See Appendix A.)

6.2.6. Hot Service Water

6.2.6.1. Showers

1) Individual shower heads used for reasons other than safety shall have an integral means of limiting the maximum water discharge to 9.5 L/min when tested in accordance with

a) ASME A112.18.1/CAN/CSA-B125.1, "Plumbing Supply Fittings," or
b) CAN/CSA-B125.3, "Plumbing Fittings."

(See Appendix A.)

2) Where multiple shower heads are served by one temperature control, each shower head shall be equipped with a device capable of automatically shutting off the flow of water when the shower is not in use. (See Appendix A.)

6.2.6.2. Lavatories

1) Lavatory faucets shall have an integral means of limiting the maximum hot water discharge to 8.3 L/min when tested in accordance with

a) ASME A112.18.1/CAN/CSA-B125.1, "Plumbing Supply Fittings," or
b) CAN/CSA-B125.3, "Plumbing Fittings."

2) Each lavatory in a public access washroom in a *building* of *assembly occupancy* shall be equipped with a device capable of automatically shutting off the flow of water when the lavatory is not in use. (See Appendix A.)

6.2.7. Swimming Pools

6.2.7.1. Controls

1) Pool heaters shall be equipped with a readily accessible and clearly labelled device that allows

a) the heater to be shut off without adjusting the thermostat setting, and
b) where applicable, the heater to be restarted without manually relighting the pilot light.

2) Except for pool pumps required by public health standards to operate on a 24-h basis, swimming pool pumps and swimming pool heaters shall be equipped with time switches or other controls that can be set to automatically turn off the pumps and heaters when their operation is not required.

6.2.7.2. Pool and Hot Tub Covers

1) Heated outdoor swimming pools and tubs shall be equipped with covers capable of covering at least 90% of the water surface.

2) Where pools or tubs are heated to a temperature above 32°C, the covers described in Sentence (1) shall have a nominal thermal transmittance of no more than 0.48 $W/m^2 \cdot °C$.

Section 6.3. Trade-off Path

(See A-1.1.2.1. in Appendix A.)

6.3.1. General

6.3.1.1. Application

1) Except as provided in Article 6.3.1.2., this Section applies only to *buildings*
a) whose *occupancy* is known,
b) for which sufficient information is known from the specifications for the *service water* heating (SWH) components listed in Article 6.3.2.2., and
c) whose SWH system meets the following criteria:
   i) it is one of the types listed in Table 6.3.1.1.,
   ii) its heating energy type is natural gas, propane, fuel oil or electricity, and
   iii) its heat pump energy type is electricity.

Table 6.3.1.1.
Types of SWH System
Forming Part of Sentence 6.3.1.1.(1)

SWH System Type ID	SWH System Type Description
SWH-1	Tank
SWH-2	Tankless (Instantaneous)
SWH-3	Space-heating *boiler*

6.3.1.2. Application Limitation

1) This Section does not apply to back-up SWH systems, which shall comply with Sentence 6.1.1.3.(2).

6.3.1.3. Compliance

1) A SWH system shall be deemed to comply with Section 6.3. if its SWH trade-off index, SWH-TOI, as calculated in accordance with Subsection 6.3.2., is greater than or equal to 0.

6.3.2. Calculation of Service Water Heating Trade-off Index

6.3.2.1. SWH Trade-off Index

1) The *service water* heating trade-off index, SWH-TOI, for an SWH-1 tank system shall be calculated using the following equation:

$$\mathrm{SWH-TOI} = 2.813 \cdot \left\{ \begin{array}{l} \dfrac{2.813 \cdot \mathrm{PDR}}{\mathrm{ToV}_1} \cdot \left\{1 - 0.6514 \cdot \mathrm{ToV}_6 \cdot \mathrm{e}^{-0.312 \cdot \mathrm{ToV}_6}\right\} \\ \qquad +0.06153 \cdot \left(\dfrac{\mathrm{A_{norm}}}{\mathrm{ToV}_2} + \dfrac{26.180}{\mathrm{ToV}_3}\right) + \dfrac{0.00677}{\mathrm{ToV}_4 \cdot \mathrm{ToV}_5} \end{array} \right\}^{-1}$$
$$-2.813 \cdot \left\{ \frac{2.813}{\eta_{\mathrm{ref}}} + 0.06153 \cdot \left(\frac{\mathrm{A_{norm}}}{12.4} + 6.807\right) + 0.0141 \right\}^{-1}$$

where
PDR = peak daily flow ratio, determined as per Article 6.3.2.2.,
ToV_1 = *service water* heating equipment efficiency, determined as per Article 6.3.2.5.,
ToV_2 = tank insulation value, determined as per Article 6.3.2.5.,
ToV_3 = piping insulation value, determined as per Article 6.3.2.5.,
ToV_4 = pump motor efficiency, determined as per Article 6.3.2.5.,

A-4.2.2.9.(1) Double-counting Primary Sidelighted Areas. To avoid double-counting overlapping primary sidelighted areas,

- daylighting contribution to an area can only be counted once either from sidelighting or toplighting, and
- overlapping areas can be included in one primary sidelighted area only.

A-4.2.2.10. Calculation of Sidelighting Effective Aperture. The effective aperture of a sidelight approximates the percentage of available daylight that will reach the floor or task area in a space with windows. It is used to determine whether a daylighted space has enough daylight to justify the use of automatic daylighting controls.

A-4.2.3.1.(3) Lighting Power Allowances for Specific Building Exterior Applications. The lighting power allowance for each specific exterior application listed in Table 4.2.3.1.C. is non-transferable: no trading of allowances with other lighting applications is permitted (in other words, "use it or lose it"). Some or all of the basic site allowance may be applied to the specific lighting applications.

A-4.2.3.1.(4) Lighting Power Allowances for General Building Exterior Applications. The lighting power allowance for each general building exterior application plus the portion of the basic site allowance that remains unused following the application of Sentence 4.2.3.1.(3) may be shared among the applications listed in Table 4.2.3.1.D.

A-4.2.4.1.(3) Exterior Lighting Controls. Using controllable circuit breakers as a means of automatic control is only permitted when they are connected to sensors.

A-4.3.2.3.(2) Daylighted Area. If the space is illuminated by sidelighting and toplighting, only the dominant daylight supply should be used in the trade-off calculations.

Further, Table 4.3.2.8. provides daylight supply factors for the four cardinal directions only. If a daylighting source does not face an exact cardinal direction, the closest cardinal direction should be used in the trade-off calculations; if the daylighting source faces a direction that is exactly halfway between two cardinal directions (e.g. a wall facing exactly south-east, which is equally close to the south and the east), the most advantageous direction for the purpose of the trade-off calculations can be chosen.

A-Table 4.3.2.8. Design Illuminances. Recommendations for design illuminances for various space types can be found in the IESNA Lighting Handbook. These recommended illuminance levels ensure that visual tasks can be safely performed in a given space. The design illuminance values can be modified from the recommended levels where specific visual tasks require different illuminances.

For design illuminances below 300 lx, the 300 lx values should be used. For design illuminances between the levels listed in Table 4.3.2.8., the raw daylight supply factor can be determined using linear interpolation. For design illuminances above 1 000 lx, the raw daylight supply factor cannot be extrapolated.

A-4.3.3.7.(4) Daylight System Control Factor for the Reference Building. Although many shading system options can be modeled in the reference building, for the purpose of the trade-off path calculations, all spaces in the reference building are considered to have a shading system equivalent to manually-controlled interior blinds, which have a C_{DL} factor of 0.5 according to Table 4.3.2.7.A.

A-5.1.1.2.(2) Exemptions. Since any list of potentially exempted spaces or equipment would necessarily be incomplete, only a broad exemption statement can be provided in the Code. One example of a space that could be exempted from complying with certain Part 5 requirements is a building or room in which the processes or activities call for temperature or humidity conditions outside the normal range required for comfort.

A-5.1.1.3.(1) Compliance. The flow chart in Figure A-5.1.1.3.(1) illustrates the process for all three paths of compliance applicable to Part 5.

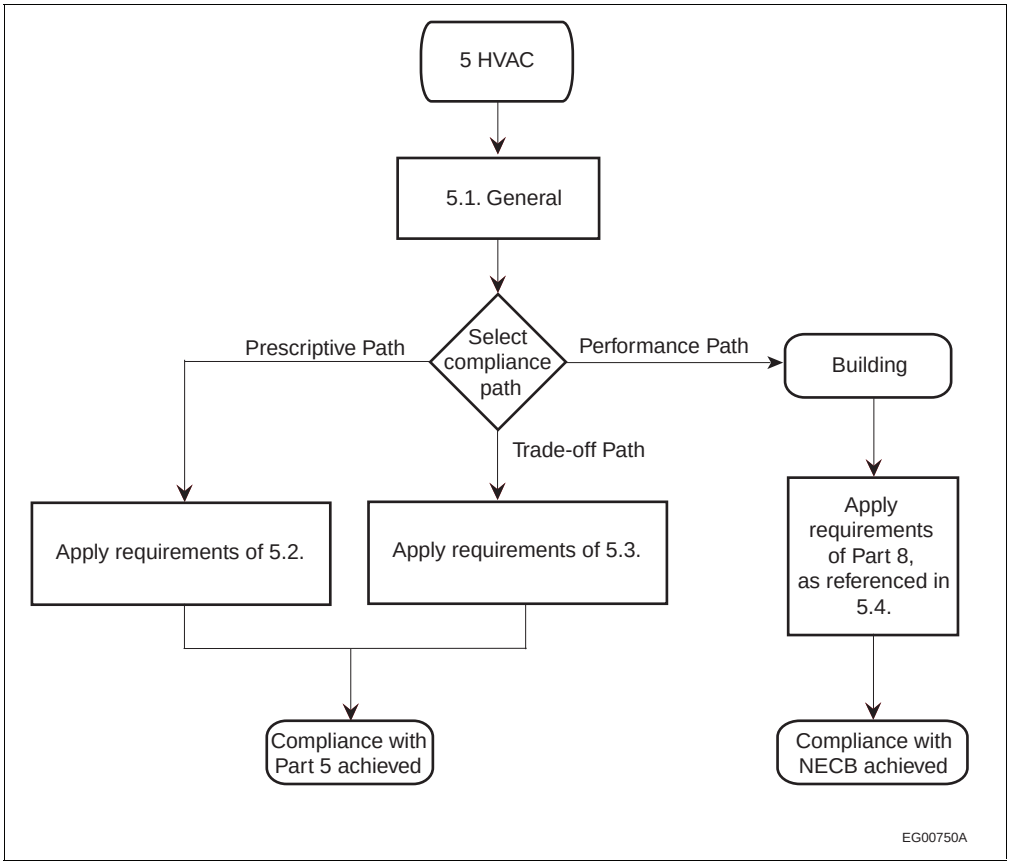

Figure A-5.1.1.3.(1)
Code compliance paths for HVAC

A-5.2.1.1.(1) Load Calculations. ASHRAE Handbooks and Standards and, for smaller buildings, the HRAI Digest, are also useful sources of information on HVAC systems.

A-5.2.2.1.(1) Design and Installation of Ducts. The following publications are a useful source of additional information on this subject:

- Publications by ASHRAE:
  –the ASHRAE Handbooks
- Publications by SMACNA:
  –HVAC Duct Construction Standards — Metal and Flexible
  –Fibrous Glass Duct Construction Standards
  –HVAC Systems — Duct Design
  –HVAC Air Duct Leakage Test Manual

A-5.2.2.2.(1) Provision for Balancing. Balancing an air distribution system is a means of fine-tuning it so that the correct amount of air for which the heating, ventilating or air-conditioning system is designed can be delivered. Except for systems having some other means of air-volume control, such as variable air-volume systems, major supply air ducts such as main, sub-main or branch ducts intended to carry conditioned air must contain air-volume balancing dampers capable of being set for specified airflows.

A-5.2.2.3.(1) SMACNA Duct Sealing Classification. Table A-5.2.2.3.(1) provides examples of how to achieve the SMACNA air duct leakage seal classes.

Table A-5.2.2.3.(1)
SMACNA Duct Sealing Classification

Static Pressure Class	Seal Class	Description
≤ 2	C	Sealing required at transverse joints
> 2 and < 4	B	Sealing required at all transverse joints and longitudinal seams
≥ 4	A	Sealing required at all transverse joints, longitudinal seams and duct wall penetrations

A-5.2.2.3.(4) Duct Sealing Exemption. The exemption afforded by Sentence 5.2.2.3.(4) does not apply to ducts in ceiling plenums or other service spaces that are immediately adjacent to the conditioned space served by the ducts.

The rationale behind the exemption from compliance with Sentence 5.2.2.3.(1) is that the energy penalty would be insignificant if a little supply air from a duct located in the same conditioned space to which it is supplying air leaks into the conditioned space before it gets to the diffuser. However, if there is a controlled element, such as a reheat coil, mixing box or variable-air-volume box or a damper, between the leak and the diffuser, a more significant energy loss may result; these types of elements are therefore required to comply with Sentence 5.2.2.3.(1).

A-5.2.2.4.(1) Leakage Testing of Ducts. The choice of ducts to be tested is left to the authority having jurisdiction.

A-5.2.2.5.(6) and 5.2.5.3.(8) Installation Standards. For the purposes of Sentences 5.2.2.5.(6) and 5.2.5.3.(8), "good practice" includes the TIAC Best Practices Guide.

A-5.2.2.8.(1) High-Limit Shut-off. All air economizers should be capable of automatically reducing outdoor air intake to the design minimum outdoor air quantity when outdoor air intake no longer reduces cooling energy usage. Table A-5.2.2.8.(1) shows the high-limit shut-off settings for different types of air economizers.

Table A-5.2.2.8.(1)
High-Limit Shut-off (HLSO) Control Settings for Air Economizers

Type of HLSO Control(1)	Conditions at which Air Economizer Turns Off	
	Equation(2)	Description
Fixed dry bulb	T_{OA} > 24°C (dry climate)	Outdoor air temperature exceeds 24°C
	T_{OA} > 18°C (humid climate)	Outdoor air temperature exceeds 18°C
Differential dry bulb	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Electronic enthalpy(3)	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the "A" setpoint curve(4)
Differential enthalpy	$h_{OA} > h_{RA}$	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry-bulb temperatures	DP_{oa} > 13°C or T_{oa} > 24°C	Outdoor air dry bulb exceeds 24°C or outside dew point exceeds 13°C (65 gr/lb)

Notes to Table A-5.2.2.8.(1):

(1) Fixed enthalpy is a prohibited type of control for the climate zones to which the NECB applies, namely zones 4 to 8.

(2) T_{OA} = temperature outdoor air; T_{RA} = temperature return air; h_{OA} = enthalpy outdoor air; RH_{OA} = relative humidity outdoor air; h_{RA} = enthalpy return air; DP_{OA} = dew point outdoor air

(3) Electronic enthalpy controls use a combination of humidity and dry-bulb temperature in their switching algorithm.

(4) Setpoint "A" corresponds to a curve on the psychrometric chart that goes through a point at approximately 24°C and 40% relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

A-5.2.2.8.(2) Outdoor Air Intake for Acceptable Indoor Air Quality. Outdoor air requirements for acceptable indoor air quality are covered in Part 6 of Division B of the NBC.

A-5.2.2.8.(6) Controls to Allow Proper Operation of Direct Expansion Systems. Preventing frost build-up on coils is an example of how the controls referred to in Sentence 5.2.2.8.(6) enable the proper operation of the equipment.

A-5.2.3.1.(2) Fan System Design. Although the allowed maximum power demand of a fan system is based solely on the supply airflow, the calculation of actual power demand includes supply fans, return fans, relief fans, and fans for series fan-powered boxes, but not parallel-powered boxes or exhaust fans such as bathroom or laboratory exhausts.

A-5.2.3.2.(1) Constant-Volume Fan Systems. This type of system includes bypass variable-air-volume systems in which the airflow through the fan is not varied.

Both supply and return fans must be accounted for, but not exhaust fans.

The power demand of the motors refers to the power drawn by the motors and not their nameplate rating.

A-5.2.3.3.(1) Variable-Air-Volume Fan Systems. The power demand of supply, relief and return fans—but not that of exhaust fans—must be accounted for in Sentence 5.2.3.2.(1).

The power demand of fans for series-fan-powered boxes—but not that of fans in parallel-fan-powered boxes—must be accounted for in Sentence 5.2.3.2.(1).

The power demand of the motors refers to the power drawn by the motors and not their nameplate rating.

A-5.2.5.2.(1) Provision for Balancing. Balancing a hydronic system is a means of fine-tuning it so that the correct amount of fluid for which the system is designed can be delivered to each of the sectors served. Pumps and major circuit divisions must be installed with adequate access to the fluid to measure differential pressure or flow, and must be equipped with a means of adjusting the flow.

The following publications are useful sources of information on hydronic systems:
- ANSI/ASHRAE 111, "Measurement, Testing, Adjusting and Balancing of Building HVAC Systems"
- the ASHRAE Handbooks
- publications by the National Environmental Balancing Bureau

A-5.2.6.2.(1) Variable-Flow Pumping Systems. Flow may be varied by one of several methods such as variable-speed-driven pumps, staged multiple pumps or pumps riding their characteristic performance curves, etc. Sentence 5.2.6.2.(1) reduces the use of three-way valves.

A-5.2.8.3.(1) Mounting Height and Location of Thermostats.

Mounting Height of Thermostats

Article 3.8.1.5. of Division B of the NBC contains a specific requirement regarding the mounting height of thermostats located in a barrier-free path of travel; the use of thermostats with separate sensors and controls may be the best option in such spaces.

Location of Thermostats

Examples of locations to be avoided are exterior walls and locations near exterior entrances, corners and within throw of supply air diffusers. Installation should include all necessary settings and adjustments, including, in the case of electric heaters, setting of the heat anticipator to match the capacity of the heaters being controlled, as required on some thermostats for performance certification.

A-5.2.8.4.(1) Supplementary Heater. For the purposes of Sentence 5.2.8.4.(1) and Clause 5.2.11.1.(2)(e), "supplementary" heat or heater refers to the provision of heat over and above the capacity of the heat pump in order to meet peak heating load demand.