



EnergyAction

Building Performance Improvements from NCC2019

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Overview

This presentation shows recommendations to the ABCB only, which is not necessarily what the code will be.

- > Measures:
 - Insulation
 - Glazing
 - Fans & pumps
 - Chillers and boilers
 - Cooling towers
 - Services insulation
 - Economy cycle
 - Outside air treatment
 - Lighting
 - Lifts

- > Overall impacts

Insulation

- > Requirement for light coloured roofs (CZ1-7)
- > Basic insulation levels unchanged
 - Except for walls, some reductions in requirement
- > Simplified presentation, adjustments removed
- > New thermal bridging material proposed for Specifications:
 - Existing provisions so well buried that no-one knows what they are!
 - Not a stringency change to the Code but significant ramifications for some construction practices
 - And important for simulators, who routinely get this wrong

Glazing Requirements (daytime operating buildings)

Total U value of window+frame+wall

	East		North		South		West	
	U_Total	SHGC x WWR	U_Total	SHGC x WWR	U_Total	SHGC x WWR	U_Total	SHGC x WWR
CZ1	2.5	0.16	2.5	0.16	2.5	0.16	2.5	0.16
CZ2	2.5	0.13	2.5	0.13	2.5	0.13	2.5	0.13
CZ3	2.5	0.16	2.5	0.16	2.5	0.16	2.5	0.16
CZ4	2.5	0.13	2.5	0.13	2.5	0.13	2.5	0.13
CZ5	2.5	0.13	2.5	0.13	2.5	0.13	2.5	0.13
CZ6	2.5	0.13	2.5	0.13	2.5	0.13	2.5	0.13
CZ7	2.5	0.13	2.5	0.13	2.5	0.13	2.5	0.13
CZ8	2.5	0.20	2.5	0.20	2.5	0.42	2.5	0.36

Total SHGC of window+frame+wall

Glazing Requirements (overnight operating buildings)

	East		North		South		West	
	U_Total	SHGC x WWR	U_Total	SHGC x WWR	U_Total	SHGC x WWR	U_Total	SHGC x WWR
CZ1	1.1	0.11	1.1	0.11	2.5	0.16	1.1	0.11
CZ2	2.5	0.16	2.5	0.16	2.5	0.16	2.5	0.16
CZ3	1.1	0.11	1.1	0.11	1.1	0.11	1.1	0.11
CZ4	1.1	0.11	1.1	0.11	0.9	0.11	1.1	0.11
CZ5	2.5	0.16	2.5	0.16	2.5	0.16	2.5	0.16
CZ6	1.1	0.11	1.1	0.11	0.9	0.11	1.1	0.11
CZ7	0.9	0.11	1.1	0.11	0.9	0.13	0.9	0.11
CZ8	0.6	0.13	0.6	0.13	0.6	0.13	0.6	0.13

Fans

- > Maximum straight Duct pressure drop: 1Pa/m
- > Turning vanes in bends

Fan type	High efficiency grade (N)	
	Installation category A or C	Installation category A or C
Axial fan*	42.0	61.0
Centrifugal forward-curved fan	46.0	51.5
Centrifugal radial bladed fan	46.0	51.5
Centrifugal backward-curved fan	64.0	64.0
Mixed-flow fan*	52.5	65.0

Filter/coil arrangement in a fan system	Max average face velocity (m/s)
Coil only	2.50m/s
Filter only	2.50m/s
Coil(s) + 1 filter	2.50m/s
Coil(s) + 2 filters	2.00m/s
HEPA filter	1.50m/s

Pumps

- > Minimum pump efficiency based on statistics of currently available product

- > Maximum pressure drop tables based on:
 - Distributive vs non-distributive
 - Hours of operation
 - Pipe diameter

Pipe and Duct Insulation – Proposed Stringencies

Pipes and Vessels

- > Simplification to 4 temperature categories
- > Increased insulation of LTHW pipes – R1.7 (R1.5)
- > Increased insulation for high temp (>85°C) pipes – R2.7 (R1-2.1)
- > Increased insulation for all heated vessels and heat exchangers – R3.0 (R1.4-2.7)
- > No other changes

Ducts

- > No changes proposed

Chillers and Hot Water Heaters – Proposed Stringencies

Chillers <350kW

- > Chillers <350kW
 - Air cooled: COP 3.0 IPLV 4.1 (2.5/3.4)
 - Water cooled: COP 4.8 IPLV 6.7 (4.2/5.2)

- > PAC Units >65kW
 - Air cooled COP 2.9 (2.6-2.8)
 - Water cooled TBA (2.6-2.8)

Hot Water Heaters

- > Minimum efficiency 86% (<500MJ/hr) – 90% (>500MJ/hr) (80-83%)
- > Excludes DHW units (MEPS)

Proposed: New requirements for chiller efficiency > 350kW

Cooling Towers Fan Power

> Simplified and made more stringent (mostly)

Tower Type	Induced draft	Forced draft
Open circuit cooling tower	10.4 W/kW ^(12.4)	19.5 W/kW ^(23.5)
Closed circuit cooling tower	16.9 W/kW ^(19.9)	No DTS option
Evaporative Condenser	11 W/kW ⁽¹⁸⁾	11 W/kW ⁽²²⁾

Economy Cycle

> Reduced stringency:

Climate Zone	Economy cycle required above cooling capacity
1	n/a (n/a)
2	n/a (50)
3	n/a (50)
4	120 (35)
5	80 (35)
6	55 (35)
7	70 (35)
8	170 (35)

Outside Air Treatment

> Increase in stringency

Region	HX/CO ₂	OA Flow
CZ1	CO ₂	>500 l/s
CZ2	Not required	n/a
CZ3	CO ₂	>1000 l/s
CZ4	HX or CO ₂	>500 l/s
CZ5	HX or CO ₂	>1000 l/s
CZ6	HX or CO ₂	>500 l/s
CZ7	HX or CO ₂	>250 l/s
CZ8	HX or CO ₂	>250 l/s

> Previously: 1000 l/s and <1m²/person

Artificial Lighting

- > Stringencies reset based on 2017 LED technology
- > Economic analysis allowed for learning rates on \$/lm and lm/W
- > Some sample figures:

Space Type	Illuminance	Max IPD W/m ²
Office	320	4.5 ⁽⁹⁾
Retail Display	240-500 on display	14 ⁽²²⁾
Various	40	1.5 ⁽⁵⁻⁶⁾
Various	80	2 ⁽⁵⁻⁷⁾

New Proposed Provision – Lifts

Standing Losses

Rated load (kg) as selected using ISO/CD 8100-32	Performance level (1=best, 7=worst) as defined by ISO 25745-2:2015
<=800	2
801 to <=2000	3
2001 to <= 4000	4
>4000	5

Lift Energy Efficiency

Usage Class as per ISO 25745-2:2015	Energy Efficiency Class (A=best, G=worst) as defined by ISO 25745-2:2015
1 to 4	C
>= 5	D

Impact on Building Energy Use

Location	Change in Annual Energy Use (%)			
	3A	5A	6B	9aC
Climate Zone 1	-10%	-32%	-37%	-41%
Climate Zone 2	-37%	-45%	-39%	-45%
Climate Zone 3	-31%	-38%	-39%	-49%
Climate Zone 4	-32%	-37%	-37%	-37%
Climate Zone 5	-36%	-43%	-43%	-43%
Climate Zone 6	-33%	-40%	-39%	-37%
Climate Zone 7	-35%	-44%	-38%	-18%
Climate Zone 8	4%	-13%	-28%	4%

These numbers are based on measures status as of May 2017 and will be updated to match subsequent changes

Impact on Building Greenhouse Emissions

Location	Change in Annual Energy Use (%)			
	3A	5A	6B	9aC
Climate Zone 1	-10%	-32%	-37%	-41%
Climate Zone 2	-37%	-45%	-40%	-46%
Climate Zone 3	-33%	-36%	-41%	-52%
Climate Zone 4	-39%	-39%	-41%	-44%
Climate Zone 5	-38%	-43%	-46%	-46%
Climate Zone 6	-43%	-46%	-46%	-48%
Climate Zone 7	-44%	-49%	-38%	-38%
Climate Zone 8	-34%	-38%	-31%	-31%

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Impact on Building Costs

	Change in Element Building Costs(%) (30% WWR/45% WWR)			
Location	3A	5A	6B	9aC
Climate Zone 1	-41/-5	-52/-20	-27/+13	-23/+25
Climate Zone 2	-35/+5	-33/+10	-28/+9	-30/+14
Climate Zone 3	-43/-9	-22/+26	-33/+2	-36/+2
Climate Zone 4	-48/-18	-38/+2	-25/+12	-26/+18
Climate Zone 5	-49/-19	-24/+25	-32/+4	-35/+4
Climate Zone 6	-43/-9	-29/+18	-17/+25	-19/+28
Climate Zone 7	-46/-13	-49/-19	-32/+2	-32/+2
Climate Zone 8	-49/-10	-43/-1	-34/+10	-27/+22

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Benefit Cost Ratios

Location	Benefit Cost Ratio (30% WWR/45% WWR)			
	3A	5A	6B	9aC
Climate Zone 1	N/N	N/N	N/3.4	N/1.1
Climate Zone 2	N/7.3	N/3.2	N/3.5	N/1.7
Climate Zone 3	N/N	N/1.0	N/21	N/12
Climate Zone 4	N/N	N/8.0	N/2.7	N/0.9
Climate Zone 5	N/N	N/1.1	N/10	N/3.8
Climate Zone 6	N/N	N/1.2	N/1.6	N/0.6
Climate Zone 7	N/N	N/N	N/13	N/3.9
Climate Zone 8	N/N	N/N	N/1.8	N/0.3

These numbers are based on measures status as of May 2017 and will be updated to match subsequent changes

Summary

- > Proposed changes in order to:
 - Clarify, simplify and shorten the code
 - Expand coverage
 - Increase stringency where appropriate
 - Encourage more use of the verification methods



Questions?



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