Code Requirements for Overheating Protection in New Residential Buildings

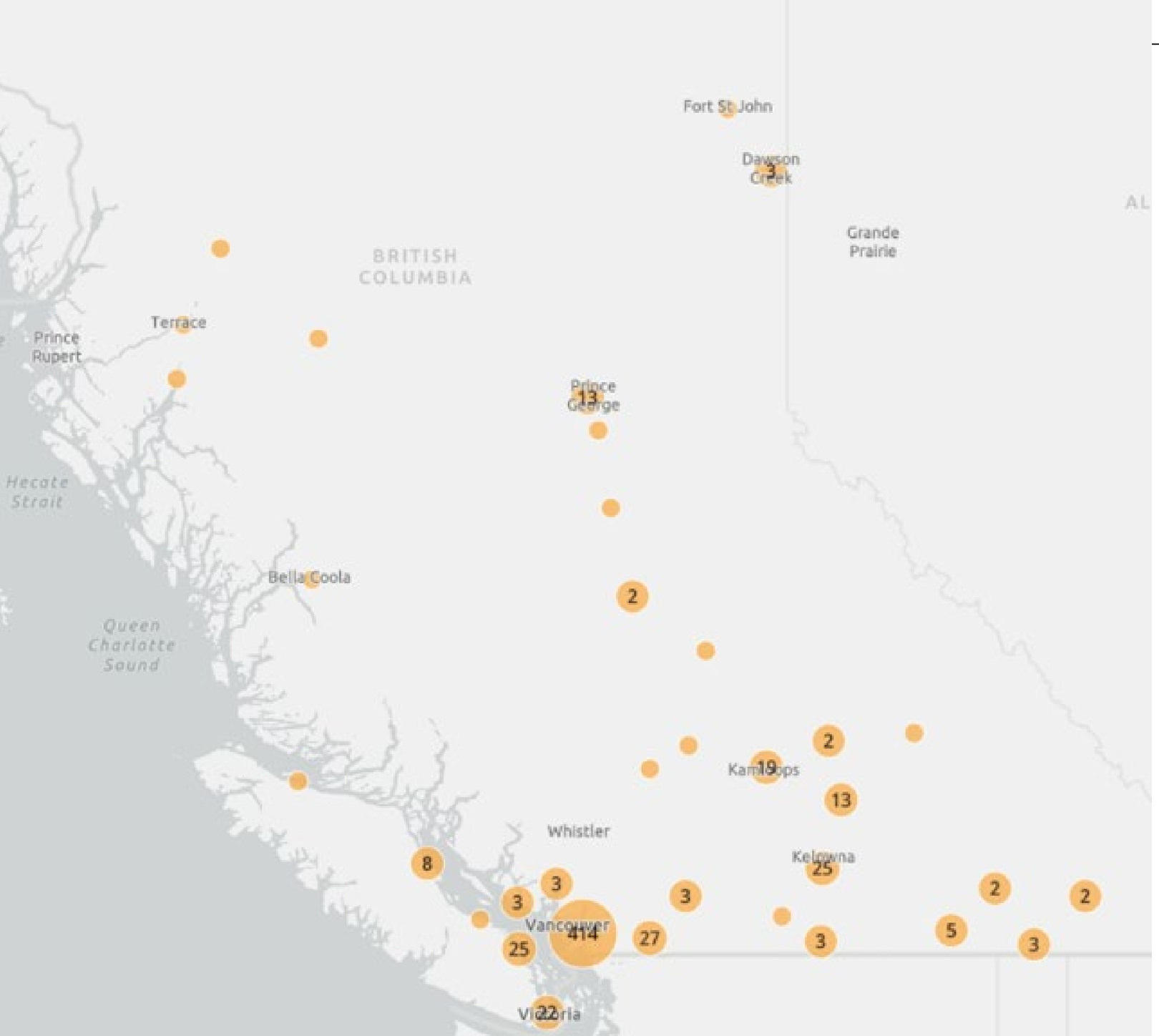
Why and How to Implement A Compliance Process

James Higgins, AScT | Associate, Senior Consultant
RDH Building Science Inc.
jhiggins@rdh.com

Neil Norris, P.Eng. | Principal, Specialist
RDH Building Science Inc.
nnorris@rdh.com

1

Overheating Protection is a life safety issue



619 people died during the 2021 BC Heat Dome

Report to the Chief Coroner of British Columbia, 2022, “Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in BC in Summer 2021”

New Code Requirements in the BCBC 2024

Part 9 (small and single-family homes):

At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of ***not more than 26°C*** *in at least one living space in each dwelling unit.*

(BCBC 9.33.3.1.(2))

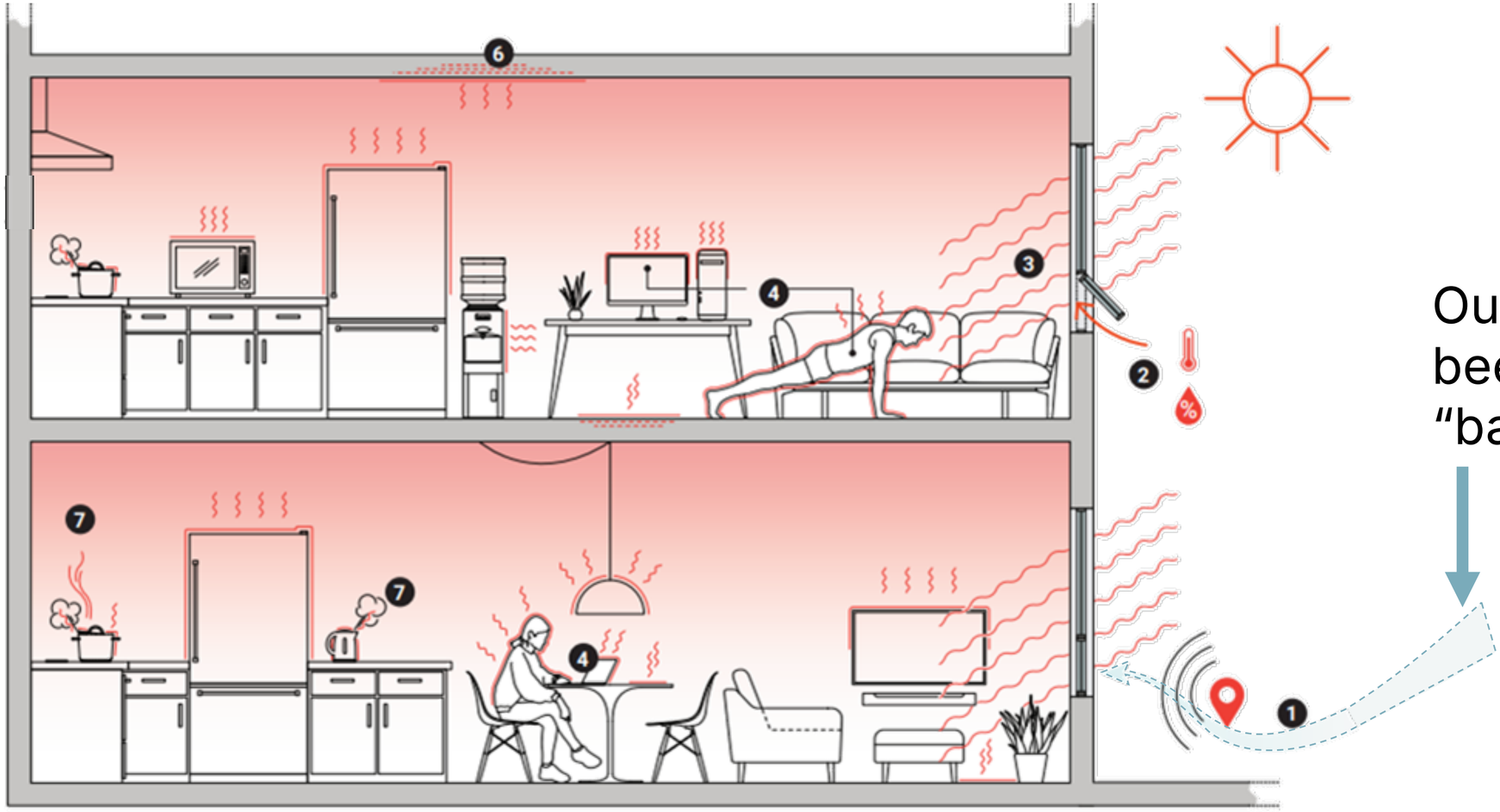
Part 3 (multi-unit and mixed-use residential buildings):

Indoor design temperatures for residential buildings shall be those established in ***Article 9.33.3.1.***

(BCBC 6.2.1.1.(2))

Why this Code Requirement Matters:

Cooling and overheating protection has not been a design or code compliance priority



Outdoor air has been the “backup plan”

BC Energy Step Code Design Guide
Supplement S3 on Overheating and Air Quality

Outdoor air has been the “backup plan”

Outdoor air has been the “backup plan”


Outdoor air has been the “backup plan”

2

Overheating Protection relies on a clear compliance process

Overheating Protection

Means:

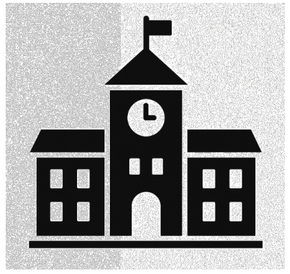
The building is designed and built with an active mechanical cooling system or passive features that can maintain max. 26°C for the conditions modelled.

Overheating Protection
Does Not Mean:

A universal perpetual guarantee that indoor temperatures will not ever reach above 26˚C under any conditions.

BUT

Local Governments are responsible for implementing a **clear** and **timely** Overheating Protection compliance process.



Is a single check box on the BP submission checklist a defensible compliance process?

*Cooling facilities can maintain an indoor air temperature of not more than **26°C** in at least one living space in each dwelling unit.*

(No)

BCBC Requirements for Heating and Cooling

Required Heating and Cooling Systems

*Except where [**CSA F280 sizing** or **good engineering practice**] can show it to be unnecessary, dwelling units…shall be equipped with cooling facilities conforming to this Section.*

(BCBC 9.33.2.1.(2))

BCBC 2024 Information Required for Proposed Work

General Information Required

Sufficient information shall be provided to show that the proposed work will conform to this code...

(BCBC 2.2.2.1.(1) Division C)

Part 9

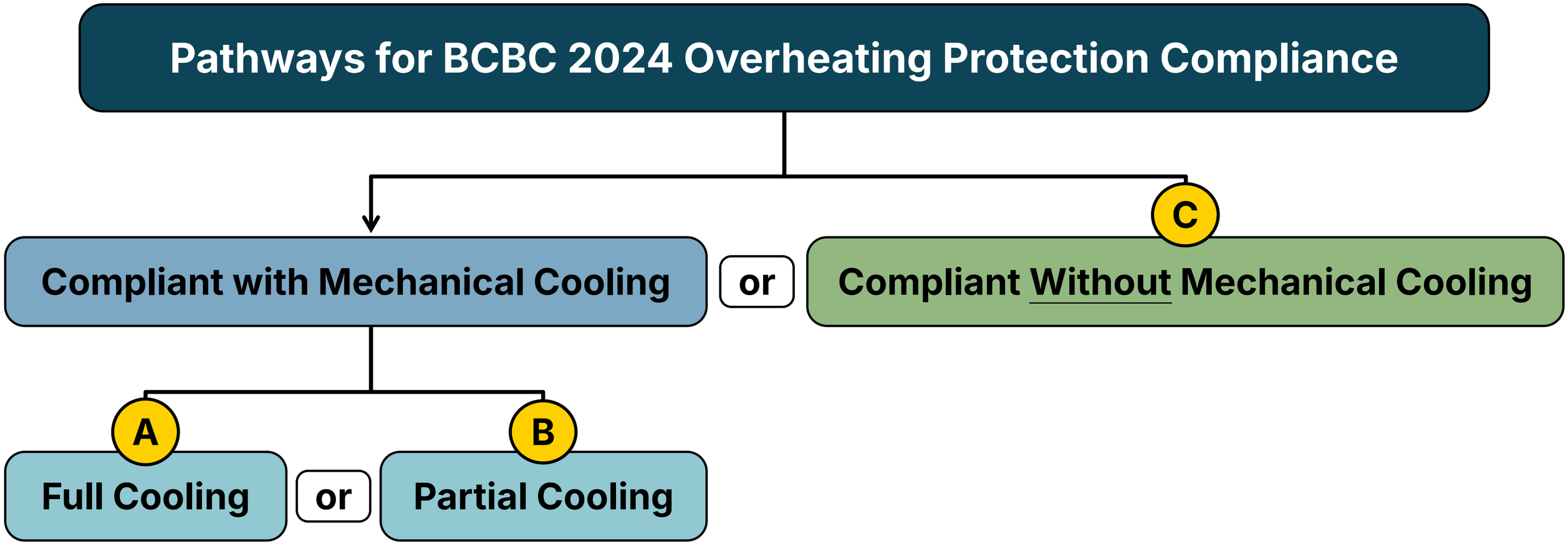
Pathways for BCBC 2024 Overheating Protection Compliance

Compliant with Mechanical Cooling **or** **Compliant Without Mechanical Cooling**

“equipped with cooling facilities”

“show it to be unnecessary”

Pathways for BCBC 2024 Overheating Protection Compliance



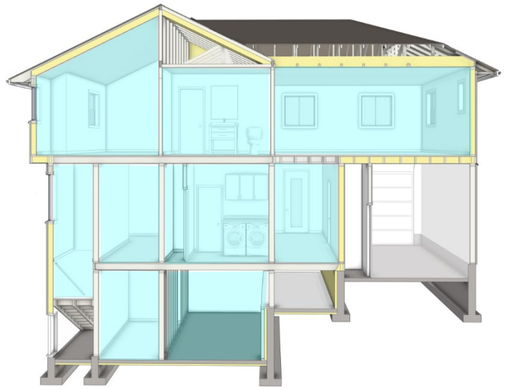
"at least one living space"

A

Full Cooling

Conventional approach

“Business-as-usual”



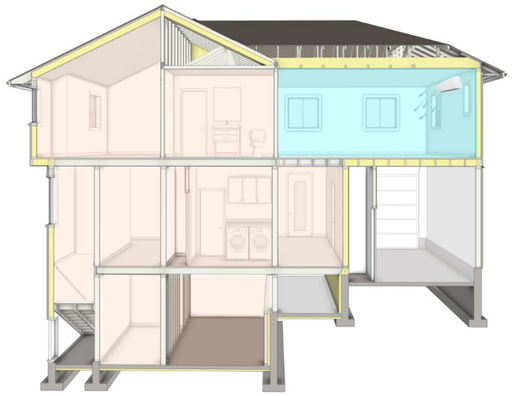
or

B

Partial Cooling

“**Cooling Zone**” approach

Extra steps for sizing and to show compliance



or

C

Without Mechanical Cooling

Not a common approach in most of BC

Realistically only by a **Registered Professional**

Section 743 LGA

A

Full Cooling

or

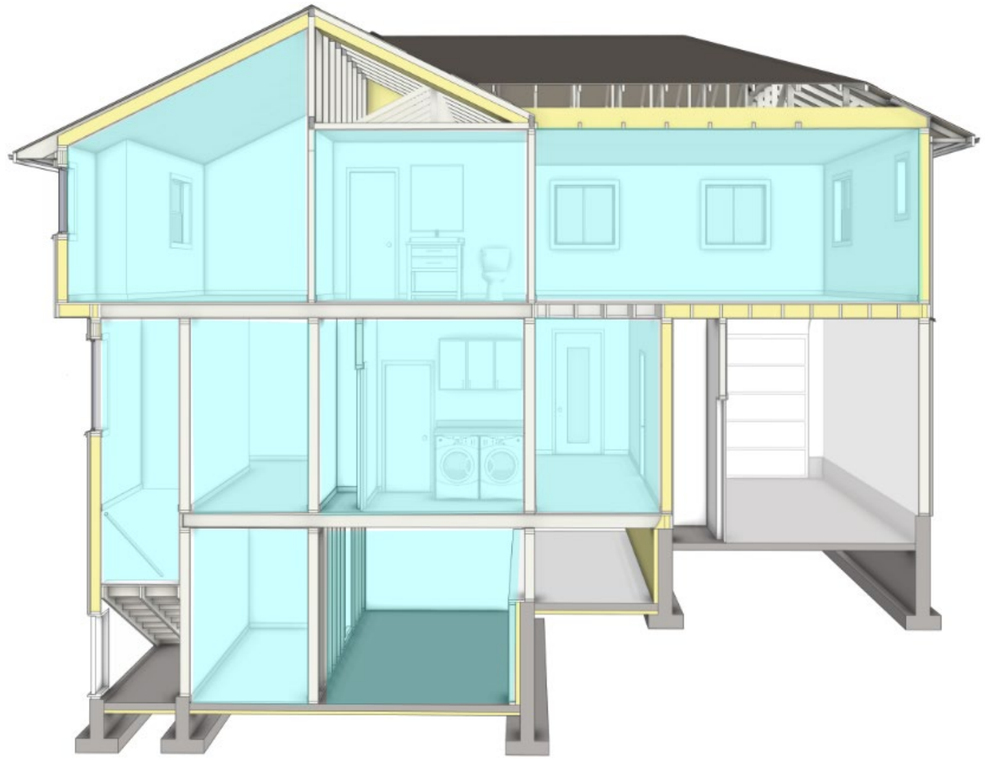
B

Partial Cooling

or

C

Without Mechanical Cooling



- Full mechanical cooling sized to CSA F280
- Typical sizing approach
  (Default 24˚C set point and 80% capacity)
- Same report as the heating CSA F280 sizing
- Fewest changes from conventional design

A

Full Cooling

or

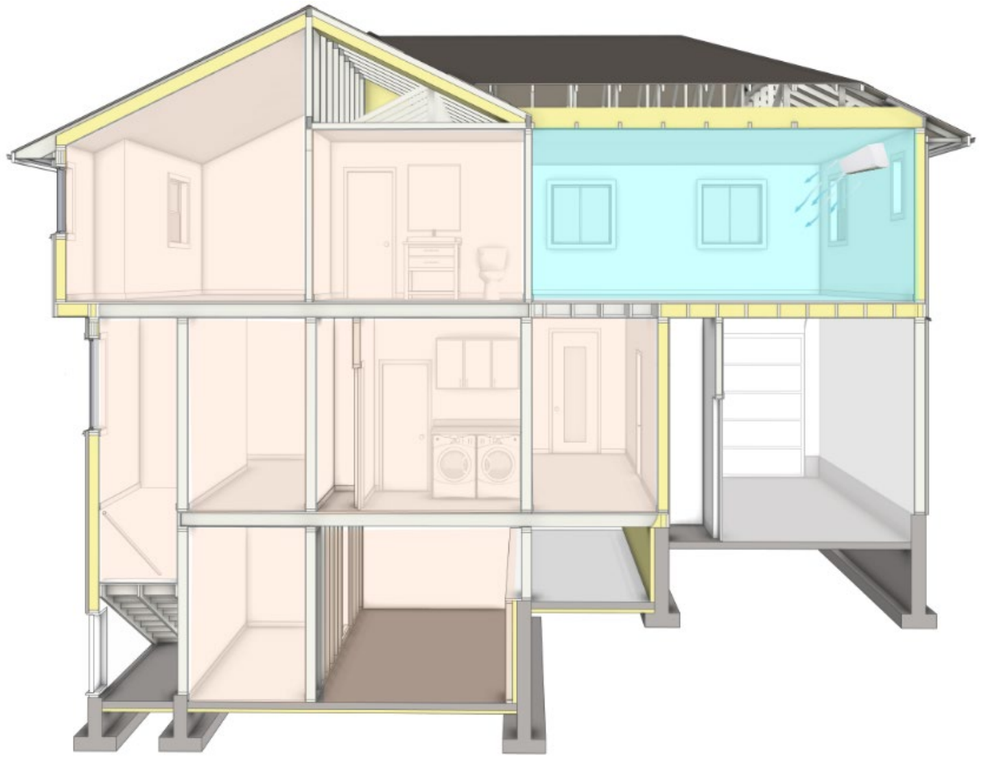
B

Partial Cooling

or

C

Without Mechanical Cooling



- Mechanical cooling in one room sized to CSA F280 with significant modifications
- Modifications to account for:
  - Separation from the rest of the unit.
  - Temperature of adjacent indoor spaces
  - Concentrated occupant load and heat gains
- Separate sizing report

A

Full Cooling

or

B

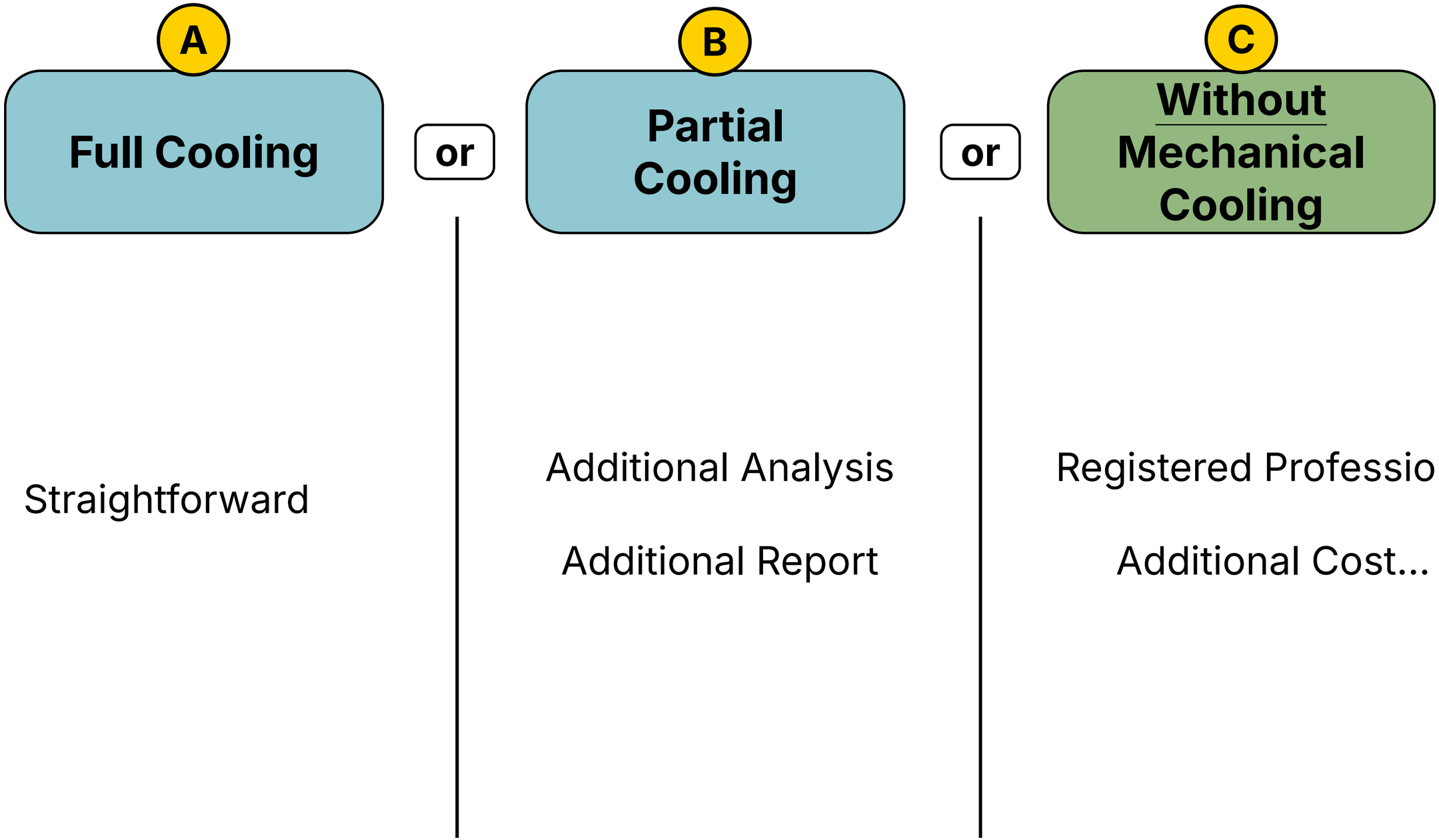
Partial Cooling

or

C

Without Mechanical Cooling

- Passive Only Overheating Protection designed according to good engineering practice:
  - Submitted by a Registered Professional
  - Following Part 6, Division B of the BCBC and using appropriate **hourly** modelling software and analysis


A
Full Cooling
or
B
Partial Cooling
or
C
Without Mechanical Cooling
Straightforward
Additional Analysis
Additional Report
Registered Professional
Additional Cost...

Part 3

Pathway for BCBC 2024 Overheating Protection Compliance

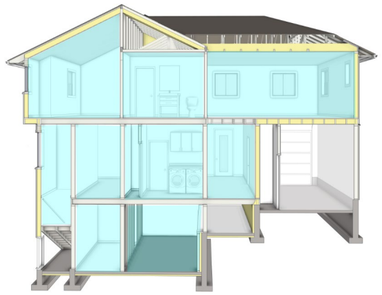
Good engineering practice by a Registered Professional

Summary of Pathways for BCBC 2024 Overheating Protection Compliance

Part 9

Part 3

Full Mechanical Cooling
Business as Usual

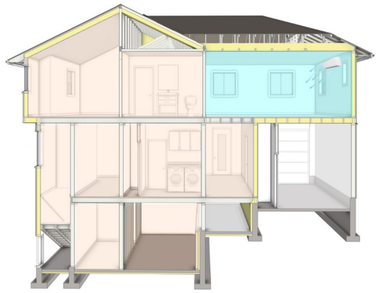


No Additional Documentation Required

- Calculated per CSA F280.
- Verified CSA F280 software.
- Indoor cooling setpoint ≤ 26˚C.
- Outdoor temp = AHJ value or 2.5% July dry-bulb.
- Internal loads included per CSA F280.
- Envelope inputs match permit.
- CSA F280 Summary Report provided.
- Proposed equipment identified.

or

Partial Mechanical Cooling
"Cooling Zone"



Additional Documentation Required

Same as Full Mechanical Cooling plus:

- Each unit has its own Cooling Zone
- Cooling Zone is a living space, accessible and fits all occupants.
- Calculated per CSDSB B25-03
- Zone separated from rest of dwelling.
- Full occupant load and adjacent heat gains included.
- Supplemental Cooling Zone compliance report provided.
- CSA F280 Summary Report shows equipment sized to 100% load.

or

Passive Only
No Mechanical Cooling

Registered Professional Required

- Designed by Registered Professional per BCBC Part 6.
- Hourly modelling tool validated to ASHRAE 140.
- Shading capability and supplemental analysis as needed.
- Modelling per COV EMGs.
- Envelope/assembly inputs match permit drawings.
- No occupant-controlled strategies.
- Sealed report provided with inputs, assumptions, results, and confirmation of ≤ 26˚C.
- Letters of Assurance for design and field review recommended.

Full Cooling | Partial Cooling | Passive Only

Registered Professional Required

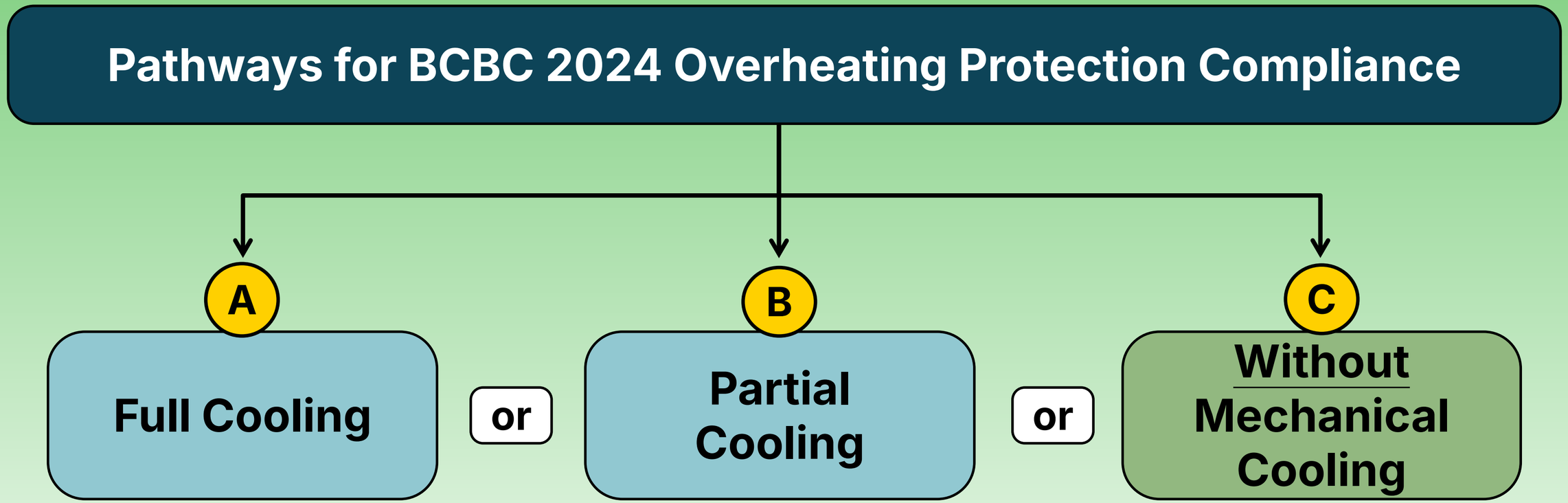
- Designed by a Registered Professional in accordance with good engineering practice and BCBC Part 6 requirements.
- Sealed report provided with inputs, assumptions, results, and confirmation of ≤ 26˚C.
- The report demonstrates that cooling equipment sizing is based on the applicable full, partial, or passive parameters, or on requirements specific to Part 3 buildings.
- Letters of Assurance for design and field review.

3

There are many compliant cooling approaches

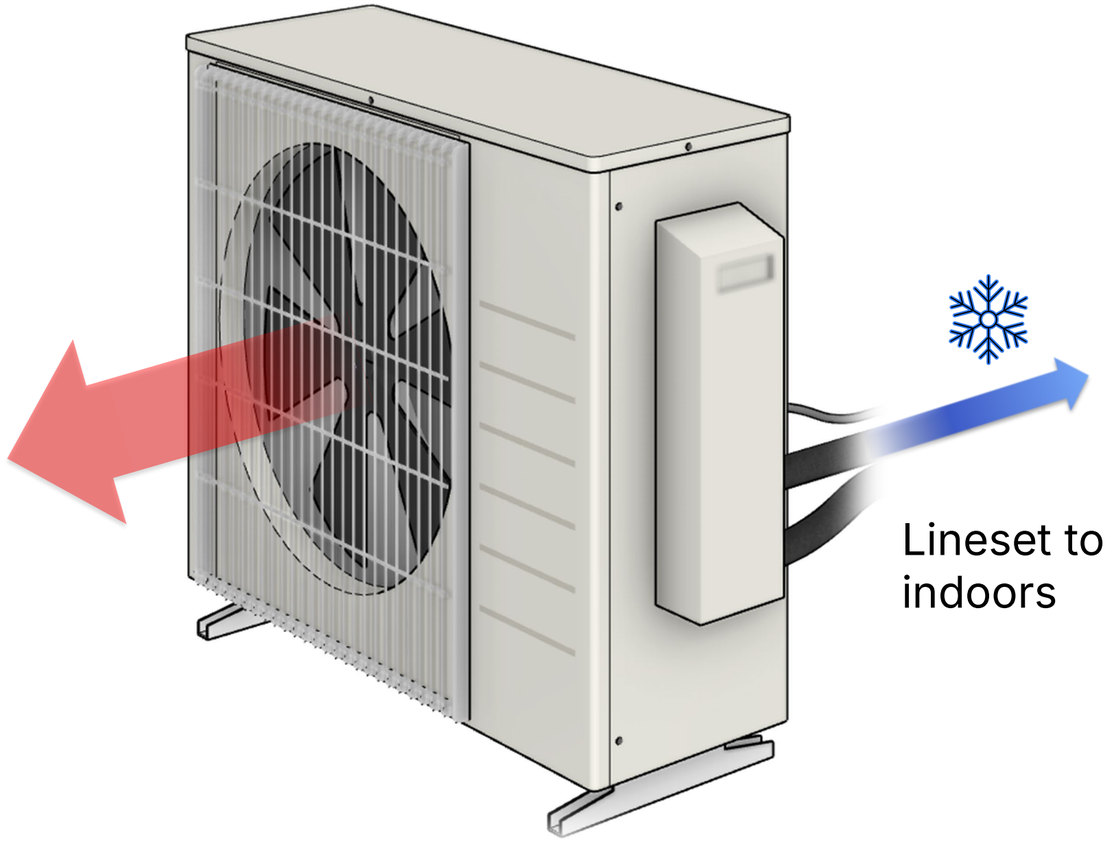
****Cooling Demand Reduction by Design is Always Recommended****

More on this later



Heat Pumps for Mechanical Cooling

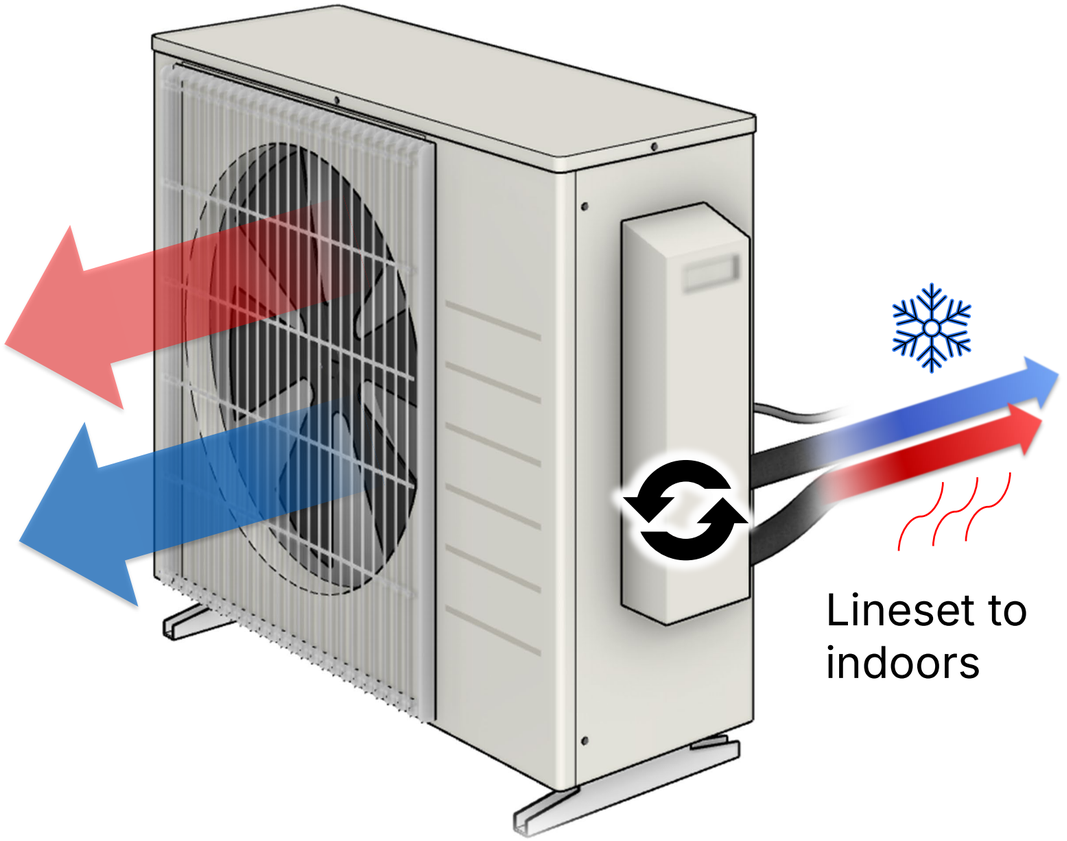
Air Conditioners Cool Only



A/C Outdoor Unit

or

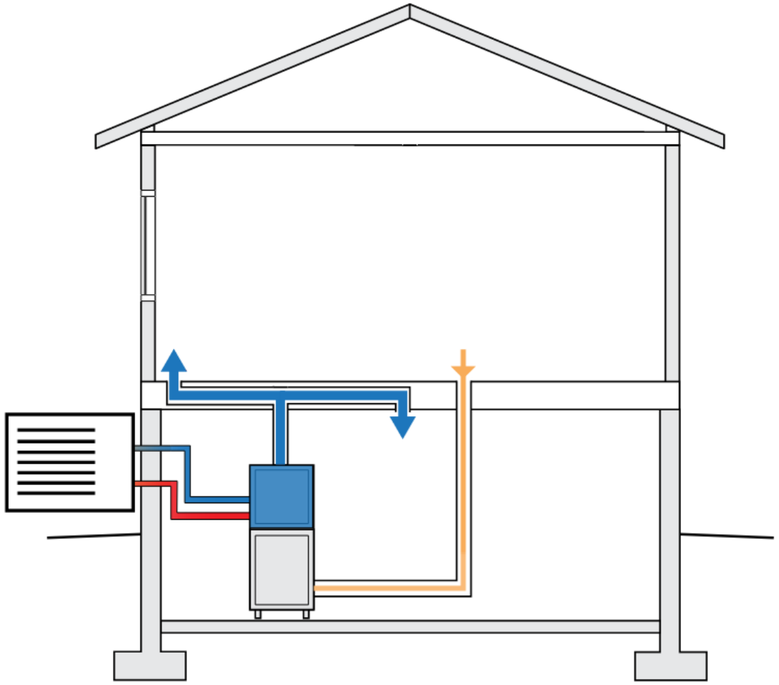
Heat Pumps Heat and Cool



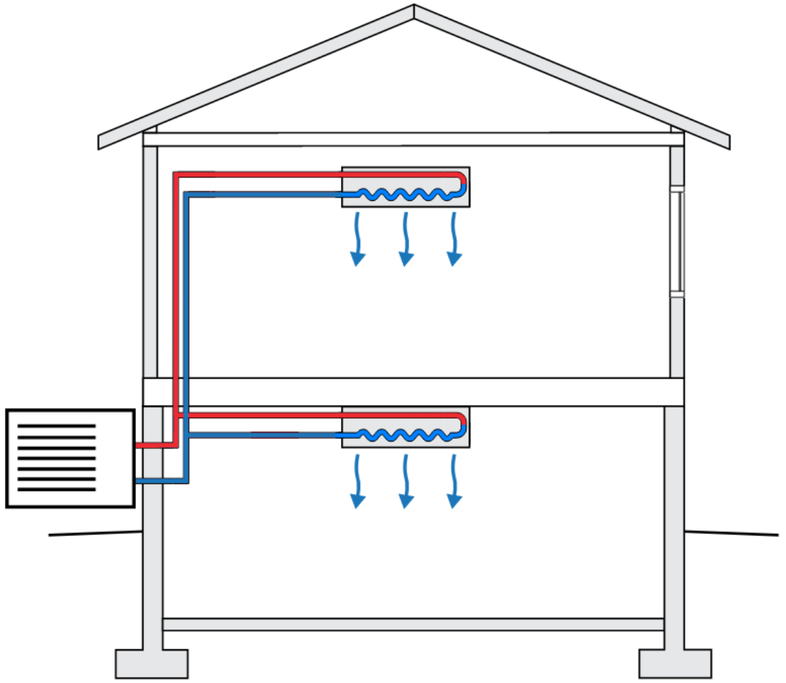
Heat Pump Outdoor Unit

Centralized Mechanical Cooling

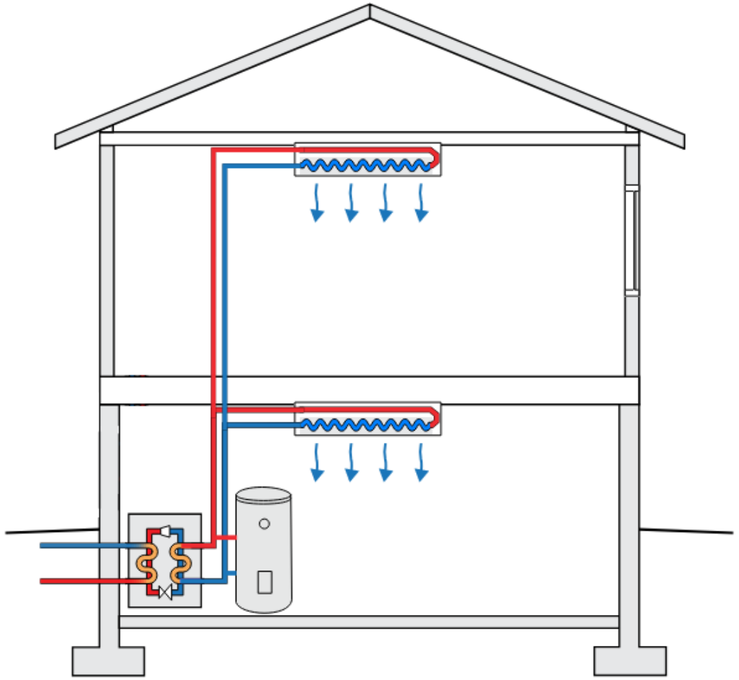
Typical for Full Cooling



Type 1: Forced Air



Type 2: Ductless Multi-Head

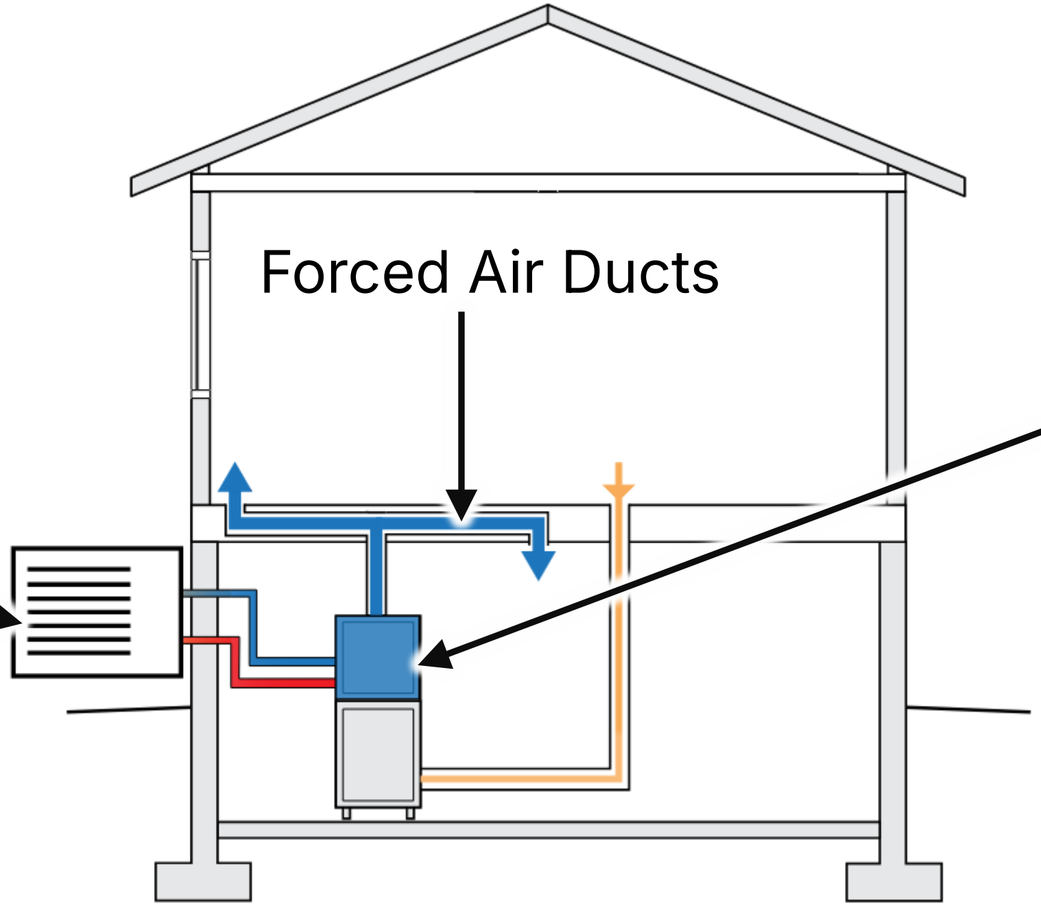


Type 3: Hydronic

Centralized Mechanical Cooling Type 1:

Forced Air

Outdoor Unit

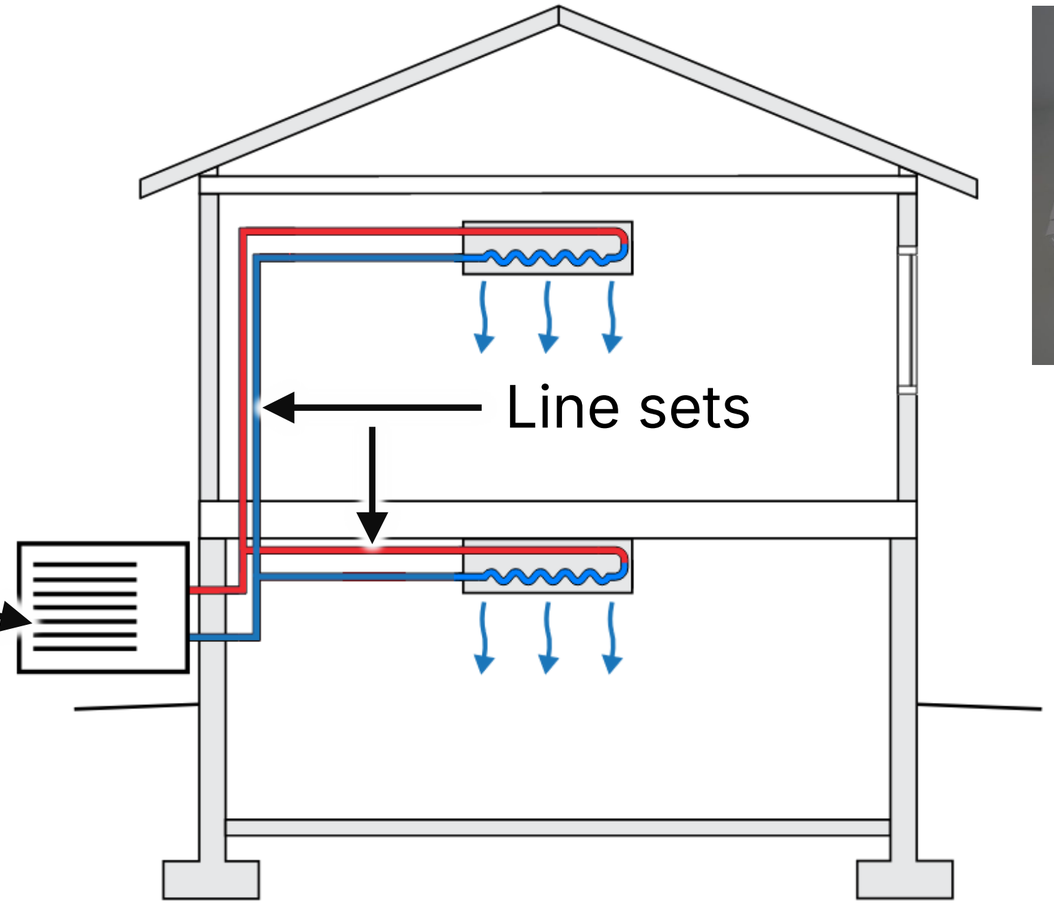


Heat Exchanger
on Air Handler

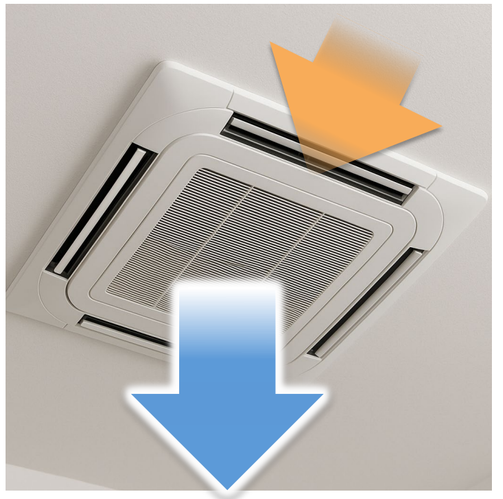
Centralized Mechanical Cooling Type 2:

Ductless Multi-Head

Outdoor Unit



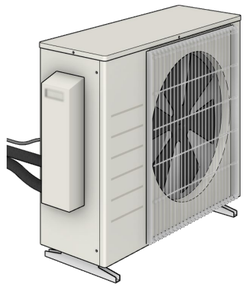
Interior Head



Ceiling Cassette

Centralized Mechanical Cooling Type 3:

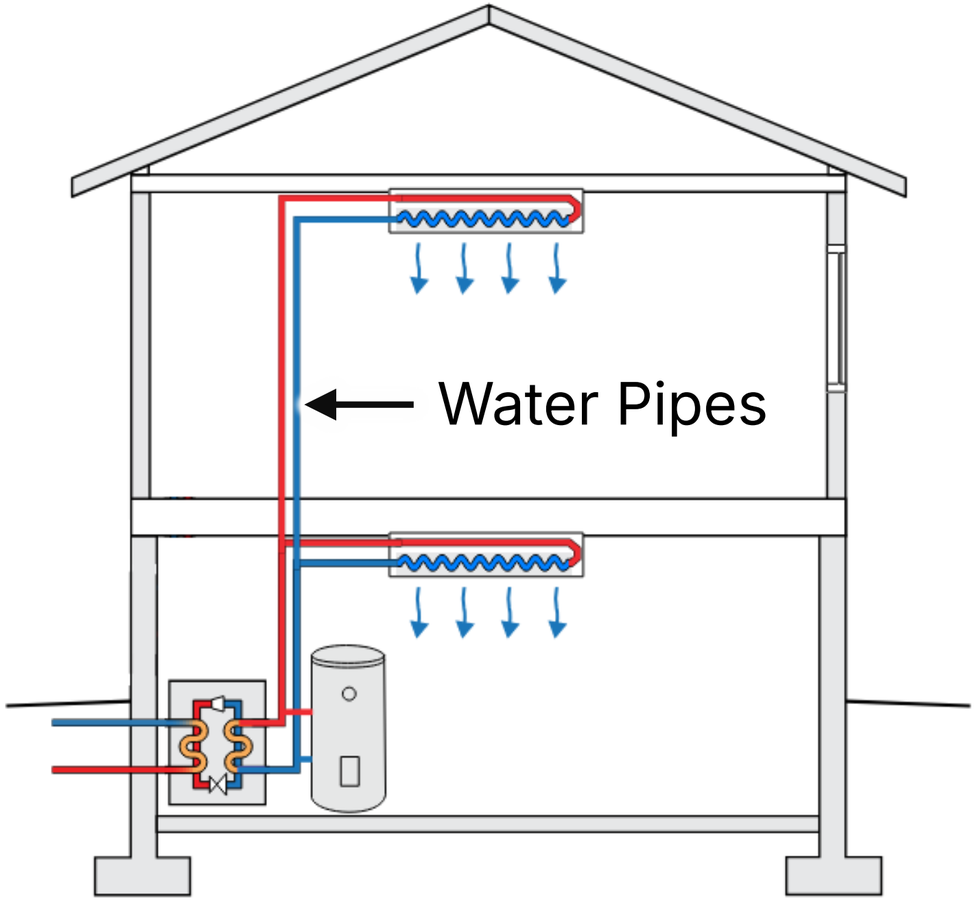
Hydronic

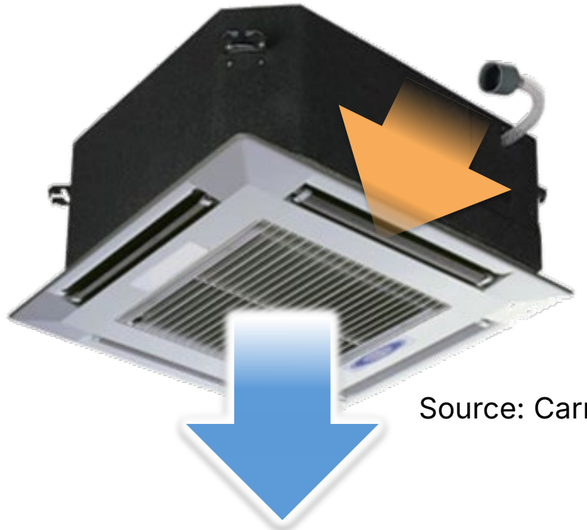


Air to Water

or

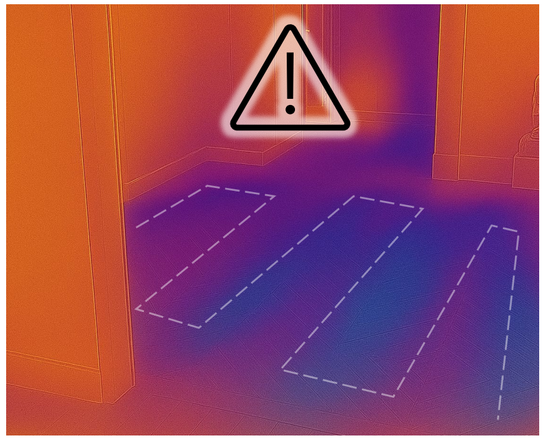
Ground Source



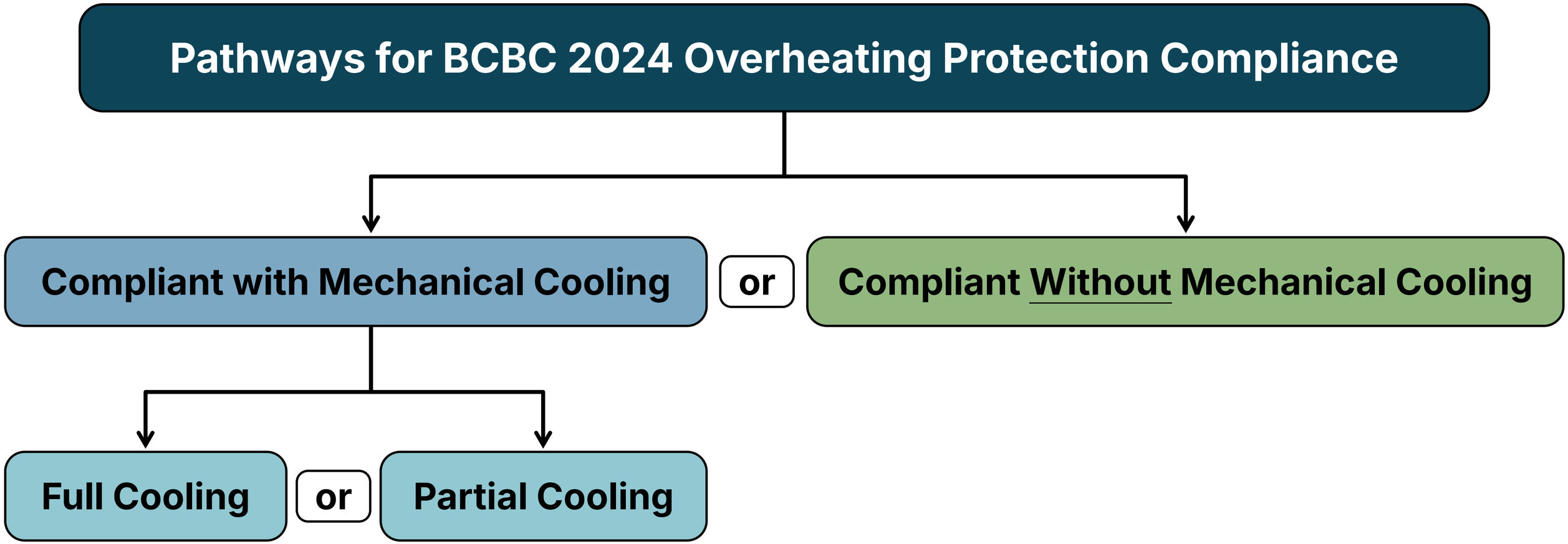


Source: Carrier

Fan Coil Unit



Hydronic Radiant Loops

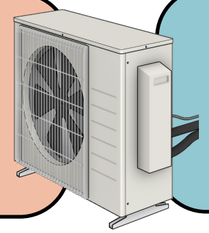

Pathways for BCBC 2024 Overheating Protection Compliance
Compliant with Mechanical Cooling
or
Compliant Without Mechanical Cooling
Full Cooling
or
Partial Cooling

Full Cooling with a Heat Pump = Easier Step Code Compliance

BCBC 2024 Zero Carbon Step Code Compliance

Compliant with Low Emissions Factor Heating System*

Full Heating with Electric Heat Pump



Full Cooling with Electric Heat Pump

Pathways for BCBC 2024 Overheating Protection Compliance

Compliant with Mechanical Cooling

or

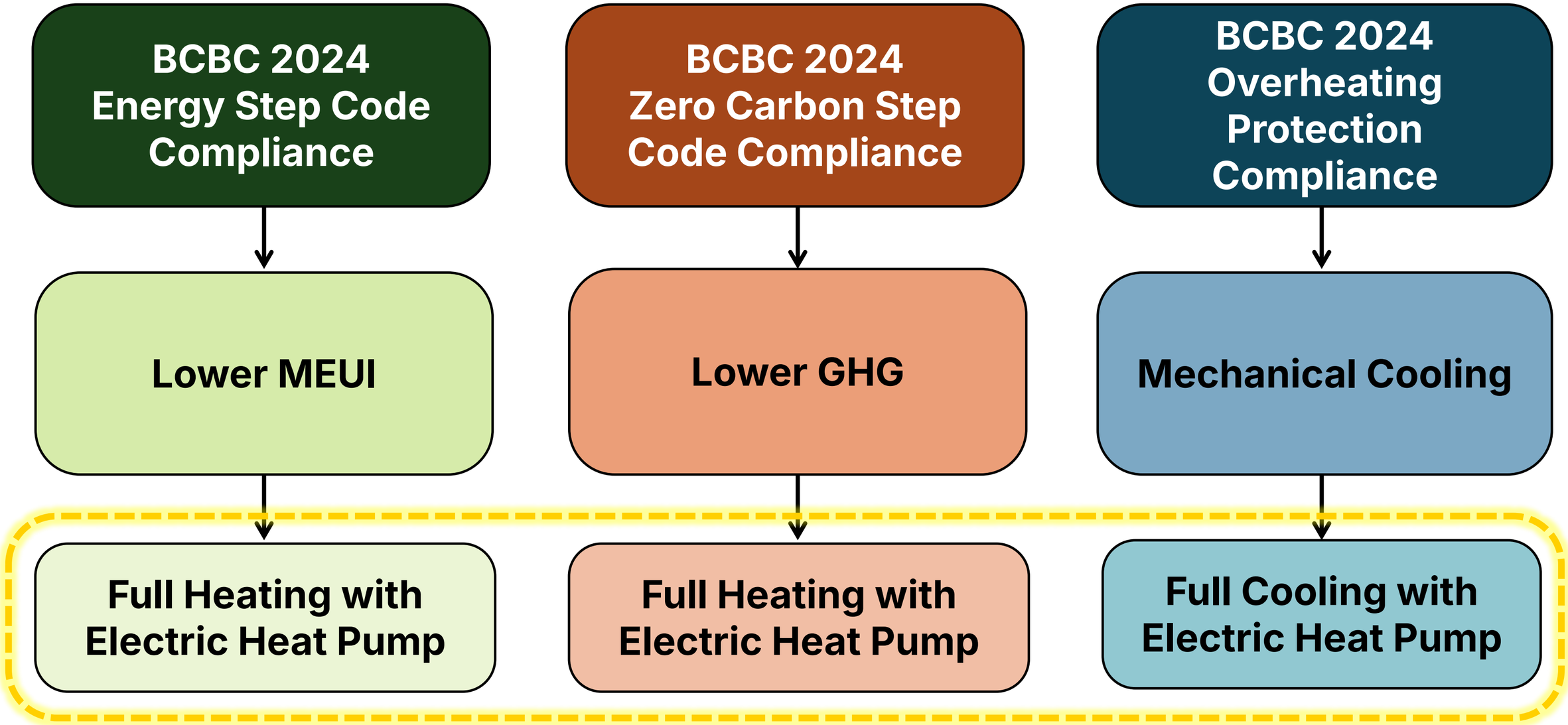
Compliant Without Mechanical Cooling

or

Partial Cooling (Cooling Zone)

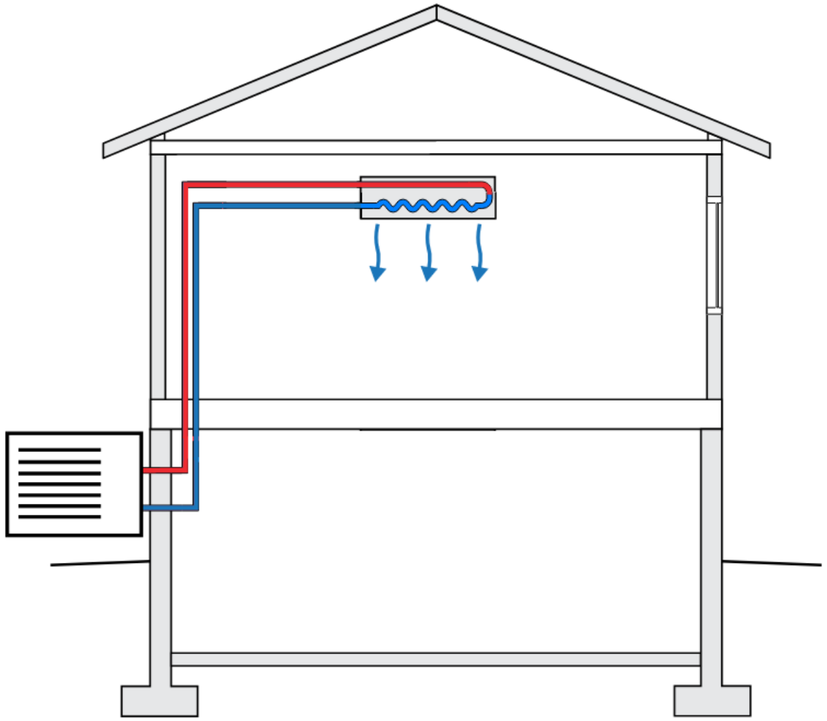
*among other equipment requirements

Full Cooling with a Heat Pump = Easier Step Code Compliance

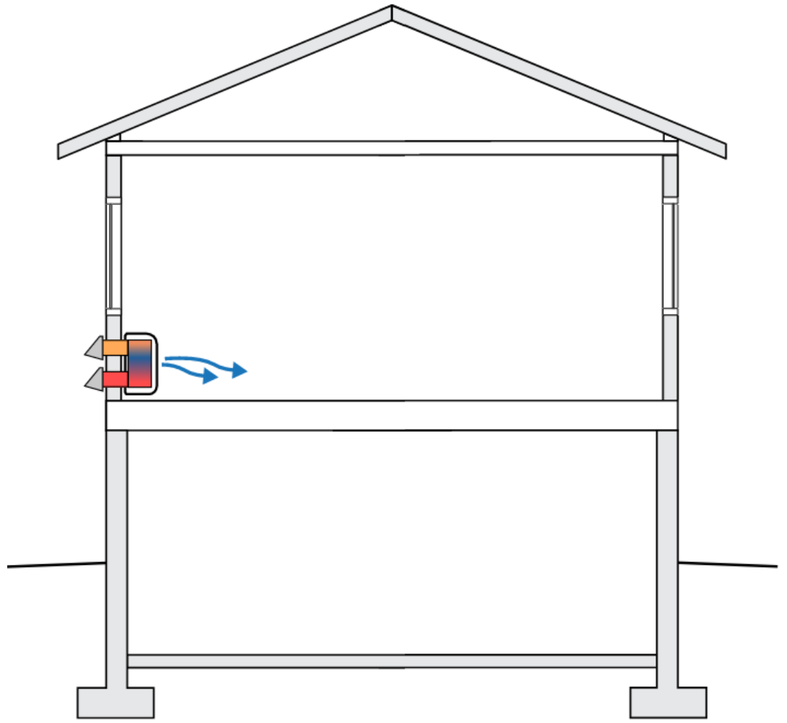


Localized Mechanical Cooling

Typical for Partial Cooling



Type 1: Ductless Single Head Mini-Split

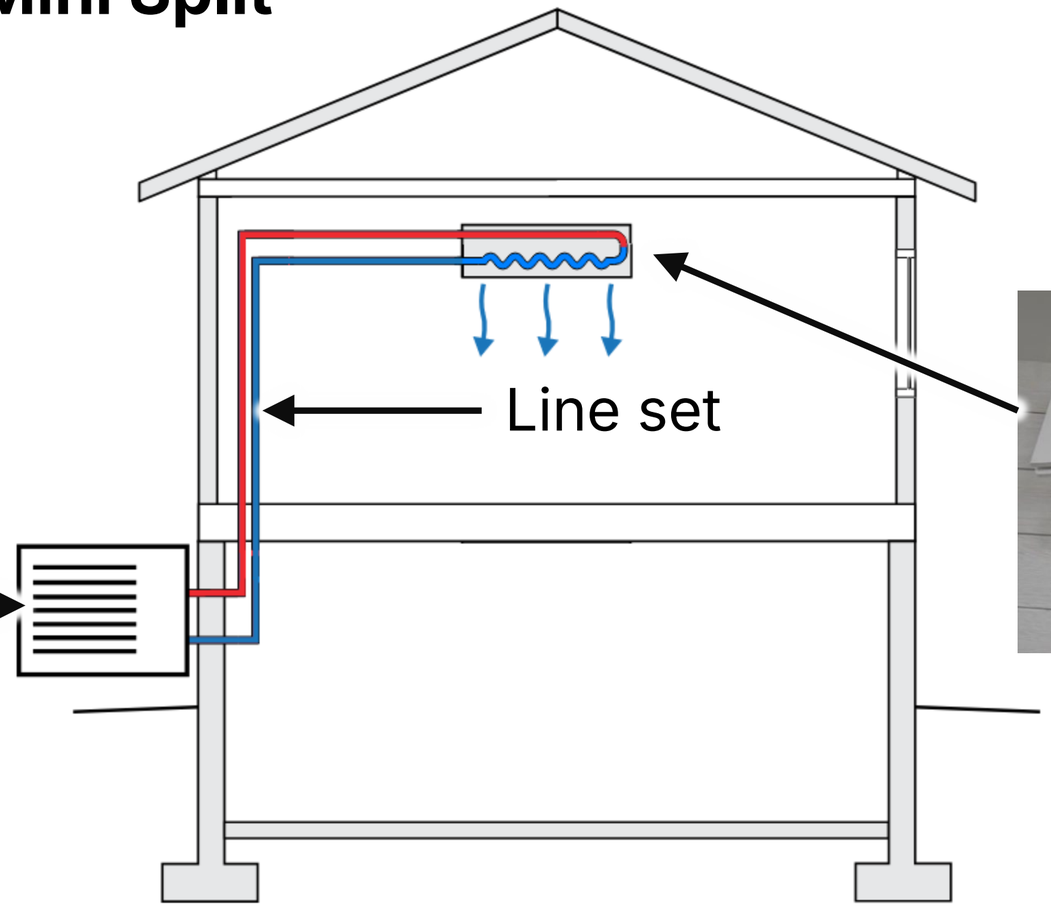


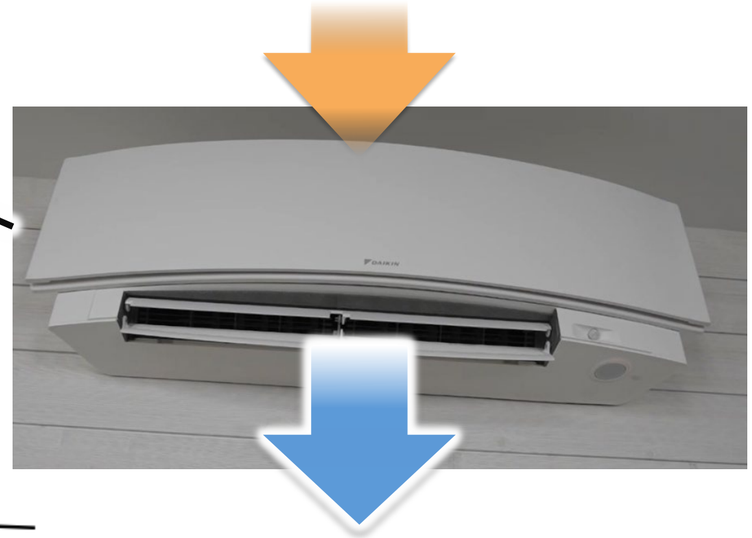
Type 2: Through-Wall Heat Pump

Localized Mechanical Cooling Type 1:

Ductless Single Head Mini Split

Outdoor Unit

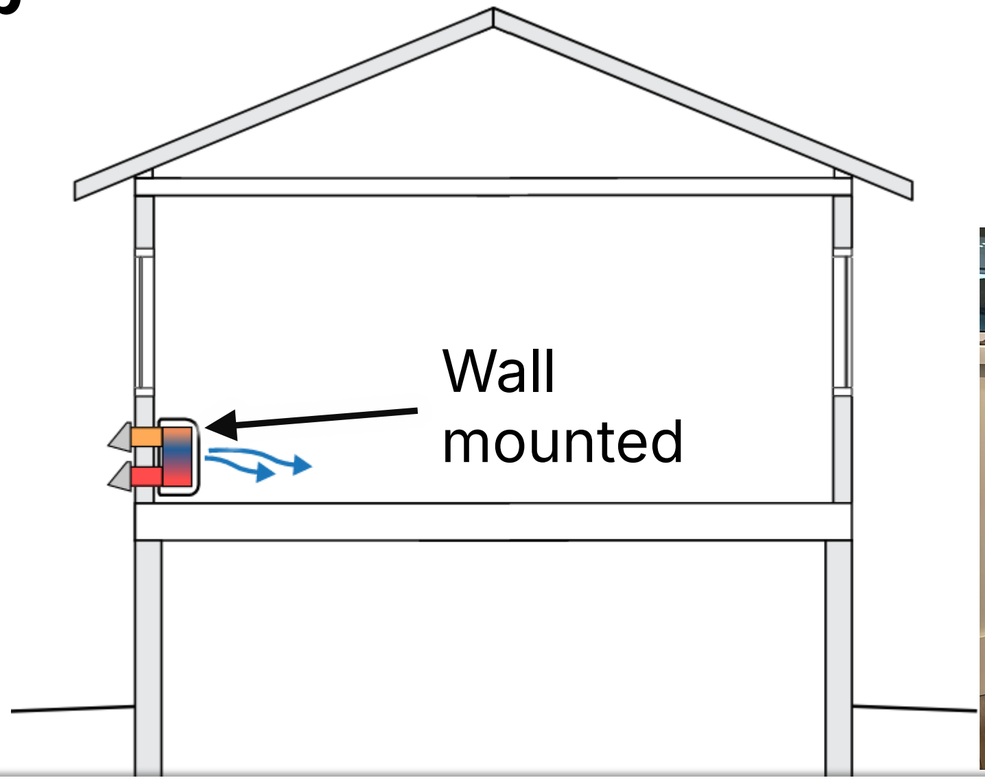




Interior Head

Localized Mechanical Cooling Type 2:

Through-Wall Heat Pump



Exterior side

Interior side

BC HOUSING

BC Housing Recommendations – Thru Wall Heat Pump (TWHP) Design

As TWHP (Thru Wall Heat Pump) products are relatively new in the current Canadian market, there is the possibility of performance issues arising – particularly in colder climates if the construction documents are not clear and/or the installation is not properly executed on site. Thus, it is important that the Mechanical Engineer of Record (EOR) for the project is fully informed and knowledgeable about the equipment, the climate zone it is specified for and its functionality.

Non-Compliant Mechanical Cooling (per BSSB Bulletin B24-08)

Window Unit

Source: Best Buy

Portable AC Unit

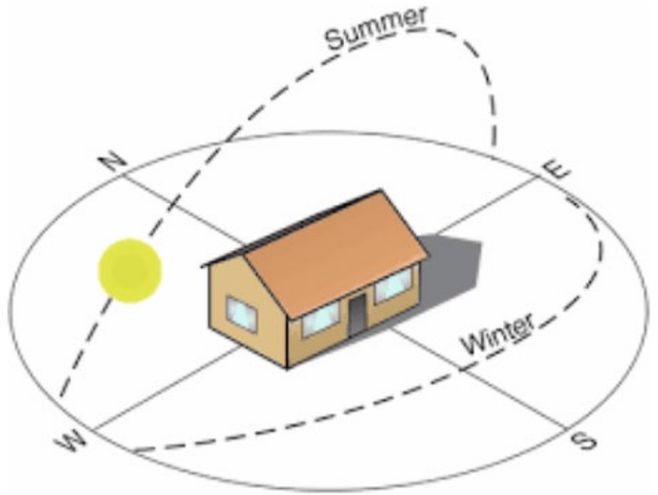
Cooling Demand Reduction Concepts

- Shading
- Less South and West Glazing
- Low SHGC Glazing
- Light-Coloured Cladding
- Insulated and Airtight Enclosure*

*with careful design strategies to avoid trapping heat

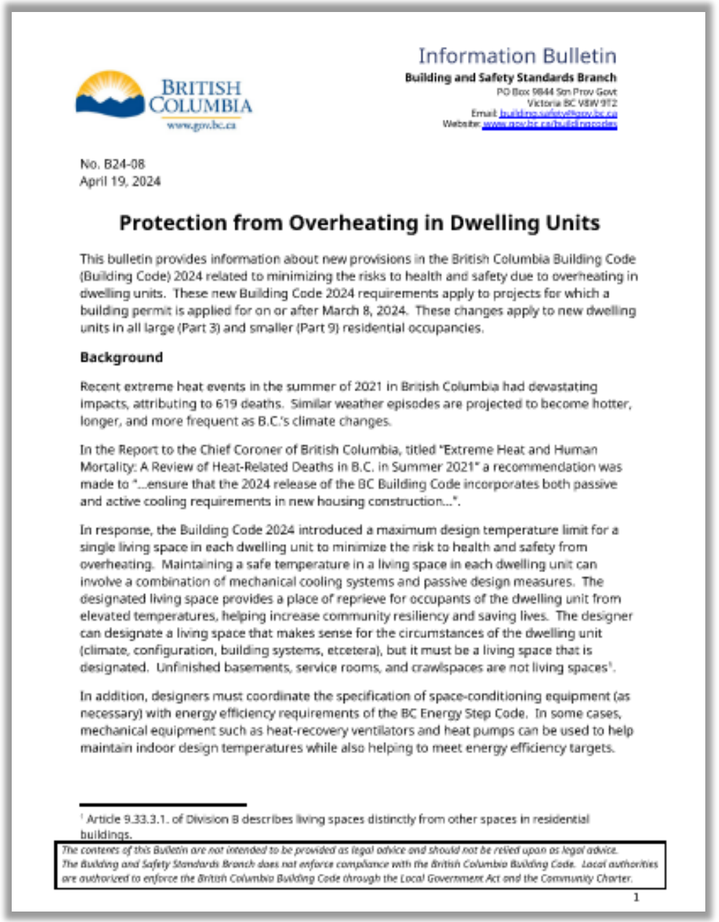
“Passive” Cooling Approach Concepts

- Substantial Shading
- Less South and West Glazing
- Low SHGC Glazing
- Light-Coloured Cladding
- Insulated and Airtight Enclosure*
- Enclosure Thermal Mass
- Natural Air Circulation
- Night Cooling



*with careful design strategies to avoid trapping heat

“Passive” Cooling Design Resources



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Building and Safety Standards Branch
PO Box 9844 Stn Prov Govt
Victoria BC V8W 9T2
Email: building.safety@gov.bc.ca
Website: www.gov.bc.ca/buildingcodes

No. B24-08
April 19, 2024

Protection from Overheating in Dwelling Units

This bulletin provides information about new provisions in the British Columbia Building Code (Building Code) 2024 related to minimizing the risks to health and safety due to overheating in dwelling units. These new Building Code 2024 requirements apply to projects for which a building permit is applied for on or after March 8, 2024. These changes apply to new dwelling units in all large (Part 3) and smaller (Part 9) residential occupancies.

Background

Recent extreme heat events in the summer of 2021 in British Columbia had devastating impacts, attributing to 619 deaths. Similar weather episodes are projected to become hotter, longer, and more frequent as B.C.'s climate changes.

In the Report to the Chief Coroner of British Columbia, titled "Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021" a recommendation was made to "...ensure that the 2024 release of the BC Building Code incorporates both passive and active cooling requirements in new housing construction...".

In response, the Building Code 2024 introduced a maximum design temperature limit for a single living space in each dwelling unit to minimize the risk to health and safety from overheating. Maintaining a safe temperature in a living space in each dwelling unit can involve a combination of mechanical cooling systems and passive design measures. The designated living space provides a place of reprieve for occupants of the dwelling unit from elevated temperatures, helping increase community resiliency and saving lives. The designer can designate a living space that makes sense for the circumstances of the dwelling unit (climate, configuration, building systems, etcetera), but it must be a living space that is designated. Unfinished basements, service rooms, and crawlspaces are not living spaces[1].

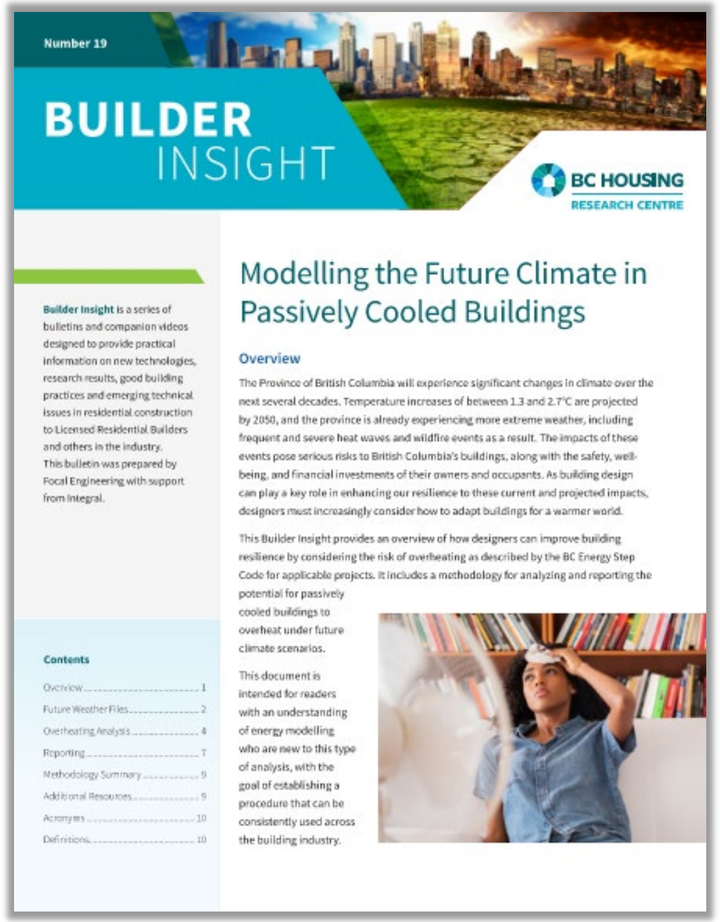
In addition, designers must coordinate the specification of space-conditioning equipment (as necessary) with energy efficiency requirements of the BC Energy Step Code. In some cases, mechanical equipment such as heat-recovery ventilators and heat pumps can be used to help maintain indoor design temperatures while also helping to meet energy efficiency targets.

[1] Article 9.33.3.1. of Division B describes living spaces distinctly from other spaces in residential buildings.

The contents of this Bulletin are not intended to be provided as legal advice and should not be relied upon as legal advice. The Building and Safety Standards Branch does not enforce compliance with the British Columbia Building Code. Local authorities are authorized to enforce the British Columbia Building Code through the Local Government Act and the Community Charter.

1

BSSB Bulletin B24-08



Number 19

BUILDER INSIGHT

BC HOUSING RESEARCH CENTRE

Builder Insight is a series of bulletins and companion videos designed to provide practical information on new technologies, research results, good building practices and emerging technical issues in residential construction to Licensed Residential Builders and others in the industry.
This bulletin was prepared by Focal Engineering with support from Integral.

Contents

Modelling the Future Climate in Passively Cooled Buildings

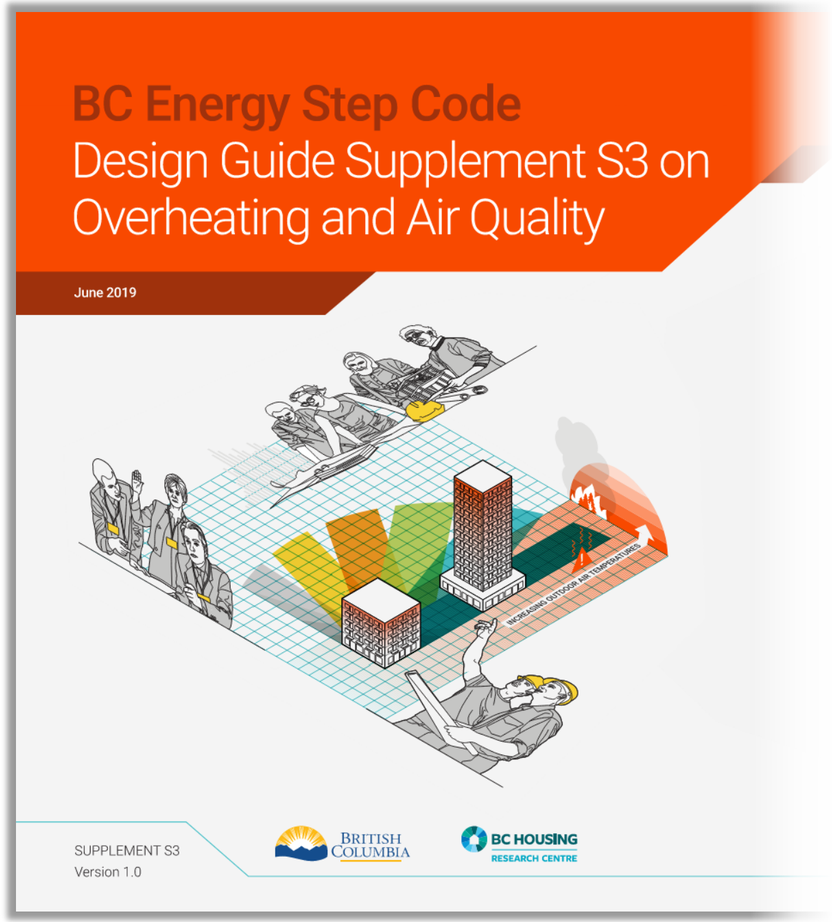
Overview

The Province of British Columbia will experience significant changes in climate over the next several decades. Temperature increases of between 1.3 and 2.7°C are projected by 2050, and the province is already experiencing more extreme weather, including frequent and severe heat waves and wildfire events as a result. The impacts of these events pose serious risks to British Columbia's buildings, along with the safety, well-being, and financial investments of their owners and occupants. As building design can play a key role in enhancing our resilience to these current and projected impacts, designers must increasingly consider how to adapt buildings for a warmer world.

This Builder Insight provides an overview of how designers can improve building resilience by considering the risk of overheating as described by the BC Energy Step Code for applicable projects. It includes a methodology for analyzing and reporting the potential for passively cooled buildings to overheat under future climate scenarios.

This document is intended for readers with an understanding of energy modelling who are new to this type of analysis, with the goal of establishing a procedure that can be consistently used across the building industry.

BC Housing
Builder Insight No. 19



BC Energy Step Code
Design Guide Supplement S3 on Overheating and Air Quality

June 2019

SUPPLEMENT S3
Version 1.0

BRITISH COLUMBIA

BC HOUSING RESEARCH CENTRE

Step Code Design Guide
Supplement S3

4

Update your code compliance process today

Adapt Your Code Compliance Process for Overheating Protection

- Information
- Resources
- Local Context
- Procedures

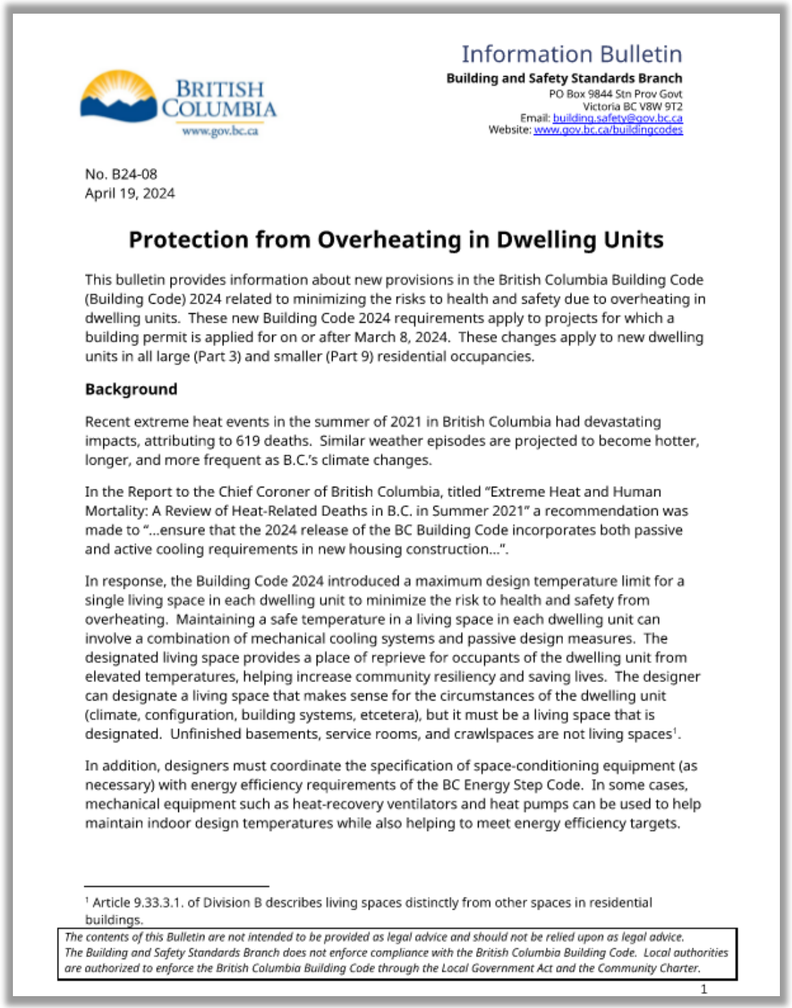
Adapt Your Code Compliance Process for Overheating Protection

Information

Resources

Local Context

Procedures



BRITISH COLUMBIA
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Information Bulletin
Building and Safety Standards Branch
PO Box 9844 Stn Prov Govt
Victoria BC V8W 9T2
Email: building.safety@gov.bc.ca
Website: www.gov.bc.ca/buildingcodes

No. B24-08
April 19, 2024

Protection from Overheating in Dwelling Units

This bulletin provides information about new provisions in the British Columbia Building Code (Building Code) 2024 related to minimizing the risks to health and safety due to overheating in dwelling units. These new Building Code 2024 requirements apply to projects for which a building permit is applied for on or after March 8, 2024. These changes apply to new dwelling units in all large (Part 3) and smaller (Part 9) residential occupancies.

Background

Recent extreme heat events in the summer of 2021 in British Columbia had devastating impacts, attributing to 619 deaths. Similar weather episodes are projected to become hotter, longer, and more frequent as B.C.'s climate changes.

In the Report to the Chief Coroner of British Columbia, titled "Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021" a recommendation was made to "...ensure that the 2024 release of the BC Building Code incorporates both passive and active cooling requirements in new housing construction...".

In response, the Building Code 2024 introduced a maximum design temperature limit for a single living space in each dwelling unit to minimize the risk to health and safety from overheating. Maintaining a safe temperature in a living space in each dwelling unit can involve a combination of mechanical cooling systems and passive design measures. The designated living space provides a place of reprieve for occupants of the dwelling unit from elevated temperatures, helping increase community resiliency and saving lives. The designer can designate a living space that makes sense for the circumstances of the dwelling unit (climate, configuration, building systems, etcetera), but it must be a living space that is designated. Unfinished basements, service rooms, and crawlspaces are not living spaces[1].

In addition, designers must coordinate the specification of space-conditioning equipment (as necessary) with energy efficiency requirements of the BC Energy Step Code. In some cases, mechanical equipment such as heat-recovery ventilators and heat pumps can be used to help maintain indoor design temperatures while also helping to meet energy efficiency targets.

[1] Article 9.33.3.1. of Division B describes living spaces distinctly from other spaces in residential buildings.

The contents of this Bulletin are not intended to be provided as legal advice and should not be relied upon as legal advice. The Building and Safety Standards Branch does not enforce compliance with the British Columbia Building Code. Local authorities are authorized to enforce the British Columbia Building Code through the Local Government Act and the Community Charter.

1

BSSB Bulletin

Detailed Report

Adapt Your Code Compliance Process for Overheating Protection

Information

Resources

Local Context

Procedures

[Your Letterhead Here]

ORIGINAL TEMPLATE PRODUCED BY RDH BUILDING SCIENCE

Policy Brief [Template] – City Name | Date

New BCBC Requirements for Overheating Protection

Scope of the Issue

- The 2024 British Columbia Building Code (BCBC) has new overheating protection requirements for new residential dwelling units.
- Heat events are becoming more intense and frequent, and 619 people died due to extreme heat indoors during the 2021 BC Heat Dome.
- 98% of the deaths occurred in residential spaces. This event showed how occupant overheating in buildings is a **critical life safety issue**.
- BCBC now requires that each residential dwelling unit include at least one living space that can maintain a maximum temperature of 26°C.
- This requirement is referred to as **Overheating Protection** and it applies to all units in new residential buildings as of March 2024.
- **Code compliance process updates are needed to accommodate implementation of the Overheating Protection requirements**.
- Timely updates with a clear compliance process helps reduce the risk of confusion and missed life safety issues.

Impacts for the Authority Having Jurisdiction

It is the responsibility of the AHJ to verify that new buildings are designed and built to comply with the code requirements. Meeting the Overheating Protection requirements involves new procedures for builders and new checks for the Authority Having Jurisdiction (AHJ).

Local governments are tasked with making bylaw and policy updates to account for the compliance process relating to overheating protection.

At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each dwelling unit.
(BCBC 9.33.3.1.(2))

Overheating Protection compliance process and submission requirements are up to the discretion of the AHJ, in consultation with their insurer and legal counsel. They will include different considerations for buildings complying under Part 9 versus Part 3 of the BCBC.

Resources for Compliance Process Updates

The following resources are provided for local governments to adapt and use in their work to implement compliance process updates:

- Overheating Protection Training Presentation: Recording and template slideshow that can be adapted and shared with staff and builders.
- AHJ Technical Bulletin Template: Editable text document which lays out the compliance pathways and related submission requirements.
- Industry Guidance Report - Navigating BCBC 2024 Overheating Protection Requirements by RDH Building Science: Detailed technical report that provides background context and key considerations for design to and implementing Overheating Protection requirements.
- Other industry reports and bulletins for reference:
  - Construction Standards & Digital Solutions Branch (formerly BSSB) Bulletin B24-08: Protection from Overheating in Dwelling Units
  - CSDSB Bulletin B25-03: Cooling of a Single Living Space in Dwelling Units for Part 9 Residential
  - HVAC Designers of Canada Guideline on Single Zone Cooling in Dwelling Units
  - Township of Langley Bulletin: Indoor Design Temperatures – Overheating Protection – Requirement 9.33.3.1.(2)

How to Update the Code Compliance Process

1. Use the training presentation as a primer for staff to gain knowledge about the background context, key compliance considerations, and risk factors for insufficient Overheating Protection.
2. Adapt the AHJ Bulletin template for the local jurisdiction and publish it for builders to use as part of their submission package.
3. Refer to the resources to assist with formal updates to bylaws, plan checking procedures, and site inspection protocols to account for Overheating Protection requirements.

Refer to the follow page for supplemental information about the compliance pathways and technology that may become more common as part of these new BCBC requirements.

Policy Brief Template

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Technical Bulletin for Code Compliance [Template] – City Name | Date

9.33.3.1.(2) BCBC 2024 Overheating Protection Requirements

BCBC 2024 Overheating Protection Requirement

The BCBC 2024 includes new requirements for new residential buildings to be capable of preventing overheating inside each dwelling unit. This is referred to as Overheating Protection. The requirement applies to both Part 9 and Part 3 residential buildings. This bulletin provides information to facilitate building permit application, processing and approval.

BCBC 9.33.3.1.(2) Indoor Design Temperatures
At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each dwelling unit.

BCBC 6.2.1.1.(2) Good Engineering Practice
Indoor design temperatures for residential buildings shall be those established in Article 9.33.3.1.

How This Requirement Applies

- Part 9 single family homes with a secondary suite count as two dwelling units, and this requirement applies to each unit.
- Part 9 multi-unit residential buildings must demonstrate compliance for each dwelling unit.
- Part 3 multi-unit residential buildings must comply following Good Engineering Practice (see page 3).
- Mechanical systems that provide cooling must be permanently installed and fixed to the building. Portable air conditioners and window-mounted units are not acceptable.
- A CSA F280 report for mechanical cooling sizing is required unless complying with Part 6. This report is either separate from or a subsection of the report showing compliance with 9.33.5.1. Capacity of Heating and Cooling Appliances.
- Documentation matching the requirements outlined in the following pages is required at building permit application.
- If there are any changes to the building design during construction which may impact mechanical system sizing, updated documentation, including updated CSA F280 calculations, will likely be required.

Overview of Compliance Pathways for Part 9 Residential Buildings

Figure 1 outlines the three basic compliance pathways. Refer to page 3 for further information on Part 3 buildings.

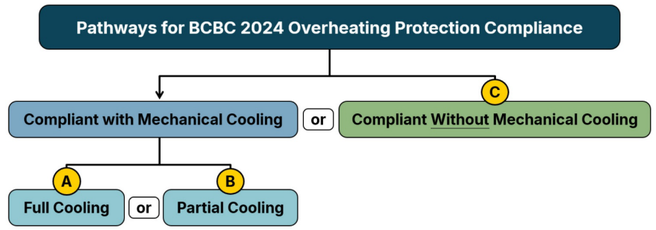

Figure 1: Compliance pathways for meeting Overheating Protection requirements.

Bulletin Template

Resources → Policy Brief Template

[Your Letterhead Here]

ORIGINAL TEMPLATE PRODUCED BY RDH BUILDING SCIENCE

Policy Brief [Template] – City Name | Date

New BCBC Requirements for Overheating Protection

Scope of the Issue

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- Heat events are becoming more intense and frequent, and 619 people died due to extreme heat indoors during the 2021 BC Heat Dome.
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It is the responsibility of the AHJ to verify that new buildings are designed and built to comply with the code requirements. Meeting the Overheating Protection requirements involves new procedures for builders and new checks for the Authority Having Jurisdiction (AHJ).

Local governments are tasked with making bylaw and policy updates to account for the

At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each dwelling unit.

Resources → Policy Brief Template

Supplemental Information: Complying with Overheating Protection Requirements

- Overheating Protection compliance can be achieved either with or without mechanical cooling, but mechanical cooling is likely to be the most common pathway. It can be provided either for the whole building/unit or with a dedicated "Cooling Zone" area in each dwelling unit.
- Buildings that achieve compliance without mechanical cooling use **cooling demand reduction strategies** to maintain a maximum indoor temperature of 26°C.
- The term "passive cooling" is commonly used to describe cooling demand reduction strategies but it is typically a misnomer. The term "passive only" overheating protection is more appropriate.

The following describes a brief overview of the three basic Overheating Protection compliance pathways.

Compliance Pathway A: Full Mechanical Cooling (Business as Usual)

This approach meets requirements when each dwelling unit has mechanical cooling equipment that is integrated, permanently installed and sized for the space(s) it serves. Full mechanical cooling sizing for Part 9 for self-contained systems serving a single dwelling unit or a house with a secondary suite must follow the standard *CSA F280-12 Determining the Required Capacity of Residential Space Heating and Cooling Appliances*. CSA F280 sizing is not a new requirement of the BCBC. Full mechanical cooling is likely the most straightforward compliance pathway for most Part 9 buildings. Full cooling sizing for mechanical systems in some Part 9 buildings and all Part 3 buildings follows *Part 6 Heating, Ventilating and Air-conditioning* in Division B of BCBC and requires design and submissions from a Registered Professional.

Compliance Pathway B: Partial Mechanical Cooling (Cooling Zone)

This approach meets requirements when each dwelling unit has mechanical cooling equipment that is integrated and permanently installed and sized for the Cooling Zone area it serves. Part 9 buildings can still use sizing following CSA F280 for partial cooling, but there are

Resources → Technical Bulletin Template

[Your Letterhead Here]

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Technical Bulletin for Code Compliance [Template] – City Name | Date

9.33.3.1.(2) BCBC 2024 Overheating Protection Requirements

BCBC 2024 Overheating Protection Requirement

The BCBC 2024 includes new requirements for new residential buildings to be capable of preventing overheating inside each dwelling unit. This is referred to as Overheating Protection. The requirement applies to both Part 9 and Part 3 residential buildings. This bulletin provides information to facilitate building permit application, processing and approval.

BCBC 9.33.3.1.(2) Indoor Design Temperatures
At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each dwelling unit.

BCBC 6.2.1.1.(2) Good Engineering Practice
Indoor design temperatures for residential buildings shall be those established in Article 9.33.3.1.

How This Requirement Applies

- Part 9 single family homes with a secondary suite count as two dwelling units, and this requirement applies to each unit.

Resources → Technical Bulletin Template

A) Full Mechanical Cooling (No Additional Documentation Required)

The full mechanical cooling approach meets overheating protection requirements when each dwelling unit has mechanical cooling equipment that is integrated, permanently installed and sized for the space(s) it serves.

Requirements for Typical Compliance Using CSA F280
(for self-contained systems serving a single dwelling unit or a house with a secondary suite)

1.	Mechanical cooling sizing calculation prepared in accordance with CSA F280-12 Determining the Required Capacity of Residential Space Heating and Cooling Appliances.	☐
2.	Calculation performed uses software or a tool verified by HVAC Designers of Canada.	☐
3.	Indoor design temperature (cooling setpoint/overheating limit) is set to 26°C or lower.	☐
4.	Outdoor design temperature is at least: • The temperature set by local AHJ for the building location, or • The 2.5% July dry-bulb temperature for the building location from Appendix C, Division B, BCBC	☐
5.	Internal loads, including occupants, appliances, and lighting are included in accordance with CSA F280.	☐
6.	Envelope performance inputs (U-values, SHGC, etc.) used in load calculations match permit drawings.	☐
7.	A standard **CSA F280 Calculation Summary Report** is provided, showing at least the "Total Building Value" (100% load) is used for equipment sizing if the cooling setpoint is higher than 24°C.	☐
8.	The proposed cooling equipment is identified and is shown to be capable of meeting the load.	☐

B) Partial Mechanical Cooling (Additional Documentation Required)

Resources → Technical Bulletin Template

C) No Mechanical Cooling (Registered Professional Required)

The "passive only" Overheating Protection approach meets requirements when each dwelling unit (or designated area within each dwelling unit) is designed with measures to manage heat gain and allow means of cooling such that the indoor temperature can be maintained at or below 26°C without any mechanical cooling equipment. The submission must demonstrate that the indoor temperature of the building as designed following good engineering practice can be maintained at or below 26°C for the conditions modelled.

Requirements for Passive Only Overheating Protection Design Compliance

1.	Evaluation and reporting of the passive design as per good engineering practice by a Registered Professional, following Part 6, Division B of BCBC and other appropriate industry references.	☐
2.	Evaluation uses appropriate hourly modelling tools, validated to ASHRAE 140, which can model exterior shading or use results from supplementary analytical programs.	☐
3.	Evaluation follows modelling procedures as per the applicable version of the City of Vancouver Energy Modelling Guidelines (EMGs).	☐
4.	Envelope/adjacent assemblies' performance inputs (U-values, SHGC, etc.) match permit drawings.	☐
5.	Evaluation does not include occupant-controlled cooling load reduction strategies, such as operable windows or shades.	☐
6.	Outdoor design temperature is at least: • The temperature set by local AHJ for the building location, or • The 2.5% July dry-bulb temperature for the building location from Appendix C, Division B, BCBC	☐
7.	A **sealed report from a Registered Professional** is provided. The Registered Professional is qualified and experienced with hourly energy modelling, building physics, thermal comfort assessment, and	☐

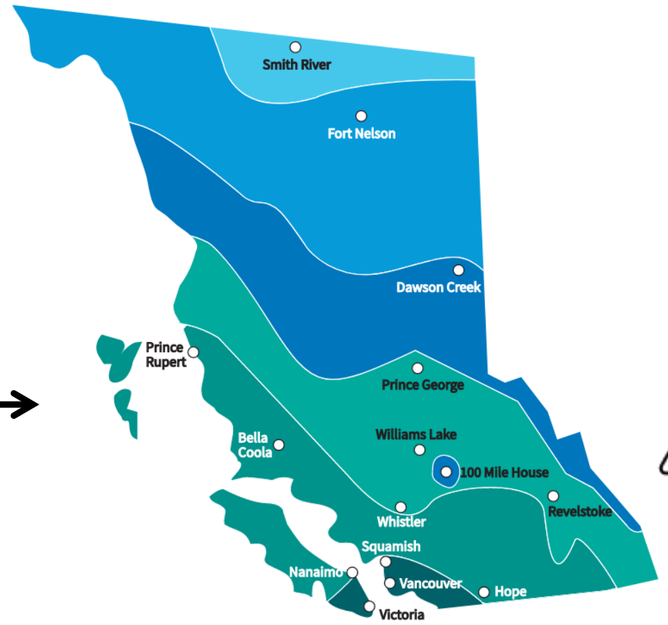
Adapt Your Code Compliance Process for Overheating Protection

Information

Resources

Local Context

Procedures



Default is **2.5% July** dry temperature per Appendix C

A higher design temp may be prudent.

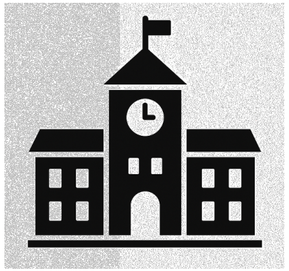
Adapt Your Code Compliance Process for Overheating Protection

Information

Resources

Local Context

Procedures



Permit Requirements, Plan Checks, and Inspection Steps as Needed

Example Local AHJ Information Bulletin

Procedures →

Indoor Design Temperatures

Overheating Protection – Requirement 9.33.3.1(2)

Township of Langley | Permits, Licences and Inspections **External Bulletin**

This bulletin provides additional information regarding BC Building Code requirement, 9.33.3.1, Indoor Design Temperatures to facilitate building permit submission, processing and approval.

Requirement

9.33.3.1(2) Indoor Design Temperatures

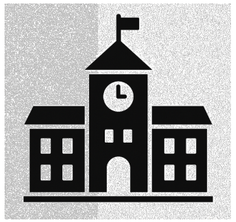
2) At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each dwelling unit.

This requirement was enacted in response to the 2021 heat dome event that impacted British Columbians across the province and resulted in 619 deaths. It aims to ensure that all new dwelling units, at minimum, have a space, otherwise known as a refuge room, where all occupants in the dwelling unit can gather during heat events and be protected from the health risks of overheating.

Notes

- Part 9 single family homes with a secondary suite are considered to be two dwelling units and this requirement applies to each unit.
- Part 9 multi-family residential buildings such as townhouses, rowhouses, and duplexes must demonstrate compliance with this requirement for each dwelling unit.
- Part 3 multi-unit residential buildings such as condos and apartment buildings are also subject to this requirement; however, this bulletin provides compliance guidance for Part 9 buildings. Speak to a Registered Professional for further guidance on Part 3 compliance or contact Township of Langley at buildings@tol.ca.
- Mechanical systems that provide cooling must be permanently installed and fixed to the building. Portable air conditioners, or window mounted units are not considered acceptable compliance methods.
- Where localized cooling to a refuge room is proposed, a CSA F280 report must be submitted. This report is in addition and separate from the CSA F280 report submission to satisfy compliance with 9.33.5.1.
  - See Compliance Methodologies, 2. Localized mechanical cooling (no central cooling).
- The Buildings Safety Standards Branch have issued a Technical Bulletin on Overheating
  - Visit www2.gov.bc.ca/gov/content/home and search for Technical Bulletin, click *Technical Bulletins*, click *BC Building Code 2024,* then click *B24-08 Overheating (PDF).*
- Documentation is required at building permit submission. If there are any changes to the building design during construction which may impact mechanical system sizing, updated documentation, including updated CSA F280 calculations will be required. This must be submitted before Final Inspection is requested.

Township of Langley
Permits, Licences and Inspections
20338 – 65 Avenue, Langley, BC V2Y 3J1
Office: 604-533-6018 | buildings@tol.ca | tol.ca



Indoor Design Temperatures

Overheating Protection – Requirement 9.33.3.1(2)

Township of Langley | Permits, Licences and Inspections **External Bulletin**

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This requirement was enacted in response to the 2021 heat dome event that impacted British Columbians across the province and resulted in 619 deaths. It aims to ensure that all new dwelling units, at minimum, have a space, otherwise known as a refuge room, where all occupants in the dwelling unit can gather during heat events and be protected from the health risks of overheating.

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    - See Compliance Methodologies, 2. Localized mechanical cooling (no central cooling).
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- Documentation is required at building permit submission. If there are any changes to the building design during construction which may impact mechanical system sizing, updated documentation, including updated CSA F280 calculations will be required. This must be submitted before Final Inspection is requested.

Compliance Methodologies

1. Central cooling

Where the dwelling unit is equipped with central mechanical cooling through a heat pump or air conditioner, serving all conditioned spaces of the dwelling unit, and sized in accordance with CSA F280, compliance shall be met.

Note: Where the dwelling unit uses a heat pump for its central heating and cooling, it also supports compliance with Township of Langley Building Bylaw requirement to meet EL-2 of the Zero Carbon Step Code.

Documentation Required

No additional documentation required.

2. Localized mechanical cooling (no central cooling)

Where the dwelling does not have central cooling and will demonstrate compliance with localized mechanical cooling, please see below for the methodology that will size cooling output for the designated refuge room.

1. Select a CSA F280 approved software. Identify a space in the home to be the refuge room.
2. Conduct CSA F280 sizing output calculation, per instructions below. Note: this sizing calculation is independent of the sizing calculations for mechanical systems sizing, per 9.33.3.1(2)
    a. The refuge room is to be modelled as a standalone house.
        i. All walls, ceiling and floor shall use their existing envelope characteristics and be calculated to be exposed to outdoor air, at summer design temp, as laid out in the drawings unless floor or walls are at or below grade.
    b. Minimum electrical load is 800W.
        i. The electrical load may be higher, per CSA F280 section 6.2.5, where it states the minimum load shall be 800W or when the calculation of 4W/m^2 exceeds 800W, the higher value shall be used.
    c. Cooling setpoint set to 26°C, or lower/cooler.
    d. The refuge room shall include all occupants of the dwelling unit when conducting the calculation.
        i. The number of occupants shall be calculated as two occupants per number of sleeping rooms in the dwelling unit, per 3.1.17.1 (b).
    e. Internal blinds and shadings shall not be in included in calculations as they are user operated, and performance will be unreliable.
    f. External fixed shading devices can be included in calculations if present.
3. The *Total Building Value* for heat gain shall be used for output sizing and not M*inimum Installed Output Capacity.*
    a. CSA F280 allows for sizing to be 80% of the calculated value, however for purposes of meeting the 9.33.3.1 requirement, output must be 100% of the calculated value or higher.

Documentation Required

The heat loss heat gain report, specifically for the refuge room, shall act as the compliance document for this regulatory requirement.

3. Passively cooled dwelling units (no mechanical cooling serving the dwelling)

Where design for 9.33.3.1(2) proposes to not include any form of mechanical cooling and intends on demonstrating compliance through the use of passive cooling strategies, the following method shall be followed:

a. Identify a space in the home to be the refuge room.
    i. The refuge room shall be modelled as a house, per 2.2(a) to 2.2(f).
b. Conduct a whole building energy simulation on the refuge room and submit a summary report, including inputs, any assumptions, and results.
    i. Report must be signed and sealed by a Registered Professional.
    ii. Software must be capable of conducting calculations at hourly or smaller time increments.
        1. See Engineers and Geoscientists of British Columbia's *Professional Practice Guidelines - Whole Building Energy Modelling Services* for guidance on software requirements.
        2. HOT2000 is not an approved software to demonstrate compliance with 9.33.3.1 and a passively cooled refuge room.
    iii. Weather file shall be for Abbotsford B.C.
    iv. The simulation shall not consider window ventilation, the use of blinds or any other user-operated passive cooling strategy as those are user driven and not reliable during heat events.
    v. Fixed external shading devices may be included in calculations.
c. Results must demonstrate that at no time during the cooling season does the dry bulb temperate of the refuge room exceed 26°C.

Documentation Required

A signed and sealed energy simulation report, with all inputs, assumptions, and results will act as the compliance document.

Impacts of a non-standardized or unclear compliance process:

- Missed life safety risks
- Incomplete or inconsistent reviews
- Confusion for applicants and staff
- Weak inspection and enforcement
- Potential liability

Non-Compliant Mechanical Cooling Sizing

❌ 1. Hot2000 energy model output only

❌ 2. “Rule of thumb”

❌ 3. CSA F280 software that is not verified by the HVAC Designers of Canada

❌ 4. Cooling Zone mechanical sizing that does not follow published procedures

❌ 5. Mechanical design following Part 6 (outside Part 9) **but** without a sealed submission by a **Registered Professional (P.Eng. or Architect AIBC)**

Review

1. Overheating Protection is a life safety issue
2. Overheating Protection relies on your local code compliance process
3. There are many compliant cooling approaches
4. Update your code compliance process today

Code Requirements for Overheating Protection in New Residential Buildings

Why and How to Implement A Compliance Process

James Higgins, AScT | Associate, Senior Consultant
RDH Building Science Inc.
jhiggins@rdh.com

Neil Norris, P.Eng. | Principal, Specialist
RDH Building Science Inc.
nnorris@rdh.com