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).
    - A refuge room is a habitable space within the dwelling unit that is large enough to safely accommodate all occupants of the dwelling unit.
- For cooling specifically in a secondary suite, also see **Compliance Methodology 4**.
- The Construction Standards and Digital Solutions Branch has 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.

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 and EL-3 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, the following methodology shall be used to determine the required cooling capacity 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 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.
4. Alternative to the Township's methodology, you may also use the TECA & HVACDC Single Zone Cooling methodology for localized mechanical cooling design and compliance.

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 to demonstrate compliance using 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 the dry-bulb temperature of the refuge room does not exceed 26°C at any time during the cooling season.

Documentation Required

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

4. Cooling for secondary suites

As highlighted in the Notes section, a secondary suite is considered a dwelling unit and that 9.33.3.1.(2) applies. Compliance with 9.33.3.1.(2) in a secondary suite can be achieved by designing the system to any of the options, 1 – 3, listed above or, the following additional options only available for secondary suites:

Where a secondary suite proposes to achieve compliance with 9.33.3.1.(2) and not include central cooling (to all habitable spaces), it can do so by either of the following methodologies, without having to perform the sizing requirement as defined in method 2 above.

1. Size mechanical cooling system (heat pump, air conditioner, packaged terminal air conditioner/heat pump etc.) for all habitable floor area in the secondary suite. This will be considered compliant. No additional documentation is required as a CSA F280 report is already required for the secondary suite; or,

2. Where a proposal to run distribution from the heating and cooling plant serving the primary dwelling to provide cooling to the secondary suite, a minimum number of requirements must be demonstrated to be met, including but not limited to:
    a. Sizing for cooling load must be conducted for the entire suite, per 9.33.5.1.
    b. 9.32.3.2. Design and Installation:
        i. Aspects of mechanical ventilation systems not specifically described in this Subsection shall be designed, constructed and installed in accordance with good practice such as that described in the ASHRAE Handbooks and Standards, the HRAI Digest, the HRAI Residential Mechanical Ventilation Manual, the Hydronics Institute Manuals and the SMACNA Manuals.
        ii. Exhaust fans and supply fans shall be installed in accordance with this Subsection and the manufacturer's instructions.
        iii. The mechanical components of a mechanical ventilation system shall be installed so as to be accessible for inspection, maintenance, repair, and cleaning.
        iv. In a house with a secondary suite including their common spaces, where a heating or ventilation system serves more than a single dwelling unit, the system shall be designed and installed to prevent the circulation of smoke upon a signal from a duct type smoke detector. (See Note A-9.32.3.2.(4).)
        v. Except as provided in Sentence 9.10.9.6.(14), ducts penetrating fire separations shall be equipped with fire dampers in conformance with Article 3.1.8.10.
    c. 9.33.1.1 Application (Heating and Air-Conditioning)
        i. Unless the air duct distribution systems serving one of the dwelling units in a house with a secondary suite are designed and installed to prevent the circulation of smoke in accordance with Sentence 9.32.3.2.(4) and equipped with fire dampers in accordance with Sentence 9.32.3.2.(5), the air duct distribution system shall not be directly interconnected with other parts of the house. 4) Systems used for heating and air-conditioning shall conform to the energy efficiency requirements in Section 9.36.
    d. Controls for the secondary suite, operatable by the occupant: 9.36.3.(1): Except for manually fuelled solid-fuel-fired appliances, the supply of heating and cooling energy to each dwelling unit, suite or common space shall be controlled by thermostatic controls that activate the appropriate supply when the temperature in a conditioned space fluctuates ±0.5°C from the set-point temperature for that space. (2) Where heating and cooling systems are controlled by separate thermostatic controls, means shall be provided to prevent these controls from simultaneously calling for heating and cooling.
        i. This would entail, on top of any other applicable requirement where heating and cooling ductwork serving multiple dwellings, that if the secondary suite is being served cooling from the central plant, it must have its own separate controls, operable by the occupant and that heating and cooling do not occur simultaneously.
    e. Documentation requirements include but are not limited to, all documentation pertaining to the design and operation of the cooling system, including sequencing of controls. An additional CSA F280 report is not required as it is already required for both the primary dwelling and secondary suite. Note, the sizing for the cooling plant must include cooling demand satisfying both the primary dwelling and secondary dwelling.