

[Submit a comment](#)

## Proposed Change 2026

<b>Code Reference(s):</b>	<b>NBC20 Div.B 9.36. (first printing)</b>
Subject:	Greenhouse Gas Emissions
Title:	Operational GHG Emissions: Tiered Prescriptive Requirements in the NBC
Description:	This proposed change introduces prescriptive requirements in the NBC to reduce operational GHG emissions.
Related Proposed Change(s):	PCF 1820, PCF 1843, PCF 1989, PCF 2003, PCF 2004, PCF 2016

This change could potentially affect the following topic areas:

- |   |   |
|---|---|
| <input type="checkbox"/> Division A   | <input checked="" type="checkbox"/> Division B              |
| <input type="checkbox"/> Division C   | <input checked="" type="checkbox"/> Design and Construction |
| <input checked="" type="checkbox"/> Building operations                       | <input checked="" type="checkbox"/> Housing                 |
| <input checked="" type="checkbox"/> Small Buildings                           | <input type="checkbox"/> Large Buildings                    |
| <input type="checkbox"/> Fire Protection                                      | <input type="checkbox"/> Occupant safety in use             |
| <input type="checkbox"/> Accessibility  | <input type="checkbox"/> Structural Requirements            |
| <input type="checkbox"/> Building Envelope                                    | <input checked="" type="checkbox"/> Energy Efficiency       |
| <input checked="" type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing                           |
|   | <input type="checkbox"/> Construction and Demolition Sites  |

## Problem

Approximately 13% of Canada's total greenhouse gas (GHG) emissions can be attributed to houses and buildings. This is primarily a result of using fossil fuels for space and water heating. Additionally, the combined impact of electricity consumption for cooling, lighting and running other appliances raises the overall contribution of buildings to GHG emissions to approximately 18%.<sup>[1]</sup> The 2020 GHG emissions from residential and building sectors are outlined in Table 1, which shows the sources and their percentage of electricity consumption.

Table 1. 2020 GHG Emissions in the Residential and Building Sectors<sup>(1)</sup>

Sector	Source	GHG Emissions, %
Residential	Space heating	64
	Water heating	20
	Running appliances	11
	Lighting	3
	Space cooling	2
Building	Space heating	65
	Running auxiliary equipment	12
	Lighting	10

	Water heating	7
	Space cooling	3
	Other	3

Note to Table 1:

(1)

[https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive\\_tables/list.cfm](https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive_tables/list.cfm)

There has been a growing recognition of the importance of addressing climate change and reducing GHG emissions from all sectors, including the built environment. However, the National Model Codes (the Codes) do not presently consider the type or quality of energy sources used by buildings and houses, nor do they address or regulate embodied and operational GHG emissions. As the industry moves towards higher energy efficiencies, the differences between energy sources must be examined because they contribute to GHG emissions differently. Historically, the Codes focused on design and construction requirements related to safety, structural integrity, accessibility and energy efficiency. With the latter, the emphasis was on reducing energy consumption during the construction and operational phases, but did not explicitly address operational GHG emissions. Furthermore, Canada is a large and diverse country with different climatic regions and building practices. This reality has led to regional variations in building codes and regulations, making it challenging to establish a unified approach to address operational GHG emissions at the national level.

The Codes currently contain an energy-efficiency objective and related requirements for the design and construction of new buildings and houses. In the 2020 editions of the National Energy Code of Canada for Buildings (NECB) and National Building Code of Canada (NBC), energy-efficiency tiers were introduced, containing measures that progressively increase energy efficiency and reduce the amount of energy needed to operate a building. These requirements play a crucial role in reducing GHG emissions by focusing on the amount of energy used. However, the Canadian Board for Harmonized Construction Codes (CBHCC) recognizes that energy savings alone will not lead to reducing emissions to meet the national goals stated in the Pan-Canadian Framework.

GHG emissions across Canadian provinces and territories exhibit substantial variations, influenced by factors such as population density, climate, energy sources and economic considerations.<sup>[2]</sup> Provinces and territories with larger populations, resource-based economies or heavy reliance on fossil fuels for electricity generation generally register higher emissions levels. This demonstrates a greatly varied energy landscape across Canada.

Ultimately, the goal is to reduce operational GHG emissions to zero or near zero across provinces and territories by 2050. Consequently, authorities having jurisdiction require a flexible framework to regulate GHG emissions due to building operation by using "levels" that move towards lower operational GHG emissions.

## References

[1] <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy/annex-homes-buildings.html>

[2] <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>

---

## Justification

---

Since 2010, the NBC and NECB have included requirements to prevent excessive use of energy. Though these requirements have improved the energy efficiency of new houses and buildings, the Codes remain silent on the type of energy used and the emissions associated with production, distribution and use. As a result, many new Code-compliant buildings contribute GHG emissions through their year-over-year operation. Reducing these emissions is an important step to enable action towards climate goals. Climate change is the biggest challenge facing humanity today, consequently, it is vital that the Codes address this gap to support Canada in reaching its emissions reduction target of 40% below 2005 levels by 2030 and net-zero emissions by 2050. Furthermore, achieving long-term climate goals requires early action on operational GHG emissions. Failure to address this pivotal issue could impede Canada's progress towards its emissions-reduction targets, jeopardizing the ability to effectively combat climate change and protect the future well-being of the country. The commitment to a sustainable future demands that these emissions be addressed comprehensively and urgently.

If these emissions are to be regulated, designers, builders and enforcement officials need a consistent and accurate means to convert expected energy use into expected GHG emissions. For years, governments and industry have relied on emissions factors (also referred to as emissions intensity factors) for this task. Emissions factors describe the amount of GHG emissions (in kg CO<sub>2</sub> equivalent) per unit of energy consumed, for instance, of electricity (in kWh), of natural gas (in m<sup>3</sup>), and of heating oil (in L). Environment and Climate Change Canada compiles this data annually and publishes estimates as part of Canada's national greenhouse gas inventory report. Emissions factors reflect the carbon intensity of different fuels, as well as regional differences in energy production and distribution. Data is generally published after two years; factors reflecting 2021 data were published in April 2023.

If Canada's energy sector were unchanging, this data would suffice for building design and Code-administration purposes. But provincial, territorial and regional utilities are presently undergoing unprecedented transition. Electric utilities are shifting away from coal power generation, while gas utilities are experimenting with new technologies to lower emissions through use of hydrogen and renewable biogas sources. These changes are expected to occur rapidly; some provincial utilities expect to reduce electric emissions by 60% or more by 2030. In this environment, referencing the most recent (2021) emissions data currently available in the Codes could encourage the construction of buildings with higher-than-expected emissions. For this reason, this proposed change is based on the best available future-looking forecasts for utility emissions, averaged for the years 2031 to 2035. Emissions factor forecasts for electricity are sourced from Environment and Climate Change Canada's most recent (2023) projections. While no similar projections are currently available for natural gas utilities, such projections are expected in future years and could be incorporated into the Codes at a later date.

---

## PROPOSED CHANGE AS SUBMITTED TO WINTER 2024 PUBLIC REVIEW

---

### [9.36.] 9.36. Energy Efficiency

#### [9.36.1.] 9.36.1. General

##### [9.36.1.1.] 9.36.1.1. Scope

##### [9.36.1.2.] 9.36.1.2. Definitions

##### [9.36.1.3.] 9.36.1.3. Compliance and Application

(See Note A-9.36.1.3.)

- [1] 1) Except as provided in Sentences ~~(3) to (7)-2025~~ ~~(2) to (6)~~, *buildings* shall comply with
- [a] a) the prescriptive or trade-off requirements in Subsections 9.36.2. to 9.36.4.,
  - [b] b) the performance requirements in Subsection 9.36.5.,
  - [c] c) the tiered performance requirements in Subsection 9.36.7.,
  - [d] d) the tiered prescriptive requirements in Subsection 9.36.8., or
  - [e] e) the NECB.
- [2] --) ~~Except as provided in Sentence (6)-2025, buildings shall comply with~~
- [a] --) ~~the tiered operational GHG emissions prescriptive requirements in Subsection 9.36.12.-2025, or~~
  - [b] --) ~~the NECB.~~
- [3] 2) Subsections 9.36.2. to 9.36.4. apply to
- [a] a) *buildings of residential occupancy* to which Part 9 applies,
  - [b] b) *buildings containing business and personal services, mercantile or low-hazard industrial occupancies* to which Part 9 applies whose combined total floor area does not exceed 300 m<sup>2</sup>, excluding parking garages that serve *residential occupancies*, and
  - [c] c) *buildings containing a mix of the residential and non-residential occupancies* described in Clauses (a) and (b).
- [4] 3) Subsection 9.36.5. and 9.36.7. apply only to
- [a] a) houses with or without a *secondary suite*, and
  - [b] b) *buildings containing only dwelling units and common spaces* whose total floor area does not exceed 20% of the total floor area of the *building*.
- (See Note A-9.36.1.3.(3).)
- [5] 4) Subsections 9.36.8. and 9.36.12.-2025 ~~applies~~ ~~apply~~ only to *buildings of residential occupancy* to which Part 9 applies.
- [6] 5) *Buildings containing non-residential occupancies* whose combined total floor area exceeds 300 m<sup>2</sup> or *medium-hazard industrial occupancies* shall comply with the NECB.
- [7] 6) *Buildings or portions of buildings* that are not required to be *conditioned spaces* are exempted from the requirements of this Section. (See Note A-9.36.1.3.(6).)

**[9.36.2.] 9.36.2. Building Envelope****[9.36.2.1.] 9.36.2.1. Scope and Application****[9.36.2.2.] 9.36.2.2. Determination of Thermal Characteristics of Materials, Components and Assemblies****[9.36.2.3.] 9.36.2.3. Calculation of Ceiling, Wall, Fenestration and Door Areas****[9.36.2.4.] 9.36.2.4. Calculation of Effective Thermal Resistance of Assemblies****[9.36.2.5.] 9.36.2.5. Continuity of Insulation****[9.36.2.6.] 9.36.2.6. Thermal Characteristics of Above-ground Opaque Building Assemblies****[9.36.2.7.] 9.36.2.7. Thermal Characteristics of Fenestration, Doors and Skylights****[9.36.2.8.] 9.36.2.8. Thermal Characteristics of Building Assemblies Below-Grade or in Contact with the Ground****[9.36.2.9.] 9.36.2.9. Airtightness****[9.36.2.10.] 9.36.2.10. Construction of Air Barrier Details****[9.36.2.11.] 9.36.2.11. Trade-off Options for Above-ground Building Envelope Components and Assemblies****[9.36.3.] 9.36.3. HVAC Requirements****[9.36.3.1.] 9.36.3.1. Scope and Application****[9.36.3.2.] 9.36.3.2. Equipment and Ducts****[9.36.3.3.] 9.36.3.3. Air Intake and Outlet Dampers****[9.36.3.4.] 9.36.3.4. Piping for Heating and Cooling Systems****[9.36.3.5.] 9.36.3.5. Equipment for Heating and Air-conditioning Systems****[9.36.3.6.] 9.36.3.6. Temperature Controls****[9.36.3.7.] 9.36.3.7. Humidification****[9.36.3.8.] 9.36.3.8. Heat Recovery from Dehumidification in Spaces with an Indoor Pool or Hot Tub****[9.36.3.9.] 9.36.3.9. Heat Recovery from Ventilation Systems****[9.36.3.10.] 9.36.3.10. Equipment Efficiency****[9.36.3.11.] 9.36.3.11. Solar Thermal Systems****[9.36.4.] 9.36.4. Service Water Heating Systems**

[\[9.36.4.1.\]](#) 9.36.4.1. Scope and Application

[\[9.36.4.2.\]](#) 9.36.4.2. Equipment Efficiency

[\[9.36.4.3.\]](#) 9.36.4.3. Solar Domestic Hot Water Systems

[\[9.36.4.4.\]](#) 9.36.4.4. Piping

[\[9.36.4.5.\]](#) 9.36.4.5. Controls

[\[9.36.4.6.\]](#) 9.36.4.6. Indoor Swimming Pool Equipment Controls

## [\[9.36.5.\]](#) 9.36.5. Energy Performance Compliance

[\[9.36.5.1.\]](#) 9.36.5.1. Scope and Application

[\[9.36.5.2.\]](#) 9.36.5.2. Definitions

[\[9.36.5.3.\]](#) 9.36.5.3. Compliance

[\[9.36.5.4.\]](#) 9.36.5.4. Calculation Methods

[\[9.36.5.5.\]](#) 9.36.5.5. Climatic Data

[\[9.36.5.6.\]](#) 9.36.5.6. Building Envelope Calculations

[\[9.36.5.7.\]](#) 9.36.5.7. HVAC System Calculations

[\[9.36.5.8.\]](#) 9.36.5.8. Service Water Heating System Calculations

[\[9.36.5.9.\]](#) 9.36.5.9. General Requirements for Modeling the Proposed House

[\[9.36.5.10.\]](#) 9.36.5.10. Modeling Building Envelope of Proposed House

[\[9.36.5.11.\]](#) 9.36.5.11. Modeling HVAC System of Proposed House

[\[9.36.5.12.\]](#) 9.36.5.12. Modeling Service Water Heating System of Proposed House

[\[9.36.5.13.\]](#) 9.36.5.13. General Requirements for Modeling the Reference House

[\[9.36.5.14.\]](#) 9.36.5.14. Modeling Building Envelope of Reference House

[\[9.36.5.15.\]](#) 9.36.5.15. Modeling HVAC System of Reference House

[\[9.36.5.16.\]](#) 9.36.5.16. Modeling Service Water Heating System of Reference House

## [\[9.36.6.\]](#) 9.36.6. Airtightness of Building Envelope

[\[9.36.6.1.\]](#) 9.36.6.1. Scope and Application

[\[9.36.6.2.\]](#) 9.36.6.2. Definitions

[\[9.36.6.3.\]](#) 9.36.6.3. Determination of Airtightness

**[9.36.6.4.] 9.36.6.4. Determination of Airtightness Level**

**[9.36.7.] 9.36.7. Tiered Energy Performance Compliance: Performance Path**

**[9.36.7.1.] 9.36.7.1. Scope and Application**

**[9.36.7.2.] 9.36.7.2. Compliance**

**[9.36.7.3.] 9.36.7.3. Energy Performance Improvement Compliance Calculations**

**[9.36.8.] 9.36.8. Tiered Energy Performance Compliance: Prescriptive Path**

**[9.36.8.1.] 9.36.8.1. Scope**

**[9.36.8.2.] 9.36.8.2. Compliance**

**[9.36.8.3.] 9.36.8.3. Definitions**

**[9.36.8.4.] 9.36.8.4. Building Envelope – General**

**[9.36.8.5.] 9.36.8.5. Energy Conservation Measures for Above-Ground Opaque Building Assemblies**

**[9.36.8.6.] 9.36.8.6. Energy Conservation Measures for Fenestration and Doors**

**[9.36.8.7.] 9.36.8.7. Energy Conservation Measures for Opaque Building Assemblies Below-Grade or in Contact with the Ground**

**[9.36.8.8.] 9.36.8.8. Energy Conservation Measures Relating to Airtightness**

**[9.36.8.9.] 9.36.8.9. Energy Conservation Measures for HVAC Systems**

**[9.36.8.10.] 9.36.8.10. Energy Conservation Measures for Service Water Heating Equipment**

**[9.36.8.11.] 9.36.8.11. Energy Conservation Points for Building Volume**

**[9.36.9.] -- Reserved**

**[9.36.10.] -- Reserved**

**[9.36.11.] -- Reserved**

**[9.36.12.] -- Tiered Operational GHG Emissions Prescriptive Compliance**

**[9.36.12.1.] --- Scope**

**[1] --)** This Subsection is concerned with GHG emissions, determined at the time of design, resulting from the supply and consumption of energy used by the *building for*

[a] --) *systems used for heating, ventilating and air-conditioning, and*

[b] --) *systems used to heat service water.*

**[9.36.12.2.] --- Application**

[1] --) This Subsection applies to the *buildings* described in Article 9.36.1.3.-2025.

**[9.36.12.3.] --- Compliance**

[1] --) The GHG emissions factor (GEF) for an energy source shall be determined in accordance with Article 9.36.11.6.-2025 (PCF 2004).

[2] --) The energy performance tier achieved by the *building* shall be determined in accordance with

[a] --) the tiered points-based prescriptive trade-off requirements in Subsection 9.36.8., or

[b] --) the tiered prescriptive requirements in Subsection 9.36.9.-2025 (PCF 1830).

[3] --) Compliance with this Subsection shall be achieved by designing and constructing *buildings* in accordance with one of the GHG emissions performance levels A to F specified in Article 9.36.12.4.

**[9.36.12.4.] --- GHG Emissions Performance Levels**

[1] --) Except as provided in Sentence (2), to comply with one of the GHG emissions performance levels A to F, the *building* shall be designed and constructed so that its energy performance meets or exceeds the minimum energy performance tier required for that performance level, as specified in Tables 9.36.12.4.-A to 9.36.12.4.-F for the energy sources or types of equipment used for space and service water heating and the applicable GHG emissions factor for electricity.

**Table [9.36.12.4.-A]  
Minimum Energy Performance Tier for GHG Emissions Performance Level A  
Forming Part of Sentence 9.36.12.4.(1)**

<b>Energy Source or Type of Equipment</b>		<b>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</b>	<b>Minimum Energy Performance Tier (2)</b>
<b>Space Heating</b>	<b>Service Water Heating</b>		
Electricity	Electricity	GEF ≤ 25	2
		25 < GEF ≤ 100	4
Heat pump (3) with electric back-up (4)	Electric storage-type service water heater or heat pump water heater	GEF ≤ 25	1
		25 < GEF ≤ 100	3
Heat pump (3) with natural gas or propane back-up (4)	Electric storage-type service water heater or heat pump water heater	GEF ≤ 100	4
Cold-climate heat pump (3) (5) with electric back-up (4)	Heat pump water heater	GEF ≤ 25	1
		25 < GEF ≤ 100	2
		100 < GEF < 200	4



<b><u>Energy Source or Type of Equipment</u></b>		<b><u>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</u></b>	<b><u>Minimum Energy Performance Tier (2)</u></b>
<b><u>Space Heating</u></b>	<b><u>Service Water Heating</u></b>		
	<u>Electric storage-type service water heater</u>	<u>GEF ≤ 25</u>	<u>1</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>3</u>
<u>Other source with GEF &lt; 25</u>	<u>Other source with GEF &lt; 25</u>	<u>GEF &lt; 200</u>	<u>2</u>

**Notes to Table [9.36.12.4.-A] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the building.
- (5) A cold-climate heat pump is an air-source heat pump that has a rated coefficient of performance not less than 1.8 at -15°C and a rated capacity at -15°C not less than 70% of the rated capacity at 8.3°C.

**Table [9.36.12.4.-B]  
Minimum Energy Performance Tier for GHG Emissions Performance Level B  
Forming Part of Sentence 9.36.12.4.(1)**

<b><u>Energy Source or Type of Equipment</u></b>		<b><u>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</u></b>	<b><u>Minimum Energy Performance Tier (2)</u></b>
<b><u>Space Heating</u></b>	<b><u>Service Water Heating</u></b>		
<u>Electricity</u>	<u>Electricity</u>	<u>GEF ≤ 25</u>	<u>2</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>3</u>
<u>Heat pump (3) with electric back-up (4)</u>	<u>Electric storage-type service water heater or heat pump water heater</u>	<u>GEF ≤ 25</u>	<u>1</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>2</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>4</u>

<b><u>Energy Source or Type of Equipment</u></b>		<b><u>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</u></b>	<b><u>Minimum Energy Performance Tier (2)</u></b>
<b><u>Space Heating</u></b>	<b><u>Service Water Heating</u></b>		
<u>Heat pump (3) with natural gas or propane back-up (4)</u>	<u>Electric storage-type service water heater or heat pump water heater</u>	<u>GEF ≤ 100</u>	<u>3</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>4</u>
<u>Other source with GEF &lt; 25</u>	<u>Other source with GEF &lt; 25</u>	<u>GEF &lt; 200</u>	<u>2</u>

**Notes to Table [9.36.12.4.-B] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the building.

**Table [9.36.12.4.-C]**  
**Minimum Energy Performance Tier for GHG Emissions Performance Level C**  
**Forming Part of Sentence 9.36.12.4.(1)**

<b><u>Energy Source or Type of Equipment</u></b>		<b><u>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</u></b>	<b><u>Minimum Energy Performance Tier (2)</u></b>
<b><u>Space Heating</u></b>	<b><u>Service Water Heating</u></b>		
<u>Electricity</u>	<u>Electricity</u>	<u>GEF ≤ 100</u>	<u>2</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>3</u>
<u>Heat pump (3) with electric back-up (4)</u>	<u>Electric storage-type service water heater or heat pump water heater</u>	<u>GEF ≤ 100</u>	<u>1</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>2</u>
<u>Heat pump (3) with natural gas or propane back-up (4)</u>	<u>Electric storage-type service water heater or heat pump water heater</u>	<u>GEF ≤ 100</u>	<u>2</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>3</u>
<u>Other source with GEF &lt; 25</u>	<u>Other source with GEF &lt; 25</u>	<u>GEF &lt; 200</u>	<u>2</u>

**Notes to Table [9.36.12.4.-C] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*.

**Table [9.36.12.4.-D]  
Minimum Energy Performance Tier for GHG Emissions Performance Level D  
Forming Part of Sentence 9.36.12.4.(1)**

<b>Energy Source or Type of Equipment</b>		<b>Electricity GEF, (1) g CO<sub>2</sub>e/kWh</b>	<b>Minimum Energy Performance Tier (2)</b>
<b>Space Heating</b>	<b>Service Water Heating</b>		
<u>Natural gas</u>	<u>Natural gas</u>	<u>Any</u>	<u>4</u>
	<u>Electricity</u>	<u>GEF ≤ 100</u>	<u>1</u>
<u>Electricity</u>	<u>Electricity</u>	<u>GEF ≤ 100</u>	<u>2</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>3</u>
<u>Heat pump (3) with electric, natural gas, or propane back-up, (4) or other source with GEF &lt; 25</u>	<u>Electricity, including electric storage-type service water heaters and heat pump water heaters, or other source with GEF &lt; 25</u>	<u>Any</u>	<u>1</u>

**Notes to Table [9.36.12.4.-D] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*.

**Table [9.36.12.4.-E]**  
**Minimum Energy Performance Tier for GHG Emission Performance Level E**  
**Forming Part of Sentence 9.36.12.4.(1)**

<b>Energy Source</b>		<b>Minimum Energy Performance Tier <sup>(1)</sup></b>
<b>Space Heating</b>	<b>Service Water Heating <sup>(2)</sup></b>	
Natural gas	Natural gas	<u>3</u>
Natural gas	Electricity or other source with GEF $\leq 25$	<u>1</u>
Electricity, heat pump <sup>(3)</sup> with electric, natural gas, or propane back-up, <sup>(4)</sup> or other source with GEF $\leq 25$	Natural gas, electricity or other source with GEF $\leq 25$	<u>1</u>

**Notes to Table [9.36.12.4.-E] :**

- (1) See Sentence 9.36.12.3.(2).
- (2) GEF = GHG emissions factor in g CO<sub>2</sub>e/kWh
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*.

**Table [9.36.12.4.-F]**  
**Minimum Energy Performance Tier for GHG Emission Performance Level F**  
**Forming Part of Sentence 9.36.12.4.(1)**

<b>Energy Source</b>		<b>Minimum Energy Performance Tier <sup>(1)</sup></b>
<b>Space Heating</b>	<b>Service Water Heating</b>	
Natural gas, electricity, heat pump <sup>(2)</sup> with electric, natural gas, or propane back-up, <sup>(3)</sup> or other source with GEF <sup>(4)</sup> $\leq 25$	Natural gas, electricity or other source with GEF <sup>(4)</sup> $\leq 25$	<u>1</u>

**Notes to Table [9.36.12.4.-F] :**

- (1) See Sentence 9.36.12.3.(2).

- 
- (2) Electrically operated.
  - (3) The heat pump must be sized to meet at least 60% of the heating load of the *building*.
  - (4) GEF = GHG emissions factor in g CO<sub>2</sub>e/kWh
- 

**[2] --)** Where the *building* cannot reasonably be connected to the provincial or territorial electrical power grid, the *building* shall be deemed to comply with GHG emissions performance level F.

---

## REVISED PROPOSED CHANGE FOLLOWING WINTER 2024 PUBLIC REVIEW

---

### **[9.36.] 9.36. Energy Efficiency**

#### **[9.36.1.] 9.36.1. General**

##### **[9.36.1.1.] 9.36.1.1. Scope**

##### **[9.36.1.2.] 9.36.1.2. Definitions**

##### **[9.36.1.3.] 9.36.1.3. Compliance and Application**

**(See Note A-9.36.1.3.)**

- [1] 1)** Except as provided in Sentences (3) to (7)-2025, *buildings* shall comply with
  - [a] a) the prescriptive or trade-off requirements in Subsections 9.36.2. to 9.36.4.,
  - [b] b) the performance requirements in Subsection 9.36.5.,
  - [c] c) the tiered performance requirements in Subsection 9.36.7.,
  - [d] d) the tiered prescriptive requirements in Subsection 9.36.8., or
  - [e] e) the NECB.
- [2] --)** Except as provided in Sentences (6) and (8)-2025, *buildings* shall comply with
  - [a] --) the tiered operational GHG emissions prescriptive requirements in Subsection 9.36.12.-2025, or
  - [b] --) the NECB.
- [3] 2)** Subsections 9.36.2. to 9.36.4. apply to
  - [a] a) *buildings* of *residential occupancy* to which Part 9 applies,
  - [b] b) *buildings* containing *business and personal services, mercantile* or *low-hazard industrial occupancies* to which Part 9 applies whose combined total *floor area* does not exceed 300 m<sup>2</sup>, excluding parking garages that serve *residential occupancies*, and
  - [c] c) *buildings* containing a mix of the *residential* and *non-residential occupancies* described in Clauses (a) and (b).
- [4] 3)** Subsection 9.36.5. and 9.36.7. apply only to
  - [a] a) houses with or without a *secondary suite*, and
  - [b] b) *buildings* containing only *dwelling units* and common spaces whose total *floor*

*area* does not exceed 20% of the total *floor area* of the *building*.

(See Note A-9.36.1.3.(3).)

- [5] 4) Subsections 9.36.8. and 9.36.12.-2025 apply only to *buildings of residential occupancy* to which Part 9 applies.
- [6] 5) *Buildings* containing non-residential occupancies whose combined total *floor area* exceeds 300 m<sup>2</sup> or *medium-hazard industrial occupancies* shall comply with the NECB.
- [7] 6) *Buildings* or portions of *buildings* that are not required to be *conditioned spaces* are exempted from the requirements of this Section. (See Note A-9.36.1.3.(6).)
- [8] --) Extensions added to existing buildings that have a floor area not greater than 60% of the original gross floor area of the existing building are exempted from the requirements of Subsections 9.36.11. (PCF 2004) and 9.36.12.-2025.

**[\[9.36.2.\]](#) 9.36.2. Building Envelope****[\[9.36.2.1.\]](#) 9.36.2.1. Scope and Application****[\[9.36.2.2.\]](#) 9.36.2.2. Determination of Thermal Characteristics of Materials, Components and Assemblies****[\[9.36.2.3.\]](#) 9.36.2.3. Calculation of Ceiling, Wall, Fenestration and Door Areas****[\[9.36.2.4.\]](#) 9.36.2.4. Calculation of Effective Thermal Resistance of Assemblies****[\[9.36.2.5.\]](#) 9.36.2.5. Continuity of Insulation****[\[9.36.2.6.\]](#) 9.36.2.6. Thermal Characteristics of Above-ground Opaque Building Assemblies****[\[9.36.2.7.\]](#) 9.36.2.7. Thermal Characteristics of Fenestration, Doors and Skylights****[\[9.36.2.8.\]](#) 9.36.2.8. Thermal Characteristics of Building Assemblies Below-Grade or in Contact with the Ground****[\[9.36.2.9.\]](#) 9.36.2.9. Airtightness****[\[9.36.2.10.\]](#) 9.36.2.10. Construction of Air Barrier Details****[\[9.36.2.11.\]](#) 9.36.2.11. Trade-off Options for Above-ground Building Envelope Components and Assemblies****[\[9.36.3.\]](#) 9.36.3. HVAC Requirements****[\[9.36.3.1.\]](#) 9.36.3.1. Scope and Application****[\[9.36.3.2.\]](#) 9.36.3.2. Equipment and Ducts****[\[9.36.3.3.\]](#) 9.36.3.3. Air Intake and Outlet Dampers****[\[9.36.3.4.\]](#) 9.36.3.4. Piping for Heating and Cooling Systems****[\[9.36.3.5.\]](#) 9.36.3.5. Equipment for Heating and Air-conditioning Systems****[\[9.36.3.6.\]](#) 9.36.3.6. Temperature Controls****[\[9.36.3.7.\]](#) 9.36.3.7. Humidification****[\[9.36.3.8.\]](#) 9.36.3.8. Heat Recovery from Dehumidification in Spaces with an Indoor Pool or Hot Tub****[\[9.36.3.9.\]](#) 9.36.3.9. Heat Recovery from Ventilation Systems****[\[9.36.3.10.\]](#) 9.36.3.10. Equipment Efficiency****[\[9.36.3.11.\]](#) 9.36.3.11. Solar Thermal Systems****[\[9.36.4.\]](#) 9.36.4. Service Water Heating Systems**

[\[9.36.4.1.\]](#) 9.36.4.1. Scope and Application

[\[9.36.4.2.\]](#) 9.36.4.2. Equipment Efficiency

[\[9.36.4.3.\]](#) 9.36.4.3. Solar Domestic Hot Water Systems

[\[9.36.4.4.\]](#) 9.36.4.4. Piping

[\[9.36.4.5.\]](#) 9.36.4.5. Controls

[\[9.36.4.6.\]](#) 9.36.4.6. Indoor Swimming Pool Equipment Controls

## [\[9.36.5.\]](#) 9.36.5. Energy Performance Compliance

[\[9.36.5.1.\]](#) 9.36.5.1. Scope and Application

[\[9.36.5.2.\]](#) 9.36.5.2. Definitions

[\[9.36.5.3.\]](#) 9.36.5.3. Compliance

[\[9.36.5.4.\]](#) 9.36.5.4. Calculation Methods

[\[9.36.5.5.\]](#) 9.36.5.5. Climatic Data

[\[9.36.5.6.\]](#) 9.36.5.6. Building Envelope Calculations

[\[9.36.5.7.\]](#) 9.36.5.7. HVAC System Calculations

[\[9.36.5.8.\]](#) 9.36.5.8. Service Water Heating System Calculations

[\[9.36.5.9.\]](#) 9.36.5.9. General Requirements for Modeling the Proposed House

[\[9.36.5.10.\]](#) 9.36.5.10. Modeling Building Envelope of Proposed House

[\[9.36.5.11.\]](#) 9.36.5.11. Modeling HVAC System of Proposed House

[\[9.36.5.12.\]](#) 9.36.5.12. Modeling Service Water Heating System of Proposed House

[\[9.36.5.13.\]](#) 9.36.5.13. General Requirements for Modeling the Reference House

[\[9.36.5.14.\]](#) 9.36.5.14. Modeling Building Envelope of Reference House

[\[9.36.5.15.\]](#) 9.36.5.15. Modeling HVAC System of Reference House

[\[9.36.5.16.\]](#) 9.36.5.16. Modeling Service Water Heating System of Reference House

## [\[9.36.6.\]](#) 9.36.6. Airtightness of Building Envelope

[\[9.36.6.1.\]](#) 9.36.6.1. Scope and Application

[\[9.36.6.2.\]](#) 9.36.6.2. Definitions

[\[9.36.6.3.\]](#) 9.36.6.3. Determination of Airtightness



**[9.36.6.4.] 9.36.6.4. Determination of Airtightness Level**

**[9.36.7.] 9.36.7. Tiered Energy Performance Compliance: Performance Path**

**[9.36.7.1.] 9.36.7.1. Scope and Application**

**[9.36.7.2.] 9.36.7.2. Compliance**

**[9.36.7.3.] 9.36.7.3. Energy Performance Improvement Compliance Calculations**

**[9.36.8.] 9.36.8. Tiered Energy Performance Compliance: Prescriptive Path**

**[9.36.8.1.] 9.36.8.1. Scope**

**[9.36.8.2.] 9.36.8.2. Compliance**

**[9.36.8.3.] 9.36.8.3. Definitions**

**[9.36.8.4.] 9.36.8.4. Building Envelope – General**

**[9.36.8.5.] 9.36.8.5. Energy Conservation Measures for Above-Ground Opaque Building Assemblies**

**[9.36.8.6.] 9.36.8.6. Energy Conservation Measures for Fenestration and Doors**

**[9.36.8.7.] 9.36.8.7. Energy Conservation Measures for Opaque Building Assemblies Below-Grade or in Contact with the Ground**

**[9.36.8.8.] 9.36.8.8. Energy Conservation Measures Relating to Airtightness**

**[9.36.8.9.] 9.36.8.9. Energy Conservation Measures for HVAC Systems**

**[9.36.8.10.] 9.36.8.10. Energy Conservation Measures for Service Water Heating Equipment**

**[9.36.8.11.] 9.36.8.11. Energy Conservation Points for Building Volume**

**[9.36.9.] -- Reserved**

**[9.36.10.] -- Reserved**

**[9.36.11.] -- Reserved**

**[9.36.12.] -- Tiered Operational GHG Emissions Prescriptive Compliance**

**[9.36.12.1.] --- Scope**

**[9.36.12.2.] --- Application**

**[9.36.12.3.] --- Compliance**

**[1]** --) The GHG emissions factor (GEF) for an energy source shall be determined in

accordance with Article 9.36.11.6.-2025 (PCF 2004).

- [2] --) The total number of energy conservation points ~~performance-tier~~ achieved by the *building* shall be determined in accordance with
  - [a] --) the tiered points-based prescriptive trade-off requirements in Subsection 9.36.8., or
  - [b] --) the tiered prescriptive requirements in ~~Subsection 9.36.9.-2025 (PCF 1830).~~
    - [i] --) Subsection 9.36.9.-2025 (PCF 2042), where Tier 1 is assigned 0 energy conservation points.
    - [ii] --) Reserved.
    - [iii] --) Reserved.
    - [iv] --) Reserved, or
    - [v] --) Subsection 9.36.13.-2025 (PCF 1830), where Tier 5 is assigned 75 energy conservation points.
- [3] --) Compliance with this Subsection shall be achieved by designing and constructing *buildings* in accordance with one of the GHG emissions performance levels A to F specified in Article 9.36.12.4.

**[9.36.12.4.] --- GHG Emissions Performance Levels**

- [1] --) Except as provided in Sentence (2), to comply with one of the GHG emissions performance levels A to F, the *building* shall be designed and constructed so that its total number of energy ~~performance~~ conservation points, as determined in accordance with Sentence 9.36.12.3.(2), meets or exceeds the minimum number of energy conservation points ~~performance-tier~~ required for that GHG emissions performance level, as specified in Tables 9.36.12.4.-A to 9.36.12.4.-F for the energy sources or types of equipment used for space and service water heating and the applicable GHG emissions factor for electricity.

**Table [9.36.12.4.-A]  
Minimum Number of Energy Conservation Points ~~Performance-Tier~~ for GHG Emissions  
Performance Level A  
Forming Part of Sentence 9.36.12.4.(1)**

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <u>Number of Energy Conservation Points</u> <del>Performance-Tier</del> (2)
Space Heating	Service Water Heating		
Electricity	<del>Electricity</del> <u>Heat pump water heater</u>	GEF ≤ 25	<del>2</del> <u>10</u>
		25 < GEF ≤ 100	<del>4</del> <u>70</u>
	<u>Electric tankless or storage-type service water heater</u>	<u>GEF ≤ 25</u>	<u>15</u>
Heat pump <sup>(3)</sup> with electric <del>back-up</del> <u>supplemental system</u> <sup>(4)</sup>	Electric <u>tankless or storage-type service water heater</u> or heat pump water heater	GEF ≤ 25	<del>1</del> <u>0</u>
		25 < GEF ≤ 100	<del>3</del> <u>65</u>
Heat pump <sup>(3)</sup> with <del>natural gas or propane back-up</del> <sup>(4)</sup>	<del>Electric storage-type service water heater or heat pump water heater</del>	<del>GEF ≤ 100</del>	<del>4</del>

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> <del>Performance Tier</del> (2)
Space Heating	Service Water Heating		
<del>Cold-climate heat pump (3) (5) with electric back-up (4)</del>	<del>Heat pump water heater</del>	<del>GEF ≤ 25</del>	<del>1</del>
		<del>25 &lt; GEF ≤ 100</del>	<del>2</del>
		<del>100 &lt; GEF &lt; 200</del>	<del>4</del>
	<del>Electric storage-type service water heater</del>	<del>GEF ≤ 25</del>	<del>1</del>
		<del>25 &lt; GEF ≤ 100</del>	<del>3</del>
Other source with GEF ≤ 25	Other source with GEF ≤ 25	GEF < 200	<del>2</del> <u>10</u>

**Notes to Table [9.36.12.4.-A] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*; the remainder of the heating load must be met by the supplemental system.
- (5) ~~A cold-climate heat pump is an air-source heat pump that has a rated coefficient of performance not less than 1.8 at -15°C and a rated capacity at -15°C not less than 70% of the rated capacity at 8.3°C.~~

**Table [9.36.12.4.-B]  
Minimum **Number of Energy Conservation Points** ~~Performance Tier~~ for GHG Emissions  
Performance Level B  
Forming Part of Sentence 9.36.12.4.(1)**

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> <del>Performance Tier</del> (2)
Space Heating	Service Water Heating		
Electricity	<del>Electricity</del> <u>Heat pump water heater</u>	GEF ≤ 25	<del>2</del> <u>10</u>
		25 < GEF ≤ 100	<del>3</del> <u>35</u>
	<u>Electric tankless or storage-type service water heater</u>	GEF ≤ 25	<u>15</u>
		25 < GEF ≤ 100	<u>35</u>

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> <b>Performance Tier</b> (2)
Space Heating	Service Water Heating		
Heat pump (3) with electric <del>back-up</del> <b>supplemental system</b> (4)	<u>Heat pump water heater</u>	<u>GEF ≤ 25</u>	<u>0</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>10</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>65</u>
	Electric <del>tankless or storage-type service water heater or heat pump water heater</del>	GEF ≤ 25	<del>1</del> <u>0</u>
		25 < GEF ≤ 100	<del>2</del> <u>20</u>
		100 < GEF < 200	<del>4</del> <u>65</u>
Heat pump (3) <del>with natural gas or propane back-up</del> (4)	Electric <del>storage-type service water heater or heat pump water heater</del>	<del>GEF ≤ 100</del>	<del>3</del>
		<del>100 &lt; GEF &lt; 200</del>	<del>4</del>
Other source with GEF <del>&lt;=</del> 25	Other source with GEF <del>&lt;=</del> 25	GEF < 200	<del>2</del> <u>10</u>

**Notes to Table [9.36.12.4.-B] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*; the remainder of the heating load must be met by the supplemental system.

**Table [9.36.12.4.-C]  
Minimum **Number of Energy Conservation Points** **Performance Tier** for GHG Emissions  
Performance Level C  
Forming Part of Sentence 9.36.12.4.(1)**

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> <b>Performance Tier</b> (2)
Space Heating	Service Water Heating		
Electricity	<del>Electricity</del> <u>Heat pump water heater</u>	GEF ≤ <del>100</del> <u>25</u>	<del>2</del> <u>10</u>
		<del>100</del> <u>25</u> < GEF < 200	<del>3</del> <u>35</u>
	<u>Electric tankless or storage-type service water heater</u>	<u>GEF ≤ 25</u>	<u>15</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>35</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>40</u>

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> Performance Tier (2)
Space Heating	Service Water Heating		
Heat pump (3) with electric <del>back-</del> <del>up</del> <u>supplemental system</u> (4)	<u>Heat pump water heater</u>	<u>GEF ≤ 25</u>	<u>0</u>
		<u>25 &lt; GEF ≤ 100</u>	<u>10</u>
		<u>100 &lt; GEF &lt; 200</u>	<u>15</u>
	Electric <u>tankless or storage-</u> <del>type service water heater or</del> <del>heat pump water heater</del>	<u>GEF ≤ 25</u>	<u>0</u>
		<del>GEF ≤ 100</del>	<del>1</del>
		<del>100</del> <u>25 &lt; GEF &lt; 200</u>	<del>2</del> <u>15</u>
Heat pump (3) with <del>natural</del> <u>utility gas or</u> propane <del>back-</del> <del>up</del> <u>supplemental system</u> (4)	Electric, <u>utility gas or propane tankless or storage-</u> <del>type service water heater or</del> heat pump water heater	<del>GEF ≤ 100</del>	<del>2</del>
		<del>100</del> <u>&lt; GEF &lt; 200</u>	<del>3</del> <u>35</u>
Other source with GEF <del>&lt;</del> <u>≤</u> 25	Other source with GEF <del>&lt;</del> <u>≤</u> 25	GEF < 200	<del>2</del> <u>10</u>

**Notes to Table [9.36.12.4.-C] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*; the remainder of the heating load must be met by the supplemental system.

**Table [9.36.12.4.-D]  
Minimum **Number of Energy Conservation Points** Performance Tier for GHG Emissions  
Performance Level D  
Forming Part of Sentence 9.36.12.4.(1)**

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> Performance Tier (2)
Space Heating	Service Water Heating		
<del>Natural</del> <u>Utility gas or propane</u>	<del>Natural</del> <u>Utility gas or propane</u>	Any	<del>4</del> <u>35</u>
	Electricity	GEF ≤ 100	<del>1</del> <u>10</u>
Electricity	Electricity	<del>GEF ≤ 100</del>	<del>2</del>

Energy Source or Type of Equipment		Electricity GEF, (1) g CO <sub>2</sub> e/kWh	Minimum <b>Number of Energy Conservation Points</b> Performance <b>Tier</b> (2)
Space Heating	Service Water Heating		
		<del>100</del> ← GEF < 200	<del>3</del> <u>10</u>
<u>Heat pump (3) with electric supplemental system (4)</u>	<u>Electric tankless or storage-type service water heater or heat pump water heater</u>	<u>GEF &lt; 200</u>	<u>0</u>
<u>Heat pump (3) with utility gas or propane supplemental system (4)</u>	<u>Electric, utility gas or propane tankless or storage-type service water heater or heat pump water heater</u>	<u>GEF &lt; 200</u>	<u>10</u>
<del>Heat pump (5) with electric, natural gas, or propane back-up, (6) or other source with GEF ≤ 25</del>	<del>Electricity, including electric storage-type service water heaters and heat pump water heaters, or other source with GEF ≤ 25</del>	<del>Any</del> <u>GEF &lt; 200</u>	<del>1</del> <u>10</u>

**Notes to Table [9.36.12.4.-D] :**

- (1) GEF = GHG emissions factor
- (2) See Sentence 9.36.12.3.(2).
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the building; the remainder of the heating load must be met by the supplemental system.
- (5) ~~Electrically operated.~~
- (6) ~~The heat pump must be sized to meet at least 60% of the heating load of the building.~~

**Table [9.36.12.4.-E]**  
**Minimum Number of Energy Conservation Points ~~Performance Tier~~ for GHG Emission**  
**Performance Level E**  
**Forming Part of Sentence 9.36.12.4.(1)**

Energy Source		Minimum <u>Number of Energy Conservation Points</u> <del>Performance Tier</del> (1)
<b>Space Heating</b>	<b>Service Water Heating (2)</b>	
<del>Natural</del> Utility gas <del>Natural-gas or propane</del>	<del>Natural</del> Utility gas or propane	<del>3</del> 15
	Electricity or other source with GEF ≤ 25	<del>1</del> 0
Electricity, heat pump (3) with electric, <del>natural</del> utility gas, or propane <del>back-up</del> supplemental system, (4) or other source with GEF ≤ 25	<del>Natural</del> Utility gas, electricity, <del>propane</del> , or other source with GEF ≤ 25	<del>1</del> 0

**Notes to Table [9.36.12.4.-E] :**

- (1) See Sentence 9.36.12.3.(2).
- (2) GEF = GHG emissions factor in g CO<sub>2</sub>e/kWh
- (3) Electrically operated.
- (4) The heat pump must be sized to meet at least 60% of the heating load of the *building*; the remainder of the heating load must be met by the supplemental system.

**Table [9.36.12.4.-F]**  
**Minimum Number of Energy Conservation Points ~~Performance Tier~~ for GHG Emissions**  
**Performance Level F**  
**Forming Part of Sentence 9.36.12.4.(1)**

Energy Source		Minimum <u>Number of Energy Conservation Points</u> <del>Performance Tier</del> <sup>(1)</sup>
<b>Space Heating</b>	<b>Service Water Heating</b>	
<u>Utility gas</u>	<u>Utility gas, electricity, propane, or other source with GEF ≤ 25</u>	<u>0</u>
<u>Propane</u>	<u>Propane</u>	<u>10</u>
	<u>Electricity or other source with GEF ≤ 25</u>	<u>0</u>
<del>Natural gas,</del> <u>Electricity, heat pump <sup>(2)</sup> with electric, <del>natural</del> utility gas, or propane <del>back-up supplemental system,</del> <sup>(3)</sup> or other source with GEF <sup>(4)</sup> ≤ 25</u>	<del>Natural</del> <u>Utility gas, electricity, propane, or other source with GEF <sup>(4)</sup> ≤ 25</u>	<del>± 0</del>

**Notes to Table [9.36.12.4.-F] :**

- (1) See Sentence 9.36.12.3.(2).
- (2) Electrically operated.
- (3) The heat pump must be sized to meet at least 60% of the heating load of the *building*; the remainder of the heating load must be met by the supplemental system.
- (4) GEF = GHG emissions factor in g CO<sub>2</sub>e/kWh

**[2] --)** Where the *building* cannot reasonably be connected to the provincial or territorial electrical power grid, the *building* shall be exempted from compliance with the requirements of this Subsection. ~~deemed to comply with GHG emissions performance level F.~~

## Impact analysis

This section describes the approach that was adopted for performing an impact analysis of the tiered prescriptive operational GHG emissions requirements for the NBC. The analysis is in accordance with the methodologies developed PCF 2004 to propose operational GHG emissions requirements in Section 9.36. The impact analysis was performed using simulations that use reference emissions factor values of 235 g CO<sub>2</sub>e/kWh and 260 g CO<sub>2</sub>e/kWh for determining the GHG emissions target for space heating and service water heating, respectively. The GHG emissions of all non-heating regulated loads were calculated taking into account the emissions factor of electricity for each province or territory (average projected 2031–2035 values). PCFs 2004 and 2026 were developed based on average emissions factors, not marginal emissions factors.



The introduction of tiered operational GHG emissions levels would provide the provinces and territories with the option to adopt the operational GHG emissions level that is the most suitable for their needs. Even though energy performance modeling is commonly used in the industry currently, in order to provide simplicity in achieving compliance with the proposed operational GHG emissions levels, in addition to the performance path, Section 9.36. would provide a prescriptive compliance path as well.

The 2020 edition of the NBC introduced energy performance tiers for buildings and houses, with increasing levels of energy performance improvement. The amount of annual operational GHG emissions is directly correlated with the annual energy use of the house. In order to provide simplicity for Code users in achieving both energy efficiency and operational GHG emissions reduction, the following correlation between energy tiers and operational GHG emissions levels was proposed.

Table 1 presents the operational GHG emissions performance levels that can be achieved through the implementation of energy conservation measures, using utility gas as the energy source for space heating and service water heating in the proposed house.

Table 1. Operational GHG Emissions Performance Levels using Utility Gas as the Energy Source for Space Heating and Service Water Heating

Minimum Energy Conservation Points	Operational GHG Emissions Performance Levels	Operational GHG Emissions Percentage Improvement
0	F	≥ 0%
15	E	≥ 10%
35	D	≥ 25%

According to Table 1, using utility gas as the energy source for the proposed house, at least 80% of the archetypes complying with the minimum requirements of the NBC will be able to achieve level F. If additional energy efficiency measures are implemented, and the minimum number of energy conservation points achieved is 15, at least 80% of the archetypes will be able to achieve operational GHG emissions level E. Improving further the energy efficiency of the proposed house, and achieving 35 minimum energy conservation points, will result in at least 80% of the archetypes meeting operational GHG emissions level D.

The scenario using electricity as the energy source was investigated as well. Depending on the emissions factor for electricity for each province or territory (2031–2035 values), there is a significant variability between provinces and territories, as such the electric grids were divided into groups based on the emissions factor value (high, moderate or low), as presented in Table 2.

Table 2. Classification of Provincial and Territorial Electric Grids.

Province or Territory	Electric Grid GHG Emissions <sup>(1)</sup>	Electric Grid GHG Emissions Factor, g CO <sub>2</sub> e/kWh
British Columbia	Low	1.32
Alberta	High	181.86
Saskatchewan	High	146.60
Manitoba	Low	0.00
Ontario	Moderate	57.90
Quebec	Low	0.38
New Brunswick	Moderate	77.88

Nova Scotia	High	161.64
Prince Edward Island	Moderate	80.42
Newfoundland and Labrador	Low	11.08
Northwest Territories	Low	6.82
Yukon	Low	25.00
Nunavut	High	465.16

Note to Table 2:

(1) High: emissions factor greater than 100 g CO<sub>2</sub>e/kWh

Moderate: emissions factor greater than 25 g CO<sub>2</sub>e/kWh and less than or equal to 100 g CO<sub>2</sub>e/kWh

Low: emissions factor less than or equal to 25 g CO<sub>2</sub>e/kWh

Table 3. GHG Emissions Performance Levels for Electric Space Heating and Service Water Heating

<b>Grid GHG Emissions Factors</b>	<b>Minimum Energy Conservation Points</b>	<b>Operational GHG Emissions Performance Levels</b>
Low (less than or equal to 25 g CO <sub>2</sub> e/kWh)	10	Level A
Moderate (more than 25 g CO <sub>2</sub> e/kWh and less than or equal to 100 g CO <sub>2</sub> e/kWh)	70	Level A
	35	Level B
	10	Level C
High (more than 100 g CO <sub>2</sub> e/kWh and less than or equal to 200 g CO <sub>2</sub> e/kWh)	40	Level C
	10	Level D

Note to Table 3: Nunavut with an electricity emissions factor of 465.16 g CO<sub>2</sub>e/kWh (significantly higher than the average emission factor for utility gas) was excluded from the analysis.

According to Table 3, a noticeable improvement in operational GHG emissions performance levels can be observed across all provinces/territories at higher energy performance tiers. For example, achieving Energy Performance Tier 2 would result in operational GHG emissions Level A for grids with low emissions factors, Level C for grids with moderate emissions factors, and Level D for grids with high emissions factors.

Table 4 presents the operational GHG emissions levels for the scenario of the proposed house using utility gas for space heating and electricity for service water heating.

Table 4. GHG Emission Performance Levels for Utility Gas Space Heating and Electric Service Water Heating

<b>Grid GHG Emissions Factor</b>	<b>GHG Emission Performance Level</b>
Low (less than or equal to 25 g CO <sub>2</sub> e/kWh)	Level D
Moderate (more than 25 g CO <sub>2</sub> e/kWh and less than or equal to 100 g CO <sub>2</sub> e/kWh)	Level D
High (more than 100 g CO <sub>2</sub> e/kWh)	Level E

As Table 4 illustrates, replacing utility gas with electricity for service water heating results in better operational GHG emissions levels without implementing any energy-efficiency measures. The provinces and territories with low and moderate emissions grids are able to achieve Level D (compared with Level F when utility gas is the energy source), while the provinces and territories with high emissions grids can achieve Level E (compared with Level F when utility gas is the energy source).

Installing an air-source heat pump in the proposed house contributes to significant energy savings. Code users who choose to install a high-efficiency air-source heat pump would benefit from the additional energy savings provided by the equipment and, at the same time, from the reduction of operational GHG emissions. Table 5 presents the operational GHG emissions levels that can be achieved across provinces and territories when installing an air-source heat pump for space heating and a heat pump water heater for service water.

Table 5. GHG Emissions Performance Levels for Electrically Operated, Air-Source Heat Pump for Space Heating and Heat Pump Service Water Heating

<b>Province or Territory</b>	<b>Grid GHG Emissions</b>	<b>GHG Emissions Performance Level</b>
British Columbia	Low	Level A
Alberta	High	Level D
Saskatchewan	High	Level C
Manitoba	Low	Level A
Ontario	Moderate	Level A
Quebec	Low	Level A
New Brunswick	Moderate	Level B
Nova Scotia	High	Level C
Prince Edward Island	Moderate	Level B
Newfoundland and Labrador	Low	Level A
Northwest Territories	Low	Level A
Yukon	Low	Level A

According to Table 5, when using an air-source heat pump for space heating and a heat pump for service water heating, the provinces and territories having low emissions grids would be able to achieve operational GHG emissions Level A. The provinces and territories having moderate emissions grids would be able to achieve Level A or B, while the ones having high emissions grids would achieve Level A, D or C, depending on climate and grid emissions factor.

For some locations, a cold climate air-source heat pump would be more appropriate than a regular air-source heat pump. Table 6 presents the operational GHG emissions levels that could be achieved by each province or territory where the air-source heat pump is replaced with a cold climate air-source heat pump.

Table 6. GHG Emissions Performance Levels for Electrically Operated, Cold Climate Air-Source Heat Pump for Space Heating and Heat Pump Service Water Heating

Province or Territory	Grid GHG Emissions	GHG Emissions Performance Level
British Columbia	Low	Level A
Alberta	High	Level D
Saskatchewan	High	Level C
Manitoba	Low	Level A
Ontario	Moderate	Level A
Quebec	Low	Level A
New Brunswick	Moderate	Level B
Nova Scotia	High	Level C
Prince Edward Island	Moderate	Level B
Newfoundland and Labrador	Low	Level A
Northwest Territories	Low	Level A
Yukon	Low	Level A

As in the previous scenario, when using a cold climate air-source heat pump for space heating and a heat pump for service water heating, the provinces and territories having low emissions grids are able to achieve operational GHG emissions Level A. The provinces and territories having moderate emissions grids are able to achieve Level A or B, while the ones having high emissions grids achieve Level A, C or D, depending on climate and grid emissions factor.

From the results presented in Tables 1 to 6, it is evident that the majority of house archetypes are able to meet the minimum level of operational GHG emissions without implementing energy-efficiency measures (Tier 1 in Section 9.36.). As Table 3 illustrates, when electricity is the energy source, depending on the emissions factor of the grid, some house archetypes compliant with Tier 1 are able to reach better operational GHG emissions levels. However, in some cases, changing the energy source is not enough to achieve better operational GHG emissions levels. The prescriptive trade-off path in Subsection 9.36.8. allows Code users to obtain energy conservation points associated with the energy savings and implicitly with operational GHG emissions reduction from a variety of measures, such as increasing the insulation of exterior walls, improving the energy performance of windows or installing mechanical equipment exceeding NBC minimum requirements (Energy Performance Tier 1 and operational GHG emissions Level F). All of these energy performance/operational GHG emissions conservation measures would have incremental costs associated with their implementation.

Table 7 presents the average cost of equipment for space heating and service water heating to meet or better the minimum performance requirements in Section 9.36. However, since the cost associated with reaching a specific GHG emissions performance level cannot be generalized for all provinces and territories, the incremental cost must be evaluated in more depth, individually case by case.

Table 7. Cost of Energy-Efficient Mechanical Equipment for an Average House

Type	Equipment	Cost <sup>(1)</sup> , \$
Space heating/cooling	Gas furnace	4 750 <sup>(2)</sup>
	Electric baseboard heater	6 000 <sup>(3)</sup>
	Electric furnace	3 400 <sup>(4)</sup>
	Air-source heat pump	15 500 <sup>(5)</sup>
	Cold climate air-source heat pump	24 000 <sup>(6)</sup>
Service water heating	Storage tank (natural gas)	2 500 <sup>(7)</sup>
	Storage tank (electric)	1 500 <sup>(8)</sup>
	Heat pump water heater	4 000 <sup>(8)</sup>

Notes to Table 7:

(1) The cost:

- takes into account the equipment, materials and installation,

- of the heating equipment is based on the sizing for an average house (floor area approx. 200 m<sup>2</sup>),
- of the service water heating is based on the load for a family of four members, and
- does not take into account inter-province/territory variability. For some locations (especially in the North), the cost may be higher.

(2) Homedepot, Gas Furnace Prices (including Installation),

<https://www.homedepot.ca/en/home/ideas-how-to/heating-and-cooling/cost-install-gas-furnace.html>

(3) HomeAdvisor, How Much Does an Electric Baseboard Heater Cost?,

<https://www.homeadvisor.com/cost/heating-and-cooling/install-an-electric-baseboard-or-wall-heater/>

(4) Modernize Home Services, 2023 Buying Guide: Electric Furnace Costs,

<https://modernize.com/hvac/heating-repair-installation/furnace/electric>

(5) 2 Ton, 24000 BTU, HVACTrust, <https://hvactrust.ca/>

(6) 24000 BTU, 1Click Heating&Cooling, <https://1clickheat.com/>

(7) Enercare, 2023 Water Heater Buyer's Guide for Homeowners,

<https://www.enercare.ca/water/water-heating/buyers-guide-to-water-heaters>

(8) Homedepot, Tank Electric Water Heaters,

<https://www.homedepot.ca/en/home/categories/building-materials/plumbing/water-heaters/tank-water-heaters/tank-electric-water-heaters.html>

Building envelope measures exceeding the minimum energy performance for tier 1 result in energy conservation points that allow the Code user to obtain credit for the energy savings associated with the building envelope measures adopted. The energy savings associated with envelope measures result in a reduction of operational GHG emissions of the house as well.

A further estimation of the costs associated with building envelope improvement will be presented. RSMMeans data for residential costs was used to estimate the incremental costs associated with the improvement of exterior wall insulation. A range of estimated values was calculated to account for the inter-province/territory variability (location factors provided by RSMMeans).

Table 8. Incremental Costs Associated with the Improvement of Insulation of Above-Ground Walls

Effective RSI Value, (m <sup>2</sup> ×K)/W	Energy Savings, %	Incremental Cost of Insulation <sup>(1)</sup> , \$/m <sup>2</sup>	Incremental Cost for a 200 m <sup>2</sup> House, \$
2.97	2.0	14.10–19.5	3 384–4 680
3.08	2.3	14.30–19.90	3 432–4 776
3.69	4.3–6.3	16.10–23.70	3 864–5 688
3.85	5.0–6.9	17.40–23.70	4 176–5 688
3.96	0.6–7.5	17.90–24.50	4 296–5 880
4.29	2.3–8.9	22.80–31.20	5 472–7 488
4.40	2.7–9.2	24.80–33.90	5 952–8 136
4.57	3.4–9.8	27.10–36.80	6 504–8 832
4.73	4.1–10.4	27.20–37.00	6 528–8 880
4.84	4.5–10.7	27.3–37.20	6 552–8 928
5.01	5.0–11.1	27.80–37.90	6 672–9 096
5.45	6.4–12.2	28.50–39.30	6 840–9 432

Source: RSMMeans 2023 – Residential costs.

Note to Table 8:

(1) Insulation type: non-rigid insulation (batt), fibre-glass, kraft-faced.

As Table 8 illustrates, the energy savings and the incremental costs increase with an increase in the effective RSI value of the exterior wall. In Section 9.36., no-cost measures, such as a decrease in the volume of the house, can result in between 1 and 10 energy-saving points, depending on the volume reduction.

Section 9.36. provides energy conservation measures for fenestration as well. Table 9 presents the costs associated with window performance improvement.

Table 9. Costs Associated with Window Performance Improvement

<b>U-Value, W/(m<sup>2</sup>×K)</b>	<b>Energy Savings, %</b>	<b>Cost, \$/m<sup>2</sup></b>	<b>Incremental Cost, \$/m<sup>2</sup></b>	<b>Incremental Cost for a 200 m<sup>2</sup> House with 20% WWR<sup>(1)</sup>, \$</b>
1.84	–	410	–	–
1.61	1.8–1.9	450	40	1 920
1.44	1.6–3.8	480	70	2 800
1.22	3.2–7.0	510	100	4 800

Note to Table 9:

(1) WWR = window-to-wall ratio

According to Table 9, the incremental costs associated with performance improvement of windows increase with a decreasing U-value (or increasing RSI value) of the window. The percentage energy savings depends on the U-value of the window and the climate zone.

Taking into account the costs presented in Tables 6 to 9, an incremental cost can be calculated for various combinations of building envelope and mechanical system improvements (i.e., “packages”). It is assumed that when the energy source is either natural gas or electricity and the properties of the building envelope meet tier 1 in Section 9.36. the incremental cost is zero. Table 10 presents the incremental costs for certain packages resulting in decreased energy use and, implicitly, decreased annual GHG emissions.

Table 10. Incremental costs associated with the adoption of energy performance/GHG emissions reduction measures

<b>Energy Performance/GHG Emissions Conservation Measure</b>	<b>Incremental Cost, \$</b>
Tier 1 building envelope + Tier 1 natural gas space heating and service water heating systems	0
Tier 1 building envelope + Tier 1 electric space heating and service water heating systems	0
Tier 1 building envelope + Tier 1 natural gas space heating system, and electric service water heating system	0
Tier 1 building envelope + electrically operated, air-source heat pump and heat pump water heater	12 250
Tier 1 building envelope + electrically operated, cold climate air-source heat pump and heat pump water heater	20 750
Tier 2 building envelope <sup>(1)</sup> + Tier 1 natural gas space heating and service water heating systems	8 488
Tier 2 building envelope <sup>(1)</sup> + electrically operated, air-source heat pump and heat pump water heater	20 738

Note to Table 10:

(1) Incremental cost varies with climate zone and house size. The example assumes climate zone 4 and floor area of approximately 200 m<sup>2</sup>.

As Table 10 illustrates, the incremental cost depends on the energy conservation measures adopted to reach a specific energy performance tier/GHG emissions level. Section 9.36 provides detailed prescriptive measures for achieving Energy Performance Tier 2. The proposed changes for the

2025 edition of NBC provide Code users with prescriptive measures for achieving energy performance tiers beyond tier 2. According to Tables 1 to 6, the GHG emissions level achieved depends on the energy source and value of electricity grid emissions factor of each province or territory. Together with the tiered energy prescriptive path, the operational GHG emissions prescriptive path would provide an acceptable means of achieving the goal of reducing energy consumption and GHG emissions.

---

## Enforcement implications

---

Enforcement of the technical requirements to minimize the excessive emission of operational GHG emissions would require additional effort by authorities having jurisdiction.

A consistent set of technical requirements to minimize the excessive emission of operational GHG emissions across Canada would contribute to meeting provincial, territorial and federal GHG emissions reduction targets and climate action plans, including Canada's goal to reduce total national GHG emissions to 40% to 45% below 2005 levels by 2030 and to reach net-zero by 2050.

---

## Who is affected

---

Designers, engineers, architects, builders, and building officials.

---

## OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

---

[\[9.36.1.1.1\]](#) 9.36.1.1. ([1] 1) no attributions

[\[9.36.1.2.1\]](#) 9.36.1.2. ([1] 1) no attributions

[\[9.36.1.2.2\]](#) 9.36.1.2. ([2] 2) no attributions

[\[9.36.1.2.3\]](#) 9.36.1.2. ([3] 3) no attributions

[\[9.36.1.2.4\]](#) 9.36.1.2. ([4] 4) no attributions

[\[9.36.1.2.5\]](#) 9.36.1.2. ([5] 5) no attributions

[\[9.36.1.2.6\]](#) 9.36.1.2. ([6] 6) no attributions

[\[9.36.1.2.7\]](#) 9.36.1.2. ([7] 7) no attributions

[\[9.36.1.2.8\]](#) 9.36.1.2. ([8] 8) no attributions

[\[9.36.1.3.1\]](#) 9.36.1.3. ([1] 1) no attributions

[\[9.36.1.3.2\]](#) 9.36.1.3. ([1] 1) ([e] e)

[\[9.36.1.3.3\]](#) -- ([2] --) no attributions

[\[9.36.1.3.4\]](#) 9.36.1.3. ([3] 2) no attributions

[\[9.36.1.3.5\]](#) 9.36.1.3. ([3] 2) no attributions

[\[9.36.1.3.6\]](#) 9.36.1.3. ([4] 3) no attributions

[\[9.36.1.3.7\]](#) 9.36.1.3. ([5] 4) no attributions

[\[9.36.1.3.8\]](#) 9.36.1.3. ([6] 5) no attributions

[\[9.36.1.3.\]](#) 9.36.1.3. ([\[7\]](#) 6) no attributions  
[\[9.36.1.3.\]](#) -- ([\[8\]](#) --) no attributions  
[\[9.36.2.1.\]](#) 9.36.2.1. ([\[1\]](#) 1) no attributions  
[\[9.36.2.1.\]](#) 9.36.2.1. ([\[2\]](#) 2) no attributions  
[\[9.36.2.1.\]](#) 9.36.2.1. ([\[3\]](#) 3) no attributions  
[\[9.36.2.1.\]](#) 9.36.2.1. ([\[4\]](#) 4) no attributions  
[\[9.36.2.1.\]](#) 9.36.2.1. ([\[5\]](#) 5) no attributions  
[\[9.36.2.2.\]](#) 9.36.2.2. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.2.\]](#) 9.36.2.2. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.2.\]](#) 9.36.2.2. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.2.\]](#) 9.36.2.2. ([\[4\]](#) 4) [F92-OE1.1]  
[\[9.36.2.2.\]](#) 9.36.2.2. ([\[5\]](#) 5) [F92-OE1.1]  
[\[9.36.2.3.\]](#) 9.36.2.3. ([\[1\]](#) 1) no attributions  
[\[9.36.2.3.\]](#) 9.36.2.3. ([\[2\]](#) 2) no attributions  
[\[9.36.2.3.\]](#) 9.36.2.3. ([\[3\]](#) 3) no attributions  
[\[9.36.2.3.\]](#) 9.36.2.3. ([\[4\]](#) 4) no attributions  
[\[9.36.2.3.\]](#) 9.36.2.3. ([\[5\]](#) 5) no attributions  
[\[9.36.2.4.\]](#) 9.36.2.4. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.4.\]](#) 9.36.2.4. ([\[2\]](#) 2) no attributions  
[\[9.36.2.4.\]](#) 9.36.2.4. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.4.\]](#) 9.36.2.4. ([\[4\]](#) 4) no attributions  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[4\]](#) 4) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[5\]](#) 5) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[6\]](#) 6) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[7\]](#) 7) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[8\]](#) 8) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[9\]](#) 9) [F92-OE1.1]  
[\[9.36.2.5.\]](#) 9.36.2.5. ([\[10\]](#) 10) no attributions  
[\[9.36.2.6.\]](#) 9.36.2.6. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.6.\]](#) 9.36.2.6. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.6.\]](#) 9.36.2.6. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.6.\]](#) 9.36.2.6. ([\[4\]](#) 4) [F92-OE1.1]



[\[9.36.2.7.\]](#) 9.36.2.7. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[3\]](#) 3) no attributions  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[4\]](#) 4) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[5\]](#) 5) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[6\]](#) 6) no attributions  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[7\]](#) 7) [F92-OE1.1]  
[\[9.36.2.7.\]](#) 9.36.2.7. ([\[8\]](#) 8) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[1\]](#) 1) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[4\]](#) 4) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[5\]](#) 5) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[6\]](#) 6) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[7\]](#) 7) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[8\]](#) 8) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[9\]](#) 9) [F92-OE1.1]  
[\[9.36.2.8.\]](#) 9.36.2.8. ([\[10\]](#) 10) no attributions  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[1\]](#) 1) [F90-OE1.1]  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[2\]](#) 2) [F90-OE1.1]  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[3\]](#) 3) [F90-OE1.1]  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[4\]](#) 4) [F90-OE1.1]  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[5\]](#) 5) [F90-OE1.1]  
[\[9.36.2.9.\]](#) 9.36.2.9. ([\[6\]](#) 6) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[1\]](#) 1) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[2\]](#) 2) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[3\]](#) 3) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[4\]](#) 4) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[5\]](#) 5) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[6\]](#) 6) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[7\]](#) 7) [F90,F91,F92,F93,F95,F100-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[8\]](#) 8) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[9\]](#) 9) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[10\]](#) 10) [F90-OE1.1]

[\[9.36.2.10.\]](#) 9.36.2.10. ([\[11\]](#) 11) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[12\]](#) 12) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[13\]](#) 13) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[14\]](#) 14) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[15\]](#) 15) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[16\]](#) 16) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[17\]](#) 17) [F90-OE1.1]  
[\[9.36.2.10.\]](#) 9.36.2.10. ([\[18\]](#) 18) [F90-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[1\]](#) 1) no attributions  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[2\]](#) 2) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[2\]](#) 2) no attributions  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[3\]](#) 3) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[3\]](#) 3) no attributions  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[4\]](#) 4) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[5\]](#) 5) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[6\]](#) 6) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[7\]](#) 7) [F92-OE1.1]  
[\[9.36.2.11.\]](#) 9.36.2.11. ([\[8\]](#) 8) [F92-OE1.1]  
[\[9.36.3.1.\]](#) 9.36.3.1. ([\[1\]](#) 1) no attributions  
[\[9.36.3.1.\]](#) 9.36.3.1. ([\[2\]](#) 2) no attributions  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[1\]](#) 1) [F95-OE1.1]  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[2\]](#) 2) no attributions  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[3\]](#) 3) [F91,F93-OE1.1]  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[4\]](#) 4) [F91,F93-OE1.1]  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[5\]](#) 5) no attributions  
[\[9.36.3.2.\]](#) 9.36.3.2. ([\[5\]](#) 5) [F91,F93-OE1.1]  
[\[9.36.3.3.\]](#) 9.36.3.3. ([\[1\]](#) 1) [F91,F95-OE1.1]  
[\[9.36.3.3.\]](#) 9.36.3.3. ([\[2\]](#) 2) [F91,F95-OE1.1]  
[\[9.36.3.3.\]](#) 9.36.3.3. ([\[3\]](#) 3) no attributions  
[\[9.36.3.3.\]](#) 9.36.3.3. ([\[4\]](#) 4) no attributions  
[\[9.36.3.4.\]](#) 9.36.3.4. ([\[1\]](#) 1) no attributions  
[\[9.36.3.4.\]](#) 9.36.3.4. ([\[2\]](#) 2) [F93-OE1.1]  
[\[9.36.3.5.\]](#) 9.36.3.5. ([\[1\]](#) 1) [F98-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[1\]](#) 1) [F95-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[1\]](#) 1) no attributions

[\[9.36.3.6.\]](#) 9.36.3.6. ([\[2\]](#) 2) [F95,F98-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[3\]](#) 3) [F95-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[4\]](#) 4) [F95-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[5\]](#) 5) [F95-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[6\]](#) 6) [F95-OE1.1]  
[\[9.36.3.6.\]](#) 9.36.3.6. ([\[7\]](#) 7) [F95-OE1.1]  
[\[9.36.3.7.\]](#) 9.36.3.7. ([\[1\]](#) 1) [F95-OE1.1]  
[\[9.36.3.8.\]](#) 9.36.3.8. ([\[1\]](#) 1) [F95,F100-OE1.1]  
[\[9.36.3.8.\]](#) 9.36.3.8. ([\[2\]](#) 2) no attributions  
[\[9.36.3.8.\]](#) 9.36.3.8. ([\[3\]](#) 3) no attributions  
[\[9.36.3.8.\]](#) 9.36.3.8. ([\[4\]](#) 4) [F98,F100-OE1.1]  
[\[9.36.3.8.\]](#) 9.36.3.8. ([\[5\]](#) 5) [F98,F100-OE1.1]  
[\[9.36.3.9.\]](#) 9.36.3.9. ([\[1\]](#) 1) no attributions  
[\[9.36.3.9.\]](#) 9.36.3.9. ([\[2\]](#) 2) [F95,F100-OE1.1]  
[\[9.36.3.9.\]](#) 9.36.3.9. ([\[3\]](#) 3) [F95,F100-OE1.1]  
[\[9.36.3.9.\]](#) 9.36.3.9. ([\[4\]](#) 4) [F95,F98,F100-OE1.1]  
[\[9.36.3.10.\]](#) 9.36.3.10. ([\[1\]](#) 1) [F95,F98,F99-OE1.1]  
[\[9.36.3.10.\]](#) 9.36.3.10. ([\[2\]](#) 2) [F95,F98,F99-OE1.1]  
[\[9.36.3.10.\]](#) 9.36.3.10. ([\[3\]](#) 3) no attributions  
[\[9.36.3.11.\]](#) 9.36.3.11. ([\[1\]](#) 1) [F95,F98,F99-OE1.1]  
[\[9.36.3.11.\]](#) 9.36.3.11. ([\[2\]](#) 2) no attributions  
[\[9.36.3.11.\]](#) 9.36.3.11. ([\[3\]](#) 3) [F93,F96-OE1.1]  
[\[9.36.4.1.\]](#) 9.36.4.1. ([\[1\]](#) 1) no attributions  
[\[9.36.4.1.\]](#) 9.36.4.1. ([\[2\]](#) 2) no attributions  
[\[9.36.4.2.\]](#) 9.36.4.2. ([\[1\]](#) 1) [F96,F98-OE1.1]  
[\[9.36.4.2.\]](#) 9.36.4.2. ([\[2\]](#) 2) [F93,F96-OE1.1]  
[\[9.36.4.2.\]](#) 9.36.4.2. ([\[3\]](#) 3) [F98-OE1.1]  
[\[9.36.4.3.\]](#) 9.36.4.3. ([\[1\]](#) 1) [F96,F98-OE1.1]  
[\[9.36.4.3.\]](#) 9.36.4.3. ([\[2\]](#) 2) no attributions  
[\[9.36.4.3.\]](#) 9.36.4.3. ([\[3\]](#) 3) [F93,F96-OE1.1]  
[\[9.36.4.4.\]](#) 9.36.4.4. ([\[1\]](#) 1) [F93,F96-OE1.1]  
[\[9.36.4.4.\]](#) 9.36.4.4. ([\[2\]](#) 2) [F93,F96-OE1.1]  
[\[9.36.4.4.\]](#) 9.36.4.4. ([\[3\]](#) 3) [F93,F96-OE1.1]  
[\[9.36.4.5.\]](#) 9.36.4.5. ([\[1\]](#) 1) [F96-OE1.1]  
[\[9.36.4.6.\]](#) 9.36.4.6. ([\[1\]](#) 1) [F96-OE1.1]

- [\[9.36.4.6.\]](#) 9.36.4.6. ([\[2\]](#) 2) [F96-OE1.1]
- [\[9.36.5.1.\]](#) 9.36.5.1. ([\[1\]](#) 1) no attributions
- [\[9.36.5.1.\]](#) 9.36.5.1. ([\[2\]](#) 2) no attributions
- [\[9.36.5.2.\]](#) 9.36.5.2. ([\[1\]](#) 1) no attributions
- [\[9.36.5.2.\]](#) 9.36.5.2. ([\[2\]](#) 2) no attributions
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[1\]](#) 1) no attributions
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[2\]](#) 2) [F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[3\]](#) 3) [F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[4\]](#) 4) [F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[5\]](#) 5) [F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.5.3.\]](#) 9.36.5.3. ([\[6\]](#) 6) [F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[1\]](#) 1) no attributions
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[2\]](#) 2) no attributions
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[3\]](#) 3) [F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[4\]](#) 4) [F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[5\]](#) 5) [F95,F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[6\]](#) 6) [F95,F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[7\]](#) 7) [F95,F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[8\]](#) 8) [F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[9\]](#) 9) [F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[10\]](#) 10) [F90,F99-OE1.1]
- [\[9.36.5.4.\]](#) 9.36.5.4. ([\[11\]](#) 11) [F90,F99-OE1.1]
- [\[9.36.5.5.\]](#) 9.36.5.5. ([\[1\]](#) 1) [F99-OE1.1]
- [\[9.36.5.5.\]](#) 9.36.5.5. ([\[2\]](#) 2) [F99-OE1.1]
- [\[9.36.5.5.\]](#) 9.36.5.5. ([\[3\]](#) 3) [F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[1\]](#) 1) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[2\]](#) 2) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[3\]](#) 3) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[4\]](#) 4) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[5\]](#) 5) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[6\]](#) 6) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[7\]](#) 7) [F92,F93,F95,F96,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[8\]](#) 8) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[9\]](#) 9) [F92,F99-OE1.1]
- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[10\]](#) 10) [F92,F99-OE1.1]

- [\[9.36.5.6.\]](#) 9.36.5.6. ([\[11\]](#) 11) [F92,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[1\]](#) 1) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[2\]](#) 2) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[3\]](#) 3) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[4\]](#) 4) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[5\]](#) 5) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[6\]](#) 6) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[7\]](#) 7) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[8\]](#) 8) [F95,F99-OE1.1]
- [\[9.36.5.7.\]](#) 9.36.5.7. ([\[9\]](#) 9) [F95,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[1\]](#) 1) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[2\]](#) 2) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[3\]](#) 3) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[4\]](#) 4) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[5\]](#) 5) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[6\]](#) 6) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[7\]](#) 7) [F96,F99-OE1.1]
- [\[9.36.5.8.\]](#) 9.36.5.8. ([\[8\]](#) 8) [F96,F99-OE1.1]
- [\[9.36.5.9.\]](#) 9.36.5.9. ([\[1\]](#) 1) [F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[1\]](#) 1) [F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[2\]](#) 2) no attributions
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[3\]](#) 3) no attributions
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[4\]](#) 4) [F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[5\]](#) 5) [F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[6\]](#) 6) [F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[7\]](#) 7) [F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[8\]](#) 8) no attributions
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[9\]](#) 9) [F90,F91,F92,F95,F99-OE1.1]
- [\[9.36.5.10.\]](#) 9.36.5.10. ([\[10\]](#) 10) [F90,F91,F92,F93,F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[1\]](#) 1) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[2\]](#) 2) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[3\]](#) 3) [F92,F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[4\]](#) 4) [F95,F99,F100-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[5\]](#) 5) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[6\]](#) 6) [F95,F99-OE1.1]

- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[7\]](#) 7) no attributions
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[8\]](#) 8) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[9\]](#) 9) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[10\]](#) 10) [F95,F99,F100-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[11\]](#) 11) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[12\]](#) 12) [F95,F99,F100-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[13\]](#) 13) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[14\]](#) 14) [F95,F99,F100-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[15\]](#) 15) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[16\]](#) 16) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[17\]](#) 17) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[18\]](#) 18) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[19\]](#) 19) [F95,F99-OE1.1]
- [\[9.36.5.11.\]](#) 9.36.5.11. ([\[20\]](#) 20) [F95,F99-OE1.1]
- [\[9.36.5.12.\]](#) 9.36.5.12. ([\[1\]](#) 1) [F96,F99-OE1.1]
- [\[9.36.5.12.\]](#) 9.36.5.12. ([\[2\]](#) 2) no attributions
- [\[9.36.5.13.\]](#) 9.36.5.13. ([\[1\]](#) 1) [F99-OE1.1]
- [\[9.36.5.13.\]](#) 9.36.5.13. ([\[2\]](#) 2) [F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[1\]](#) 1) [F92,F95,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[2\]](#) 2) [F90,F91,F92,F95,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[3\]](#) 3) [F92,F95,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[4\]](#) 4) [F92,F95,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[5\]](#) 5) [F92,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[6\]](#) 6) [F92,F95,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[7\]](#) 7) [F92,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[8\]](#) 8) [F92,F99-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[9\]](#) 9) [F92,F99,F95-OE1.1]
- [\[9.36.5.14.\]](#) 9.36.5.14. ([\[10\]](#) 10) [F92,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[1\]](#) 1) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[2\]](#) 2) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[3\]](#) 3) [F95,F99,F100-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[4\]](#) 4) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[5\]](#) 5) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[6\]](#) 6) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[7\]](#) 7) [F95,F99-OE1.1]

- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[8\]](#) 8) [F95,F99,F100-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[9\]](#) 9) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[10\]](#) 10) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[11\]](#) 11) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[12\]](#) 12) [F95,F99,F100-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[13\]](#) 13) [F95,F99,F100-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[14\]](#) 14) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[15\]](#) 15) [F95,F99-OE1.1]
- [\[9.36.5.15.\]](#) 9.36.5.15. ([\[16\]](#) 16) [F95,F99-OE1.1]
- [\[9.36.5.16.\]](#) 9.36.5.16. ([\[1\]](#) 1) [F95,F99-OE1.1]
- [\[9.36.5.16.\]](#) 9.36.5.16. ([\[2\]](#) 2) [F95,F99-OE1.1]
- [\[9.36.5.16.\]](#) 9.36.5.16. ([\[3\]](#) 3) [F95,F99-OE1.1]
- [\[9.36.6.1.\]](#) 9.36.6.1. ([\[1\]](#) 1) no attributions
- [\[9.36.6.2.\]](#) 9.36.6.2. ([\[1\]](#) 1) no attributions
- [\[9.36.6.3.\]](#) 9.36.6.3. ([\[1\]](#) 1) no attributions
- [\[9.36.6.3.\]](#) 9.36.6.3. ([\[1\]](#) 1) [F90-OE1.1]
- [\[9.36.6.3.\]](#) 9.36.6.3. ([\[2\]](#) 2) no attributions
- [\[9.36.6.3.\]](#) 9.36.6.3. ([\[3\]](#) 3) no attributions
- [\[9.36.6.4.\]](#) 9.36.6.4. ([\[1\]](#) 1) no attributions
- [\[9.36.6.4.\]](#) 9.36.6.4. ([\[1\]](#) 1) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.6.4.\]](#) 9.36.6.4. ([\[2\]](#) 2) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.6.4.\]](#) 9.36.6.4. ([\[3\]](#) 3) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.6.4.\]](#) 9.36.6.4. ([\[4\]](#) 4) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.7.1.\]](#) 9.36.7.1. ([\[1\]](#) 1) no attributions
- [\[9.36.7.1.\]](#) 9.36.7.1. ([\[2\]](#) 2) no attributions
- [\[9.36.7.2.\]](#) 9.36.7.2. ([\[1\]](#) 1) no attributions
- [\[9.36.7.2.\]](#) 9.36.7.2. ([\[1\]](#) 1) [F90,F91,F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[1\]](#) 1) no attributions
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[2\]](#) 2) [F95-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[3\]](#) 3) no attributions
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[3\]](#) 3) [F90,F91,F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[4\]](#) 4) no attributions
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[5\]](#) 5) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[6\]](#) 6) no attributions
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[6\]](#) 6) [F99-OE1.1]

- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[7\]](#) 7) [F99-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[8\]](#) 8) [F90,F91,F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.7.3.\]](#) 9.36.7.3. ([\[9\]](#) 9) [F90,F91,F92,F93,F95,F100-OE1.1]
- [\[9.36.8.1.\]](#) 9.36.8.1. ([\[1\]](#) 1) no attributions
- [\[9.36.8.2.\]](#) 9.36.8.2. ([\[1\]](#) 1) no attributions
- [\[9.36.8.2.\]](#) 9.36.8.2. ([\[1\]](#) 1) [F90,F91,F92,F93,F95,F96,F98,F99,F100-OE1.1]
- [\[9.36.8.4.\]](#) 9.36.8.4. ([\[1\]](#) 1) no attributions
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[1\]](#) 1) no attributions
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[2\]](#) 2) [F92-OE1.1]
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[3\]](#) 3) [F92-OE1.1]
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[4\]](#) 4) no attributions
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[4\]](#) 4) [F92-OE1.1]
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[5\]](#) 5) no attributions
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[5\]](#) 5) [F92-OE1.1]
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[6\]](#) 6) [F92-OE1.1]
- [\[9.36.8.5.\]](#) 9.36.8.5. ([\[7\]](#) 7) [F92-OE1.1]
- [\[9.36.8.6.\]](#) 9.36.8.6. ([\[1\]](#) 1) [F92-OE1.1]
- [\[9.36.8.6.\]](#) 9.36.8.6. ([\[2\]](#) 2) no attributions
- [\[9.36.8.6.\]](#) 9.36.8.6. ([\[3\]](#) 3) no attributions
- [\[9.36.8.6.\]](#) 9.36.8.6. ([\[3\]](#) 3) [F92-OE1.1]
- [\[9.36.8.6.\]](#) 9.36.8.6. ([\[4\]](#) 4) [F92-OE1.1]
- [\[9.36.8.7.\]](#) 9.36.8.7. ([\[1\]](#) 1) no attributions
- [\[9.36.8.7.\]](#) 9.36.8.7. ([\[2\]](#) 2) [F92-OE1.1]
- [\[9.36.8.7.\]](#) 9.36.8.7. ([\[3\]](#) 3) [F92-OE1.1]
- [\[9.36.8.7.\]](#) 9.36.8.7. ([\[4\]](#) 4) no attributions
- [\[9.36.8.8.\]](#) 9.36.8.8. ([\[1\]](#) 1) no attributions
- [\[9.36.8.8.\]](#) 9.36.8.8. ([\[2\]](#) 2) [F90-OE1.1]
- [\[9.36.8.9.\]](#) 9.36.8.9. ([\[1\]](#) 1) no attributions
- [\[9.36.8.9.\]](#) 9.36.8.9. ([\[2\]](#) 2) no attributions
- [\[9.36.8.9.\]](#) 9.36.8.9. ([\[3\]](#) 3) no attributions
- [\[9.36.8.9.\]](#) 9.36.8.9. ([\[3\]](#) 3) [F95,F100-OE1.1]
- [\[9.36.8.9.\]](#) 9.36.8.9. ([\[4\]](#) 4) [F95-OE1.1]
- [\[9.36.8.10.\]](#) 9.36.8.10. ([\[1\]](#) 1) no attributions
- [\[9.36.8.10.\]](#) 9.36.8.10. ([\[2\]](#) 2) no attributions
- [\[9.36.8.10.\]](#) 9.36.8.10. ([\[3\]](#) 3) [F96-OE1.1]



[9.36.8.11.] 9.36.8.11. ([1] 1) [F95-OE1.1]

[9.36.8.11.] 9.36.8.11. ([2] 2) [F95-OE1.1]

[9.36.12.1.] -- ([1] --) no attributions

[9.36.12.2.] -- ([1] --) no attributions

[9.36.12.3.] -- ([1] --) no attributions

[9.36.12.3.] -- ([2] --) no attributions

[9.36.12.3.] -- ([3] --) no attributions

[9.36.12.4.] -- ([1] --) [F101-OE2.1]

[9.36.12.4.] -- ([2] --) [F101-OE2.1]