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Britt/Makela Group
Development of the Guide

• Funded by the Institute for Market Transformation

Compliance Guide


Britt/Makela Group
Ryan Meres

• Project Manager: Ryan Meres
Goals of the Guide

• Focus on a subset of provisions that represent the greatest percentage of commercial construction
• Translate the code into usable language
• Increase compliance with the energy code
• Mike Rosenberg, PNNL
• Forrest Fielder, CBO
• Randy Dahmen, Wisconsin Department of Safety and Professional Services
• David Ruffcorn, Iowa Department of Public Safety
• Don Vigneau, NEEP
Overview of the Guide

- The Checklist
- Building Envelope
- Mechanical Systems
- Service Hot Water Systems
- Electrical Power and Lighting Systems
The Checklist

• Provides step-by-step instructions for each building assembly.

• With each building assembly we also provide Code citations for further reference.
Guide

Simple Building criteria
for the Mechanical
System:

Mechanical Systems

Step M1.
Calculate heating and cooling loads in accordance with ASHRAE 183.

Step M2.
Ensure efficiencies comply with the IECC Table 503.2.3 (1)-(4).

Step M3.a.
Ensure temperature controls are specified and installed with all required features.

Fan system of 5 horse power or less

Low or medium pressure duct system

Single zone unitary System

No snow melt systems

No steam systems

Guide Format
Building Envelope

- No more than 2 wall types in the building
- Only 1 roof type
- Only 1 floor type
- Glass levels below 40% window-to-wall ratio
Key Features (Examples)

• Definitions
  • In depth explanations of R-Value, U-Factor, and F-Factor, Solar Heat Gain Coefficient, and Projection Factor

• Diagrams differentiating the different options for Slab on grade insulation

• All of the material is based off of the IECC and cited throughout

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**R-Value (Thermal Resistance)**: The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions.

**U-Factor (Thermal Transmittance)**: The coefficient of heat transmission (air to air) through a building component or assembly, equal to time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films. This is used for above grade assemblies and fenestration.

**F-Factor**: The perimeter heat loss factor for slab-on-grade floors.

Note: As a reminder, the U-Factor and the R-Value are similar equations and use the same data. The main distinction is that R-Value shows how much heat the assembly type is retaining and is generally used in reference to insulation. U-Factor shows how much heat the assembly type is letting out and is generally used in the context of fenestration. In other words, an assembly that has a high R-Value will have a low U-Factor. It's the difference between dividing 1 by 4 or 4 by 1.
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<thead>
<tr>
<th>Climate Zone</th>
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<th>4 Except Marine</th>
<th>5 and Marine 4</th>
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# Overview FenestrationEnvelope Requirements

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Mechanical

• Single zone unitary systems
• 5 horsepower or less
• Low or medium pressure duct systems
• No snow melt systems
Key Features

- Calculating heating and cooling loads
- Simple buildings must still comply with energy recovery ventilation requirements
- Demand control ventilation also required for spaces with high occupancy loads
Overview

• Controls
  • Thermostats
    • Set Point overlap restriction
    • Off-hour controls
  • Heat Pump supplementary heating
  • Shut-off damper controls

• Equipment Efficiencies

• Economizers

• Duct and Plenum insulation and sealing

• Piping insulation

• Manuals
Service Hot Water Systems

• Standard water heater
  • Minimum equipment efficiency requirement

• Circulation system controls
Service Hot Water Systems

• Heat Traps
• Piping Insulation

4. Piping Insulation 504.5

The piping insulation provision accounts for two different piping configurations—automatic circulating hot water systems and non-circulating systems.
Electrical Power and Lighting systems

• Everything is required

• Overview
  • Maximum interior lighting power,
  • Interior lighting controls,
  • Maximum exterior lighting power, and
  • Exterior lighting controls.
Interior Lighting

Continuous Checklist

Step by step instructions for calculating lighting allowance

Includes list of exemptions from IECC
Exterior Lighting

• Provides the same resources
• Deals with lighting controls
• Expounds on lighting zones
Lighting Controls

- **Interior**
  - Interior Lighting reduction controls
  - Automatic Lighting Shutoff
    - Scheduled on/off
  - Daylight Zone Controls

- **Exterior**
  - Astronomical clock required for-
    - All lighting for dusk to dawn operations
    - All other exterior lighting
Questions