

1323.0550 SECTION 5.5, PRESCRIPTIVE BUILDING ENVELOPE OPTION.

Subpart 1. **Roof insulation.** ASHRAE Standard 90.1, Section 5.5.3.1, is amended to read:

5.5.3.1 Roof insulation. All roofs shall comply with the insulation values specified in Tables 5.5-1 through 5.5-8. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Subp. 2. **Table 5.5-6.** ASHRAE Standard 90.1, Table 5.5-6, Building Envelope Requirements for the Southern Minnesota Climate Zone is amended to read:

**TABLE 5.5-6 Building Envelope Requirements For
Southern Minnesota Climate Zone (Zone 6)**

| | Nonresidential | | Residential | | Semiheated | |
|---------------------------|-----------------------|--------------------------------|----------------------|--------------------------------|----------------------|--------------------------------|
| Opaque Elements | Assembly Max. | Insulation Min. R-Value | Assembly Max. | Insulation Min. R-Value | Assembly Max. | Insulation Min. R-Value |
| Roofs, Insulation | | | | | | |
| Entirely Above Deck | U-0.043 | R-23 ci | U-0.043 | R-23 ci | U-0.06 | R-16.6 ci |
| Metal Building | U-0.043 | R-30 | U-0.043 | R-30 | U-0.06 | R-19 |
| Attic and Other | U-0.027 | R-30 | U-0.027 | R-30 | U-0.06 | R-19 |
| Walls, Above Grade | | | | | | |
| Mass | U-0.104 | R-9.5 ci | U-0.09 | R-11.4 ci | U-0.58 | NR |
| Metal Building | U-0.113 | R-13 | U-0.057 | 13 + R-13 | U-0.113 | R-13 |
| Steel Framed | U-0.084 | R-13 ci + R-3.8 ci | U-0.064 | R-13 + R-7.5 ci | U-0.124 | R-13 |
| Wood Framed and Other | U-0.089 | R-13 | U-0.064 | R-13 + R-3.8 ci | U-0.089 | R-13 |
| Wall, Below Grade | | | | | | |

| | | | | | | |
|-----------------------------------|--|---|--|---|---|---|
| Below-Grade Wall | C-0.085 | R-10 ci | C-0.085 | R-10 ci | C-0.085 | R-10 ci |
| Floors | | | | | | |
| Mass | U-0.087 | R-8.3 ci | U-0.064 | R-12.5 ci | U-0.322 | NR |
| Steel Joist | U-0.038 | R-30 | U-0.038 | R-30 | U-0.069 | R-13 |
| Wood Framed and Other | U-0.033 | R-30 | U-0.033 | R-30 | U-.0066 | R-13 |
| Slab-On-Grade Floors | | | | | | |
| Unheated | F-0.520 | R-10 to footing* | F-0.520 | R-10 to footing* | F-0.520 | R-10 to footing* |
| Heated | F-0.520 | R-10 to footing* | F-0.520 | R-10 to footing* | F-0.520 | R-10 to footing* |
| Opaque Doors | | | | | | |
| Swinging | U-0.700 | | U-0.500 | | U-0.700 | |
| Non-swinging | U-0.500 | | U-0.500 | | U-1.450 | |
| Fene- stration | Assembly Max. U (Fixed/ Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) | Assembly Max. U (Fixed/ Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) | Assembly Max. U (Fixed Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) |
| Vertical Glazing, Percent of Wall | | | | | | |
| 0-10.0 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.49 | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -1.27 | SHGC _{north} -NR |
| 10.1- 20.0 | U _{fixed} -0.57 | SHGC _{all} -0.39 | U _{fixed} -0.57 | SHGC _{all} -0.39 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.49 | U _{oper} -0.67 | SHGC _{north} -0.49 | U _{oper} -1.27 | SHGC _{north} -NR |

| | | | | | | |
|---------------------------|--------------------------|---------------------------------------|--------------------------|---------------------------------------|--------------------------|-------------------------------------|
| 20.1- 30.0 | U_{fixed} -0.57 | SHGC_{all} -0.39 | U_{fixed} -0.57 | SHGC_{all} -0.39 | U_{fixed} -1.22 | SHGC_{all} -NR |
| | U_{oper} -0.67 | $\text{SHGC}_{\text{north}}$ -0.49 | U_{oper} -0.67 | $\text{SHGC}_{\text{north}}$ -0.49 | U_{oper} -1.27 | $\text{SHGC}_{\text{north}}$ -NR |
| 30.1- 40.0 | U_{fixed} -0.57 | SHGC_{all} -0.39 | U_{fixed} -0.57 | SHGC_{all} -0.39 | U_{fixed} -1.22 | SHGC_{all} -NR |
| | U_{oper} -0.67 | $\text{SHGC}_{\text{north}}$ -0.49 | U_{oper} -0.67 | $\text{SHGC}_{\text{north}}$ -0.49 | U_{oper} -1.27 | $\text{SHGC}_{\text{north}}$ -NR |
| 40.1 -50.0 | U_{fixed} -0.46 | SHGC_{all} -0.26 | U_{fixed} -0.46 | SHGC_{all} -0.26 | U_{fixed} -0.98 | SHGC_{all} -NR |
| | U_{oper} -0.47 | $\text{SHGC}_{\text{north}}$ -0.47 | U_{oper} -0.47 | $\text{SHGC}_{\text{north}}$ -0.49 | U_{oper} -1.02 | $\text{SHGC}_{\text{north}}$ -NR |
| Skylight, Percent of Roof | | | | | | |
| 0-2.0 | U_{all} -0.69 | SHGC_{all} -0.49 | U_{all} -0.58 | SHGC_{all} -0.49 | U_{all} -1.36 | SHGC_{all} -NR |
| Greater than 2 to 5.0 | U_{all} -0.69 | SHGC_{all} -0.49 | U_{all} -0.58 | SHGC_{all} -0.39 | U_{all} -1.36 | SHGC_{all} -NR |

*"To footing" means to the top of the footing if the insulation is on the exterior, or to the top of the slab if the insulation is on the interior.

Subp. 3. **Table 5.5-7.** ASHRAE Standard 90.1, Table 5.5-7, Building envelope requirements for the northern Minnesota climate zone is amended to read:

| | Nonresidential | | Residential | | Semiheated | |
|---------------------|----------------|-------------------------|---------------|-------------------------|---------------|-------------------------|
| Opaque Elements | Assembly Max. | Insulation Min. R-Value | Assembly Max. | Insulation Min. R-Value | Assembly Max. | Insulation Min. R-Value |
| Roofs, Insulation | | | | | | |
| Entirely Above Deck | U-0.043 | R-23 ci | U-0.043 | R-23 ci | U-0.06 | R-16.6 ci |
| Metal Building | U-0.043 | R-23 | U-0.043 | R-23 | U-0.06 | R-16.6 |
| Attic and Other | U-0.043 | R-30 | U-0.043 | R-30 | U-.06 | R-19 |

| | | | | | | |
|-----------------------|---------|--------------------|---------|--------------------------|---------|------------------|
| Walls, Above Grade | | | | | | |
| Mass | U-0.09 | R-9.5 ci | U-0.08 | R-13.3 ci R-13.0 + R- | U-0.58 | NR |
| Metal Building | U-0.057 | R-13 | U-0.057 | R-13 R-13 + R-13 | U-0.113 | R-13 |
| Steel Framed | U-0.064 | R-13 + R-3.8 ci | U-0.064 | R-13 + R-7.5 ci | U-0.124 | R-13 |
| Wood Framed and Other | U-0.089 | R-13 | U-0.051 | R-13 + R-7.5 ci | U-0.089 | R-13 |
| Walls, Below Grade | | | | | | |
| Below-Grade Wall | C-0.085 | R-10 ci | C-0.085 | R-10 ci | C-0.085 | R-10 ci |
| Floors | | | | | | |
| Mass | U-0.087 | R-8.3 ci | U-0.064 | R-12.5 ci | U-0.137 | R-4.2 ci |
| Steel Joist | U-0.038 | R-30 | U-0.038 | R-30 | U-0.052 | R-19 |
| Wood Framed and Other | U-0.033 | R-30 | U-0.033 | R-30 | U-.0066 | R-13 |
| Slab-On-Grade Floors | | | | | | |
| Unheated | F-0.52 | R-10 to footing* | F-0.52 | R-10 to footing* | F-0.52 | R-10 to footing* |
| Heated | F-0.52 | R-10 to footing* | F-0.52 | R-10 to footing* | F-0.52 | R-10 to footing* |
| Opaque Doors | | | | | | |
| Swinging | U-0.70 | | U-0.50 | | U-0.70 | |
| Non-swinging | U-0.50 | | U-0.50 | | U-1.45 | |

| Fene- stration | Assembly Max. U (Fixed/ Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) | Assembly Max. U (Fixed/ Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) | Assembly Max. U (Fixed/ Operable) | Assembly Max. SHGC (All Orienta- tions/ North- Oriented) |
|--|--|---|--|---|--|---|
| Vertical Glazing, Percent of Wall | | | | | | |
| 0-10.0 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -1.27 | SHGC _{north} -NR |
| 10.1- 20.0 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -1.27 | SHGC _{north} -NR |
| 20.1- 30.0 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -1.27 | SHGC _{north} -NR |
| 30.1- 40.0 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -0.57 | SHGC _{all} -0.49 | U _{fixed} -1.22 | SHGC _{all} -NR |
| | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -0.67 | SHGC _{north} -0.64 | U _{oper} -1.27 | SHGC _{north} -NR |
| 40.1 -50.0 | U _{fixed} -0.46 | SHGC _{all} -0.36 | U _{fixed} -0.46 | SHGC _{all} -0.36 | U _{fixed} -0.98 | SHGC _{all} -NR |
| | U _{oper} -0.47 | SHGC _{north} -0.64 | U _{oper} -0.47 | SHGC _{north} -0.64 | U _{oper} -1.02 | SHGC _{north} -NR |
| Skylight, Percent of Roof | | | | | | |
| 0-2.0 | U _{all} -0.69 | SHGC _{all} -0.68 | U _{all} -0.69 | SHGC _{all} -0.64 | U _{all} -1.36 | SHGC _{all} NR |
| Greater than 2.1 to 5.0 | U _{all} -0.69 | SHGC _{all} -0.64 | U _{all} -0.69 | SHGC _{all} -0.64 | U _{all} -1.36 | SHGC _{all} -NR |

*"To footing" means to the top of the footing if the insulation is on the exterior, or to the top of the slab if the insulation is on the interior.

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