

WAC 51-11C-610336 Section A103.3.6—Metal stud walls.

A103.3.6 Metal stud walls. The nominal R-values in Tables A103.3.6.1 through A103.3.6.3 may be used for purposes of calculating metal stud wall section U-factors in lieu of the ASHRAE zone calculation method as provided in Chapter 27 of the ASHRAE Fundamentals Handbook.

A103.3.6.1 Metal stud wall, overall assembly U-factors. Tables A103.3.6.1(1) and A103.6.1(2): Assumes metal studs spaced on 16 or 24 inch centers with insulation installed to fill wall cavities. Continuous rigid board insulation is applied without creating uninsulated voids in the wall assembly.

**Table A103.3.6.1(1)
Overall Assembly U-factors for Metal Stud Walls with Continuous Insulation**

| Metal Framing | R-Value of Continuous Foam Board Insulation | Cavity Insulation | | | | | |
|---------------|---|-------------------|-------|-------|-------|-------|-------|
| | | R-0 | R-11 | R-13 | R-15 | R-19 | R-21 |
| 16" o.c. | R-0 (none) | 0.352 | 0.132 | 0.124 | 0.118 | 0.109 | 0.106 |
| | R-1 | 0.260 | 0.117 | 0.111 | 0.106 | 0.099 | 0.096 |
| | R-2 | 0.207 | 0.105 | 0.100 | 0.096 | 0.090 | 0.087 |
| | R-3 | 0.171 | 0.095 | 0.091 | 0.087 | 0.082 | 0.080 |
| | R-4 | 0.146 | 0.087 | 0.083 | 0.080 | 0.076 | 0.074 |
| | R-5 | 0.128 | 0.080 | 0.077 | 0.074 | 0.071 | 0.069 |
| | R-6 | 0.113 | 0.074 | 0.071 | 0.069 | 0.066 | 0.065 |
| | R-7 | 0.102 | 0.069 | 0.066 | 0.065 | 0.062 | 0.061 |
| | R-8 | 0.092 | 0.064 | 0.062 | 0.061 | 0.058 | 0.057 |
| | R-9 | 0.084 | 0.060 | 0.059 | 0.057 | 0.055 | 0.054 |
| | R-10 | 0.078 | 0.057 | 0.055 | 0.054 | 0.052 | 0.051 |
| | R-11 | 0.072 | 0.054 | 0.052 | 0.051 | 0.050 | 0.049 |
| | R-12 | 0.067 | 0.051 | 0.050 | 0.049 | 0.047 | 0.047 |
| | R-13 | 0.063 | 0.049 | 0.048 | 0.047 | 0.045 | 0.045 |
| | R-14 | 0.059 | 0.046 | 0.045 | 0.045 | 0.043 | 0.043 |
| | R-15 | 0.056 | 0.044 | 0.043 | 0.043 | 0.041 | 0.041 |
| R-20 | 0.044 | 0.036 | 0.036 | 0.035 | 0.034 | 0.034 | |
| 24" o.c. | R-0 (none) | 0.338 | 0.116 | 0.108 | 0.102 | 0.094 | 0.090 |
| | R-1 | 0.253 | 0.104 | 0.098 | 0.092 | 0.086 | 0.083 |
| | R-2 | 0.202 | 0.094 | 0.089 | 0.084 | 0.079 | 0.077 |
| | R-3 | 0.168 | 0.086 | 0.082 | 0.078 | 0.073 | 0.071 |
| | R-4 | 0.144 | 0.079 | 0.075 | 0.072 | 0.068 | 0.066 |
| | R-5 | 0.126 | 0.073 | 0.070 | 0.067 | 0.064 | 0.062 |
| | R-6 | 0.112 | 0.068 | 0.066 | 0.063 | 0.060 | 0.059 |
| | R-7 | 0.100 | 0.064 | 0.062 | 0.059 | 0.057 | 0.055 |
| | R-8 | 0.091 | 0.060 | 0.058 | 0.056 | 0.054 | 0.052 |
| | R-9 | 0.084 | 0.057 | 0.055 | 0.053 | 0.051 | 0.050 |
| | R-10 | 0.077 | 0.054 | 0.052 | 0.050 | 0.048 | 0.048 |
| | R-11 | 0.072 | 0.051 | 0.049 | 0.048 | 0.046 | 0.045 |
| | R-12 | 0.067 | 0.048 | 0.047 | 0.046 | 0.044 | 0.043 |

| Metal Framing | R-Value of Continuous Foam Board Insulation | Cavity Insulation | | | | | |
|---------------|---|-------------------|-------|-------|-------|-------|-------|
| | | R-0 | R-11 | R-13 | R-15 | R-19 | R-21 |
| | R-13 | 0.063 | 0.046 | 0.045 | 0.044 | 0.042 | 0.042 |
| | R-14 | 0.059 | 0.044 | 0.043 | 0.042 | 0.041 | 0.040 |
| | R-15 | 0.056 | 0.042 | 0.041 | 0.040 | 0.039 | 0.038 |
| | R-20 | 0.044 | 0.035 | 0.034 | 0.034 | 0.033 | 0.032 |

Continuous foam board insulation: Continuous insulation assumes no thermal bridging of insulation by framing or z-furring through applied foam board. Zone calculation method as provided in the ASHRAE Fundamentals Handbook must be used for thermally bridged foam board insulation. Values for attachment of insulation with z-furring are given in Table A103.3.6.1(2).

**Table A103.3.6.1(2)
Overall Assembly U-factors for Metal Stud Walls with Insulation Supported by Z-furring**

| Metal Framing | R-Value of Foam Board Insulation | Z-furring Attachment | Cavity Insulation | | | | | |
|---------------|----------------------------------|----------------------|-------------------|-------|-------|-------|-------|-------|
| | | | R-0 | R-11 | R-13 | R-15 | R-19 | R-21 |
| 16" o.c. | R-0 (none) | Horizontal | 0.352 | 0.132 | 0.124 | 0.118 | 0.109 | 0.106 |
| | R-5 | Horizontal | 0.155 | 0.089 | 0.086 | 0.083 | 0.078 | 0.077 |
| | R-7.5 | Horizontal | 0.128 | 0.080 | 0.077 | 0.074 | 0.071 | 0.069 |
| | R-10 | Horizontal | 0.110 | 0.072 | 0.070 | 0.068 | 0.065 | 0.064 |
| | R-12.5 | Horizontal | 0.099 | 0.068 | 0.065 | 0.064 | 0.061 | 0.060 |
| | R-15 | Horizontal | 0.091 | 0.064 | 0.062 | 0.060 | 0.058 | 0.057 |
| | R-17.5 | Horizontal | 0.084 | 0.060 | 0.058 | 0.057 | 0.055 | 0.054 |
| | R-20 | Horizontal | 0.078 | 0.057 | 0.056 | 0.054 | 0.052 | 0.052 |
| | R-22.5 | Horizontal | 0.074 | 0.055 | 0.054 | 0.052 | 0.051 | 0.050 |
| | R-25 | Horizontal | 0.071 | 0.053 | 0.052 | 0.051 | 0.049 | 0.048 |
| | R-0 (none) | Vertical | 0.352 | 0.132 | 0.124 | 0.118 | 0.109 | 0.106 |
| | R-5 | Vertical | 0.165 | 0.093 | 0.089 | 0.086 | 0.081 | 0.079 |
| | R-7.5 | Vertical | 0.142 | 0.085 | 0.081 | 0.079 | 0.075 | 0.073 |
| | R-10 | Vertical | 0.126 | 0.079 | 0.076 | 0.074 | 0.070 | 0.069 |
| | R-12.5 | Vertical | 0.115 | 0.074 | 0.072 | 0.070 | 0.066 | 0.065 |
| | R-15 | Vertical | 0.107 | 0.071 | 0.069 | 0.067 | 0.064 | 0.063 |
| | R-17.5 | Vertical | 0.100 | 0.068 | 0.065 | 0.064 | 0.061 | 0.060 |
| | R-20 | Vertical | 0.094 | 0.065 | 0.063 | 0.061 | 0.059 | 0.058 |
| R-22.5 | Vertical | 0.090 | 0.063 | 0.061 | 0.060 | 0.057 | 0.056 | |
| R-25 | Vertical | 0.086 | 0.061 | 0.059 | 0.058 | 0.056 | 0.055 | |
| 24" o.c. | R-0 (none) | Horizontal | 0.338 | 0.116 | 0.108 | 0.102 | 0.094 | 0.090 |
| | R-5 | Horizontal | 0.152 | 0.082 | 0.078 | 0.074 | 0.070 | 0.068 |
| | R-7.5 | Horizontal | 0.126 | 0.074 | 0.070 | 0.068 | 0.064 | 0.062 |
| | R-10 | Horizontal | 0.109 | 0.067 | 0.065 | 0.062 | 0.059 | 0.058 |
| | R-12.5 | Horizontal | 0.098 | 0.063 | 0.061 | 0.059 | 0.056 | 0.055 |
| | R-15 | Horizontal | 0.090 | 0.060 | 0.058 | 0.056 | 0.053 | 0.052 |
| | R-17.5 | Horizontal | 0.083 | 0.057 | 0.055 | 0.053 | 0.051 | 0.050 |

| Metal Framing | R-Value of Foam Board Insulation | Z-furring Attachment | Cavity Insulation | | | | | |
|---------------|----------------------------------|----------------------|-------------------|-------|-------|-------|-------|-------|
| | | | R-0 | R-11 | R-13 | R-15 | R-19 | R-21 |
| | R-20 | Horizontal | 0.078 | 0.054 | 0.052 | 0.051 | 0.049 | 0.048 |
| | R-22.5 | Horizontal | 0.074 | 0.052 | 0.050 | 0.049 | 0.047 | 0.046 |
| | R-25 | Horizontal | 0.070 | 0.050 | 0.049 | 0.047 | 0.046 | 0.045 |
| | R-0 (none) | Vertical | 0.338 | 0.116 | 0.108 | 0.102 | 0.094 | 0.090 |
| | R-5 | Vertical | 0.162 | 0.084 | 0.080 | 0.077 | 0.072 | 0.070 |
| | R-7.5 | Vertical | 0.140 | 0.078 | 0.074 | 0.071 | 0.067 | 0.065 |
| | R-10 | Vertical | 0.124 | 0.073 | 0.070 | 0.067 | 0.063 | 0.062 |
| | R-12.5 | Vertical | 0.113 | 0.069 | 0.066 | 0.064 | 0.061 | 0.059 |
| | R-15 | Vertical | 0.106 | 0.066 | 0.063 | 0.061 | 0.058 | 0.057 |
| | R-17.5 | Vertical | 0.098 | 0.063 | 0.061 | 0.059 | 0.056 | 0.055 |
| | R-20 | Vertical | 0.093 | 0.061 | 0.059 | 0.057 | 0.054 | 0.053 |
| | R-22.5 | Vertical | 0.089 | 0.059 | 0.057 | 0.055 | 0.053 | 0.051 |
| | R-25 | Vertical | 0.085 | 0.057 | 0.055 | 0.054 | 0.051 | 0.050 |

Values in Table A103.3.6.1(2) may not be interpolated between. The value of the foam board insulation must meet or exceed the value listed in the table in order to use the value shown.

A103.3.6.2 Metal stud wall, effective R-values for metal framing and cavity only. Table A103.3.6.2: These values may be used for the metal-framing/cavity layers in walls with metal studs spaced on 16- or 24-inch centers with insulation installed to fill wall cavities in lieu of using the zone method provided in Chapter 25 of the ASHRAE Fundamentals Handbook.

**Table A103.3.6.2
Effective R-values for Metal Framing and Cavity Only**

| | Cavity | | Insulation | | |
|-------------------|-----------------------|----------------------------|-----------------|-------------------|----------|
| | Nominal Depth, Inches | Actual Depth, Inches | Nominal R-Value | Effective R-Value | |
| | | | | 16" O.C. | 24" O.C. |
| <i>Air Cavity</i> | any | any | R-0.91 (air) | 0.79 | 0.91 |
| Wall | 4 | 3-1/2 | R-11 | 5.5 | 6.6 |
| | 4 | 3-1/2 | R-13 | 6.0 | 7.2 |
| | 4 | 3-1/2 | R-15 | 6.4 | 7.8 |
| | 6 | 5-1/2 | R-19 | 7.1 | 8.6 |
| | 6 | 5-1/2 | R-21 | 7.4 | 9.0 |
| | 8 | 7-1/4 | R-25 | 7.8 | 9.6 |
| Roof | | Insulation is uncompressed | R-11 | 5.5 | 6.1 |
| | | | R-19 | 7.0 | 9.1 |
| | | | R-30 | 9.3 | 11.4 |

A103.3.6.3 Metal building wall. Table A103.3.6.3: A wall whose structure consists of metal spanning panels supported by steel structural members (does not include spandrel glass or metal panels in curtain wall systems). The first nominal R-value is for insulation compressed between metal wall panels and the steel structure. For double-layer installations, the second rated R-value of insulation is for insula-

tion installed from the inside, covering the girts. For continuous insulation (e.g., insulation boards) it is assumed that the insulation boards are installed on the inside of the girts and uninterrupted by the framing members. Insulation exposed to the conditioned space or semi-heated space shall have a facing, and all insulation seams shall be continuously sealed to provide a continuous air barrier.

**Table A103.3.6.3
Default Metal Building Wall U-factors**

| Insulation System | Rated R-Value of Insulation | Overall U-Factor for Entire Base Wall Assembly | Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (Uninterrupted by Framing) | | | | | |
|--------------------------------------|-----------------------------|--|--|-------|--------|-------|--------|-------|
| | | | R-6.5 | R-13 | R-19.5 | R-26 | R-32.5 | R-39 |
| Single Layer of Mineral Fiber | | | | | | | | |
| | None | 1.180 | 0.136 | 0.072 | 0.049 | 0.037 | 0.030 | 0.025 |
| | R-10 | 0.186 | 0.084 | 0.054 | 0.040 | 0.032 | 0.026 | 0.023 |
| | R-11 | 0.185 | 0.084 | 0.054 | 0.040 | 0.032 | 0.026 | 0.023 |
| | R-13 | 0.162 | 0.079 | 0.052 | 0.039 | 0.031 | 0.026 | 0.022 |
| | R-16 | 0.155 | 0.077 | 0.051 | 0.039 | 0.031 | 0.026 | 0.022 |
| | R-19 | 0.147 | 0.075 | 0.050 | 0.038 | 0.030 | 0.025 | 0.022 |

[Statutory Authority: RCW 19.27A.020, 19.27A.025 and chapters 19.27 and 34.05 RCW. WSR 13-04-056, § 51-11C-610336, filed 2/1/13, effective 7/1/13.]