

**Table 2—R-Values For 6 in. (152 mm) Concrete Masonry Walls, hr·ft<sup>2</sup>·F/Btu<sup>a</sup>**

| Construction  | Density of concrete, pcf | Cores empty |      | Cores filled with <sup>b</sup> : |      |             |      |                                |      |               |      |
|---|--------------------------|-------------|------|----------------------------------|------|-------------|------|--------------------------------|------|---------------|------|
|   |                          |             |      | Loose-fill insulation            |      |             |      | Polyurethane foamed insulation |      | Solid grouted |      |
|   |                          |             |      | Perlite                          |      | Vermiculite |      | range                          | mid  | range         | mid  |
|   |                          |             |      | range                            | mid  | range       | mid  |                                |      |               |      |
| Exposed block, both sides   | 85                       | 2.2-2.5     | 2.4  | 4.8-6.1                          | 5.3  | 4.5-5.6     | 5.0  | 5.2-7.0                        | 5.9  | 1.6-1.8       | 1.7  |
|   | 95                       | 2.1-2.4     | 2.2  | 4.1-5.4                          | 4.6  | 3.9-5.0     | 4.3  | 4.4-6.1                        | 5.0  | 1.5-1.7       | 1.6  |
|   | 105                      | 2.0-2.2     | 2.1  | 3.5-4.8                          | 4.0  | 3.3-4.5     | 3.8  | 3.7-5.2                        | 4.3  | 1.4-1.6       | 1.5  |
|   | 115                      | 1.8-2.1     | 2.0  | 3.0-4.2                          | 3.4  | 2.9-4.0     | 3.3  | 3.1-4.5                        | 3.6  | 1.4-1.5       | 1.4  |
|   | 125                      | 1.7-2.0     | 1.8  | 2.5-3.7                          | 3.0  | 2.5-3.5     | 2.9  | 2.6-3.9                        | 3.1  | 1.3-1.5       | 1.4  |
|   | 135                      | 1.6-1.9     | 1.7  | 2.2-3.2                          | 2.6  | 2.2-3.1     | 2.5  | 2.2-3.4                        | 2.7  | 1.3-1.4       | 1.3  |
| ½ in. (13 mm) gypsum board on furring                               | 85                       | 3.6-3.9     | 3.8  | 6.2-7.5                          | 6.7  | 5.9-7.0     | 6.3  | 6.6-8.4                        | 7.3  | 3.0-3.2       | 3.1  |
|   | 95                       | 3.5-3.8     | 3.6  | 5.5-6.8                          | 6.0  | 5.3-6.4     | 5.7  | 5.8-7.5                        | 6.4  | 2.9-3.1       | 3.0  |
|   | 105                      | 3.4-3.6     | 3.5  | 4.9-6.2                          | 5.4  | 4.7-5.9     | 5.2  | 5.1-6.6                        | 5.7  | 2.8-3.0       | 2.9  |
|   | 115                      | 3.2-3.5     | 3.4  | 4.4-5.6                          | 4.8  | 4.3-5.4     | 4.7  | 4.5-5.9                        | 5.0  | 2.8-2.9       | 2.8  |
|   | 125                      | 3.1-3.4     | 3.2  | 3.9-5.1                          | 4.4  | 3.9-4.9     | 4.3  | 4.0-5.3                        | 4.5  | 2.7-2.9       | 2.8  |
|   | 135                      | 3.0-3.3     | 3.1  | 3.6-4.6                          | 4.0  | 3.6-4.5     | 3.9  | 3.6-4.8                        | 4.1  | 2.7-2.8       | 2.7  |
| 1 in. (25 mm) expanded polystyrene <sup>c</sup>                     | 85                       | 7.6-7.9     | 7.8  | 10.2-11.5                        | 10.7 | 9.9-11.0    | 10.3 | 10.6-12.4                      | 11.3 | 7.0-7.2       | 7.1  |
|   | 95                       | 7.5-7.8     | 7.6  | 9.5-10.8                         | 10.0 | 9.3-10.4    | 9.7  | 9.8-11.5                       | 10.4 | 6.9-7.1       | 7.0  |
|   | 105                      | 7.4-7.6     | 7.5  | 8.9-10.2                         | 9.4  | 8.7-9.9     | 9.2  | 9.1-10.6                       | 9.7  | 6.8-7.0       | 6.9  |
|   | 115                      | 7.2-7.5     | 7.4  | 8.4-9.6                          | 8.8  | 8.3-9.4     | 8.7  | 8.5-9.9                        | 9.0  | 6.8-6.9       | 6.8  |
|   | 125                      | 7.1-7.4     | 7.2  | 7.9-9.1                          | 8.4  | 7.9-8.9     | 8.3  | 8.0-9.3                        | 8.5  | 6.7-6.9       | 6.8  |
|   | 135                      | 7.0-7.3     | 7.1  | 7.6-8.6                          | 8.0  | 7.6-8.5     | 7.9  | 7.6-8.8                        | 8.1  | 6.7-6.8       | 6.7  |
| 1 in. (25 mm) extruded polystyrene <sup>c</sup>                     | 85                       | 8.6-8.9     | 8.8  | 11.2-12.5                        | 11.7 | 10.9-12.0   | 11.3 | 11.6-13.4                      | 12.3 | 8.0-8.2       | 8.1  |
|   | 95                       | 8.5-8.8     | 8.6  | 10.5-11.8                        | 11.0 | 10.3-11.4   | 10.7 | 10.8-12.5                      | 11.4 | 7.9-8.1       | 8.0  |
|   | 105                      | 8.4-8.6     | 8.5  | 9.9-11.2                         | 10.4 | 9.7-10.9    | 10.2 | 10.1-11.6                      | 10.7 | 7.8-8.0       | 7.9  |
|   | 115                      | 8.2-8.5     | 8.4  | 9.4-10.6                         | 9.8  | 9.3-10.4    | 9.7  | 9.5-10.9                       | 10.0 | 7.8-7.9       | 7.8  |
|   | 125                      | 8.1-8.4     | 8.2  | 8.9-10.1                         | 9.4  | 8.9-9.9     | 9.3  | 9.0-10.3                       | 9.5  | 7.7-7.9       | 7.8  |
|   | 135                      | 8.0-8.3     | 8.1  | 8.6-9.6                          | 9.0  | 8.6-9.5     | 8.9  | 8.6-9.8                        | 9.1  | 7.7-7.8       | 7.7  |
| 1 in. (25 mm) polyisocyanurate <sup>d</sup>                         | 85                       | 12.1-12.4   | 12.2 | 14.6-16.0                        | 15.2 | 14.3-15.5   | 14.8 | 15.1-16.9                      | 15.8 | 11.5-11.7     | 11.6 |
|   | 95                       | 12.0-12.2   | 12.1 | 13.9-15.3                        | 14.5 | 13.7-14.9   | 14.2 | 14.2-15.9                      | 14.9 | 11.4-11.6     | 11.5 |
|   | 105                      | 11.8-12.1   | 12.0 | 13.3-14.6                        | 13.8 | 13.2-14.3   | 13.7 | 13.5-15.1                      | 14.1 | 11.3-11.5     | 11.4 |
|   | 115                      | 11.7-12.0   | 11.8 | 12.8-14.1                        | 13.3 | 12.7-13.8   | 13.2 | 12.9-14.4                      | 13.5 | 11.2-11.4     | 11.3 |
|   | 125                      | 11.6-11.9   | 11.7 | 12.4-13.5                        | 12.8 | 12.3-13.4   | 12.7 | 12.5-13.8                      | 13.0 | 11.2-11.3     | 11.2 |
|   | 135                      | 11.5-11.8   | 11.6 | 12.1-13.1                        | 12.4 | 12.0-13.0   | 12.4 | 12.0-13.2                      | 12.5 | 11.1-11.3     | 11.2 |
| 2 x 4 furring with R13 batt & ½ in. (13 mm) gypsum board on furring | 85                       | 13.0-13.3   | 13.2 | 15.6-16.9                        | 16.1 | 15.3-16.4   | 15.7 | 16.0-17.8                      | 16.7 | 12.4-12.6     | 12.5 |
|   | 95                       | 12.9-13.2   | 13.0 | 14.9-16.2                        | 15.4 | 14.7-15.8   | 15.1 | 15.2-16.9                      | 15.8 | 12.3-12.5     | 12.4 |
|   | 105                      | 12.8-13.0   | 12.9 | 14.3-15.6                        | 14.8 | 14.1-15.3   | 14.6 | 14.5-16.0                      | 15.1 | 12.2-12.4     | 12.3 |
|   | 115                      | 12.6-12.9   | 12.8 | 13.8-15.0                        | 14.2 | 13.7-14.8   | 14.1 | 13.9-15.3                      | 14.4 | 12.2-12.3     | 12.2 |
|   | 125                      | 12.5-12.8   | 12.6 | 13.3-14.5                        | 13.8 | 13.3-14.3   | 13.7 | 13.4-14.7                      | 13.9 | 12.1-12.3     | 12.2 |
|   | 135                      | 12.4-12.7   | 12.5 | 13.0-14.0                        | 13.4 | 13.0-13.9   | 13.3 | 13.0-14.2                      | 13.5 | 12.1-12.2     | 12.1 |

- <sup>a</sup> Notes: (hr·ft<sup>2</sup>·F/Btu) (0.176) = m<sup>2</sup>·K/W. Mortar joints are ⅛ in. (10 mm) thick, with face shell mortar bedding assumed. Unit dimensions based on *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90 (ref. 2). Surface air films are included.
- <sup>b</sup> Values apply when all masonry cores are filled completely. Grout density is 140 pcf (2243 kg/m<sup>3</sup>). Lightweight grouts, which will provide higher R-values, are also available in some areas.
- <sup>c</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and nonreflective air space.
- <sup>d</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and reflective air space.

**Table 3—R-Values For 8 in. (203 mm) Concrete Masonry Walls, hr·ft<sup>2</sup>·F/Btu<sup>a</sup>**

| Construction  | Density of concrete, pcf | Cores empty |      | Cores filled with <sup>b</sup> : |      |             |      |                                |      |               |      |
|---|--------------------------|-------------|------|----------------------------------|------|-------------|------|--------------------------------|------|---------------|------|
|   |                          |             |      | Loose-fill insulation            |      |             |      | Polyurethane foamed insulation |      | Solid grouted |      |
|   |                          |             |      | Perlite                          |      | Vermiculite |      | range                          | mid  | range         | mid  |
|   |                          |             |      | range                            | mid  | range       | mid  |                                |      |               |      |
| Exposed block, both sides   | 85                       | 2.4-2.7     | 2.5  | 6.3-8.2                          | 7.1  | 5.9-7.5     | 6.6  | 6.9-9.4                        | 8.0  | 1.9-2.1       | 2.0  |
|   | 95                       | 2.3-2.6     | 2.4  | 5.3-7.2                          | 6.1  | 5.0-6.7     | 5.7  | 5.8-8.1                        | 6.7  | 1.7-2.0       | 1.8  |
|   | 105                      | 2.1-2.4     | 2.2  | 4.5-6.3                          | 5.2  | 4.3-5.9     | 4.9  | 4.8-7.0                        | 5.6  | 1.6-1.9       | 1.7  |
|   | 115                      | 2.0-2.3     | 2.1  | 3.8-5.5                          | 4.4  | 3.7-5.2     | 4.3  | 4.0-6.0                        | 4.7  | 1.5-1.8       | 1.6  |
|   | 125                      | 1.9-2.2     | 2.0  | 3.2-4.8                          | 3.8  | 3.1-4.6     | 3.7  | 3.3-5.1                        | 4.0  | 1.5-1.7       | 1.5  |
|   | 135                      | 1.7-2.1     | 1.9  | 2.7-4.2                          | 3.3  | 2.7-4.0     | 3.2  | 2.8-4.4                        | 3.4  | 1.4-1.6       | 1.5  |
| ½ in. (13 mm) gypsum board on furring                               | 85                       | 3.8-4.1     | 3.9  | 7.7-9.6                          | 8.5  | 7.3-8.9     | 8.0  | 8.3-10.8                       | 9.4  | 3.3-3.5       | 3.4  |
|   | 95                       | 3.7-4.0     | 3.8  | 6.7-8.6                          | 7.5  | 6.4-8.1     | 7.1  | 7.2-9.5                        | 8.1  | 3.1-3.4       | 3.2  |
|   | 105                      | 3.5-3.8     | 3.6  | 5.9-7.7                          | 6.6  | 5.7-7.3     | 6.3  | 6.2-8.4                        | 7.0  | 3.0-3.3       | 3.1  |
|   | 115                      | 3.4-3.7     | 3.5  | 5.2-6.9                          | 5.8  | 5.1-6.6     | 5.7  | 5.4-7.4                        | 6.1  | 2.9-3.2       | 3.0  |
|   | 125                      | 3.3-3.6     | 3.4  | 4.6-6.2                          | 5.2  | 4.5-6.0     | 5.1  | 4.7-6.5                        | 5.4  | 2.9-3.1       | 2.9  |
|   | 135                      | 3.1-3.5     | 3.3  | 4.1-5.6                          | 4.7  | 4.1-5.4     | 4.6  | 4.2-5.8                        | 4.8  | 2.8-3.0       | 2.9  |
| 1 in. (25 mm) expanded polystyrene <sup>c</sup>                     | 85                       | 7.8-8.1     | 7.9  | 11.7-13.6                        | 12.5 | 11.3-12.9   | 12.0 | 12.3-14.8                      | 13.4 | 7.3-7.5       | 7.4  |
|   | 95                       | 7.7-8.0     | 7.8  | 10.7-12.6                        | 11.5 | 10.4-12.1   | 11.1 | 11.2-13.5                      | 12.1 | 7.1-7.4       | 7.2  |
|   | 105                      | 7.5-7.8     | 7.6  | 9.9-11.7                         | 10.6 | 9.7-11.3    | 10.3 | 10.2-12.4                      | 11.0 | 7.0-7.3       | 7.1  |
|   | 115                      | 7.4-7.7     | 7.5  | 9.2-10.9                         | 9.8  | 9.1-10.6    | 9.7  | 9.4-11.4                       | 10.1 | 6.9-7.2       | 7.0  |
|   | 125                      | 7.3-7.6     | 7.4  | 8.6-10.2                         | 9.2  | 8.5-10.0    | 9.1  | 8.7-10.5                       | 9.4  | 6.9-7.1       | 6.9  |
|   | 135                      | 7.1-7.5     | 7.3  | 8.1-9.6                          | 8.7  | 8.1-9.4     | 8.6  | 8.2-9.8                        | 8.8  | 6.8-7.0       | 6.9  |
| 1 in. (25 mm) extruded polystyrene <sup>c</sup>                     | 85                       | 8.8-9.1     | 8.9  | 12.7-14.6                        | 13.5 | 12.3-13.9   | 13.0 | 13.4-15.8                      | 14.4 | 8.3-8.5       | 8.4  |
|   | 95                       | 8.7-9.0     | 8.8  | 11.7-13.6                        | 12.5 | 11.4-13.1   | 12.1 | 12.2-14.5                      | 13.1 | 8.1-8.4       | 8.2  |
|   | 105                      | 8.5-8.8     | 8.6  | 10.9-12.7                        | 11.6 | 10.7-12.3   | 11.3 | 11.2-13.4                      | 12.0 | 8.0-8.3       | 8.1  |
|   | 115                      | 8.4-8.7     | 8.5  | 10.2-11.9                        | 10.8 | 10.1-11.6   | 10.7 | 10.4-12.4                      | 11.1 | 7.9-8.2       | 8.0  |
|   | 125                      | 8.3-8.6     | 8.4  | 9.6-11.2                         | 10.2 | 9.5-11.0    | 10.1 | 9.7-11.5                       | 10.4 | 7.9-8.1       | 7.9  |
|   | 135                      | 8.1-8.5     | 8.3  | 9.1-10.6                         | 9.7  | 9.1-10.4    | 9.6  | 9.2-10.8                       | 9.8  | 7.8-8.0       | 7.9  |
| 1 in. (25 mm) polyisocyanurate <sup>d</sup>                         | 85                       | 12.3-12.6   | 12.4 | 16.2-18.1                        | 17.0 | 15.7-17.3   | 16.4 | 16.8-19.3                      | 17.8 | 11.7-12.0     | 11.8 |
|   | 95                       | 12.1-12.4   | 12.3 | 15.2-17.1                        | 16.0 | 14.9-16.5   | 15.6 | 15.6-18.0                      | 16.6 | 11.6-11.9     | 11.7 |
|   | 105                      | 12.0-12.3   | 12.1 | 14.4-16.2                        | 15.1 | 14.2-15.8   | 14.8 | 14.6-16.8                      | 15.5 | 11.5-11.7     | 11.6 |
|   | 115                      | 11.9-12.2   | 12.0 | 13.7-15.4                        | 14.3 | 13.5-15.1   | 14.1 | 13.8-15.8                      | 14.6 | 11.4-11.6     | 11.5 |
|   | 125                      | 11.7-12.0   | 11.9 | 13.1-14.7                        | 13.7 | 13.0-14.4   | 13.5 | 13.2-15.0                      | 13.9 | 11.3-11.5     | 11.4 |
|   | 135                      | 11.6-11.9   | 11.7 | 12.6-14.0                        | 13.1 | 12.5-13.9   | 13.0 | 12.7-14.3                      | 13.2 | 11.3-11.5     | 11.4 |
| 2 x 4 furring with R13 batt & ½ in. (13 mm) gypsum board on furring | 85                       | 13.2-13.5   | 13.3 | 17.1-19.0                        | 17.9 | 16.7-18.3   | 17.4 | 17.7-20.2                      | 18.8 | 12.7-12.9     | 12.8 |
|   | 95                       | 13.1-13.4   | 13.2 | 16.1-18.0                        | 16.9 | 15.8-17.5   | 16.5 | 16.6-18.9                      | 17.5 | 12.5-12.8     | 12.6 |
|   | 105                      | 12.9-13.2   | 13.0 | 15.3-17.1                        | 16.0 | 15.1-16.7   | 15.7 | 15.6-17.8                      | 16.4 | 12.4-12.7     | 12.5 |
|   | 115                      | 12.8-13.1   | 12.9 | 14.6-16.3                        | 15.2 | 14.5-16.0   | 15.1 | 14.8-16.8                      | 15.5 | 12.3-12.6     | 12.4 |
|   | 125                      | 12.7-13.0   | 12.8 | 14.0-15.6                        | 14.6 | 13.9-15.4   | 14.5 | 14.1-15.9                      | 14.8 | 12.3-12.5     | 12.3 |
|   | 135                      | 12.5-12.9   | 12.7 | 13.5-15.0                        | 14.1 | 13.5-14.8   | 14.0 | 13.6-15.2                      | 14.2 | 12.2-12.4     | 12.3 |

- <sup>a</sup> Notes: (hr·ft<sup>2</sup>·F/Btu) (0.176) = m<sup>2</sup>·K/W. Mortar joints are ⅛ in. (10 mm) thick, with face shell mortar bedding assumed. Unit dimensions based on *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90 (ref. 2). Surface air films are included.
- <sup>b</sup> Values apply when all masonry cores are filled completely. Grout density is 140 pcf (2243 kg/m<sup>3</sup>). Lightweight grouts, which will provide higher R-values, are also available in some areas.
- <sup>c</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and nonreflective air space.
- <sup>d</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and reflective air space.

**Table 4—R-Values For 10 in. (254 mm) Concrete Masonry Walls, hrft<sup>2</sup>·F/Btu<sup>a</sup>**

| Construction  | Density of concrete, pcf | Cores empty |      | Cores filled with <sup>b</sup> : |      |             |      |                                |      |               |      |
|---|--------------------------|-------------|------|----------------------------------|------|-------------|------|--------------------------------|------|---------------|------|
|   |                          |             |      | Loose-fill insulation            |      |             |      | Polyurethane foamed insulation |      | Solid grouted |      |
|   |                          |             |      | Perlite                          |      | Vermiculite |      | range                          | mid  | range         | mid  |
|   |                          |             |      | range                            | mid  | range       | mid  |                                |      |               |      |
| Exposed block, both sides   | 85                       | 2.5-2.9     | 2.7  | 7.5-9.9                          | 8.5  | 7.0-9.1     | 7.9  | 8.2-11.3                       | 9.5  | 2.1-2.4       | 2.2  |
|   | 95                       | 2.4-2.7     | 2.5  | 6.3-8.7                          | 7.2  | 6.0-8.0     | 6.8  | 6.7-9.7                        | 7.9  | 1.9-2.2       | 2.0  |
|   | 105                      | 2.2-2.5     | 2.3  | 5.2-7.5                          | 6.1  | 5.0-7.0     | 5.8  | 5.5-8.2                        | 6.6  | 1.8-2.1       | 1.9  |
|   | 115                      | 2.1-2.4     | 2.2  | 4.4-6.5                          | 5.2  | 4.2-6.2     | 5.0  | 4.6-7.0                        | 5.5  | 1.7-2.0       | 1.8  |
|   | 125                      | 1.9-2.3     | 2.1  | 3.7-5.6                          | 4.4  | 3.6-5.4     | 4.3  | 3.8-6.0                        | 4.6  | 1.6-1.9       | 1.7  |
|   | 135                      | 1.8-2.1     | 2.0  | 3.1-4.9                          | 3.7  | 3.0-4.7     | 3.6  | 3.2-5.1                        | 3.9  | 1.5-1.8       | 1.6  |
| ½ in. (13 mm) gypsum board on furring                               | 85                       | 3.9-4.3     | 4.1  | 8.9-11.3                         | 9.9  | 8.4-10.5    | 9.3  | 9.6-12.7                       | 10.9 | 3.5-3.8       | 3.6  |
|   | 95                       | 3.8-4.1     | 3.9  | 7.7-10.1                         | 8.6  | 7.4-9.4     | 8.2  | 8.1-11.1                       | 9.3  | 3.3-3.6       | 3.4  |
|   | 105                      | 3.6-3.9     | 3.7  | 6.6-8.9                          | 7.5  | 6.4-8.4     | 7.2  | 6.9-9.6                        | 8.0  | 3.2-3.5       | 3.3  |
|   | 115                      | 3.5-3.8     | 3.6  | 5.8-7.9                          | 6.6  | 5.6-7.6     | 6.4  | 6.0-8.4                        | 6.9  | 3.1-3.4       | 3.2  |
|   | 125                      | 3.3-3.7     | 3.5  | 5.1-7.0                          | 5.8  | 5.0-6.8     | 5.7  | 5.2-7.4                        | 6.0  | 3.0-3.3       | 3.1  |
|   | 135                      | 3.2-3.5     | 3.4  | 4.5-6.3                          | 5.1  | 4.4-6.1     | 5.0  | 4.6-6.5                        | 5.3  | 2.9-3.2       | 3.0  |
| 1 in. (25 mm) expanded polystyrene <sup>c</sup>                     | 85                       | 7.9-8.3     | 8.1  | 12.9-15.3                        | 13.9 | 12.4-14.5   | 13.3 | 13.6-16.7                      | 14.9 | 7.5-7.8       | 7.6  |
|   | 95                       | 7.8-8.1     | 7.9  | 11.7-14.1                        | 12.6 | 11.4-13.4   | 12.2 | 12.1-15.1                      | 13.3 | 7.3-7.6       | 7.4  |
|   | 105                      | 7.6-7.9     | 7.7  | 10.6-12.9                        | 11.5 | 10.4-12.4   | 11.2 | 10.9-13.6                      | 12.0 | 7.2-7.5       | 7.3  |
|   | 115                      | 7.5-7.8     | 7.6  | 9.8-11.9                         | 10.6 | 9.6-11.6    | 10.4 | 10.0-12.4                      | 10.9 | 7.1-7.4       | 7.2  |
|   | 125                      | 7.3-7.7     | 7.5  | 9.1-11.0                         | 9.8  | 9.0-10.8    | 9.7  | 9.2-11.4                       | 10.0 | 7.0-7.3       | 7.1  |
|   | 135                      | 7.2-7.5     | 7.4  | 8.5-10.3                         | 9.1  | 8.4-10.1    | 9.0  | 8.6-10.5                       | 9.3  | 6.9-7.2       | 7.0  |
| 1 in. (25 mm) extruded polystyrene <sup>c</sup>                     | 85                       | 8.9-9.3     | 9.1  | 13.9-16.3                        | 14.9 | 13.4-15.5   | 14.3 | 14.6-17.7                      | 15.9 | 8.5-8.8       | 8.6  |
|   | 95                       | 8.8-9.1     | 8.9  | 12.7-15.1                        | 13.6 | 12.4-14.4   | 13.2 | 13.1-16.1                      | 14.3 | 8.3-8.6       | 8.4  |
|   | 105                      | 8.6-8.9     | 8.7  | 11.6-13.9                        | 12.5 | 11.4-13.4   | 12.2 | 11.9-14.6                      | 13.0 | 8.2-8.5       | 8.3  |
|   | 115                      | 8.5-8.8     | 8.6  | 10.8-12.9                        | 11.6 | 10.6-12.6   | 11.4 | 11.0-13.4                      | 11.9 | 8.1-8.4       | 8.2  |
|   | 125                      | 8.3-8.7     | 8.5  | 10.1-12.0                        | 10.8 | 10.0-11.8   | 10.7 | 10.2-12.4                      | 11.0 | 8.0-8.3       | 8.1  |
|   | 135                      | 8.2-8.5     | 8.4  | 9.5-11.3                         | 10.1 | 9.4-11.1    | 10.0 | 9.6-11.5                       | 10.3 | 7.9-8.2       | 8.0  |
| 1 in. (25 mm) polyisocyanurate <sup>d</sup>                         | 85                       | 12.4-12.7   | 12.5 | 17.4-19.8                        | 18.4 | 16.9-18.9   | 17.8 | 18.0-21.1                      | 19.3 | 11.9-12.2     | 12.1 |
|   | 95                       | 12.2-12.6   | 12.4 | 16.1-18.5                        | 17.1 | 15.8-17.9   | 16.7 | 16.6-19.5                      | 17.8 | 11.8-12.1     | 11.9 |
|   | 105                      | 12.1-12.4   | 12.2 | 15.1-17.4                        | 16.0 | 14.9-16.9   | 15.7 | 15.4-18.1                      | 16.5 | 11.7-11.9     | 11.8 |
|   | 115                      | 11.9-12.3   | 12.1 | 14.3-16.4                        | 15.1 | 14.1-16.0   | 14.9 | 14.4-16.9                      | 15.4 | 11.6-11.8     | 11.7 |
|   | 125                      | 11.8-12.1   | 11.9 | 13.5-15.5                        | 14.3 | 13.5-15.2   | 14.1 | 13.7-15.9                      | 14.5 | 11.5-11.7     | 11.6 |
|   | 135                      | 11.7-12.0   | 11.8 | 13.0-14.7                        | 13.6 | 12.9-14.6   | 13.5 | 13.0-14.9                      | 13.7 | 11.4-11.6     | 11.5 |
| 2 x 4 furring with R13 batt & ½ in. (13 mm) gypsum board on furring | 85                       | 13.3-13.7   | 13.5 | 18.3-20.7                        | 19.3 | 17.8-19.9   | 18.7 | 19.0-22.1                      | 20.3 | 12.9-13.2     | 13.0 |
|   | 95                       | 13.2-13.5   | 13.3 | 17.1-19.5                        | 18.0 | 16.8-18.8   | 17.6 | 17.5-20.5                      | 18.7 | 12.7-13.0     | 12.8 |
|   | 105                      | 13.0-13.3   | 13.1 | 16.0-18.3                        | 16.9 | 15.8-17.8   | 16.6 | 16.3-19.0                      | 17.4 | 12.6-12.9     | 12.7 |
|   | 115                      | 12.9-13.2   | 13.0 | 15.2-17.3                        | 16.0 | 15.0-17.0   | 15.8 | 15.4-17.8                      | 16.3 | 12.5-12.8     | 12.6 |
|   | 125                      | 12.7-13.1   | 12.9 | 14.5-16.4                        | 15.2 | 14.4-16.2   | 15.1 | 14.6-16.8                      | 15.4 | 12.4-12.7     | 12.5 |
|   | 135                      | 12.6-12.9   | 12.8 | 13.9-15.7                        | 14.5 | 13.8-15.5   | 14.4 | 14.0-15.9                      | 14.7 | 12.3-12.6     | 12.4 |

- <sup>a</sup> Notes: (hrft<sup>2</sup>·F/Btu) (0.176) = m<sup>2</sup>·K/W. Mortar joints are ⅛ in. (10 mm) thick, with face shell mortar bedding assumed. Unit dimensions based on *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90 (ref. 2). Surface air films are included.
- <sup>b</sup> Values apply when all masonry cores are filled completely. Grout density is 140 pcf (2243 kg/m<sup>3</sup>). Lightweight grouts, which will provide higher R-values, are also available in some areas.
- <sup>c</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and nonreflective air space.
- <sup>d</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and reflective air space.

**Table 5—R-Values For 12 in. (305 mm) Concrete Masonry Walls, hrft<sup>2</sup>/Btu<sup>a</sup>**

| Construction   | Density of concrete, pcf | Cores empty |      | Cores filled with <sup>b</sup> : |      |             |      |                                |      |               |      |
|--|--------------------------|-------------|------|----------------------------------|------|-------------|------|--------------------------------|------|---------------|------|
|  |                          |             |      | Loose-fill insulation            |      |             |      | Polyurethane foamed insulation |      | Solid grouted |      |
|  |                          |             |      | Perlite                          |      | Vermiculite |      | range                          | mid  |               |      |
| range  | mid                      | range       | mid  | range                            | mid  | range       | mid  | range                          | mid  |               |      |
| Exposed block, both sides  | 85                       | 2.6-3.0     | 2.8  | 9.1-12.1                         | 10.3 | 8.5-11.0    | 9.6  | 10.0-13.8                      | 11.5 | 2.3-2.6       | 2.4  |
|  | 95                       | 2.4-2.8     | 2.6  | 7.6-10.5                         | 8.8  | 7.2-9.7     | 8.2  | 8.2-11.8                       | 9.6  | 2.1-2.4       | 2.3  |
|  | 105                      | 2.3-2.6     | 2.4  | 6.3-9.1                          | 7.4  | 6.0-8.5     | 7.0  | 6.7-10.0                       | 8.0  | 2.0-2.3       | 2.1  |
|  | 115                      | 2.1-2.5     | 2.3  | 5.2-7.9                          | 6.2  | 5.1-7.4     | 6.0  | 5.5-8.5                        | 6.6  | 1.9-2.2       | 2.0  |
|  | 125                      | 2.0-2.3     | 2.2  | 4.4-6.8                          | 5.3  | 4.2-6.5     | 5.1  | 4.5-7.2                        | 5.5  | 1.8-2.0       | 1.9  |
|  | 135                      | 1.9-2.2     | 2.0  | 3.6-5.8                          | 4.4  | 3.6-5.6     | 4.3  | 3.7-6.1                        | 4.6  | 1.7-1.9       | 1.8  |
| ½ in. (13 mm) gypsum board on furring                              | 85                       | 4.0-4.4     | 4.2  | 10.5-13.5                        | 11.7 | 9.9-12.4    | 11.0 | 11.4-15.2                      | 12.9 | 3.7-4.0       | 3.8  |
|  | 95                       | 3.8-4.2     | 4.0  | 9.0-11.9                         | 10.2 | 8.6-11.1    | 9.6  | 9.6-13.2                       | 11.0 | 3.5-3.8       | 3.7  |
|  | 105                      | 3.7-4.0     | 3.8  | 7.7-10.5                         | 8.8  | 7.4-9.9     | 8.4  | 8.1-11.4                       | 9.4  | 3.4-3.7       | 3.5  |
|  | 115                      | 3.5-3.9     | 3.7  | 6.6-9.3                          | 7.6  | 6.5-8.8     | 7.4  | 6.9-9.9                        | 8.0  | 3.3-3.6       | 3.4  |
|  | 125                      | 3.4-3.7     | 3.6  | 5.8-8.2                          | 6.7  | 5.6-7.9     | 6.5  | 5.9-8.6                        | 6.9  | 3.2-3.4       | 3.3  |
|  | 135                      | 3.3-3.6     | 3.4  | 5.0-7.2                          | 5.8  | 5.0-7.0     | 5.7  | 5.1-7.5                        | 6.0  | 3.1-3.3       | 3.2  |
| 1 in. (25 mm) expanded polystyrene <sup>c</sup>                    | 85                       | 8.0-8.4     | 8.2  | 14.5-17.5                        | 15.7 | 13.9-16.4   | 15.0 | 15.4-19.2                      | 16.9 | 7.7-8.0       | 7.8  |
|  | 95                       | 7.8-8.2     | 8.0  | 13.0-15.9                        | 14.2 | 12.6-15.1   | 13.6 | 13.6-17.2                      | 15.0 | 7.5-7.8       | 7.7  |
|  | 105                      | 7.7-8.0     | 7.8  | 11.7-14.5                        | 12.8 | 11.4-13.9   | 12.4 | 12.1-15.4                      | 13.4 | 7.4-7.7       | 7.5  |
|  | 115                      | 7.5-7.9     | 7.7  | 10.6-13.3                        | 11.6 | 10.5-12.8   | 11.4 | 10.9-13.9                      | 12.0 | 7.3-7.6       | 7.4  |
|  | 125                      | 7.4-7.7     | 7.6  | 9.8-12.2                         | 10.7 | 9.6-11.9    | 10.5 | 9.9-12.6                       | 10.9 | 7.2-7.4       | 7.3  |
|  | 135                      | 7.3-7.6     | 7.4  | 9.0-11.2                         | 9.8  | 9.0-11.0    | 9.7  | 9.1-11.5                       | 10.0 | 7.1-7.3       | 7.2  |
| 1 in. (25 mm) extruded polystyrene <sup>c</sup>                    | 85                       | 9.0-9.4     | 9.2  | 15.5-18.5                        | 16.7 | 14.9-17.4   | 16.0 | 16.4-20.2                      | 17.9 | 8.7-9.0       | 8.8  |
|  | 95                       | 8.8-9.2     | 9.0  | 14.0-16.9                        | 15.2 | 13.6-16.1   | 14.6 | 14.6-18.2                      | 16.0 | 8.5-8.8       | 8.7  |
|  | 105                      | 8.7-9.0     | 8.8  | 12.7-15.5                        | 13.8 | 12.4-14.9   | 13.4 | 13.1-16.4                      | 14.4 | 8.4-8.7       | 8.5  |
|  | 115                      | 8.5-8.9     | 8.7  | 11.6-14.3                        | 12.6 | 11.5-13.8   | 12.4 | 11.9-14.9                      | 13.0 | 8.3-8.6       | 8.4  |
|  | 125                      | 8.4-8.7     | 8.6  | 10.8-13.2                        | 11.7 | 10.6-12.9   | 11.5 | 10.9-13.6                      | 11.9 | 8.2-8.4       | 8.3  |
|  | 135                      | 8.3-8.6     | 8.4  | 10.0-12.2                        | 10.8 | 10.0-12.0   | 10.7 | 10.1-12.5                      | 11.0 | 8.1-8.4       | 8.2  |
| 1 in. (25 mm) polyiso-cyanurate <sup>d</sup>                       | 85                       | 12.5-12.8   | 12.6 | 19.0-22.0                        | 20.2 | 18.4-20.9   | 19.4 | 19.8-23.7                      | 21.4 | 12.2-12.5     | 12.3 |
|  | 95                       | 12.3-12.6   | 12.4 | 17.4-20.4                        | 18.6 | 17.0-19.6   | 18.1 | 18.0-21.6                      | 19.5 | 12.0-12.3     | 12.1 |
|  | 105                      | 12.2-12.5   | 12.3 | 16.2-19.0                        | 17.3 | 15.9-18.4   | 16.9 | 16.5-19.9                      | 17.8 | 11.9-12.2     | 12.0 |
|  | 115                      | 12.0-12.3   | 12.1 | 15.1-17.7                        | 16.1 | 14.9-17.3   | 15.8 | 15.3-18.4                      | 16.5 | 11.8-12.0     | 11.9 |
|  | 125                      | 11.9-12.2   | 12.0 | 14.2-16.6                        | 15.1 | 14.1-16.3   | 14.9 | 14.4-17.1                      | 15.4 | 11.7-11.9     | 11.8 |
|  | 135                      | 11.8-12.1   | 11.9 | 13.5-15.7                        | 14.3 | 13.4-15.5   | 14.2 | 13.6-16.0                      | 14.5 | 11.6-11.8     | 11.7 |
| 2 x 4 furring with R13 batt& ½ in. (13 mm) gypsum board on furring | 85                       | 13.4-13.8   | 13.6 | 19.9-22.9                        | 21.1 | 19.3-21.8   | 20.4 | 20.8-24.6                      | 22.3 | 13.1-13.4     | 13.2 |
|  | 95                       | 13.2-13.6   | 13.4 | 18.4-21.3                        | 19.6 | 18.0-20.5   | 19.0 | 19.0-22.6                      | 20.4 | 12.9-13.2     | 13.1 |
|  | 105                      | 13.1-13.4   | 13.2 | 17.1-19.9                        | 18.2 | 16.8-19.3   | 17.8 | 17.5-20.8                      | 18.8 | 12.8-13.1     | 12.9 |
|  | 115                      | 12.9-13.3   | 13.1 | 16.0-18.7                        | 17.0 | 15.9-18.2   | 16.8 | 16.3-19.3                      | 17.4 | 12.7-13.0     | 12.8 |
|  | 125                      | 12.8-13.1   | 13.0 | 15.2-17.6                        | 16.1 | 15.0-17.3   | 15.9 | 15.3-18.0                      | 16.3 | 12.6-12.8     | 12.7 |
|  | 135                      | 12.7-13.0   | 12.8 | 14.4-16.6                        | 15.2 | 14.4-16.4   | 15.1 | 14.5-16.9                      | 15.4 | 12.5-12.7     | 12.6 |

<sup>a</sup> Notes: (hrft<sup>2</sup>/Btu) (0.176) = m<sup>2</sup>K/W. Mortar joints are ⅛ in. (10 mm) thick, with face shell mortar bedding assumed. Unit dimensions based on *Standard Specification for Loadbearing Concrete Masonry Units*, ASTM C 90 (ref. 2). Surface air films are included.

<sup>b</sup> Values apply when all masonry cores are filled completely. Grout density is 140 pcf (2243 kg/m<sup>3</sup>). Lightweight grouts, which will provide higher R-values, are also available in some areas.

<sup>c</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and nonreflective air space.

<sup>d</sup> Installed over wood furring. Includes ½ in. (13 mm) gypsum board and reflective air space.