Thermal Catalog of Concrete Masonry Wall Assemblies, 2nd Edition.

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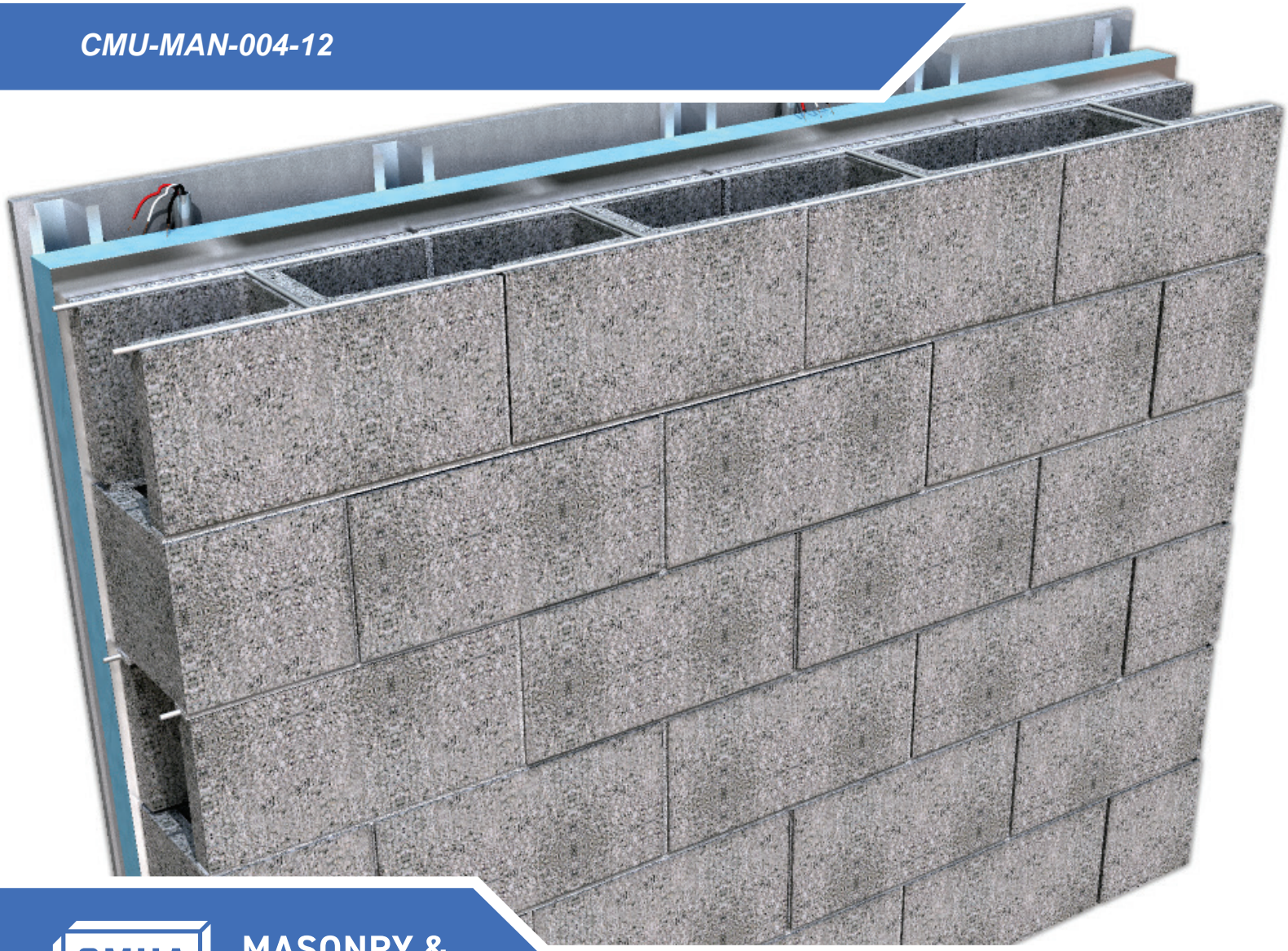

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FOREWORD

NCMA promotes the use of concrete masonry in part through the development and dissemination of technical information. This catalog is intended as a guide for architects, engineers, building code officials and others capable of understanding and correctly applying the information presented.

The material presented does not cover all possible situations, but is intended to represent some of the more widely used concrete masonry constructions. The R-values provided are steady-state only; and do not take into account concrete masonry's thermal mass contributions that often offer additional efficiencies for specific projects and climate zones. Care has been taken to ensure that the information included in this catalog is as accurate as possible. However, NCMA does not assume responsibility for errors or omissions resulting from the use of this catalog or in the preparation of plans or specifications. Additionally, information contained herein may not conform to local building code requirements and should therefore be reviewed carefully to ensure compliance.

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USING THIS CATALOG

Within this Thermal Catalog, there are various insulation materials and installation methods. While there are many options presented, the Catalog is intended to provide representative examples of typical concrete masonry assemblies, and is not an exhaustive list of all options available.

Each different type of insulation material and installation/application has inherent advantages and disadvantages. For example, insulation placed on the interior side of the concrete masonry assembly (so that the mass wall is not in direct contact with the interior environment) reduces the benefits of thermal mass. Some insulation materials are susceptible to degradation due to exposure to moisture and other environmental conditions and can only be used in limited applications. Some insulation materials cannot be left exposed due to an increased risk of fire or the release of toxic fumes when burned. Also, different insulation strategies will have different costs associated with the material as well as the method of installation.

Users of this Catalog are encouraged to consider all relevant factors when choosing an insulation type and installation method to help ensure the maximum benefit and return on investment is obtained for each unique project.

This Thermal Catalog provides calculated thermal resistance/conductance for various types of concrete masonry assemblies. These values represent the most state-of-the-art calculation methods, material thermal properties, and ASHRAE stated values and requirements. These values are supported by current energy codes and standards and are intended to create consistency in thermal calculations and presented values for concrete masonry assemblies.

In this energy- and sustainability-driven construction market, there are many different stated values for thermal performance. Some of these claims may be based on antiquated test methods, modified test procedures, and other assumptions not supported by current energy codes and standards. This Catalog provides consistent, code-recognized assumptions and calculation methods for concrete masonry assemblies and are to be considered the standard practice for the concrete masonry industry for the determination of thermal performance of concrete masonry assemblies until such time as they are subsequently revised or updated to reflect new research, building code requirements, or standardized modeling techniques.

One non-standard method of characterizing thermal performance of mass wall systems is ‘effective R-value’, also referred to as the ‘dynamic’ or ‘equivalent’ R-value. The ‘effective R-value’ can be determined in many different ways, but is essentially an adjusted R-value to take into account various properties (such as thermal mass or air tightness) that are not directly accounted for with steady-state R-values. Different ‘effective’ values for different systems can only be compared if all the variables considered when determining the ‘effective R-value’ (climate zone, building orientation and use, and location of insulation, to name a few) are the same. **It is important to understand that ‘effective R-values’ of mass wall systems cannot be used to determine compliance with energy codes. Building codes and standards already take into account the thermal mass benefits of mass wall construction by requiring smaller steady-state R-values for mass walls than corresponding light frame construction. Using ‘effective R-values’ for demonstrating code compliance of mass wall systems would be the equivalent of taking credit for mass twice.** The values provided in this catalog are steady-state R-values, not ‘effective R-values’. Additional discussion on this topic can be found in the article “*The Effectiveness of Effective R-Value*” by Maribeth Bradfield, published in *Masonry Edge/The Story Pole Magazine* (Vol. 6, No. 3, 2011).

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INTRODUCTION

Today's buildings are being designed in a changing environment with regard to energy efficiency. From a recent past of very basic energy requirements, a new generation of energy codes has evolved, as have more comprehensive programs that include building energy efficiency as only part of the larger design goals and objectives.

Masonry can provide significant benefits to modern energy codes and sustainable design practices. In addition to its energy efficiency, concrete masonry is a locally-produced, natural material that is durable and long-lived, minimizing the need for repair or replacement. Concrete masonry can incorporate recycled materials, and can itself be reused or recycled at the end of its life. Various architectural finishes are available that can eliminate the need for paint or other coatings, the addition of which can impair indoor air quality and contribute to long-term maintenance needs.

Whether your building project is being designed to maximize sustainability or to meet the current energy code requirements as economically as possible, concrete masonry construction can fulfill the project's energy efficiency requirements, while also providing superior structural capacity, durability, and resistance to fire, sound transmission, insects and mold.

1. Concrete Masonry Thermal Performance

Although this catalog presents a compendium of concrete masonry assembly R-values, it is important to note that R-values alone do not fully describe the thermal performance of a concrete masonry assembly. Concrete masonry's thermal performance depends on its steady-state thermal characteristics (described by R-value or U-factor) as well as the thermal mass (heat capacity) characteristics of the assembly. The steady state and mass performance are influenced by the size, type, and configuation of masonry unit, type and location of insulation, finish materials, density of masonry, climate, and building orientation and exposure conditions.

Thermal mass describes the ability of materials to store heat. Because of its comparatively high density and specific heat, masonry provides very effective thermal storage. Masonry walls retain their temperature long after the heat or air-conditioning has shut off. This, in turn, effectively reduces heating and cooling loads, moderates indoor temperature swings, and shifts heating and cooling loads to off-peak hours. Due to the significant benefits of concrete masonry's inherent thermal mass, concrete masonry buildings can provide similar energy performance to more heavily insulated light frame buildings.

The benefits of thermal mass have been incorporated into energy code requirements as well as sophisticated computer models. Due to the thermal mass of concrete masonry construction, energy codes and standards such as the *International Energy Conservation Code (IECC)* (ref. 1) and *Energy Efficient Standard for Buildings Except Low-Rise Residential Buildings, ASHRAE Standard 90.1* (ref. 2), require less insulation in concrete masonry assemblies than equivalent light-frame systems to meet the energy requirements.

Although the thermal mass and inherent R-value/U-factor of concrete masonry may be enough to meet energy code requirements (particularly in warmer climates), concrete masonry assemblies may require additional insulation, particularly when designed under more contemporary building code requirements or to achieve above-code thermal performance. For such conditions, there are many options available for insulating concrete masonry construction.

Although in general higher R-values reduce heat flow through a building element, R-values have a diminishing impact on the overall building envelope energy use. In other words, it's important not to automatically equate higher R-value with improved energy efficiency. As an example, consider a two-story elementary school in Bowling Green, Kentucky. If this school is built using single wythe concrete masonry walls with cell insulation only, with a resulting wall R-value of 7 hr·ft^2·^{o}F/Btu, an estimate

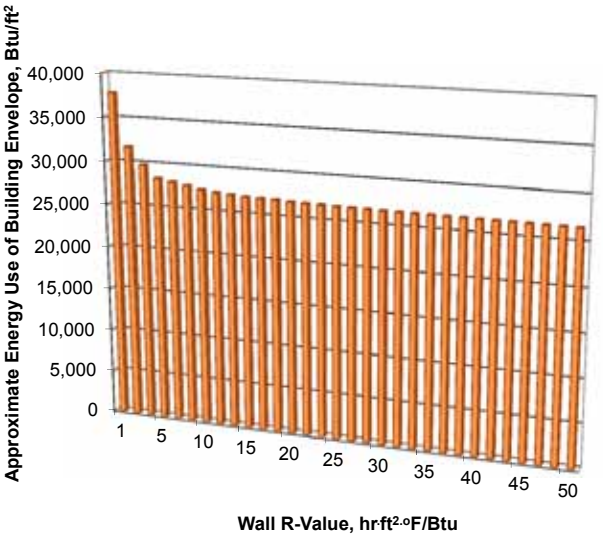


Figure 1:
Diminishing Returns of Added Wall Insulation

of the building envelope energy use for this structure is approximately 27,800 Btu/ft². If we increase the R-value of the wall to R14 by adding additional insulation while holding the other envelope variables constant, the building envelope energy use drops by only 2.5%, which is not in proportion to doubling the wall R-value. Figure 1 illustrates this trend: as wall R-value increases, it has less and less impact on the building envelope thermal performance. In this example, a wall R-value larger than about R12 no longer has a significant impact on the envelope energy use. At this point, it makes more sense to invest in energy efficiency measures other than wall insulation.

When required, concrete masonry can provide assemblies with R-values that exceed code minimums. For overall project economy, however, the industry recommends balancing the needs and performance expectations with reasonable insulation levels.

2. Scope of the Catalog

This Thermal Catalog of Concrete Masonry Assemblies presents tabulated R-values of some common concrete masonry constructions. Because of concrete masonry's inherent design flexibility, the assemblies presented are not all-inclusive, but are intended to represent a wide range of common concrete masonry wall designs.

Each page of the Catalog addresses a particular assembly and includes brief notes on the features of that construction and a table of R-values for 6-in., 8-in., 10-in. and 12-in. concrete masonry units of various concrete densities and with various types and amounts of insulation. The basis and assumptions used to determine these R-values are described in the following section.

Tabulated R-values include ungrouted walls, lightly reinforced/grouted walls, heavily reinforced/grouted walls and fully grouted walls. "Lightly reinforced," as used in this Catalog, refers to reinforcement and grout at 8 ft on center both vertically and horizontally, which is approximately the same amount of grouted cells as an assembly containing vertical reinforcement at 48 in. o.c. only. "Heavily reinforced" refers to reinforcement and grout at 32 in. on center vertically and 48 in. on center horizontally, which is approximately the same as vertical reinforcement at 24 in. o.c. without horizontally reinforced/grouted courses. Other reinforcement schedules can be calculated using the information in TEK 6-2C, *R-Values and U-Factors of Single Wythe Concrete Masonry Walls* (ref. 3).

The grouting of hollow cells primarily impacts concrete masonry R-values when cell insulation is used in single wythe assemblies because the grout displaces some of the wall insulation. Some rigid insulation inserts, however, are configured to accommodate reinforcing steel and grout in the same cell to maintain a more continuous insulation layer when cell insulation is used.

In regards to insulation, several types of rigid board and batt insulation are covered in this catalog for specific assemblies. For integral insulation within the cells of assemblies covered in this catalog, a polyurethane foamed-in-place insulation is assumed. It is important to note that other types of insulation materials are available that may have an R-value that differs from that assumed in this Catalog. Differences in insulation properties will affect the assembly R-value as well.

Revisions in 2011 to ASTM C90, *Standard Specification for Loadbearing Concrete Masonry Units* (Ref. 4) have significantly reduced the minimum amount of web material required for CMU. Because of this revision this Catalog is split into three sections; with each section highlighting the use of different unit configurations. In the first section, the CMU have three webs, with each web being the full height of the unit, and having a minimum thickness as provided in historical versions of ASTM C90. The second section contains calculations using a CMU having two full height, 0.75 in. thick webs. The third section contains a 'hybrid' system of CMU, intended to maximize thermal efficiency. In this 'hybrid' system both two-web and one-web units are used. The two-web units are the same as that used in the second section, while the one-web units contain a single, full height 0.76 in. thick web, which represents the minimum web size allowed in current versions of ASTM C90. The combination of single and two web unit configurations presented

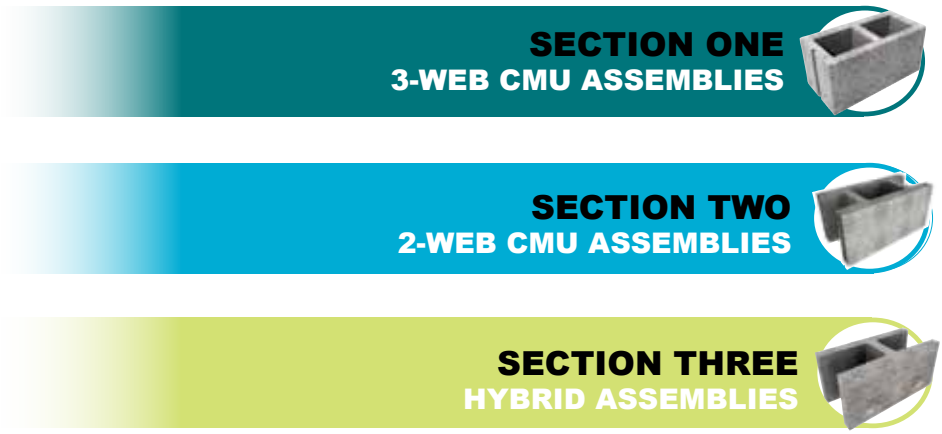


Figure 2: Each section of the catalog is identified by a colored band and icon at the top of the page

in Section Three allows for partially grouted assemblies to be constructed while minimizing the thermal bridging through the webs—thereby maximizing the R-value of the assembly. More information on the unit configurations used can be found in the introduction to each section.

This Catalog is intended as a tool to determine R-values for energy analysis and/or code compliance, although the tables do not indicate whether a particular assembly meets a particular energy code. More detailed information on concrete masonry energy code compliance is included in Section 4 below.

3. Basis of the Thermal Catalog Thermal Properties

The R-values/U-factors listed in the following tables were determined by calculation using the code-recognized series-parallel (also called isothermal planes) calculation method (refs. 5, 6). The method accounts for the thermal bridging (heat flow) that occurs through the webs of concrete masonry units. The method is fully described in TEK 6-1C, *R-Values of Multi-Wythe Concrete Masonry Walls* (ref. 7).

Thermal values for concrete masonry assemblies are correlated to density because the thermal conductivity of concrete increases with increasing concrete density. For each unit density listed in the following tables, a range of thermal conductivities may exist based on variations in factors such as aggregate type(s), concrete mix design or moisture content. The thermal conductivity values used in developing in the following tables represent the moisture-corrected thermal conductivity values, based on a compendium of thermal conductivity research data (refs. 5, 6). Locally available products and local conditions may result in thermal conductivity values that differ from those used in the development of this catalog.

Although the R-values are based on typical 8-in. high concrete masonry units, 4-in. high units ("half-high" units) are also widely available and other heights may be available in some markets. Because the wall R-values vary so little with different unit heights, the tables of this catalog can be applied to units having heights other than 8 in.

The calculations include the effects of mortar and grout, when used, as well as surface air film resistances. Thermal data for these and other included materials are listed in Appendix A.

For many values provided in this Catalog, surface finishes or additional materials are included in the calculations. The thermal resistivity values for these finishes and materials used are either directly from ASHRAE 90.1 (2007) or from thermal calculations performed in accordance with ASHRAE 90.1. The thermal properties for various materials are provided in Appendix A and C.

Sample calculations can be found in Appendix C. Each type of assembly has a sample calculation showing all steps, including assumptions for materials, finishes, and assemblies. These calculations are meant to help a designer understand the concepts that form the basis of this document.

4. Energy Performance Goals for Concrete Masonry Assemblies

Today's buildings have varied energy efficiency goals. Programs such as LEED and Green Globes set benchmarks for designers to integrate sustainable design concepts into their projects to produce a comprehensively "green" building. For these projects, the energy efficiency goal for the building envelope is often to minimize energy use. Another approach is taken on projects where economy is the top priority. For these buildings, the design goal is to meet the current energy code requirements as economically as possible. Between the two are a range of building types and design goals that could be met.

For buildings using LEED or other sustainability rating programs, the R-values listed in this catalog can be used in computer programs such as EnergyPlus, DOE-2 or BLAST to develop an estimate of energy use for the building under consideration.

If the project goal is to meet, rather than exceed, the energy code requirements, most codes allow any one of three methods to be used to show compliance: prescriptive, trade-off or system performance, and whole building energy analysis. The project need only comply under one of these methods, not all three.

Of the three compliance methods, the prescriptive method is the easiest to apply and perhaps the most well-recognized. Building envelope components are listed in table format, with prescriptive requirements listed separately for each component and climate zone. In the case of the International Energy Conservation Code (IECC), prescriptive requirements are listed as either a maximum U-factor of the overall wall (U-factor is simply the inverse of R-value, i.e., $U = 1/R$) or as a minimum R-value for the assembly.

The IECC prescriptive R-value table calls for "continuous insulation" on concrete masonry and other mass walls. This refers to insulation uninterrupted by furring or by the webs of concrete masonry units. Examples of continuous insulation include rigid insulation adhered to the interior of the wall with furring and drywall applied over the insulation, continuous insulation in a masonry cavity wall, and exterior insulation and finish systems. Various assemblies in this Catalog have continuous insulation.

If the concrete masonry assembly will not include continuous insulation, there are several other options to comply with the IECC requirements—concrete masonry assemblies are not required to have continuous insulation in order to meet the IECC, regardless of climate zone.

Single Wythe Concrete Masonry Assemblies

Single wythe concrete masonry assemblies are often constructed of hollow units with cells filled with insulation

and/or grout. Hence, single wythe assemblies allow insulation and reinforcement to be used to increase thermal and structural performance, respectively, without increasing the wall thickness.

Masonry cell insulation is typically molded polystyrene inserts, foamed-in-place insulation, or, less frequently, expanded perlite or vermiculite granular fills. The thermal resistance of the concrete masonry webs and any grouted cells are accounted for when determining the assembly R-values. When using cell insulation, the insulation should occupy all ungrouted cell spaces (although some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell).

Single wythe construction also provides the options of installing insulation on either the exterior or interior of the masonry. The insulation may be rigid board (extruded or expanded polystyrene or polyisocyanurate), closed-cell spray polyurethane foam, cellular glass, fibrous batt, or fibrous blown-in insulation (note, however, that fibrous insulation is susceptible to moisture).

When an interior finish is included in the following tables, that finish is assumed to be 1/2 in. gypsum wallboard on steel or wood furring. Other interior finish materials are available, including paneling, plaster and adhered masonry veneer, among others.

Changing the interior finish materials does not typically change the overall assembly R-value significantly, unless the finish material itself is insulative. For finish materials installed on furring, such as wood paneling, the R-value tables for gypsum wallboard on furring can be used as a very close approximation. For interior finishes applied directly to the concrete masonry, such as an adhered masonry veneer or plaster, R-values of assemblies without an interior finish should be used.

When using interior or exterior insulation, concrete masonry can accommodate both vertical and horizontal reinforcement with partial or full grouting without interrupting the insulation layer.

Exterior-insulated masonry assemblies provide a continuous exterior insulation layer that envelopes the masonry, minimizing the effect of thermal bridges. This also places the thermal mass inside the insulation layer, keeping the masonry directly in contact with the interior conditioned air and maximizing the thermal mass benefit.

Exterior insulation can also reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed. Exterior insulation, however, negates the aesthetic advantage of exposed masonry. In addition, the insulation requires a protective finish to maintain the durability, integrity, and effectiveness of the insulation.

When concrete masonry is used as infill in a structural concrete or steel frame, the R-value of the concrete masonry portion of the wall may be obtained from the following tables. This is then combined with the thermal performance of the framing material to determine the overall wall R-value or U-factor.

Concrete Masonry Multi-wythe Assemblies

Multi-wythe concrete masonry construction lends itself to placing insulation between two wythes of masonry when the wythes are separated to form a cavity.

Placing insulation between two wythes of masonry offers maximum protection for the insulation while allowing a vast amount of the thermal mass to be exposed to the conditioned interior to help moderate temperatures. The means to meet or exceed energy code requirements are easily obtainable, because the cavity installation allows a continuous layer of insulation to envelop the masonry. When properly sealed, this continuous insulation layer can also increase energy efficiency by mitigating air infiltration/exfiltration.

Cavity construction, as well as single wythe masonry with cell insulation, provides hard, durable surfaces on both sides of the assembly, efficiently utilizing the inherent impact resistance and low maintenance needs of concrete masonry. While these needs are most commonly associated with multi-family dwellings, hospitals, schools and detention centers, the benefits of resistance to damage from hail, shopping and loading carts, gurneys, motorized chairs, and even sports make cavity construction ideal for any application.

The term cavity insulation, which in some codes refers to the insulation between studs in lightweight framing systems, should not be confused with the long established term: “masonry cavity wall.” Masonry cavity assemblies are comprised of at least two wythes of masonry separated by a continuous airspace (cavity).

Under current building code requirements a 1 in. clear airspace between the insulation and the outer wythe is required (2 in. is preferred) to help ensure free water drainage (ref. 7). Cavity assemblies are typically designed and detailed using actual out-to-out dimensions. Thus, a 14-in. cavity wall with a nominal 4-in. exterior wythe and 8-in. backup wythe has a nominal cavity width of $2^{3}/_{4}$ in., allowing for $1^{3}/_{4}$ in. of rigid board insulation.

Typical cavity assemblies are constructed with a 6, 8, 10 or 12 in. concrete masonry backup wythe, a 2 to $4^{1}/_{2}$ in. wide cavity, and a 4-in. masonry veneer. By reference to Specification for Masonry Structures (ref. 8), the International Building Code (ref. 9) prescriptively allows cavity widths up to $4^{1}/_{2}$ in., beyond which a detailed wall tie analysis must be performed.

As with single wythe assemblies, changing the interior finish materials of a multi-wythe assembly does not typically change the overall assembly R-value significantly, unless the finish material itself is insulative. For cavity assemblies with interior-side finish materials installed on furring, such as wood paneling, the R-values for Assembly 10 of each section can be used as a very close approximation. For finishes applied directly to the interior concrete masonry, such as an adhered masonry veneer or plaster, R-values could be used from Assembly 9 of each section.

SECTION ONE
3-WEB CMU ASSEMBLIES

Section One of the Thermal Catalog provides calculated R-values and U-factors for various assemblies using concrete masonry units with three webs. These units are configured to meet the minimum section properties historically required by ASTM C90 prior to the 2011b version of this standard. The table below shows the relevant configuration of the units used as the basis for this section.

Nominal Width	Specified Width	Specified Height[1]	Specified Length[1]	Face Shell Thickness	Number of Face Shells	Web Thickness	Number of Webs
6-in.	5.625	7.625	15.625	1.00	2	1.000	3
8-in.	7.625	7.625	15.625	1.25	2	1.000	3
10-in.	9.625	7.625	15.625	1.25	2	1.125	3
12-in.	11.625	7.625	15.625	1.25	2	1.125	3

[1] Specified height and length provided for reference. Actual calculations apply to assemblies with other heights and lengths, such as half-high units.
*Certain configurations may not be available in local markets. Producers should be consulted for availability of desired unit configurations.

Figure 1.1 shows a diagram of a typical Section One single-wythe assembly, with one face shell removed to show the number of webs (and therefore thermal shorts) from one side of the assembly to the other.

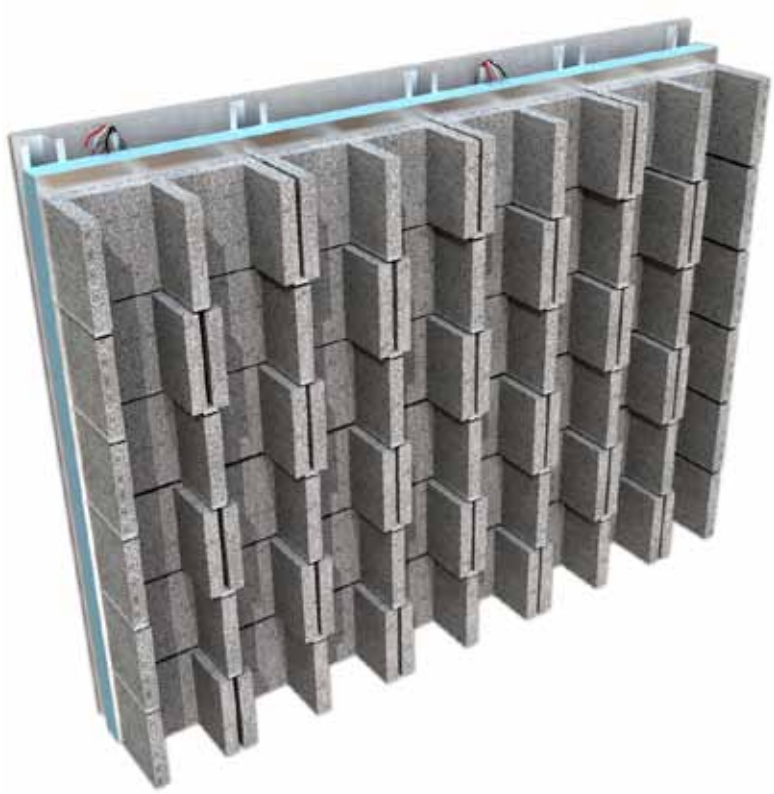
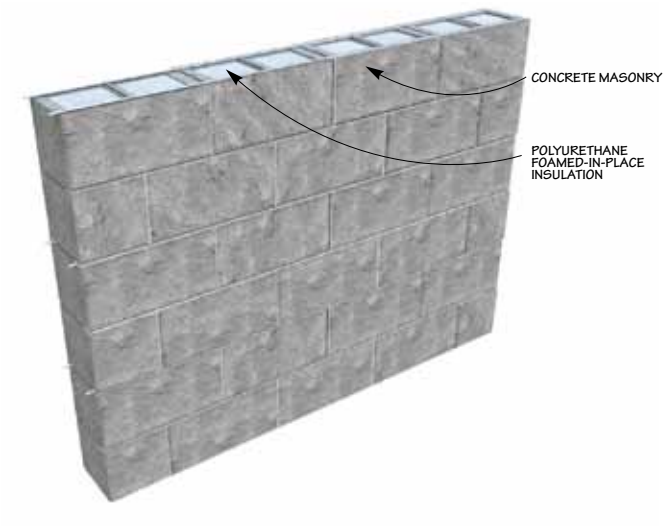


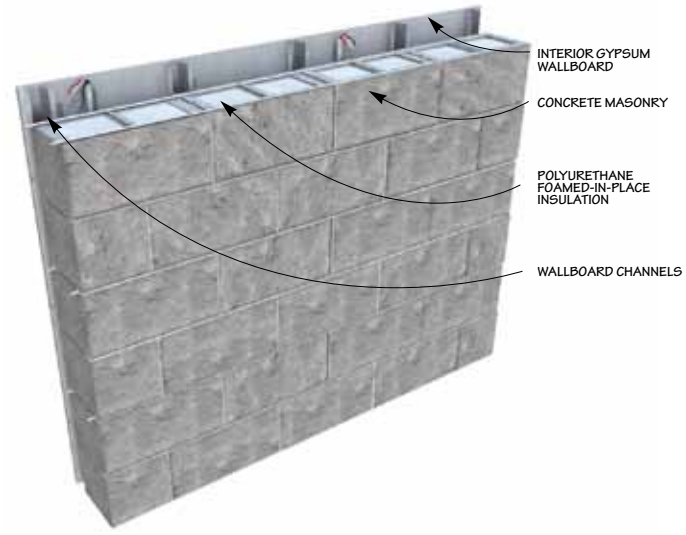
Figure 1.1:
3-web wall-section cut-away illustrating interior web configuation

Assembly 1-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior)



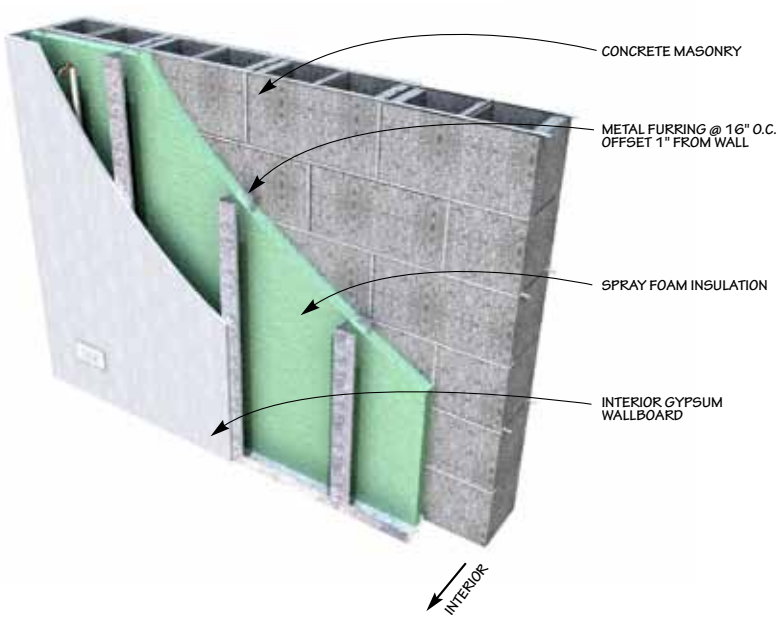
- Masonry exposed on both the interior and exterior provides maximum durability.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulations and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 1-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior



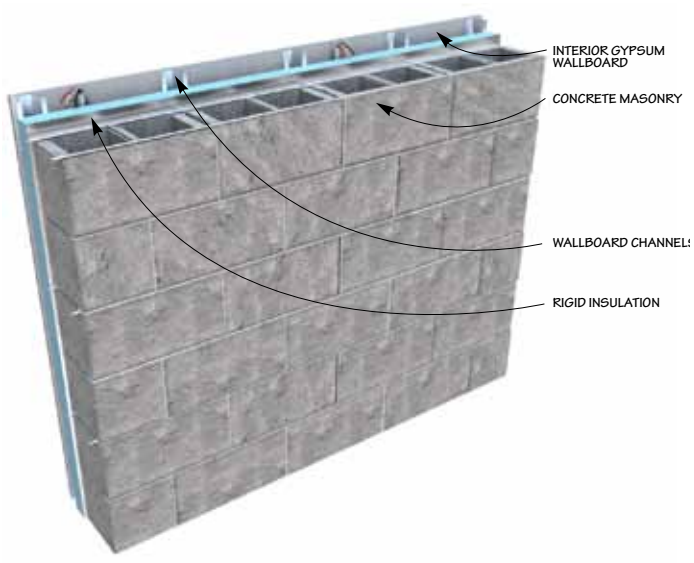
- Interior furring allows for electrical rough-in.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulation, and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 1-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

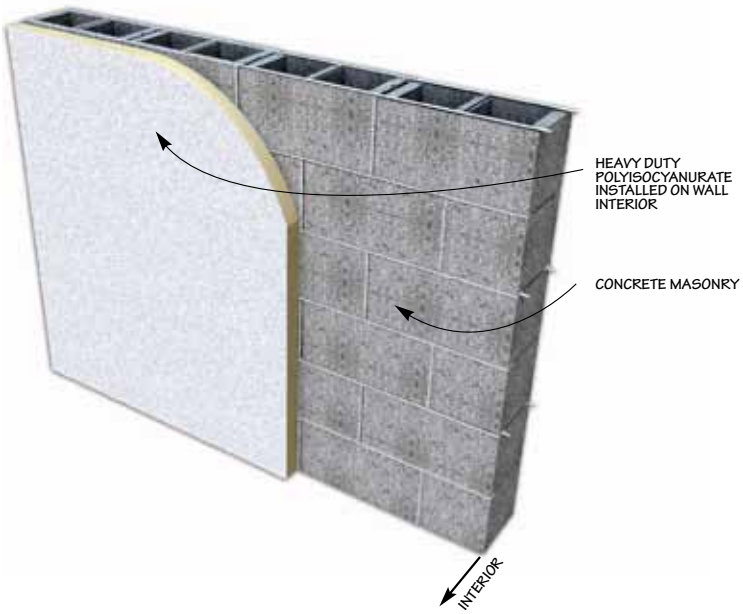
Assembly 1-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

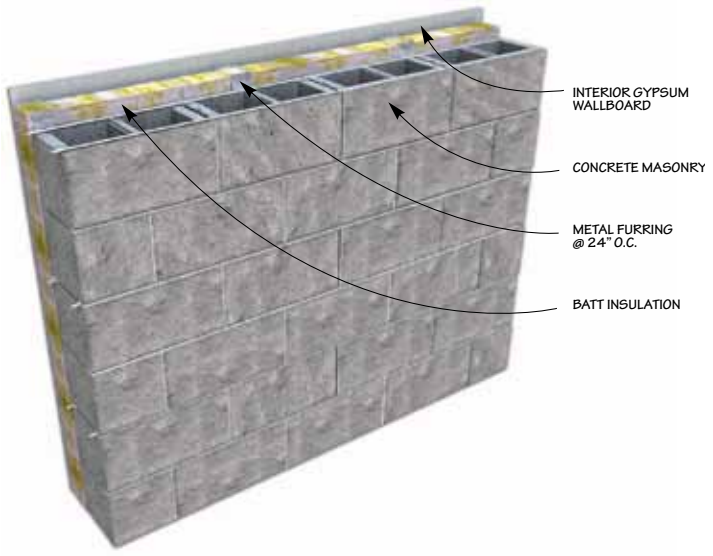
Assembly 1-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

- Joints of the HD polyisocyanurate must be butt-caulked or taped.
- Several types of HD polyisocyanurate are available with various amounts of impact resistance.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

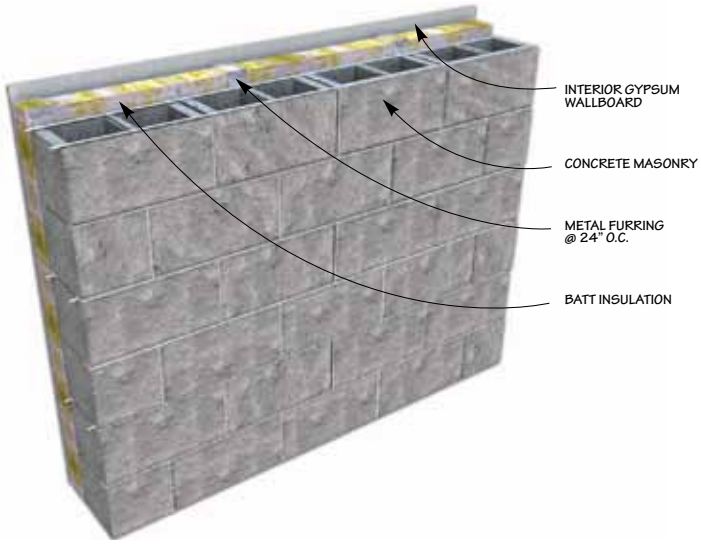


Assembly 1-6: Metal furring at 24 in. o.c. with batt insulation between furring and $^1/_2$ in. gypsum wallboard on interior, exposed exterior masonry

- Note: batt insulation is susceptible to moisture.
- Steel penetrations through insulation significantly affect the thermal resistance by conducting heat from one side of the insulation to the other.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

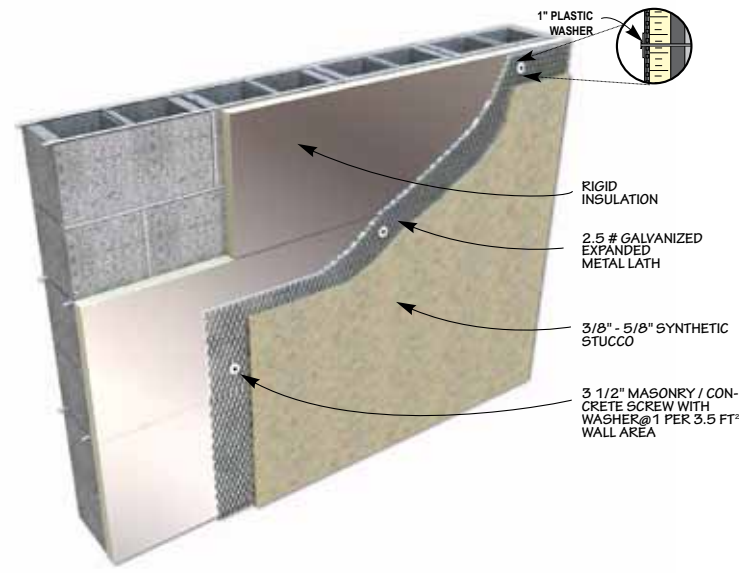


Assembly 1-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



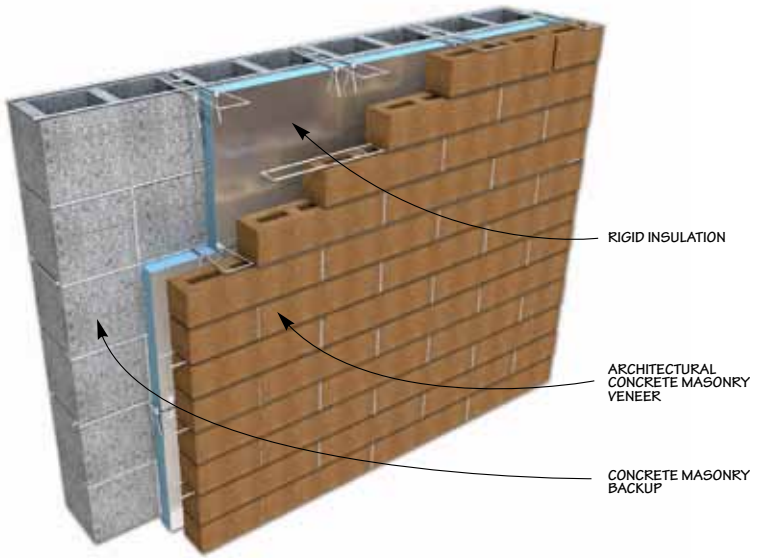
- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- R-values for assemblies with extruded polystyrene insulation include a nonreflective air space.
- Note that batt insulation is susceptible to moisture.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 1-8: Continuous exterior insulation and finish system, exposed interior masonry



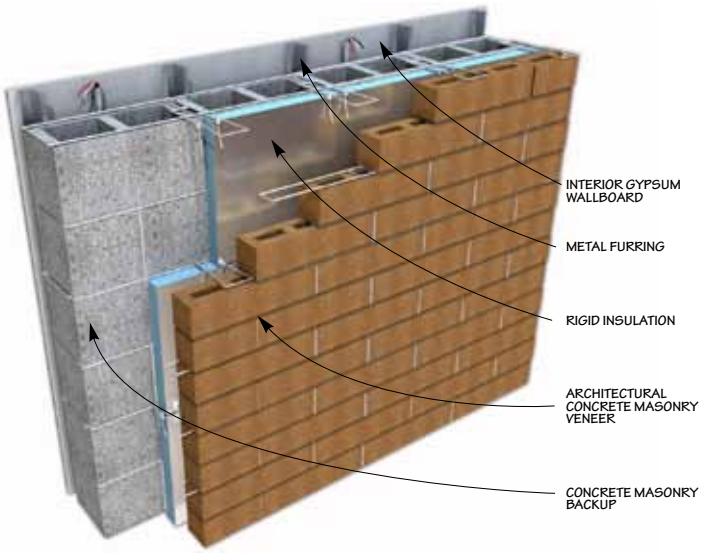
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Exterior insulation negates the aesthetic and durability advantages of exposed masonry.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 1-9: Continuous insulation in cavity, 4-in. concrete masonry veneer

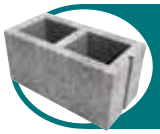


- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed-cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Masonry exposed on both the interior and exterior provides maximum durability.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

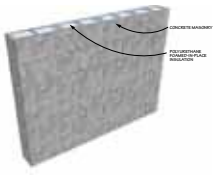
Assembly 1-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring



- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Interior furring allows for electrical rough-in.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
CELL INSULATION



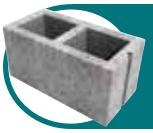
Assembly 1-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior) *

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

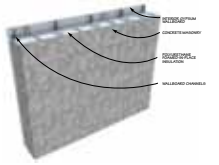
Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	6.38 (0.157)	4.45 (0.225)	3.29 (0.304)	1.80 (0.555)	8.58 (0.117)	5.63 (0.177)	4.01 (0.249)	2.11 (0.475)
95	5.54 (0.181)	4.01 (0.249)	3.03 (0.330)	1.71 (0.584)	7.40 (0.135)	5.07 (0.197)	3.70 (0.270)	2.00 (0.501)
105	4.80 (0.208)	3.61 (0.277)	2.80 (0.358)	1.63 (0.612)	6.38 (0.157)	4.55 (0.220)	3.40 (0.294)	1.90 (0.527)
115	4.17 (0.240)	3.25 (0.308)	2.58 (0.388)	1.56 (0.639)	5.49 (0.182)	4.08 (0.245)	3.13 (0.319)	1.81 (0.553)
125	3.63 (0.276)	2.92 (0.342)	2.38 (0.420)	1.50 (0.666)	4.73 (0.211)	3.65 (0.274)	2.88 (0.347)	1.73 (0.579)
135	3.16 (0.316)	2.63 (0.380)	2.20 (0.455)	1.45 (0.692)	4.08 (0.245)	3.27 (0.306)	2.65 (0.378)	1.66 (0.604)

Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	10.47 (0.095)	6.60 (0.152)	4.60 (0.218)	2.35 (0.425)	12.99 (0.077)	7.71 (0.130)	5.22 (0.192)	2.58 (0.387)
95	8.98 (0.111)	5.94 (0.168)	4.24 (0.236)	2.23 (0.447)	11.10 (0.090)	6.96 (0.144)	4.83 (0.207)	2.46 (0.406)
105	7.69 (0.130)	5.32 (0.188)	3.91 (0.256)	2.13 (0.470)	9.47 (0.106)	6.26 (0.160)	4.47 (0.224)	2.35 (0.425)
115	6.57 (0.152)	4.76 (0.210)	3.60 (0.278)	2.03 (0.492)	8.07 (0.124)	5.61 (0.178)	4.13 (0.242)	2.25 (0.444)
125	5.62 (0.178)	4.26 (0.235)	3.31 (0.302)	1.95 (0.514)	6.87 (0.146)	5.01 (0.200)	3.80 (0.263)	2.16 (0.463)
135	4.82 (0.208)	3.80 (0.263)	3.04 (0.329)	1.86 (0.537)	5.86 (0.171)	4.47 (0.224)	3.49 (0.286)	2.07 (0.483)

*Assembly details page 11.



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
CELL INSULATION



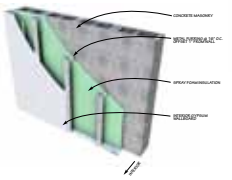
Assembly 1-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	7.48 (0.134)	5.55 (0.180)	4.39 (0.228)	2.90 (0.345)	9.68 (0.103)	6.73 (0.148)	5.11 (0.196)	3.21 (0.312)
95	6.64 (0.151)	5.11 (0.196)	4.13 (0.242)	2.81 (0.356)	8.50 (0.118)	6.17 (0.162)	4.80 (0.208)	3.10 (0.323)
105	5.90 (0.169)	4.71 (0.212)	3.90 (0.257)	2.73 (0.366)	7.48 (0.134)	5.65 (0.177)	4.50 (0.222)	3.00 (0.334)
115	5.27 (0.190)	4.35 (0.230)	3.68 (0.272)	2.66 (0.375)	6.59 (0.152)	5.18 (0.193)	4.23 (0.236)	2.91 (0.344)
125	4.73 (0.212)	4.02 (0.249)	3.48 (0.287)	2.60 (0.384)	5.83 (0.172)	4.75 (0.210)	3.98 (0.251)	2.83 (0.354)
135	4.26 (0.235)	3.73 (0.268)	3.30 (0.303)	2.55 (0.393)	5.18 (0.193)	4.37 (0.229)	3.75 (0.267)	2.76 (0.363)

Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	11.57 (0.086)	7.70 (0.130)	5.70 (0.176)	3.45 (0.290)	14.09 (0.071)	8.81 (0.113)	6.32 (0.158)	3.68 (0.271)
95	10.08 (0.099)	7.04 (0.142)	5.34 (0.187)	3.33 (0.300)	12.20 (0.082)	8.06 (0.124)	5.93 (0.168)	3.56 (0.281)
105	8.79 (0.114)	6.42 (0.156)	5.01 (0.200)	3.23 (0.310)	10.57 (0.095)	7.36 (0.136)	5.57 (0.179)	3.45 (0.289)
115	7.67 (0.130)	5.86 (0.171)	4.70 (0.213)	3.13 (0.319)	9.17 (0.109)	6.71 (0.149)	5.23 (0.191)	3.35 (0.298)
125	6.72 (0.149)	5.36 (0.187)	4.41 (0.227)	3.05 (0.328)	7.97 (0.125)	6.11 (0.164)	4.90 (0.204)	3.26 (0.307)
135	5.92 (0.169)	4.90 (0.204)	4.14 (0.242)	2.96 (0.337)	6.96 (0.144)	5.57 (0.180)	4.59 (0.218)	3.17 (0.315)

*Assembly details page 11.



Assembly 1-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.07 (0.076)	12.95 (0.077)	12.82 (0.078)	12.50 (0.080)	13.26 (0.075)	13.17 (0.076)	13.07 (0.077)	12.81 (0.078)
	95	12.96 (0.077)	12.84 (0.078)	12.72 (0.079)	12.41 (0.081)	13.13 (0.076)	13.04 (0.077)	12.95 (0.077)	12.70 (0.079)
	105	12.85 (0.078)	12.74 (0.078)	12.63 (0.079)	12.33 (0.081)	13.01 (0.077)	12.93 (0.077)	12.84 (0.078)	12.60 (0.079)
	115	12.75 (0.078)	12.64 (0.079)	12.54 (0.080)	12.26 (0.082)	12.90 (0.078)	12.82 (0.078)	12.73 (0.079)	12.51 (0.080)
	125	12.65 (0.079)	12.55 (0.080)	12.45 (0.080)	12.20 (0.082)	12.79 (0.078)	12.72 (0.079)	12.64 (0.079)	12.43 (0.080)
	135	12.55 (0.080)	12.47 (0.080)	12.38 (0.081)	12.15 (0.082)	12.69 (0.079)	12.63 (0.079)	12.55 (0.080)	12.36 (0.081)
2 in.	85	14.27 (0.070)	14.15 (0.071)	14.02 (0.071)	13.70 (0.073)	14.46 (0.069)	14.37 (0.070)	14.27 (0.070)	14.01 (0.071)
	95	14.16 (0.071)	14.04 (0.071)	13.92 (0.072)	13.61 (0.073)	14.33 (0.070)	14.24 (0.070)	14.15 (0.071)	13.90 (0.072)
	105	14.05 (0.071)	13.94 (0.072)	13.83 (0.072)	13.53 (0.074)	14.21 (0.070)	14.13 (0.071)	14.04 (0.071)	13.80 (0.072)
	115	13.95 (0.072)	13.84 (0.072)	13.74 (0.073)	13.46 (0.074)	14.10 (0.071)	14.02 (0.071)	13.93 (0.072)	13.71 (0.073)
	125	13.85 (0.072)	13.75 (0.073)	13.65 (0.073)	13.40 (0.075)	13.99 (0.071)	13.92 (0.072)	13.84 (0.072)	13.63 (0.073)
	135	13.75 (0.073)	13.67 (0.073)	13.58 (0.074)	13.35 (0.075)	13.89 (0.072)	13.83 (0.072)	13.75 (0.073)	13.56 (0.074)
3 in.	85	14.87 (0.067)	14.75 (0.068)	14.62 (0.068)	14.30 (0.070)	15.06 (0.066)	14.97 (0.067)	14.87 (0.067)	14.61 (0.068)
	95	14.76 (0.068)	14.64 (0.068)	14.52 (0.069)	14.21 (0.070)	14.93 (0.067)	14.84 (0.067)	14.75 (0.068)	14.50 (0.069)
	105	14.65 (0.068)	14.54 (0.069)	14.43 (0.069)	14.13 (0.071)	14.81 (0.068)	14.73 (0.068)	14.64 (0.068)	14.40 (0.069)
	115	14.55 (0.069)	14.44 (0.069)	14.34 (0.070)	14.06 (0.071)	14.70 (0.068)	14.62 (0.068)	14.53 (0.069)	14.31 (0.070)
	125	14.45 (0.069)	14.35 (0.070)	14.25 (0.070)	14.00 (0.071)	14.59 (0.069)	14.52 (0.069)	14.44 (0.069)	14.23 (0.070)
	135	14.35 (0.070)	14.27 (0.070)	14.18 (0.071)	13.95 (0.072)	14.49 (0.069)	14.43 (0.069)	14.35 (0.070)	14.16 (0.071)
3 1/2 in.	85	15.07 (0.066)	14.95 (0.067)	14.82 (0.067)	14.50 (0.069)	15.26 (0.066)	15.17 (0.066)	15.07 (0.066)	14.81 (0.068)
	95	14.96 (0.067)	14.84 (0.067)	14.72 (0.068)	14.41 (0.069)	15.13 (0.066)	15.04 (0.066)	14.95 (0.067)	14.70 (0.068)
	105	14.85 (0.067)	14.74 (0.068)	14.63 (0.068)	14.33 (0.070)	15.01 (0.067)	14.93 (0.067)	14.84 (0.067)	14.60 (0.069)
	115	14.75 (0.068)	14.64 (0.068)	14.54 (0.069)	14.26 (0.070)	14.90 (0.067)	14.82 (0.067)	14.73 (0.068)	14.51 (0.069)
	125	14.65 (0.068)	14.55 (0.069)	14.45 (0.069)	14.20 (0.070)	14.79 (0.068)	14.72 (0.068)	14.64 (0.068)	14.43 (0.069)
	135	14.55 (0.069)	14.47 (0.069)	14.38 (0.070)	14.15 (0.071)	14.69 (0.068)	14.63 (0.068)	14.55 (0.069)	14.36 (0.070)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.31 (0.075)	13.26 (0.075)	13.21 (0.076)	13.05 (0.077)	13.33 (0.075)	13.32 (0.075)	13.31 (0.075)	13.28 (0.075)
	95	13.18 (0.076)	13.14 (0.076)	13.08 (0.076)	12.93 (0.077)	13.21 (0.076)	13.20 (0.076)	13.19 (0.076)	13.16 (0.076)
	105	13.07 (0.077)	13.02 (0.077)	12.97 (0.077)	12.83 (0.078)	13.10 (0.076)	13.09 (0.076)	13.08 (0.076)	13.05 (0.077)
	115	12.96 (0.077)	12.92 (0.077)	12.87 (0.078)	12.73 (0.079)	13.00 (0.077)	12.99 (0.077)	12.98 (0.077)	12.95 (0.077)
	125	12.85 (0.078)	12.82 (0.078)	12.77 (0.078)	12.65 (0.079)	12.90 (0.078)	12.89 (0.078)	12.88 (0.078)	12.86 (0.078)
	135	12.76 (0.078)	12.72 (0.079)	12.68 (0.079)	12.56 (0.080)	12.81 (0.078)	12.80 (0.078)	12.79 (0.078)	12.77 (0.078)
2 in.	85	14.51 (0.069)	14.46 (0.069)	14.41 (0.069)	14.25 (0.070)	14.53 (0.069)	14.52 (0.069)	14.51 (0.069)	14.48 (0.069)
	95	14.38 (0.070)	14.34 (0.070)	14.28 (0.070)	14.13 (0.071)	14.41 (0.069)	14.40 (0.069)	14.39 (0.069)	14.36 (0.070)
	105	14.27 (0.070)	14.22 (0.070)	14.17 (0.071)	14.03 (0.071)	14.30 (0.070)	14.29 (0.070)	14.28 (0.070)	14.25 (0.070)
	115	14.16 (0.071)	14.12 (0.071)	14.07 (0.071)	13.93 (0.072)	14.20 (0.070)	14.19 (0.070)	14.18 (0.071)	14.15 (0.071)
	125	14.05 (0.071)	14.02 (0.071)	13.97 (0.072)	13.85 (0.072)	14.10 (0.071)	14.09 (0.071)	14.08 (0.071)	14.06 (0.071)
	135	13.96 (0.072)	13.92 (0.072)	13.88 (0.072)	13.76 (0.073)	14.01 (0.071)	14.00 (0.071)	13.99 (0.071)	13.97 (0.072)
3 in.	85	15.11 (0.066)	15.06 (0.066)	15.01 (0.067)	14.85 (0.067)	15.13 (0.066)	15.12 (0.066)	15.11 (0.066)	15.08 (0.066)
	95	14.98 (0.067)	14.94 (0.067)	14.88 (0.067)	14.73 (0.068)	15.01 (0.067)	15.00 (0.067)	14.99 (0.067)	14.96 (0.067)
	105	14.87 (0.067)	14.82 (0.067)	14.77 (0.068)	14.63 (0.068)	14.90 (0.067)	14.89 (0.067)	14.88 (0.067)	14.85 (0.067)
	115	14.76 (0.068)	14.72 (0.068)	14.67 (0.068)	14.53 (0.069)	14.80 (0.068)	14.79 (0.068)	14.78 (0.068)	14.75 (0.068)
	125	14.65 (0.068)	14.62 (0.068)	14.57 (0.069)	14.45 (0.069)	14.70 (0.068)	14.69 (0.068)	14.68 (0.068)	14.66 (0.068)
	135	14.56 (0.069)	14.52 (0.069)	14.48 (0.069)	14.36 (0.070)	14.61 (0.068)	14.60 (0.068)	14.59 (0.069)	14.57 (0.069)
3 1/2 in.	85	15.31 (0.065)	15.26 (0.066)	15.21 (0.066)	15.05 (0.066)	15.33 (0.065)	15.32 (0.065)	15.31 (0.065)	15.28 (0.065)
	95	15.18 (0.066)	15.14 (0.066)	15.08 (0.066)	14.93 (0.067)	15.21 (0.066)	15.20 (0.066)	15.19 (0.066)	15.16 (0.066)
	105	15.07 (0.066)	15.02 (0.067)	14.97 (0.067)	14.83 (0.067)	15.10 (0.066)	15.09 (0.066)	15.08 (0.066)	15.05 (0.066)
	115	14.96 (0.067)	14.92 (0.067)	14.87 (0.067)	14.73 (0.068)	15.00 (0.067)	14.99 (0.067)	14.98 (0.067)	14.95 (0.067)
	125	14.85 (0.067)	14.82 (0.067)	14.77 (0.068)	14.65 (0.068)	14.90 (0.067)	14.89 (0.067)	14.88 (0.067)	14.86 (0.067)
	135	14.76 (0.068)	14.72 (0.068)	14.68 (0.068)	14.56 (0.069)	14.81 (0.068)	14.80 (0.068)	14.79 (0.068)	14.77 (0.068)

*Assembly details page 12.

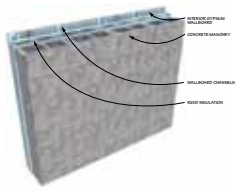
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 1-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry
(Continued on next page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.22 (0.138)	7.10 (0.141)	6.97 (0.143)	6.65 (0.150)	7.41 (0.135)	7.32 (0.137)	7.22 (0.139)	6.96 (0.144)
	95	7.11 (0.141)	6.99 (0.143)	6.87 (0.146)	6.56 (0.152)	7.28 (0.137)	7.19 (0.139)	7.10 (0.141)	6.85 (0.146)
	105	7.00 (0.143)	6.89 (0.145)	6.78 (0.148)	6.48 (0.154)	7.16 (0.140)	7.08 (0.141)	6.99 (0.143)	6.75 (0.148)
	115	6.90 (0.145)	6.79 (0.147)	6.69 (0.150)	6.41 (0.156)	7.05 (0.142)	6.97 (0.143)	6.88 (0.145)	6.66 (0.150)
	125	6.80 (0.147)	6.70 (0.149)	6.60 (0.151)	6.35 (0.157)	6.94 (0.144)	6.87 (0.146)	6.79 (0.147)	6.58 (0.152)
	135	6.70 (0.149)	6.62 (0.151)	6.53 (0.153)	6.30 (0.159)	6.84 (0.146)	6.78 (0.148)	6.70 (0.149)	6.51 (0.154)
Extruded Polystyrene, 1 in.	85	8.47 (0.118)	8.35 (0.120)	8.22 (0.122)	7.90 (0.127)	8.66 (0.116)	8.57 (0.117)	8.47 (0.118)	8.21 (0.122)
	95	8.36 (0.120)	8.24 (0.121)	8.12 (0.123)	7.81 (0.128)	8.53 (0.117)	8.44 (0.118)	8.35 (0.120)	8.10 (0.124)
	105	8.25 (0.121)	8.14 (0.123)	8.03 (0.125)	7.73 (0.129)	8.41 (0.119)	8.33 (0.120)	8.24 (0.121)	8.00 (0.125)
	115	8.15 (0.123)	8.04 (0.124)	7.94 (0.126)	7.66 (0.130)	8.30 (0.121)	8.22 (0.122)	8.13 (0.123)	7.91 (0.126)
	125	8.05 (0.124)	7.95 (0.126)	7.85 (0.127)	7.60 (0.132)	8.19 (0.122)	8.12 (0.123)	8.04 (0.124)	7.83 (0.128)
	135	7.95 (0.126)	7.87 (0.127)	7.78 (0.129)	7.55 (0.133)	8.09 (0.124)	8.03 (0.125)	7.95 (0.126)	7.76 (0.129)
Extruded Polystyrene, 1 1/2 in.	85	10.97 (0.091)	10.85 (0.092)	10.72 (0.093)	10.40 (0.096)	11.16 (0.090)	11.07 (0.090)	10.97 (0.091)	10.71 (0.093)
	95	10.86 (0.092)	10.74 (0.093)	10.62 (0.094)	10.31 (0.097)	11.03 (0.091)	10.94 (0.091)	10.85 (0.092)	10.60 (0.094)
	105	10.75 (0.093)	10.64 (0.094)	10.53 (0.095)	10.23 (0.098)	10.91 (0.092)	10.83 (0.092)	10.74 (0.093)	10.50 (0.095)
	115	10.65 (0.094)	10.54 (0.095)	10.44 (0.096)	10.16 (0.098)	10.80 (0.093)	10.72 (0.093)	10.63 (0.094)	10.41 (0.096)
	125	10.55 (0.095)	10.45 (0.096)	10.35 (0.097)	10.10 (0.099)	10.69 (0.094)	10.62 (0.094)	10.54 (0.095)	10.33 (0.097)
	135	10.45 (0.096)	10.37 (0.096)	10.28 (0.097)	10.05 (0.100)	10.59 (0.094)	10.53 (0.095)	10.45 (0.096)	10.26 (0.098)
Extruded Polystyrene, 2 in.	85	13.47 (0.074)	13.35 (0.075)	13.22 (0.076)	12.90 (0.078)	13.66 (0.073)	13.57 (0.074)	13.47 (0.074)	13.21 (0.076)
	95	13.36 (0.075)	13.24 (0.076)	13.12 (0.076)	12.81 (0.078)	13.53 (0.074)	13.44 (0.074)	13.35 (0.075)	13.10 (0.076)
	105	13.25 (0.075)	13.14 (0.076)	13.03 (0.077)	12.73 (0.079)	13.41 (0.075)	13.33 (0.075)	13.24 (0.076)	13.00 (0.077)
	115	13.15 (0.076)	13.04 (0.077)	12.94 (0.077)	12.66 (0.079)	13.30 (0.075)	13.22 (0.076)	13.13 (0.076)	12.91 (0.077)
	125	13.05 (0.077)	12.95 (0.077)	12.85 (0.078)	12.60 (0.079)	13.19 (0.076)	13.12 (0.076)	13.04 (0.077)	12.83 (0.078)
	135	12.95 (0.077)	12.87 (0.078)	12.78 (0.078)	12.55 (0.080)	13.09 (0.076)	13.03 (0.077)	12.95 (0.077)	12.76 (0.078)
Extruded Polystyrene, 2 1/2 in.	85	15.97 (0.063)	15.85 (0.063)	15.72 (0.064)	15.40 (0.065)	16.16 (0.062)	16.07 (0.062)	15.97 (0.063)	15.71 (0.064)
	95	15.86 (0.063)	15.74 (0.064)	15.62 (0.064)	15.31 (0.065)	16.03 (0.062)	15.94 (0.063)	15.85 (0.063)	15.60 (0.064)
	105	15.75 (0.063)	15.64 (0.064)	15.53 (0.064)	15.23 (0.066)	15.91 (0.063)	15.83 (0.063)	15.74 (0.064)	15.50 (0.065)
	115	15.65 (0.064)	15.54 (0.064)	15.44 (0.065)	15.16 (0.066)	15.80 (0.063)	15.72 (0.064)	15.63 (0.064)	15.41 (0.065)
	125	15.55 (0.064)	15.45 (0.065)	15.35 (0.065)	15.10 (0.066)	15.69 (0.064)	15.62 (0.064)	15.54 (0.064)	15.33 (0.065)
	135	15.45 (0.065)	15.37 (0.065)	15.28 (0.065)	15.05 (0.066)	15.59 (0.064)	15.53 (0.064)	15.45 (0.065)	15.26 (0.066)
Extruded Polystyrene, 3 in.	85	18.47 (0.054)	18.35 (0.054)	18.22 (0.055)	17.90 (0.056)	18.66 (0.054)	18.57 (0.054)	18.47 (0.054)	18.21 (0.055)
	95	18.36 (0.054)	18.24 (0.055)	18.12 (0.055)	17.81 (0.056)	18.53 (0.054)	18.44 (0.054)	18.35 (0.055)	18.10 (0.055)
	105	18.25 (0.055)	18.14 (0.055)	18.03 (0.055)	17.73 (0.056)	18.41 (0.054)	18.33 (0.055)	18.24 (0.055)	18.00 (0.056)
	115	18.15 (0.055)	18.04 (0.055)	17.94 (0.056)	17.66 (0.057)	18.30 (0.055)	18.22 (0.055)	18.13 (0.055)	17.91 (0.056)
	125	18.05 (0.055)	17.95 (0.056)	17.85 (0.056)	17.60 (0.057)	18.19 (0.055)	18.12 (0.055)	18.04 (0.055)	17.83 (0.056)
	135	17.95 (0.056)	17.87 (0.056)	17.78 (0.056)	17.55 (0.057)	18.09 (0.055)	18.03 (0.055)	17.95 (0.056)	17.76 (0.056)

*Assembly details page 12.



Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.46 (0.134)	7.41 (0.135)	7.36 (0.136)	7.20 (0.139)	7.48 (0.134)	7.47 (0.134)	7.46 (0.134)	7.43 (0.135)
	95	7.33 (0.136)	7.29 (0.137)	7.23 (0.138)	7.08 (0.141)	7.36 (0.136)	7.35 (0.136)	7.34 (0.136)	7.31 (0.137)
	105	7.22 (0.139)	7.17 (0.139)	7.12 (0.140)	6.98 (0.143)	7.25 (0.138)	7.24 (0.138)	7.23 (0.138)	7.20 (0.139)
	115	7.11 (0.141)	7.07 (0.142)	7.02 (0.142)	6.88 (0.145)	7.15 (0.140)	7.14 (0.140)	7.13 (0.140)	7.10 (0.141)
	125	7.00 (0.143)	6.97 (0.144)	6.92 (0.144)	6.80 (0.147)	7.05 (0.142)	7.04 (0.142)	7.03 (0.142)	7.01 (0.143)
	135	6.91 (0.145)	6.87 (0.146)	6.83 (0.146)	6.71 (0.149)	6.96 (0.144)	6.95 (0.144)	6.94 (0.144)	6.92 (0.144)
Extruded Polystyrene, 1 in.	85	8.71 (0.115)	8.66 (0.115)	8.61 (0.116)	8.45 (0.118)	8.73 (0.115)	8.72 (0.115)	8.71 (0.115)	8.68 (0.115)
	95	8.58 (0.117)	8.54 (0.117)	8.48 (0.118)	8.33 (0.120)	8.61 (0.116)	8.60 (0.116)	8.59 (0.116)	8.56 (0.117)
	105	8.47 (0.118)	8.42 (0.119)	8.37 (0.119)	8.23 (0.122)	8.50 (0.118)	8.49 (0.118)	8.48 (0.118)	8.45 (0.118)
	115	8.36 (0.120)	8.32 (0.120)	8.27 (0.121)	8.13 (0.123)	8.40 (0.119)	8.39 (0.119)	8.38 (0.119)	8.35 (0.120)
	125	8.25 (0.121)	8.22 (0.122)	8.17 (0.122)	8.05 (0.124)	8.30 (0.120)	8.29 (0.121)	8.28 (0.121)	8.26 (0.121)
	135	8.16 (0.123)	8.12 (0.123)	8.08 (0.124)	7.96 (0.126)	8.21 (0.122)	8.20 (0.122)	8.19 (0.122)	8.17 (0.122)
Extruded Polystyrene, 1 1/2 in.	85	11.21 (0.089)	11.16 (0.090)	11.11 (0.090)	10.95 (0.091)	11.23 (0.089)	11.22 (0.089)	11.21 (0.089)	11.18 (0.089)
	95	11.08 (0.090)	11.04 (0.091)	10.98 (0.091)	10.83 (0.092)	11.11 (0.090)	11.10 (0.090)	11.09 (0.090)	11.06 (0.090)
	105	10.97 (0.091)	10.92 (0.092)	10.87 (0.092)	10.73 (0.093)	11.00 (0.091)	10.99 (0.091)	10.98 (0.091)	10.95 (0.091)
	115	10.86 (0.092)	10.82 (0.092)	10.77 (0.093)	10.63 (0.094)	10.90 (0.092)	10.89 (0.092)	10.88 (0.092)	10.85 (0.092)
	125	10.75 (0.093)	10.72 (0.093)	10.67 (0.094)	10.55 (0.095)	10.80 (0.093)	10.79 (0.093)	10.78 (0.093)	10.76 (0.093)
	135	10.66 (0.094)	10.62 (0.094)	10.58 (0.095)	10.46 (0.096)	10.71 (0.093)	10.70 (0.093)	10.69 (0.094)	10.67 (0.094)
Extruded Polystyrene, 2 in.	85	13.71 (0.073)	13.66 (0.073)	13.61 (0.073)	13.45 (0.074)	13.73 (0.073)	13.72 (0.073)	13.71 (0.073)	13.68 (0.073)
	95	13.58 (0.074)	13.54 (0.074)	13.48 (0.074)	13.33 (0.075)	13.61 (0.073)	13.60 (0.074)	13.59 (0.074)	13.56 (0.074)
	105	13.47 (0.074)	13.42 (0.075)	13.37 (0.075)	13.23 (0.076)	13.50 (0.074)	13.49 (0.074)	13.48 (0.074)	13.45 (0.074)
	115	13.36 (0.075)	13.32 (0.075)	13.27 (0.075)	13.13 (0.076)	13.40 (0.075)	13.39 (0.075)	13.38 (0.075)	13.35 (0.075)
	125	13.25 (0.075)	13.22 (0.076)	13.17 (0.076)	13.05 (0.077)	13.30 (0.075)	13.29 (0.075)	13.28 (0.075)	13.26 (0.075)
	135	13.16 (0.076)	13.12 (0.076)	13.08 (0.076)	12.96 (0.077)	13.21 (0.076)	13.20 (0.076)	13.19 (0.076)	13.17 (0.076)
Extruded Polystyrene, 2 1/2 in.	85	16.21 (0.062)	16.16 (0.062)	16.11 (0.062)	15.95 (0.063)	16.23 (0.062)	16.22 (0.062)	16.21 (0.062)	16.18 (0.062)
	95	16.08 (0.062)	16.04 (0.062)	15.98 (0.063)	15.83 (0.063)	16.11 (0.062)	16.10 (0.062)	16.09 (0.062)	16.06 (0.062)
	105	15.97 (0.063)	15.92 (0.063)	15.87 (0.063)	15.73 (0.064)	16.00 (0.063)	15.99 (0.063)	15.98 (0.063)	15.95 (0.063)
	115	15.86 (0.063)	15.82 (0.063)	15.77 (0.063)	15.63 (0.064)	15.90 (0.063)	15.89 (0.063)	15.88 (0.063)	15.85 (0.063)
	125	15.75 (0.063)	15.72 (0.064)	15.67 (0.064)	15.55 (0.064)	15.80 (0.063)	15.79 (0.063)	15.78 (0.063)	15.76 (0.063)
	135	15.66 (0.064)	15.62 (0.064)	15.58 (0.064)	15.46 (0.065)	15.71 (0.064)	15.70 (0.064)	15.69 (0.064)	15.67 (0.064)
Extruded Polystyrene, 3 in.	85	18.71 (0.053)	18.66 (0.054)	18.61 (0.054)	18.45 (0.054)	18.73 (0.053)	18.72 (0.053)	18.71 (0.053)	18.68 (0.054)
	95	18.58 (0.054)	18.54 (0.054)	18.48 (0.054)	18.33 (0.055)	18.61 (0.054)	18.60 (0.054)	18.59 (0.054)	18.56 (0.054)
	105	18.47 (0.054)	18.42 (0.054)	18.37 (0.054)	18.23 (0.055)	18.50 (0.054)	18.49 (0.054)	18.48 (0.054)	18.45 (0.054)
	115	18.36 (0.054)	18.32 (0.055)	18.27 (0.055)	18.13 (0.055)	18.40 (0.054)	18.39 (0.054)	18.38 (0.054)	18.35 (0.054)
	125	18.25 (0.055)	18.22 (0.055)	18.17 (0.055)	18.05 (0.055)	18.30 (0.055)	18.29 (0.055)	18.28 (0.055)	18.26 (0.055)
	135	18.16 (0.055)	18.12 (0.055)	18.08 (0.055)	17.96 (0.056)	18.21 (0.055)	18.20 (0.055)	18.19 (0.055)	18.17 (0.055)

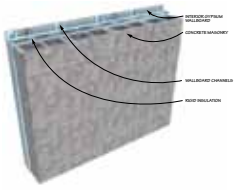
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 1-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry
(Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

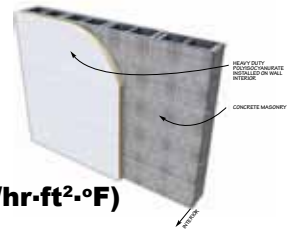
Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.73 (0.103)	9.61 (0.104)	9.48 (0.105)	9.16 (0.109)	9.91 (0.101)	9.82 (0.102)	9.72 (0.103)	9.46 (0.106)
	95	9.61 (0.104)	9.50 (0.105)	9.38 (0.107)	9.07 (0.110)	9.78 (0.102)	9.70 (0.103)	9.60 (0.104)	9.35 (0.107)
	105	9.50 (0.105)	9.40 (0.106)	9.28 (0.108)	8.99 (0.111)	9.66 (0.103)	9.58 (0.104)	9.49 (0.105)	9.25 (0.108)
	115	9.40 (0.106)	9.30 (0.108)	9.19 (0.109)	8.92 (0.112)	9.55 (0.105)	9.47 (0.106)	9.39 (0.106)	9.16 (0.109)
	125	9.30 (0.108)	9.21 (0.109)	9.11 (0.110)	8.86 (0.113)	9.45 (0.106)	9.37 (0.107)	9.30 (0.108)	9.08 (0.110)
	135	9.20 (0.109)	9.12 (0.110)	9.03 (0.111)	8.80 (0.114)	9.35 (0.107)	9.28 (0.108)	9.21 (0.109)	9.01 (0.111)
Polyisocyanurate, 1 in.	85	11.40 (0.088)	11.28 (0.089)	11.15 (0.090)	10.83 (0.092)	11.59 (0.086)	11.50 (0.087)	11.40 (0.088)	11.14 (0.090)
	95	11.29 (0.089)	11.17 (0.090)	11.05 (0.090)	10.74 (0.093)	11.46 (0.087)	11.37 (0.088)	11.28 (0.089)	11.03 (0.091)
	105	11.18 (0.089)	11.07 (0.090)	10.96 (0.091)	10.66 (0.094)	11.34 (0.088)	11.26 (0.089)	11.17 (0.090)	10.93 (0.092)
	115	11.08 (0.090)	10.97 (0.091)	10.87 (0.092)	10.59 (0.094)	11.23 (0.089)	11.15 (0.090)	11.06 (0.090)	10.84 (0.092)
	125	10.98 (0.091)	10.88 (0.092)	10.78 (0.093)	10.53 (0.095)	11.12 (0.090)	11.05 (0.091)	10.97 (0.091)	10.76 (0.093)
	135	10.88 (0.092)	10.80 (0.093)	10.71 (0.093)	10.48 (0.095)	11.02 (0.091)	10.96 (0.091)	10.88 (0.092)	10.69 (0.094)
Polyisocyanurate, 1 1/2 in.	85	15.20 (0.066)	15.08 (0.066)	14.95 (0.067)	14.63 (0.068)	15.39 (0.065)	15.30 (0.065)	15.20 (0.066)	14.94 (0.067)
	95	15.09 (0.066)	14.97 (0.067)	14.85 (0.067)	14.54 (0.069)	15.26 (0.066)	15.17 (0.066)	15.08 (0.066)	14.83 (0.067)
	105	14.98 (0.067)	14.87 (0.067)	14.76 (0.068)	14.46 (0.069)	15.14 (0.066)	15.06 (0.066)	14.97 (0.067)	14.73 (0.068)
	115	14.88 (0.067)	14.77 (0.068)	14.67 (0.068)	14.39 (0.069)	15.03 (0.067)	14.95 (0.067)	14.86 (0.067)	14.64 (0.068)
	125	14.78 (0.068)	14.68 (0.068)	14.58 (0.069)	14.33 (0.070)	14.92 (0.067)	14.85 (0.067)	14.77 (0.068)	14.56 (0.069)
	135	14.68 (0.068)	14.60 (0.069)	14.51 (0.069)	14.28 (0.070)	14.82 (0.067)	14.76 (0.068)	14.68 (0.068)	14.49 (0.069)
Polyisocyanurate, 2 in.	85	19.10 (0.052)	18.98 (0.053)	18.85 (0.053)	18.53 (0.054)	19.29 (0.052)	19.20 (0.052)	19.10 (0.052)	18.84 (0.053)
	95	18.99 (0.053)	18.87 (0.053)	18.75 (0.053)	18.44 (0.054)	19.16 (0.052)	19.07 (0.052)	18.98 (0.053)	18.73 (0.053)
	105	18.88 (0.053)	18.77 (0.053)	18.66 (0.054)	18.36 (0.054)	19.04 (0.053)	18.96 (0.053)	18.87 (0.053)	18.63 (0.054)
	115	18.78 (0.053)	18.67 (0.054)	18.57 (0.054)	18.29 (0.055)	18.93 (0.053)	18.85 (0.053)	18.76 (0.053)	18.54 (0.054)
	125	18.68 (0.054)	18.58 (0.054)	18.48 (0.054)	18.23 (0.055)	18.82 (0.053)	18.75 (0.053)	18.67 (0.054)	18.46 (0.054)
	135	18.58 (0.054)	18.50 (0.054)	18.41 (0.054)	18.18 (0.055)	18.72 (0.053)	18.66 (0.054)	18.58 (0.054)	18.39 (0.054)
Polyisocyanurate, 2 1/2 in.	85	22.50 (0.044)	22.38 (0.045)	22.25 (0.045)	21.93 (0.046)	22.69 (0.044)	22.60 (0.044)	22.50 (0.044)	22.24 (0.045)
	95	22.39 (0.045)	22.27 (0.045)	22.15 (0.045)	21.84 (0.046)	22.56 (0.044)	22.47 (0.044)	22.38 (0.045)	22.13 (0.045)
	105	22.28 (0.045)	22.17 (0.045)	22.06 (0.045)	21.76 (0.046)	22.44 (0.045)	22.36 (0.045)	22.27 (0.045)	22.03 (0.045)
	115	22.18 (0.045)	22.07 (0.045)	21.97 (0.046)	21.69 (0.046)	22.33 (0.045)	22.25 (0.045)	22.16 (0.045)	21.94 (0.046)
	125	22.08 (0.045)	21.98 (0.045)	21.88 (0.046)	21.63 (0.046)	22.22 (0.045)	22.15 (0.045)	22.07 (0.045)	21.86 (0.046)
	135	21.98 (0.045)	21.90 (0.046)	21.81 (0.046)	21.58 (0.046)	22.12 (0.045)	22.06 (0.045)	21.98 (0.045)	21.79 (0.046)
Polyisocyanurate, 3 in.	85	25.90 (0.039)	25.78 (0.039)	25.65 (0.039)	25.33 (0.039)	26.09 (0.038)	26.00 (0.038)	25.90 (0.039)	25.64 (0.039)
	95	25.79 (0.039)	25.67 (0.039)	25.55 (0.039)	25.24 (0.040)	25.96 (0.039)	25.87 (0.039)	25.78 (0.039)	25.53 (0.039)
	105	25.68 (0.039)	25.57 (0.039)	25.46 (0.039)	25.16 (0.040)	25.84 (0.039)	25.76 (0.039)	25.67 (0.039)	25.43 (0.039)
	115	25.58 (0.039)	25.47 (0.039)	25.37 (0.039)	25.09 (0.040)	25.73 (0.039)	25.65 (0.039)	25.56 (0.039)	25.34 (0.039)
	125	25.48 (0.039)	25.38 (0.039)	25.28 (0.040)	25.03 (0.040)	25.62 (0.039)	25.55 (0.039)	25.47 (0.039)	25.26 (0.040)
	135	25.38 (0.039)	25.30 (0.040)	25.21 (0.040)	24.98 (0.040)	25.52 (0.039)	25.46 (0.039)	25.38 (0.039)	25.19 (0.040)

*Assembly details page 12.



Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.96 (0.100)	9.92 (0.101)	9.86 (0.101)	9.71 (0.103)	9.99 (0.100)	9.98 (0.100)	9.97 (0.100)	9.94 (0.101)
	95	9.84 (0.102)	9.79 (0.102)	9.74 (0.103)	9.59 (0.104)	9.87 (0.101)	9.86 (0.101)	9.85 (0.102)	9.82 (0.102)
	105	9.72 (0.103)	9.68 (0.103)	9.63 (0.104)	9.48 (0.105)	9.75 (0.103)	9.75 (0.103)	9.74 (0.103)	9.71 (0.103)
	115	9.61 (0.104)	9.57 (0.104)	9.52 (0.105)	9.39 (0.107)	9.65 (0.104)	9.64 (0.104)	9.63 (0.104)	9.61 (0.104)
	125	9.51 (0.105)	9.47 (0.106)	9.43 (0.106)	9.30 (0.108)	9.55 (0.105)	9.55 (0.105)	9.54 (0.105)	9.51 (0.105)
	135	9.41 (0.106)	9.38 (0.107)	9.34 (0.107)	9.22 (0.108)	9.46 (0.106)	9.46 (0.106)	9.45 (0.106)	9.43 (0.106)
Polyisocyanurate, 1 in.	85	11.64 (0.086)	11.59 (0.086)	11.54 (0.087)	11.38 (0.088)	11.66 (0.086)	11.65 (0.086)	11.64 (0.086)	11.61 (0.086)
	95	11.51 (0.087)	11.47 (0.087)	11.41 (0.088)	11.26 (0.089)	11.54 (0.087)	11.53 (0.087)	11.52 (0.087)	11.49 (0.087)
	105	11.40 (0.088)	11.35 (0.088)	11.30 (0.088)	11.16 (0.090)	11.43 (0.087)	11.42 (0.088)	11.41 (0.088)	11.38 (0.088)
	115	11.29 (0.089)	11.25 (0.089)	11.20 (0.089)	11.06 (0.090)	11.33 (0.088)	11.32 (0.088)	11.31 (0.088)	11.28 (0.089)
	125	11.18 (0.089)	11.15 (0.090)	11.10 (0.090)	10.98 (0.091)	11.23 (0.089)	11.22 (0.089)	11.21 (0.089)	11.19 (0.089)
	135	11.09 (0.090)	11.05 (0.090)	11.01 (0.091)	10.89 (0.092)	11.14 (0.090)	11.13 (0.090)	11.12 (0.090)	11.10 (0.090)
Polyisocyanurate, 1 1/2 in.	85	15.44 (0.065)	15.39 (0.065)	15.34 (0.065)	15.18 (0.066)	15.46 (0.065)	15.45 (0.065)	15.44 (0.065)	15.41 (0.065)
	95	15.31 (0.065)	15.27 (0.066)	15.21 (0.066)	15.06 (0.066)	15.34 (0.065)	15.33 (0.065)	15.32 (0.065)	15.29 (0.065)
	105	15.20 (0.066)	15.15 (0.066)	15.10 (0.066)	14.96 (0.067)	15.23 (0.066)	15.22 (0.066)	15.21 (0.066)	15.18 (0.066)
	115	15.09 (0.066)	15.05 (0.066)	15.00 (0.067)	14.86 (0.067)	15.13 (0.066)	15.12 (0.066)	15.11 (0.066)	15.08 (0.066)
	125	14.98 (0.067)	14.95 (0.067)	14.90 (0.067)	14.78 (0.068)	15.03 (0.067)	15.02 (0.067)	15.01 (0.067)	14.99 (0.067)
	135	14.89 (0.067)	14.85 (0.067)	14.81 (0.068)	14.69 (0.068)	14.94 (0.067)	14.93 (0.067)	14.92 (0.067)	14.90 (0.067)
Polyisocyanurate, 2 in.	85	19.34 (0.052)	19.29 (0.052)	19.24 (0.052)	19.08 (0.052)	19.36 (0.052)	19.35 (0.052)	19.34 (0.052)	19.31 (0.052)
	95	19.21 (0.052)	19.17 (0.052)	19.11 (0.052)	18.96 (0.053)	19.24 (0.052)	19.23 (0.052)	19.22 (0.052)	19.19 (0.052)
	105	19.10 (0.052)	19.05 (0.052)	19.00 (0.053)	18.86 (0.053)	19.13 (0.052)	19.12 (0.052)	19.11 (0.052)	19.08 (0.052)
	115	18.99 (0.053)	18.95 (0.053)	18.90 (0.053)	18.76 (0.053)	19.03 (0.053)	19.02 (0.053)	19.01 (0.053)	18.98 (0.053)
	125	18.88 (0.053)	18.85 (0.053)	18.80 (0.053)	18.68 (0.054)	18.93 (0.053)	18.92 (0.053)	18.91 (0.053)	18.89 (0.053)
	135	18.79 (0.053)	18.75 (0.053)	18.71 (0.053)	18.59 (0.054)	18.84 (0.053)	18.83 (0.053)	18.82 (0.053)	18.80 (0.053)
Polyisocyanurate, 2 1/2 in.	85	22.74 (0.044)	22.69 (0.044)	22.64 (0.044)	22.48 (0.044)	22.76 (0.044)	22.75 (0.044)	22.74 (0.044)	22.71 (0.044)
	95	22.61 (0.044)	22.57 (0.044)	22.51 (0.044)	22.36 (0.045)	22.64 (0.044)	22.63 (0.044)	22.62 (0.044)	22.59 (0.044)
	105	22.50 (0.044)	22.45 (0.045)	22.40 (0.045)	22.26 (0.045)	22.53 (0.044)	22.52 (0.044)	22.51 (0.044)	22.48 (0.044)
	115	22.39 (0.045)	22.35 (0.045)	22.30 (0.045)	22.16 (0.045)	22.43 (0.045)	22.42 (0.045)	22.41 (0.045)	22.38 (0.045)
	125	22.28 (0.045)	22.25 (0.045)	22.20 (0.045)	22.08 (0.045)	22.33 (0.045)	22.32 (0.045)	22.31 (0.045)	22.29 (0.045)
	135	22.19 (0.045)	22.15 (0.045)	22.11 (0.045)	21.99 (0.045)	22.24 (0.045)	22.23 (0.045)	22.22 (0.045)	22.20 (0.045)
Polyisocyanurate, 3 in.	85	26.14 (0.038)	26.09 (0.038)	26.04 (0.038)	25.88 (0.039)	26.16 (0.038)	26.15 (0.038)	26.14 (0.038)	26.11 (0.038)
	95	26.01 (0.038)	25.97 (0.039)	25.91 (0.039)	25.76 (0.039)	26.04 (0.038)	26.03 (0.038)	26.02 (0.038)	25.99 (0.038)
	105	25.90 (0.039)	25.85 (0.039)	25.80 (0.039)	25.66 (0.039)	25.93 (0.039)	25.92 (0.039)	25.91 (0.039)	25.88 (0.039)
	115	25.79 (0.039)	25.75 (0.039)	25.70 (0.039)	25.56 (0.039)	25.83 (0.039)	25.82 (0.039)	25.81 (0.039)	25.78 (0.039)
	125	25.68 (0.039)	25.65 (0.039)	25.60 (0.039)	25.48 (0.039)	25.73 (0.039)	25.72 (0.039)	25.71 (0.039)	25.69 (0.039)
	135	25.59 (0.039)	25.55 (0.039)	25.51 (0.039)	25.39 (0.039)	25.64 (0.039)	25.63 (0.039)	25.62 (0.039)	25.60 (0.039)

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION



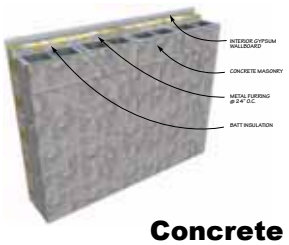
Assembly 1-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of HD polyisocyanurate:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	16.77 (0.060)	16.65 (0.060)	16.52 (0.061)	16.20 (0.062)	16.96 (0.059)	16.87 (0.059)	16.77 (0.060)	16.51 (0.061)
	95	16.66 (0.060)	16.54 (0.060)	16.42 (0.061)	16.11 (0.062)	16.83 (0.059)	16.74 (0.060)	16.65 (0.060)	16.40 (0.061)
	105	16.55 (0.060)	16.44 (0.061)	16.33 (0.061)	16.03 (0.062)	16.71 (0.060)	16.63 (0.060)	16.54 (0.060)	16.30 (0.061)
	115	16.45 (0.061)	16.34 (0.061)	16.24 (0.062)	15.96 (0.063)	16.60 (0.060)	16.52 (0.061)	16.43 (0.061)	16.21 (0.062)
	125	16.35 (0.061)	16.25 (0.062)	16.15 (0.062)	15.90 (0.063)	16.49 (0.061)	16.42 (0.061)	16.34 (0.061)	16.13 (0.062)
	135	16.25 (0.062)	16.17 (0.062)	16.08 (0.062)	15.85 (0.063)	16.39 (0.061)	16.33 (0.061)	16.25 (0.062)	16.06 (0.062)
2 1/2 in.	85	20.17 (0.050)	20.05 (0.050)	19.92 (0.050)	19.60 (0.051)	20.36 (0.049)	20.27 (0.049)	20.17 (0.050)	19.91 (0.050)
	95	20.06 (0.050)	19.94 (0.050)	19.82 (0.050)	19.51 (0.051)	20.23 (0.049)	20.14 (0.050)	20.05 (0.050)	19.80 (0.051)
	105	19.95 (0.050)	19.84 (0.050)	19.73 (0.051)	19.43 (0.051)	20.11 (0.050)	20.03 (0.050)	19.94 (0.050)	19.70 (0.051)
	115	19.85 (0.050)	19.74 (0.051)	19.64 (0.051)	19.36 (0.052)	20.00 (0.050)	19.92 (0.050)	19.83 (0.050)	19.61 (0.051)
	125	19.75 (0.051)	19.65 (0.051)	19.55 (0.051)	19.30 (0.052)	19.89 (0.050)	19.82 (0.050)	19.74 (0.051)	19.53 (0.051)
	135	19.65 (0.051)	19.57 (0.051)	19.48 (0.051)	19.25 (0.052)	19.79 (0.051)	19.73 (0.051)	19.65 (0.051)	19.46 (0.051)
3 in.	85	23.57 (0.042)	23.45 (0.043)	23.32 (0.043)	23.00 (0.043)	23.76 (0.042)	23.67 (0.042)	23.57 (0.042)	23.31 (0.043)
	95	23.46 (0.043)	23.34 (0.043)	23.22 (0.043)	22.91 (0.044)	23.63 (0.042)	23.54 (0.042)	23.45 (0.043)	23.20 (0.043)
	105	23.35 (0.043)	23.24 (0.043)	23.13 (0.043)	22.83 (0.044)	23.51 (0.043)	23.43 (0.043)	23.34 (0.043)	23.10 (0.043)
	115	23.25 (0.043)	23.14 (0.043)	23.04 (0.043)	22.76 (0.044)	23.40 (0.043)	23.32 (0.043)	23.23 (0.043)	23.01 (0.043)
	125	23.15 (0.043)	23.05 (0.043)	22.95 (0.044)	22.70 (0.044)	23.29 (0.043)	23.22 (0.043)	23.14 (0.043)	22.93 (0.044)
	135	23.05 (0.043)	22.97 (0.044)	22.88 (0.044)	22.65 (0.044)	23.19 (0.043)	23.13 (0.043)	23.05 (0.043)	22.86 (0.044)
3 1/2 in.	85	26.97 (0.037)	26.85 (0.037)	26.72 (0.037)	26.40 (0.038)	27.16 (0.037)	27.07 (0.037)	26.97 (0.037)	26.71 (0.037)
	95	26.86 (0.037)	26.74 (0.037)	26.62 (0.038)	26.31 (0.038)	27.03 (0.037)	26.94 (0.037)	26.85 (0.037)	26.60 (0.038)
	105	26.75 (0.037)	26.64 (0.038)	26.53 (0.038)	26.23 (0.038)	26.91 (0.037)	26.83 (0.037)	26.74 (0.037)	26.50 (0.038)
	115	26.65 (0.038)	26.54 (0.038)	26.44 (0.038)	26.16 (0.038)	26.80 (0.037)	26.72 (0.037)	26.63 (0.038)	26.41 (0.038)
	125	26.55 (0.038)	26.45 (0.038)	26.35 (0.038)	26.10 (0.038)	26.69 (0.037)	26.62 (0.038)	26.54 (0.038)	26.33 (0.038)
	135	26.45 (0.038)	26.37 (0.038)	26.28 (0.038)	26.05 (0.038)	26.59 (0.038)	26.53 (0.038)	26.45 (0.038)	26.26 (0.038)

Thickness of HD polyisocyanurate:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	17.01 (0.059)	16.96 (0.059)	16.91 (0.059)	16.75 (0.060)	17.03 (0.059)	17.02 (0.059)	17.01 (0.059)	16.98 (0.059)
	95	16.88 (0.059)	16.84 (0.059)	16.78 (0.060)	16.63 (0.060)	16.91 (0.059)	16.90 (0.059)	16.89 (0.059)	16.86 (0.059)
	105	16.77 (0.060)	16.72 (0.060)	16.67 (0.060)	16.53 (0.060)	16.80 (0.060)	16.79 (0.060)	16.78 (0.060)	16.75 (0.060)
	115	16.66 (0.060)	16.62 (0.060)	16.57 (0.060)	16.43 (0.061)	16.70 (0.060)	16.69 (0.060)	16.68 (0.060)	16.65 (0.060)
	125	16.55 (0.060)	16.52 (0.061)	16.47 (0.061)	16.35 (0.061)	16.60 (0.060)	16.59 (0.060)	16.58 (0.060)	16.56 (0.060)
	135	16.46 (0.061)	16.42 (0.061)	16.38 (0.061)	16.26 (0.061)	16.51 (0.061)	16.50 (0.061)	16.49 (0.061)	16.47 (0.061)
2 1/2 in.	85	20.41 (0.049)	20.36 (0.049)	20.31 (0.049)	20.15 (0.050)	20.43 (0.049)	20.42 (0.049)	20.41 (0.049)	20.38 (0.049)
	95	20.28 (0.049)	20.24 (0.049)	20.18 (0.050)	20.03 (0.050)	20.31 (0.049)	20.30 (0.049)	20.29 (0.049)	20.26 (0.049)
	105	20.17 (0.050)	20.12 (0.050)	20.07 (0.050)	19.93 (0.050)	20.20 (0.050)	20.19 (0.050)	20.18 (0.050)	20.15 (0.050)
	115	20.06 (0.050)	20.02 (0.050)	19.97 (0.050)	19.83 (0.050)	20.10 (0.050)	20.09 (0.050)	20.08 (0.050)	20.05 (0.050)
	125	19.95 (0.050)	19.92 (0.050)	19.87 (0.050)	19.75 (0.051)	20.00 (0.050)	19.99 (0.050)	19.98 (0.050)	19.96 (0.050)
	135	19.86 (0.050)	19.82 (0.050)	19.78 (0.051)	19.66 (0.051)	19.91 (0.050)	19.90 (0.050)	19.89 (0.050)	19.87 (0.050)
3 in.	85	23.81 (0.042)	23.76 (0.042)	23.71 (0.042)	23.55 (0.042)	23.83 (0.042)	23.82 (0.042)	23.81 (0.042)	23.78 (0.042)
	95	23.68 (0.042)	23.64 (0.042)	23.58 (0.042)	23.43 (0.043)	23.71 (0.042)	23.70 (0.042)	23.69 (0.042)	23.66 (0.042)
	105	23.57 (0.042)	23.52 (0.043)	23.47 (0.043)	23.33 (0.043)	23.60 (0.042)	23.59 (0.042)	23.58 (0.042)	23.55 (0.042)
	115	23.46 (0.043)	23.42 (0.043)	23.37 (0.043)	23.23 (0.043)	23.50 (0.043)	23.49 (0.043)	23.48 (0.043)	23.45 (0.043)
	125	23.35 (0.043)	23.32 (0.043)	23.27 (0.043)	23.15 (0.043)	23.40 (0.043)	23.39 (0.043)	23.38 (0.043)	23.36 (0.043)
	135	23.26 (0.043)	23.22 (0.043)	23.18 (0.043)	23.06 (0.043)	23.31 (0.043)	23.30 (0.043)	23.29 (0.043)	23.27 (0.043)
3 1/2 in.	85	27.21 (0.037)	27.16 (0.037)	27.11 (0.037)	26.95 (0.037)	27.23 (0.037)	27.22 (0.037)	27.21 (0.037)	27.18 (0.037)
	95	27.08 (0.037)	27.04 (0.037)	26.98 (0.037)	26.83 (0.037)	27.11 (0.037)	27.10 (0.037)	27.09 (0.037)	27.06 (0.037)
	105	26.97 (0.037)	26.92 (0.037)	26.87 (0.037)	26.73 (0.037)	27.00 (0.037)	26.99 (0.037)	26.98 (0.037)	26.95 (0.037)
	115	26.86 (0.037)	26.82 (0.037)	26.77 (0.037)	26.63 (0.038)	26.90 (0.037)	26.89 (0.037)	26.88 (0.037)	26.85 (0.037)
	125	26.75 (0.037)	26.72 (0.037)	26.67 (0.037)	26.55 (0.038)	26.80 (0.037)	26.79 (0.037)	26.78 (0.037)	26.76 (0.037)
	135	26.66 (0.038)	26.62 (0.038)	26.58 (0.038)	26.46 (0.038)	26.71 (0.037)	26.70 (0.037)	26.69 (0.037)	26.67 (0.037)

*Assembly details page 13.



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

INTERIOR INSULATION

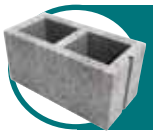
Assembly 1-6: Metal furring at 24 in. o.c. with batt insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation Type	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.42 (0.106)	9.30 (0.107)	9.17 (0.109)	8.85 (0.113)	9.61 (0.104)	9.52 (0.105)	9.42 (0.106)	9.16 (0.109)
	95	9.31 (0.107)	9.19 (0.109)	9.07 (0.110)	8.76 (0.114)	9.48 (0.106)	9.39 (0.106)	9.30 (0.108)	9.05 (0.111)
	105	9.20 (0.109)	9.09 (0.110)	8.98 (0.111)	8.68 (0.115)	9.36 (0.107)	9.28 (0.108)	9.19 (0.109)	8.95 (0.112)
	115	9.10 (0.110)	8.99 (0.111)	8.89 (0.113)	8.61 (0.116)	9.25 (0.108)	9.17 (0.109)	9.08 (0.110)	8.86 (0.113)
	125	9.00 (0.111)	8.90 (0.112)	8.80 (0.114)	8.55 (0.117)	9.14 (0.109)	9.07 (0.110)	8.99 (0.111)	8.78 (0.114)
	135	8.90 (0.112)	8.82 (0.113)	8.73 (0.115)	8.50 (0.118)	9.04 (0.111)	8.98 (0.111)	8.90 (0.112)	8.71 (0.115)
R13 Batt	85	10.02 (0.100)	9.90 (0.101)	9.77 (0.102)	9.45 (0.106)	10.21 (0.098)	10.12 (0.099)	10.02 (0.100)	9.76 (0.102)
	95	9.91 (0.101)	9.79 (0.102)	9.67 (0.103)	9.36 (0.107)	10.08 (0.099)	9.99 (0.100)	9.90 (0.101)	9.65 (0.104)
	105	9.80 (0.102)	9.69 (0.103)	9.58 (0.104)	9.28 (0.108)	9.96 (0.100)	9.88 (0.101)	9.79 (0.102)	9.55 (0.105)
	115	9.70 (0.103)	9.59 (0.104)	9.49 (0.105)	9.21 (0.109)	9.85 (0.102)	9.77 (0.102)	9.68 (0.103)	9.46 (0.106)
	125	9.60 (0.104)	9.50 (0.105)	9.40 (0.106)	9.15 (0.109)	9.74 (0.103)	9.67 (0.103)	9.59 (0.104)	9.38 (0.107)
	135	9.50 (0.105)	9.42 (0.106)	9.33 (0.107)	9.10 (0.110)	9.64 (0.104)	9.58 (0.104)	9.50 (0.105)	9.31 (0.107)
R15 Batt	85	10.62 (0.094)	10.50 (0.095)	10.37 (0.096)	10.05 (0.099)	10.81 (0.093)	10.72 (0.093)	10.62 (0.094)	10.36 (0.097)
	95	10.51 (0.095)	10.39 (0.096)	10.27 (0.097)	9.96 (0.100)	10.68 (0.094)	10.59 (0.094)	10.50 (0.095)	10.25 (0.098)
	105	10.40 (0.096)	10.29 (0.097)	10.18 (0.098)	9.88 (0.101)	10.56 (0.095)	10.48 (0.095)	10.39 (0.096)	10.15 (0.099)
	115	10.30 (0.097)	10.19 (0.098)	10.09 (0.099)	9.81 (0.102)	10.45 (0.096)	10.37 (0.096)	10.28 (0.097)	10.06 (0.099)
	125	10.20 (0.098)	10.10 (0.099)	10.00 (0.100)	9.75 (0.103)	10.34 (0.097)	10.27 (0.097)	10.19 (0.098)	9.98 (0.100)
	135	10.10 (0.099)	10.02 (0.100)	9.93 (0.101)	9.70 (0.103)	10.24 (0.098)	10.18 (0.098)	10.10 (0.099)	9.91 (0.101)
R19 Batt	85	11.42 (0.088)	11.30 (0.088)	11.17 (0.089)	10.85 (0.092)	11.61 (0.086)	11.52 (0.087)	11.42 (0.088)	11.16 (0.090)
	95	11.31 (0.088)	11.19 (0.089)	11.07 (0.090)	10.76 (0.093)	11.48 (0.087)	11.39 (0.088)	11.30 (0.089)	11.05 (0.091)
	105	11.20 (0.089)	11.09 (0.090)	10.98 (0.091)	10.68 (0.094)	11.36 (0.088)	11.28 (0.089)	11.19 (0.089)	10.95 (0.091)
	115	11.10 (0.090)	10.99 (0.091)	10.89 (0.092)	10.61 (0.094)	11.25 (0.089)	11.17 (0.090)	11.08 (0.090)	10.86 (0.092)
	125	11.00 (0.091)	10.90 (0.092)	10.80 (0.093)	10.55 (0.095)	11.14 (0.090)	11.07 (0.090)	10.99 (0.091)	10.78 (0.093)
	135	10.90 (0.092)	10.82 (0.092)	10.73 (0.093)	10.50 (0.095)	11.04 (0.091)	10.98 (0.091)	10.90 (0.092)	10.71 (0.093)
R21 Batt	85	11.82 (0.085)	11.70 (0.085)	11.57 (0.086)	11.25 (0.089)	12.01 (0.083)	11.92 (0.084)	11.82 (0.085)	11.56 (0.087)
	95	11.71 (0.085)	11.59 (0.086)	11.47 (0.087)	11.16 (0.090)	11.88 (0.084)	11.79 (0.085)	11.70 (0.085)	11.45 (0.087)
	105	11.60 (0.086)	11.49 (0.087)	11.38 (0.088)	11.08 (0.090)	11.76 (0.085)	11.68 (0.086)	11.59 (0.086)	11.35 (0.088)
	115	11.50 (0.087)	11.39 (0.088)	11.29 (0.089)	11.01 (0.091)	11.65 (0.086)	11.57 (0.086)	11.48 (0.087)	11.26 (0.089)
	125	11.40 (0.088)	11.30 (0.088)	11.20 (0.089)	10.95 (0.091)	11.54 (0.087)	11.47 (0.087)	11.39 (0.088)	11.18 (0.089)
	135	11.30 (0.089)	11.22 (0.089)	11.13 (0.090)	10.90 (0.092)	11.44 (0.087)	11.38 (0.088)	11.30 (0.088)	11.11 (0.090)

Insulation Type	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.66 (0.104)	9.61 (0.104)	9.56 (0.105)	9.40 (0.106)	9.68 (0.103)	9.67 (0.103)	9.66 (0.103)	9.63 (0.104)
	95	9.53 (0.105)	9.49 (0.105)	9.43 (0.106)	9.28 (0.108)	9.56 (0.105)	9.55 (0.105)	9.54 (0.105)	9.51 (0.105)
	105	9.42 (0.106)	9.37 (0.107)	9.32 (0.107)	9.18 (0.109)	9.45 (0.106)	9.44 (0.106)	9.43 (0.106)	9.40 (0.106)
	115	9.31 (0.107)	9.27 (0.108)	9.22 (0.108)	9.08 (0.110)	9.35 (0.107)	9.34 (0.107)	9.33 (0.107)	9.30 (0.107)
	125	9.20 (0.109)	9.17 (0.109)	9.12 (0.110)	9.00 (0.111)	9.25 (0.108)	9.24 (0.108)	9.23 (0.108)	9.21 (0.109)
	135	9.11 (0.110)	9.07 (0.110)	9.03 (0.111)	8.91 (0.112)	9.16 (0.109)	9.15 (0.109)	9.14 (0.109)	9.12 (0.110)
R13 Batt	85	10.26 (0.097)	10.21 (0.098)	10.16 (0.098)	10.00 (0.100)	10.28 (0.097)	10.27 (0.097)	10.26 (0.097)	10.23 (0.098)
	95	10.13 (0.099)	10.09 (0.099)	10.03 (0.100)	9.88 (0.101)	10.16 (0.098)	10.15 (0.098)	10.14 (0.099)	10.11 (0.099)
	105	10.02 (0.100)	9.97 (0.100)	9.92 (0.101)	9.78 (0.102)	10.05 (0.100)	10.04 (0.100)	10.03 (0.100)	10.00 (0.100)
	115	9.91 (0.101)	9.87 (0.101)	9.82 (0.102)	9.68 (0.103)	9.95 (0.101)	9.94 (0.101)	9.93 (0.101)	9.90 (0.101)
	125	9.80 (0.102)	9.77 (0.102)	9.72 (0.103)	9.60 (0.104)	9.85 (0.102)	9.84 (0.102)	9.83 (0.102)	9.81 (0.102)
	135	9.71 (0.103)	9.67 (0.103)	9.63 (0.104)	9.51 (0.105)	9.76 (0.102)	9.75 (0.103)	9.74 (0.103)	9.72 (0.103)
R15 Batt	85	10.86 (0.092)	10.81 (0.093)	10.76 (0.093)	10.60 (0.094)	10.88 (0.092)	10.87 (0.092)	10.86 (0.092)	10.83 (0.092)
	95	10.73 (0.093)	10.69 (0.094)	10.63 (0.094)	10.48 (0.095)	10.76 (0.093)	10.75 (0.093)	10.74 (0.093)	10.71 (0.093)
	105	10.62 (0.094)	10.57 (0.095)	10.52 (0.095)	10.38 (0.096)	10.65 (0.094)	10.64 (0.094)	10.63 (0.094)	10.60 (0.094)
	115	10.51 (0.095)	10.47 (0.096)	10.42 (0.096)	10.28 (0.097)	10.55 (0.095)	10.54 (0.095)	10.53 (0.095)	10.50 (0.095)
	125	10.40 (0.096)	10.37 (0.096)	10.32 (0.097)	10.20 (0.098)	10.45 (0.096)	10.44 (0.096)	10.43 (0.096)	10.41 (0.096)
	135	10.31 (0.097)	10.27 (0.097)	10.23 (0.098)	10.11 (0.099)	10.36 (0.097)	10.35 (0.097)	10.34 (0.097)	10.32 (0.097)
R19 Batt	85	11.66 (0.086)	11.61 (0.086)	11.56 (0.087)	11.40 (0.088)	11.68 (0.086)	11.67 (0.086)	11.66 (0.086)	11.63 (0.086)
	95	11.53 (0.087)	11.49 (0.087)	11.43 (0.087)	11.28 (0.089)	11.56 (0.086)	11.55 (0.087)	11.54 (0.087)	11.51 (0.087)
	105	11.42 (0.088)	11.37 (0.088)	11.32 (0.088)	11.18 (0.089)	11.45 (0.087)	11.44 (0.087)	11.43 (0.087)	11.40 (0.088)
	115	11.31 (0.088)	11.27 (0.089)	11.22 (0.089)	11.08 (0.090)	11.35 (0.088)	11.34 (0.088)	11.33 (0.088)	11.30 (0.088)
	125	11.20 (0.089)	11.17 (0.090)	11.12 (0.090)	11.00 (0.091)	11.25 (0.089)	11.24 (0.089)	11.23 (0.089)	11.21 (0.089)
	135	11.11 (0.090)	11.07 (0.090)	11.03 (0.091)	10.91 (0.092)	11.16 (0.090)	11.15 (0.090)	11.14 (0.090)	11.12 (0.090)
R21 Batt	85	12.06 (0.083)	12.01 (0.083)	11.96 (0.084)	11.80 (0.085)	12.08 (0.083)	12.07 (0.083)	12.06 (0.083)	12.03 (0.083)
	95	11.93 (0.084)	11.89 (0.084)	11.83 (0.084)	11.68 (0.086)	11.96 (0.084)	11.95 (0.084)	11.94 (0.084)	11.91 (0.084)
	105	11.82 (0.085)	11.77 (0.085)	11.72 (0.085)	11.58 (0.086)	11.85 (0.084)	11.84 (0.084)	11.83 (0.085)	11.80 (0.085)
	115	11.71 (0.085)	11.67 (0.086)	11.62 (0.086)	11.48 (0.087)	11.75 (0.085)	11.74 (0.085)	11.73 (0.085)	11.70 (0.085)
	125	11.60 (0.086)	11.57 (0.086)	11.52 (0.087)	11.40 (0.088)	11.65 (0.086)	11.64 (0.086)	11.63 (0.086)	11.61 (0.086)
	135	11.51 (0.087)	11.47 (0.087)	11.43 (0.087)	11.31 (0.088)	11.56 (0.087)	11.55 (0.087)	11.54 (0.087)	11.52 (0.087)

*Assembly details page 13.



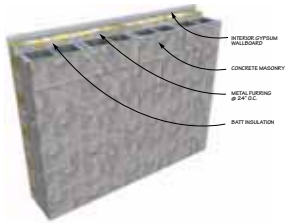
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 1-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

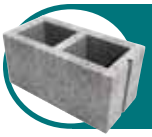
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.39 (0.157)	6.27 (0.160)	6.14 (0.163)	5.81 (0.172)	6.57 (0.152)	6.48 (0.154)	6.38 (0.157)	6.12 (0.163)
	95	6.27 (0.159)	6.16 (0.162)	6.03 (0.166)	5.73 (0.175)	6.44 (0.155)	6.35 (0.157)	6.26 (0.160)	6.01 (0.166)
	105	6.16 (0.162)	6.05 (0.165)	5.94 (0.168)	5.65 (0.177)	6.32 (0.158)	6.24 (0.160)	6.15 (0.163)	5.91 (0.169)
	115	6.06 (0.165)	5.96 (0.168)	5.85 (0.171)	5.58 (0.179)	6.21 (0.161)	6.13 (0.163)	6.05 (0.165)	5.82 (0.172)
	125	5.96 (0.168)	5.86 (0.171)	5.77 (0.173)	5.51 (0.181)	6.10 (0.164)	6.03 (0.166)	5.95 (0.168)	5.74 (0.174)
	135	5.86 (0.171)	5.78 (0.173)	5.69 (0.176)	5.46 (0.183)	6.00 (0.167)	5.94 (0.168)	5.87 (0.171)	5.67 (0.176)
Polyisocyanurate, 3/4 in.	85	7.58 (0.132)	7.46 (0.134)	7.33 (0.136)	7.01 (0.143)	7.76 (0.129)	7.68 (0.130)	7.58 (0.132)	7.31 (0.137)
	95	7.47 (0.134)	7.35 (0.136)	7.23 (0.138)	6.92 (0.144)	7.64 (0.131)	7.55 (0.132)	7.46 (0.134)	7.20 (0.139)
	105	7.36 (0.136)	7.25 (0.138)	7.13 (0.140)	6.84 (0.146)	7.52 (0.133)	7.43 (0.135)	7.34 (0.136)	7.10 (0.141)
	115	7.25 (0.138)	7.15 (0.140)	7.04 (0.142)	6.77 (0.148)	7.40 (0.135)	7.33 (0.136)	7.24 (0.138)	7.02 (0.143)
	125	7.15 (0.140)	7.06 (0.142)	6.96 (0.144)	6.71 (0.149)	7.30 (0.137)	7.23 (0.138)	7.15 (0.140)	6.94 (0.144)
	135	7.06 (0.142)	6.97 (0.143)	6.88 (0.145)	6.65 (0.150)	7.20 (0.139)	7.13 (0.140)	7.06 (0.142)	6.86 (0.146)
Extruded Polystyrene, 3/4 in.	85	9.95 (0.101)	9.83 (0.102)	9.70 (0.103)	9.38 (0.107)	10.13 (0.099)	10.04 (0.100)	9.94 (0.101)	9.68 (0.103)
	95	9.83 (0.102)	9.72 (0.103)	9.60 (0.104)	9.29 (0.108)	10.00 (0.100)	9.92 (0.101)	9.82 (0.102)	9.57 (0.104)
	105	9.72 (0.103)	9.62 (0.104)	9.50 (0.105)	9.21 (0.109)	9.88 (0.101)	9.80 (0.102)	9.71 (0.103)	9.47 (0.106)
	115	9.62 (0.104)	9.52 (0.105)	9.41 (0.106)	9.14 (0.109)	9.77 (0.102)	9.69 (0.103)	9.61 (0.104)	9.38 (0.107)
	125	9.52 (0.105)	9.43 (0.106)	9.33 (0.107)	9.08 (0.110)	9.67 (0.103)	9.59 (0.104)	9.52 (0.105)	9.30 (0.107)
	135	9.42 (0.106)	9.34 (0.107)	9.25 (0.108)	9.02 (0.111)	9.57 (0.105)	9.50 (0.105)	9.43 (0.106)	9.23 (0.108)
Polyisocyanurate, 3/4 in.	85	12.76 (0.078)	12.64 (0.079)	12.51 (0.080)	12.19 (0.082)	12.94 (0.077)	12.85 (0.078)	12.76 (0.078)	12.49 (0.080)
	95	12.65 (0.079)	12.53 (0.080)	12.41 (0.081)	12.10 (0.083)	12.82 (0.078)	12.73 (0.079)	12.64 (0.079)	12.38 (0.081)
	105	12.54 (0.080)	12.43 (0.080)	12.31 (0.081)	12.02 (0.083)	12.70 (0.079)	12.61 (0.079)	12.52 (0.080)	12.28 (0.081)
	115	12.43 (0.080)	12.33 (0.081)	12.22 (0.082)	11.95 (0.084)	12.58 (0.079)	12.51 (0.080)	12.42 (0.081)	12.20 (0.082)
	125	12.33 (0.081)	12.24 (0.082)	12.14 (0.082)	11.89 (0.084)	12.48 (0.080)	12.41 (0.081)	12.33 (0.081)	12.12 (0.083)
	135	12.24 (0.082)	12.15 (0.082)	12.06 (0.083)	11.83 (0.085)	12.38 (0.081)	12.31 (0.081)	12.24 (0.082)	12.04 (0.083)
R11 Batt	85	13.42 (0.074)	13.30 (0.075)	13.17 (0.076)	12.85 (0.078)	13.61 (0.073)	13.52 (0.074)	13.42 (0.075)	13.16 (0.076)
	95	13.31 (0.075)	13.19 (0.076)	13.07 (0.077)	12.76 (0.078)	13.48 (0.074)	13.39 (0.075)	13.30 (0.075)	13.05 (0.077)
	105	13.20 (0.076)	13.09 (0.076)	12.98 (0.077)	12.68 (0.079)	13.36 (0.075)	13.28 (0.075)	13.19 (0.076)	12.95 (0.077)
	115	13.10 (0.076)	12.99 (0.077)	12.89 (0.078)	12.61 (0.079)	13.25 (0.075)	13.17 (0.076)	13.08 (0.076)	12.86 (0.078)
	125	13.00 (0.077)	12.90 (0.078)	12.80 (0.078)	12.55 (0.080)	13.14 (0.076)	13.07 (0.077)	12.99 (0.077)	12.78 (0.078)
	135	12.90 (0.078)	12.82 (0.078)	12.73 (0.079)	12.50 (0.080)	13.04 (0.077)	12.98 (0.077)	12.90 (0.078)	12.71 (0.079)
R13 Batt	85	14.42 (0.069)	14.30 (0.070)	14.17 (0.071)	13.85 (0.072)	14.61 (0.068)	14.52 (0.069)	14.42 (0.069)	14.16 (0.071)
	95	14.31 (0.070)	14.19 (0.070)	14.07 (0.071)	13.76 (0.073)	14.48 (0.069)	14.39 (0.069)	14.30 (0.070)	14.05 (0.071)
	105	14.20 (0.070)	14.09 (0.071)	13.98 (0.072)	13.68 (0.073)	14.36 (0.070)	14.28 (0.070)	14.19 (0.070)	13.95 (0.072)
	115	14.10 (0.071)	13.99 (0.071)	13.89 (0.072)	13.61 (0.073)	14.25 (0.070)	14.17 (0.071)	14.08 (0.071)	13.86 (0.072)
	125	14.00 (0.071)	13.90 (0.072)	13.80 (0.072)	13.55 (0.074)	14.14 (0.071)	14.07 (0.071)	13.99 (0.071)	13.78 (0.073)
	135	13.90 (0.072)	13.82 (0.072)	13.73 (0.073)	13.50 (0.074)	14.04 (0.071)	13.98 (0.072)	13.90 (0.072)	13.71 (0.073)
R15 Batt	85	15.32 (0.065)	15.20 (0.066)	15.07 (0.066)	14.75 (0.068)	15.51 (0.064)	15.42 (0.065)	15.32 (0.065)	15.06 (0.066)
	95	15.21 (0.066)	15.09 (0.066)	14.97 (0.067)	14.66 (0.068)	15.38 (0.065)	15.29 (0.065)	15.20 (0.066)	14.95 (0.067)
	105	15.10 (0.066)	14.99 (0.067)	14.88 (0.067)	14.58 (0.069)	15.26 (0.066)	15.18 (0.066)	15.09 (0.066)	14.85 (0.067)
	115	15.00 (0.067)	14.89 (0.067)	14.79 (0.068)	14.51 (0.069)	15.15 (0.066)	15.07 (0.066)	14.98 (0.067)	14.76 (0.068)
	125	14.90 (0.067)	14.80 (0.068)	14.70 (0.068)	14.45 (0.069)	15.04 (0.066)	14.97 (0.067)	14.89 (0.067)	14.68 (0.068)
	135	14.80 (0.068)	14.72 (0.068)	14.63 (0.068)	14.40 (0.069)	14.94 (0.067)	14.88 (0.067)	14.80 (0.068)	14.61 (0.068)
R19 Batt	85	18.22 (0.055)	18.10 (0.055)	17.97 (0.056)	17.65 (0.057)	18.41 (0.054)	18.32 (0.055)	18.22 (0.055)	17.96 (0.056)
	95	18.11 (0.055)	17.99 (0.056)	17.87 (0.056)	17.56 (0.057)	18.28 (0.055)	18.19 (0.055)	18.10 (0.055)	17.85 (0.056)
	105	18.00 (0.056)	17.89 (0.056)	17.78 (0.056)	17.48 (0.057)	18.16 (0.055)	18.08 (0.055)	17.99 (0.056)	17.75 (0.056)
	115	17.90 (0.056)	17.79 (0.056)	17.69 (0.057)	17.41 (0.057)	18.05 (0.055)	17.97 (0.056)	17.88 (0.056)	17.66 (0.057)
	125	17.80 (0.056)	17.70 (0.056)	17.60 (0.057)	17.35 (0.058)	17.94 (0.056)	17.87 (0.056)	17.79 (0.056)	17.58 (0.057)
	135	17.70 (0.056)	17.62 (0.057)	17.53 (0.057)	17.30 (0.058)	17.84 (0.056)	17.78 (0.056)	17.70 (0.056)	17.51 (0.057)
R21 Batt	85	19.52 (0.051)	19.40 (0.052)	19.27 (0.052)	18.95 (0.053)	19.71 (0.051)	19.62 (0.051)	19.52 (0.051)	19.26 (0.052)
	95	19.41 (0.052)	19.29 (0.052)	19.17 (0.052)	18.86 (0.053)	19.58 (0.051)	19.49 (0.051)	19.40 (0.052)	19.15 (0.052)
	105	19.30 (0.052)	19.19 (0.052)	19.08 (0.052)	18.78 (0.053)	19.46 (0.051)	19.38 (0.052)	19.29 (0.052)	19.05 (0.053)
	115	19.20 (0.052)	19.09 (0.052)	18.99 (0.053)	18.71 (0.053)	19.35 (0.052)	19.27 (0.052)	19.18 (0.052)	18.96 (0.053)
	125	19.10 (0.052)	19.00 (0.053)	18.90 (0.053)	18.65 (0.054)	19.24 (0.052)	19.17 (0.052)	19.09 (0.052)	18.88 (0.053)
	135	19.00 (0.053)	18.92 (0.053)	18.83 (0.053)	18.60 (0.054)	19.14 (0.052)	19.08 (0.052)	19.00 (0.053)	18.81 (0.053)

*Assembly details page 14.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.62 (0.151)	6.57 (0.152)	6.52 (0.153)	6.36 (0.157)	6.65 (0.150)	6.64 (0.151)	6.63 (0.151)	6.60 (0.152)
	95	6.49 (0.154)	6.45 (0.155)	6.40 (0.156)	6.25 (0.160)	6.52 (0.153)	6.52 (0.153)	6.51 (0.154)	6.48 (0.154)
	105	6.38 (0.157)	6.33 (0.158)	6.28 (0.159)	6.14 (0.163)	6.41 (0.156)	6.40 (0.156)	6.40 (0.156)	6.37 (0.157)
	115	6.27 (0.160)	6.23 (0.161)	6.18 (0.162)	6.05 (0.165)	6.31 (0.159)	6.30 (0.159)	6.29 (0.159)	6.27 (0.160)
	125	6.17 (0.162)	6.13 (0.163)	6.08 (0.164)	5.96 (0.168)	6.21 (0.161)	6.20 (0.161)	6.20 (0.161)	6.17 (0.162)
	135	6.07 (0.165)	6.03 (0.166)	5.99 (0.167)	5.88 (0.170)	6.12 (0.163)	6.11 (0.164)	6.11 (0.164)	6.08 (0.164)
Polyisocyanurate, 3/4 in.	85	7.82 (0.128)	7.77 (0.129)	7.71 (0.130)	7.56 (0.132)	7.84 (0.128)	7.83 (0.128)	7.82 (0.128)	7.79 (0.128)
	95	7.69 (0.130)	7.64 (0.131)	7.59 (0.132)	7.44 (0.134)	7.72 (0.130)	7.71 (0.130)	7.70 (0.130)	7.67 (0.130)
	105	7.57 (0.132)	7.53 (0.133)	7.48 (0.134)	7.34 (0.136)	7.61 (0.131)	7.60 (0.132)	7.59 (0.132)	7.56 (0.132)
	115	7.46 (0.134)	7.42 (0.135)	7.38 (0.136)	7.24 (0.138)	7.50 (0.133)	7.50 (0.133)	7.49 (0.134)	7.46 (0.134)
	125	7.36 (0.136)	7.32 (0.137)	7.28 (0.137)	7.15 (0.140)	7.41 (0.135)	7.40 (0.135)	7.39 (0.135)	7.37 (0.136)
	135	7.27 (0.138)	7.23 (0.138)	7.19 (0.139)	7.07 (0.141)	7.32 (0.137)	7.31 (0.137)	7.30 (0.137)	7.28 (0.137)
Extruded Polystyrene, 3/4 in.	85	10.18 (0.098)	10.14 (0.099)	10.08 (0.099)	9.93 (0.101)	10.21 (0.098)	10.20 (0.098)	10.19 (0.098)	10.16 (0.098)
	95	10.06 (0.099)	10.01 (0.100)	9.96 (0.100)	9.81 (0.102)	10.09 (0.099)	10.08 (0.099)	10.07 (0.099)	10.04 (0.100)
	105	9.94 (0.101)	9.90 (0.101)	9.85 (0.102)	9.70 (0.103)	9.97 (0.100)	9.97 (0.100)	9.96 (0.100)	9.93 (0.101)
	115	9.83 (0.102)	9.79 (0.102)	9.74 (0.103)	9.61 (0.104)	9.87 (0.101)	9.86 (0.101)	9.85 (0.101)	9.83 (0.102)
	125	9.73 (0.103)	9.69 (0.103)	9.65 (0.104)	9.52 (0.105)	9.77 (0.102)	9.77 (0.102)	9.76 (0.102)	9.73 (0.103)
	135	9.63 (0.104)	9.60 (0.104)	9.56 (0.105)	9.44 (0.106)	9.68 (0.103)	9.68 (0.103)	9.67 (0.103)	9.65 (0.104)
Polyisocyanurate, 3/4 in.	85	13.00 (0.077)	12.95 (0.077)	12.89 (0.078)	12.74 (0.079)	13.02 (0.077)	13.01 (0.077)	13.00 (0.077)	12.97 (0.077)
	95	12.87 (0.078)	12.82 (0.078)	12.77 (0.078)	12.62 (0.079)	12.90 (0.078)	12.89 (0.078)	12.88 (0.078)	12.85 (0.078)
	105	12.75 (0.078)	12.71 (0.079)	12.66 (0.079)	12.52 (0.080)	12.79 (0.078)	12.78 (0.078)	12.77 (0.078)	12.74 (0.078)
	115	12.64 (0.079)	12.60 (0.079)	12.56 (0.080)	12.42 (0.081)	12.68 (0.079)	12.68 (0.079)	12.67 (0.079)	12.64 (0.079)
	125	12.54 (0.080)	12.50 (0.080)	12.46 (0.080)	12.33 (0.081)	12.59 (0.079)	12.58 (0.079)	12.57 (0.080)	12.55 (0.080)
	135	12.44 (0.080)	12.41 (0.081)	12.37 (0.081)	12.25 (0.082)	12.50 (0.080)	12.49 (0.080)	12.48 (0.080)	12.46 (0.080)
R11 Batt	85	13.66 (0.073)	13.61 (0.073)	13.56 (0.074)	13.40 (0.075)	13.68 (0.073)	13.67 (0.073)	13.66 (0.073)	13.63 (0.073)
	95	13.53 (0.074)	13.49 (0.074)	13.43 (0.074)	13.28 (0.075)	13.56 (0.074)	13.55 (0.074)	13.54 (0.074)	13.51 (0.074)
	105	13.42 (0.075)	13.37 (0.075)	13.32 (0.075)	13.18 (0.076)	13.45 (0.074)	13.44 (0.074)	13.43 (0.074)	13.40 (0.075)
	115	13.31 (0.075)	13.27 (0.075)	13.22 (0.076)	13.08 (0.076)	13.35 (0.075)	13.34 (0.075)	13.33 (0.075)	13.30 (0.075)
	125	13.20 (0.076)	13.17 (0.076)	13.12 (0.076)	13.00 (0.077)	13.25 (0.075)	13.24 (0.076)	13.23 (0.076)	13.21 (0.076)
	135	13.11 (0.076)	13.07 (0.077)	13.03 (0.077)	12.91 (0.077)	13.16 (0.076)	13.15 (0.076)	13.14 (0.076)	13.12 (0.076)
R13 Batt	85	14.66 (0.068)	14.61 (0.068)	14.56 (0.069)	14.40 (0.069)	14.68 (0.068)	14.67 (0.068)	14.66 (0.068)	14.63 (0.068)
	95	14.53 (0.069)	14.49 (0.069)	14.43 (0.069)	14.28 (0.070)	14.56 (0.069)	14.55 (0.069)	14.54 (0.069)	14.51 (0.069)
	105	14.42 (0.069)	14.37 (0.070)	14.32 (0.070)	14.18 (0.071)	14.45 (0.069)	14.44 (0.069)	14.43 (0.069)	14.40 (0.069)
	115	14.31 (0.070)	14.27 (0.070)	14.22 (0.070)	14.08 (0.071)	14.35 (0.070)	14.34 (0.070)	14.33 (0.070)	14.30 (0.070)
	125	14.20 (0.070)	14.17 (0.071)	14.12 (0.071)	14.00 (0.071)	14.25 (0.070)	14.24 (0.070)	14.23 (0.070)	14.21 (0.070)
	135	14.11 (0.071)	14.07 (0.071)	14.03 (0.071)	13.91 (0.072)	14.16 (0.071)	14.15 (0.071)	14.14 (0.071)	14.12 (0.071)
R15 Batt	85	15.56 (0.064)	15.51 (0.064)	15.46 (0.065)	15.30 (0.065)	15.58 (0.064)	15.57 (0.064)	15.56 (0.064)	15.53 (0.064)
	95	15.43 (0.065)	15.39 (0.065)	15.33 (0.065)	15.18 (0.066)	15.46 (0.065)	15.45 (0.065)	15.44 (0.065)	15.41 (0.065)
	105	15.32 (0.065)	15.27 (0.065)	15.22 (0.066)	15.08 (0.066)	15.35 (0.065)	15.34 (0.065)	15.33 (0.065)	15.30 (0.065)
	115	15.21 (0.066)	15.17 (0.066)	15.12 (0.066)	14.98 (0.067)	15.25 (0.066)	15.24 (0.066)	15.23 (0.066)	15.20 (0.066)
	125	15.10 (0.066)	15.07 (0.066)	15.02 (0.067)	14.90 (0.067)	15.15 (0.066)	15.14 (0.066)	15.13 (0.066)	15.11 (0.066)
	135	15.01 (0.067)	14.97 (0.067)	14.93 (0.067)	14.81 (0.068)	15.06 (0.066)	15.05 (0.066)	15.04 (0.066)	15.02 (0.067)
R19 Batt	85	18.46 (0.054)	18.41 (0.054)	18.36 (0.054)	18.20 (0.055)	18.48 (0.054)	18.47 (0.054)	18.46 (0.054)	18.43 (0.054)
	95	18.33 (0.055)	18.29 (0.055)	18.23 (0.055)	18.08 (0.055)	18.36 (0.054)	18.35 (0.054)	18.34 (0.055)	18.31 (0.055)
	105	18.22 (0.055)	18.17 (0.055)	18.12 (0.055)	17.98 (0.056)	18.25 (0.055)	18.24 (0.055)	18.23 (0.055)	18.20 (0.055)
	115	18.11 (0.055)	18.07 (0.055)	18.02 (0.055)	17.88 (0.056)	18.15 (0.055)	18.14 (0.055)	18.13 (0.055)	18.10 (0.055)
	125	18.00 (0.056)	17.97 (0.056)	17.92 (0.056)	17.80 (0.056)	18.05 (0.055)	18.04 (0.055)	18.03 (0.055)	18.01 (0.056)
	135	17.91 (0.056)	17.87 (0.056)	17.83 (0.056)	17.71 (0.056)	17.96 (0.056)	17.95 (0.056)	17.94 (0.056)	17.92 (0.056)
R21 Batt	85	19.76 (0.051)	19.71 (0.051)	19.66 (0.051)	19.50 (0.051)	19.78 (0.051)	19.77 (0.051)	19.76 (0.051)	19.73 (0.051)
	95	19.63 (0.051)	19.59 (0.051)	19.53 (0.051)	19.38 (0.052)	19.66 (0.051)	19.65 (0.051)	19.64 (0.051)	19.61 (0.051)
	105	19.52 (0.051)	19.47 (0.051)	19.42 (0.051)	19.28 (0.052)	19.55 (0.051)	19.54 (0.051)	19.53 (0.051)	19.50 (0.051)
	115	19.41 (0.052)	19.37 (0.052)	19.32 (0.052)	19.18 (0.052)	19.45 (0.051)	19.44 (0.051)	19.43 (0.051)	19.40 (0.052)
	125	19.30 (0.052)	19.27 (0.052)	19.22 (0.052)	19.10 (0.052)	19.35 (0.052)	19.34 (0.052)	19.33 (0.052)	19.31 (0.052)
	135	19.21 (0.052)	19.17 (0.052)	19.13 (0.052)	19.01 (0.053)	19.26 (0.052)	19.25 (0.052)	19.24 (0.052)	19.22 (0.052)



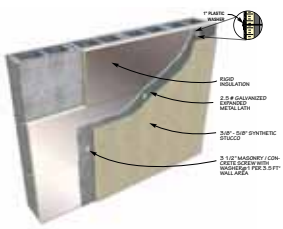
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
EXTERIOR INSULATION

Assembly 1-8: Continuous exterior insulation and finish system, exposed interior masonry

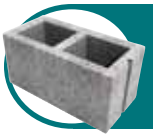
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Rigid insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.27 (0.108)	9.15 (0.109)	9.02 (0.111)	8.70 (0.115)	9.46 (0.106)	9.37 (0.107)	9.27 (0.108)	9.01 (0.111)
	95	9.16 (0.109)	9.04 (0.111)	8.92 (0.112)	8.61 (0.116)	9.33 (0.107)	9.24 (0.108)	9.15 (0.109)	8.90 (0.112)
	105	9.05 (0.111)	8.94 (0.112)	8.83 (0.113)	8.53 (0.117)	9.21 (0.109)	9.13 (0.110)	9.04 (0.111)	8.80 (0.114)
	115	8.95 (0.112)	8.84 (0.113)	8.74 (0.114)	8.46 (0.118)	9.10 (0.110)	9.02 (0.111)	8.93 (0.112)	8.71 (0.115)
	125	8.85 (0.113)	8.75 (0.114)	8.65 (0.116)	8.40 (0.119)	8.99 (0.111)	8.92 (0.112)	8.84 (0.113)	8.63 (0.116)
	135	8.75 (0.114)	8.67 (0.115)	8.58 (0.117)	8.35 (0.120)	8.89 (0.112)	8.83 (0.113)	8.75 (0.114)	8.56 (0.117)
Expanded polystyrene, 1 1/2 in.	85	8.57 (0.117)	8.45 (0.118)	8.32 (0.120)	8.00 (0.125)	8.76 (0.114)	8.67 (0.115)	8.57 (0.117)	8.31 (0.120)
	95	8.46 (0.118)	8.34 (0.120)	8.22 (0.122)	7.91 (0.126)	8.63 (0.116)	8.54 (0.117)	8.45 (0.118)	8.20 (0.122)
	105	8.35 (0.120)	8.24 (0.121)	8.13 (0.123)	7.83 (0.128)	8.51 (0.118)	8.43 (0.119)	8.34 (0.120)	8.10 (0.124)
	115	8.25 (0.121)	8.14 (0.123)	8.04 (0.124)	7.76 (0.129)	8.40 (0.119)	8.32 (0.120)	8.23 (0.121)	8.01 (0.125)
	125	8.15 (0.123)	8.05 (0.124)	7.95 (0.126)	7.70 (0.130)	8.29 (0.121)	8.22 (0.122)	8.14 (0.123)	7.93 (0.126)
	135	8.05 (0.124)	7.97 (0.126)	7.88 (0.127)	7.65 (0.131)	8.19 (0.122)	8.13 (0.123)	8.05 (0.124)	7.86 (0.127)
Expanded polystyrene, 2 in.	85	10.57 (0.095)	10.45 (0.096)	10.32 (0.097)	10.00 (0.100)	10.76 (0.093)	10.67 (0.094)	10.57 (0.095)	10.31 (0.097)
	95	10.46 (0.096)	10.34 (0.097)	10.22 (0.098)	9.91 (0.101)	10.63 (0.094)	10.54 (0.095)	10.45 (0.096)	10.20 (0.098)
	105	10.35 (0.097)	10.24 (0.098)	10.13 (0.099)	9.83 (0.102)	10.51 (0.095)	10.43 (0.096)	10.34 (0.097)	10.10 (0.099)
	115	10.25 (0.098)	10.14 (0.099)	10.04 (0.100)	9.76 (0.102)	10.40 (0.096)	10.32 (0.097)	10.23 (0.098)	10.01 (0.100)
	125	10.15 (0.099)	10.05 (0.099)	9.95 (0.100)	9.70 (0.103)	10.29 (0.097)	10.22 (0.098)	10.14 (0.099)	9.93 (0.101)
	135	10.05 (0.100)	9.97 (0.100)	9.88 (0.101)	9.65 (0.104)	10.19 (0.098)	10.13 (0.099)	10.05 (0.099)	9.86 (0.101)
Extruded polystyrene, 2 in.	85	12.57 (0.080)	12.45 (0.080)	12.32 (0.081)	12.00 (0.083)	12.76 (0.078)	12.67 (0.079)	12.57 (0.080)	12.31 (0.081)
	95	12.46 (0.080)	12.34 (0.081)	12.22 (0.082)	11.91 (0.084)	12.63 (0.079)	12.54 (0.080)	12.45 (0.080)	12.20 (0.082)
	105	12.35 (0.081)	12.24 (0.082)	12.13 (0.082)	11.83 (0.084)	12.51 (0.080)	12.43 (0.080)	12.34 (0.081)	12.10 (0.083)
	115	12.25 (0.082)	12.14 (0.082)	12.04 (0.083)	11.76 (0.085)	12.40 (0.081)	12.32 (0.081)	12.23 (0.082)	12.01 (0.083)
	125	12.15 (0.082)	12.05 (0.083)	11.95 (0.084)	11.70 (0.085)	12.29 (0.081)	12.22 (0.082)	12.14 (0.082)	11.93 (0.084)
	135	12.05 (0.083)	11.97 (0.084)	11.88 (0.084)	11.65 (0.086)	12.19 (0.082)	12.13 (0.082)	12.05 (0.083)	11.86 (0.084)
Polyisocyanurate, 2 in.	85	16.97 (0.059)	16.85 (0.059)	16.72 (0.060)	16.40 (0.061)	17.16 (0.058)	17.07 (0.059)	16.97 (0.059)	16.71 (0.060)
	95	16.86 (0.059)	16.74 (0.060)	16.62 (0.060)	16.31 (0.061)	17.03 (0.059)	16.94 (0.059)	16.85 (0.059)	16.60 (0.060)
	105	16.75 (0.060)	16.64 (0.060)	16.53 (0.061)	16.23 (0.062)	16.91 (0.059)	16.83 (0.059)	16.74 (0.060)	16.50 (0.061)
	115	16.65 (0.060)	16.54 (0.060)	16.44 (0.061)	16.16 (0.062)	16.80 (0.060)	16.72 (0.060)	16.63 (0.060)	16.41 (0.061)
	125	16.55 (0.060)	16.45 (0.061)	16.35 (0.061)	16.10 (0.062)	16.69 (0.060)	16.62 (0.060)	16.54 (0.060)	16.33 (0.061)
	135	16.45 (0.061)	16.37 (0.061)	16.28 (0.061)	16.05 (0.062)	16.59 (0.060)	16.53 (0.061)	16.45 (0.061)	16.26 (0.062)
Extruded Polystyrene, 2 1/2 in	85	15.07 (0.066)	14.95 (0.067)	14.82 (0.067)	14.50 (0.069)	15.26 (0.066)	15.17 (0.066)	15.07 (0.066)	14.81 (0.068)
	95	14.96 (0.067)	14.84 (0.067)	14.72 (0.068)	14.41 (0.069)	15.13 (0.066)	15.04 (0.066)	14.95 (0.067)	14.70 (0.068)
	105	14.85 (0.067)	14.74 (0.068)	14.63 (0.068)	14.33 (0.070)	15.01 (0.067)	14.93 (0.067)	14.84 (0.067)	14.60 (0.069)
	115	14.75 (0.068)	14.64 (0.068)	14.54 (0.069)	14.26 (0.070)	14.90 (0.067)	14.82 (0.067)	14.73 (0.068)	14.51 (0.069)
	125	14.65 (0.068)	14.55 (0.069)	14.45 (0.069)	14.20 (0.070)	14.79 (0.068)	14.72 (0.068)	14.64 (0.068)	14.43 (0.069)
	135	14.55 (0.069)	14.47 (0.069)	14.38 (0.070)	14.15 (0.071)	14.69 (0.068)	14.63 (0.068)	14.55 (0.069)	14.36 (0.070)
Expanded polystyrene, 3 in.	85	14.57 (0.069)	14.45 (0.069)	14.32 (0.070)	14.00 (0.071)	14.76 (0.068)	14.67 (0.068)	14.57 (0.069)	14.31 (0.070)
	95	14.46 (0.069)	14.34 (0.070)	14.22 (0.070)	13.91 (0.072)	14.63 (0.068)	14.54 (0.069)	14.45 (0.069)	14.20 (0.070)
	105	14.35 (0.070)	14.24 (0.070)	14.13 (0.071)	13.83 (0.072)	14.51 (0.069)	14.43 (0.069)	14.34 (0.070)	14.10 (0.071)
	115	14.25 (0.070)	14.14 (0.071)	14.04 (0.071)	13.76 (0.073)	14.40 (0.069)	14.32 (0.070)	14.23 (0.070)	14.01 (0.071)
	125	14.15 (0.071)	14.05 (0.071)	13.95 (0.072)	13.70 (0.073)	14.29 (0.070)	14.22 (0.070)	14.14 (0.071)	13.93 (0.072)
	135	14.05 (0.071)	13.97 (0.072)	13.88 (0.072)	13.65 (0.073)	14.19 (0.070)	14.13 (0.071)	14.05 (0.071)	13.86 (0.072)
Polyisocyanurate, 3 in.	85	23.77 (0.042)	23.65 (0.042)	23.52 (0.043)	23.20 (0.043)	23.96 (0.042)	23.87 (0.042)	23.77 (0.042)	23.51 (0.043)
	95	23.66 (0.042)	23.54 (0.042)	23.42 (0.043)	23.11 (0.043)	23.83 (0.042)	23.74 (0.042)	23.65 (0.042)	23.40 (0.043)
	105	23.55 (0.042)	23.44 (0.043)	23.33 (0.043)	23.03 (0.043)	23.71 (0.042)	23.63 (0.042)	23.54 (0.042)	23.30 (0.043)
	115	23.45 (0.043)	23.34 (0.043)	23.24 (0.043)	22.96 (0.044)	23.60 (0.042)	23.52 (0.043)	23.43 (0.043)	23.21 (0.043)
	125	23.35 (0.043)	23.25 (0.043)	23.15 (0.043)	22.90 (0.044)	23.49 (0.043)	23.42 (0.043)	23.34 (0.043)	23.13 (0.043)
	135	23.25 (0.043)	23.17 (0.043)	23.08 (0.043)	22.85 (0.044)	23.39 (0.043)	23.33 (0.043)	23.25 (0.043)	23.06 (0.043)

*Assembly details page 14.



Rigid insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.51 (0.105)	9.46 (0.106)	9.41 (0.106)	9.25 (0.108)	9.53 (0.105)	9.52 (0.105)	9.51 (0.105)	9.48 (0.105)
	95	9.38 (0.107)	9.34 (0.107)	9.28 (0.108)	9.13 (0.109)	9.41 (0.106)	9.40 (0.106)	9.39 (0.106)	9.36 (0.107)
	105	9.27 (0.108)	9.22 (0.108)	9.17 (0.109)	9.03 (0.111)	9.30 (0.108)	9.29 (0.108)	9.28 (0.108)	9.25 (0.108)
	115	9.16 (0.109)	9.12 (0.110)	9.07 (0.110)	8.93 (0.112)	9.20 (0.109)	9.19 (0.109)	9.18 (0.109)	9.15 (0.109)
	125	9.05 (0.110)	9.02 (0.111)	8.97 (0.111)	8.85 (0.113)	9.10 (0.110)	9.09 (0.110)	9.08 (0.110)	9.06 (0.110)
	135	8.96 (0.112)	8.92 (0.112)	8.88 (0.113)	8.76 (0.114)	9.01 (0.111)	9.00 (0.111)	8.99 (0.111)	8.97 (0.111)
Expanded polystyrene, 1 1/2 in.	85	8.81 (0.114)	8.76 (0.114)	8.71 (0.115)	8.55 (0.117)	8.83 (0.113)	8.82 (0.113)	8.81 (0.113)	8.78 (0.114)
	95	8.68 (0.115)	8.64 (0.116)	8.58 (0.116)	8.43 (0.119)	8.71 (0.115)	8.70 (0.115)	8.69 (0.115)	8.66 (0.115)
	105	8.57 (0.117)	8.52 (0.117)	8.47 (0.118)	8.33 (0.120)	8.60 (0.116)	8.59 (0.116)	8.58 (0.117)	8.55 (0.117)
	115	8.46 (0.118)	8.42 (0.119)	8.37 (0.119)	8.23 (0.121)	8.50 (0.118)	8.49 (0.118)	8.48 (0.118)	8.45 (0.118)
	125	8.35 (0.120)	8.32 (0.120)	8.27 (0.121)	8.15 (0.123)	8.40 (0.119)	8.39 (0.119)	8.38 (0.119)	8.36 (0.120)
	135	8.26 (0.121)	8.22 (0.122)	8.18 (0.122)	8.06 (0.124)	8.31 (0.120)	8.30 (0.120)	8.29 (0.121)	8.27 (0.121)
Expanded polystyrene, 2 in.	85	10.81 (0.093)	10.76 (0.093)	10.71 (0.093)	10.55 (0.095)	10.83 (0.092)	10.82 (0.092)	10.81 (0.092)	10.78 (0.093)
	95	10.68 (0.094)	10.64 (0.094)	10.58 (0.094)	10.43 (0.096)	10.71 (0.093)	10.70 (0.093)	10.69 (0.094)	10.66 (0.094)
	105	10.57 (0.095)	10.52 (0.095)	10.47 (0.095)	10.33 (0.097)	10.60 (0.094)	10.59 (0.094)	10.58 (0.094)	10.55 (0.095)
	115	10.46 (0.096)	10.42 (0.096)	10.37 (0.096)	10.23 (0.098)	10.50 (0.095)	10.49 (0.095)	10.48 (0.095)	10.45 (0.096)
	125	10.35 (0.097)	10.32 (0.097)	10.27 (0.097)	10.15 (0.099)	10.40 (0.096)	10.39 (0.096)	10.38 (0.096)	10.36 (0.097)
	135	10.26 (0.097)	10.22 (0.098)	10.18 (0.098)	10.06 (0.099)	10.31 (0.097)	10.30 (0.097)	10.29 (0.097)	10.27 (0.097)
Extruded polystyrene, 2 in.	85	12.81 (0.078)	12.76 (0.078)	12.71 (0.079)	12.55 (0.080)	12.83 (0.078)	12.82 (0.078)	12.81 (0.078)	12.78 (0.078)
	95	12.68 (0.079)	12.64 (0.079)	12.58 (0.079)	12.43 (0.080)	12.71 (0.079)	12.70 (0.079)	12.69 (0.079)	12.66 (0.079)
	105	12.57 (0.080)	12.52 (0.080)	12.47 (0.080)	12.33 (0.081)	12.60 (0.079)	12.59 (0.079)	12.58 (0.079)	12.55 (0.080)
	115	12.46 (0.080)	12.42 (0.081)	12.37 (0.081)	12.23 (0.082)	12.50 (0.080)	12.49 (0.080)	12.48 (0.080)	12.45 (0.080)
	125	12.35 (0.081)	12.32 (0.081)	12.27 (0.081)	12.15 (0.082)	12.40 (0.081)	12.39 (0.081)	12.38 (0.081)	12.36 (0.081)
	135	12.26 (0.082)	12.22 (0.082)	12.18 (0.082)	12.06 (0.083)	12.31 (0.081)	12.30 (0.081)	12.29 (0.081)	12.27 (0.081)
Polyisocyanurate, 2 in.	85	17.21 (0.058)	17.16 (0.058)	17.11 (0.058)	16.95 (0.059)	17.23 (0.058)	17.22 (0.058)	17.21 (0.058)	17.18 (0.058)
	95	17.08 (0.059)	17.04 (0.059)	16.98 (0.059)	16.83 (0.059)	17.11 (0.058)	17.10 (0.058)	17.09 (0.059)	17.06 (0.059)
	105	16.97 (0.059)	16.92 (0.059)	16.87 (0.059)	16.73 (0.060)	17.00 (0.059)	16.99 (0.059)	16.98 (0.059)	16.95 (0.059)
	115	16.86 (0.059)	16.82 (0.059)	16.77 (0.060)	16.63 (0.060)	16.90 (0.059)	16.89 (0.059)	16.88 (0.059)	16.85 (0.059)
	125	16.75 (0.060)	16.72 (0.060)	16.67 (0.060)	16.55 (0.060)	16.80 (0.060)	16.79 (0.060)	16.78 (0.060)	16.76 (0.060)
	135	16.66 (0.060)	16.62 (0.060)	16.58 (0.060)	16.46 (0.061)	16.71 (0.060)	16.70 (0.060)	16.69 (0.060)	16.67 (0.060)
Extruded Polystyrene, 2 1/2 in	85	15.31 (0.065)	15.26 (0.066)	15.21 (0.066)	15.05 (0.066)	15.33 (0.065)	15.32 (0.065)	15.31 (0.065)	15.28 (0.065)
	95	15.18 (0.066)	15.14 (0.066)	15.08 (0.066)	14.93 (0.067)	15.21 (0.066)	15.20 (0.066)	15.19 (0.066)	15.16 (0.066)
	105	15.07 (0.066)	15.02 (0.067)	14.97 (0.067)	14.83 (0.067)	15.10 (0.066)	15.09 (0.066)	15.08 (0.066)	15.05 (0.066)
	115	14.96 (0.067)	14.92 (0.067)	14.87 (0.067)	14.73 (0.068)	15.00 (0.067)	14.99 (0.067)	14.98 (0.067)	14.95 (0.067)
	125	14.85 (0.067)	14.82 (0.067)	14.77 (0.068)	14.65 (0.068)	14.90 (0.067)	14.89 (0.067)	14.88 (0.067)	14.86 (0.067)
	135	14.76 (0.068)	14.72 (0.068)	14.68 (0.068)	14.56 (0.069)	14.81 (0.068)	14.80 (0.068)	14.79 (0.068)	14.77 (0.068)
Expanded polystyrene, 3 in.	85	14.81 (0.068)	14.76 (0.068)	14.71 (0.068)	14.55 (0.069)	14.83 (0.067)	14.82 (0.067)	14.81 (0.067)	14.78 (0.068)
	95	14.68 (0.068)	14.64 (0.068)	14.58 (0.069)	14.43 (0.069)	14.71 (0.068)	14.70 (0.068)	14.69 (0.068)	14.66 (0.068)
	105	14.57 (0.069)	14.52 (0.069)	14.47 (0.069)	14.33 (0.070)	14.60 (0.068)	14.59 (0.069)	14.58 (0.069)	14.55 (0.069)
	115	14.46 (0.069)	14.42 (0.069)	14.37 (0.070)	14.23 (0.070)	14.50 (0.069)	14.49 (0.069)	14.48 (0.069)	14.45 (0.069)
	125	14.35 (0.070)	14.32 (0.070)	14.27 (0.070)	14.15 (0.071)	14.40 (0.069)	14.39 (0.069)	14.38 (0.070)	14.36 (0.070)
	135	14.26 (0.070)	14.22 (0.070)	14.18 (0.071)	14.06 (0.071)	14.31 (0.070)	14.30 (0.070)	14.29 (0.070)	14.27 (0.070)
Polyisocyanurate, 3 in.	85	24.01 (0.042)	23.96 (0.042)	23.91 (0.042)	23.75 (0.042)	24.03 (0.042)	24.02 (0.042)	24.01 (0.042)	23.98 (0.042)
	95	23.88 (0.042)	23.84 (0.042)	23.78 (0.042)	23.63 (0.042)	23.91 (0.042)	23.90 (0.042)	23.89 (0.042)	23.86 (0.042)
	105	23.77 (0.042)	23.72 (0.042)	23.67 (0.042)	23.53 (0.043)	23.80 (0.042)	23.79 (0.042)	23.78 (0.042)	23.75 (0.042)
	115	23.66 (0.042)	23.62 (0.042)	23.57 (0.042)	23.43 (0.043)	23.70 (0.042)	23.69 (0.042)	23.68 (0.042)	23.65 (0.042)
	125	23.55 (0.042)	23.52 (0.043)	23.47 (0.043)	23.35 (0.043)	23.60 (0.042)	23.59 (0.042)	23.58 (0.042)	23.56 (0.042)
	135	23.46 (0.043)	23.42 (0.043)	23.38 (0.043)	23.26 (0.043)	23.51 (0.043)	23.50 (0.043)	23.49 (0.043)	23.47 (0.043)



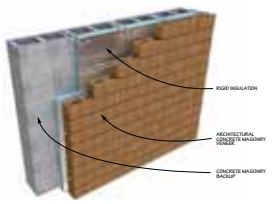
CONCRETE MASONRY CAVITY ASSEMBLIES
NO INTERIOR FINISHES

Assembly 1-9: Continuous insulation in cavity, 4-in. concrete masonry veneer
(Continued on next page)

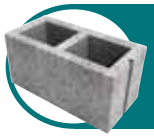
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.27 (0.108)	9.15 (0.109)	9.02 (0.111)	8.68 (0.115)	9.43 (0.106)	9.34 (0.107)	9.24 (0.108)	8.98 (0.111)
	95	9.18 (0.109)	9.05 (0.110)	8.92 (0.112)	8.60 (0.116)	9.32 (0.107)	9.23 (0.108)	9.13 (0.110)	8.87 (0.113)
	105	9.08 (0.110)	8.96 (0.112)	8.84 (0.113)	8.53 (0.117)	9.21 (0.109)	9.13 (0.110)	9.03 (0.111)	8.78 (0.114)
	115	9.00 (0.111)	8.88 (0.113)	8.76 (0.114)	8.46 (0.118)	9.12 (0.110)	9.03 (0.111)	8.94 (0.112)	8.70 (0.115)
	125	8.92 (0.112)	8.81 (0.114)	8.69 (0.115)	8.40 (0.119)	9.03 (0.111)	8.95 (0.112)	8.86 (0.113)	8.63 (0.116)
	135	8.85 (0.113)	8.74 (0.114)	8.63 (0.116)	8.35 (0.120)	8.95 (0.112)	8.87 (0.113)	8.79 (0.114)	8.56 (0.117)
Closed cell spray polyurethane foam, 1 in.	85	11.07 (0.090)	10.95 (0.091)	10.82 (0.092)	10.48 (0.095)	11.23 (0.089)	11.14 (0.090)	11.04 (0.091)	10.78 (0.093)
	95	10.98 (0.091)	10.85 (0.092)	10.72 (0.093)	10.40 (0.096)	11.12 (0.090)	11.03 (0.091)	10.93 (0.091)	10.67 (0.094)
	105	10.88 (0.092)	10.76 (0.093)	10.64 (0.094)	10.33 (0.097)	11.01 (0.091)	10.93 (0.092)	10.83 (0.092)	10.58 (0.095)
	115	10.80 (0.093)	10.68 (0.094)	10.56 (0.095)	10.26 (0.097)	10.92 (0.092)	10.83 (0.092)	10.74 (0.093)	10.50 (0.095)
	125	10.72 (0.093)	10.61 (0.094)	10.49 (0.095)	10.20 (0.098)	10.83 (0.092)	10.75 (0.093)	10.66 (0.094)	10.43 (0.096)
	135	10.65 (0.094)	10.54 (0.095)	10.43 (0.096)	10.15 (0.098)	10.75 (0.093)	10.67 (0.094)	10.59 (0.094)	10.36 (0.097)
Polyisocyanurate, 1 in.	85	12.80 (0.078)	12.68 (0.079)	12.55 (0.080)	12.21 (0.082)	12.96 (0.077)	12.87 (0.078)	12.77 (0.078)	12.51 (0.080)
	95	12.71 (0.079)	12.58 (0.079)	12.45 (0.080)	12.13 (0.082)	12.85 (0.078)	12.76 (0.078)	12.66 (0.079)	12.40 (0.081)
	105	12.61 (0.079)	12.49 (0.080)	12.37 (0.081)	12.06 (0.083)	12.74 (0.078)	12.66 (0.079)	12.56 (0.080)	12.31 (0.081)
	115	12.53 (0.080)	12.41 (0.081)	12.29 (0.081)	11.99 (0.083)	12.65 (0.079)	12.56 (0.080)	12.47 (0.080)	12.23 (0.082)
	125	12.45 (0.080)	12.34 (0.081)	12.22 (0.082)	11.93 (0.084)	12.56 (0.080)	12.48 (0.080)	12.39 (0.081)	12.16 (0.082)
	135	12.38 (0.081)	12.27 (0.082)	12.16 (0.082)	11.88 (0.084)	12.48 (0.080)	12.40 (0.081)	12.32 (0.081)	12.09 (0.083)
Extruded polystyrene, 1 1/2 in.	85	11.77 (0.085)	11.65 (0.086)	11.52 (0.087)	11.18 (0.089)	11.93 (0.084)	11.84 (0.084)	11.74 (0.085)	11.48 (0.087)
	95	11.68 (0.086)	11.55 (0.087)	11.42 (0.088)	11.10 (0.090)	11.82 (0.085)	11.73 (0.085)	11.63 (0.086)	11.37 (0.088)
	105	11.58 (0.086)	11.46 (0.087)	11.34 (0.088)	11.03 (0.091)	11.71 (0.085)	11.63 (0.086)	11.53 (0.087)	11.28 (0.089)
	115	11.50 (0.087)	11.38 (0.088)	11.26 (0.089)	10.96 (0.091)	11.62 (0.086)	11.53 (0.087)	11.44 (0.087)	11.20 (0.089)
	125	11.42 (0.088)	11.31 (0.088)	11.19 (0.089)	10.90 (0.092)	11.53 (0.087)	11.45 (0.087)	11.36 (0.088)	11.13 (0.090)
	135	11.35 (0.088)	11.24 (0.089)	11.13 (0.090)	10.85 (0.092)	11.45 (0.087)	11.37 (0.088)	11.29 (0.089)	11.06 (0.090)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.17 (0.071)	14.05 (0.071)	13.92 (0.072)	13.58 (0.074)	14.33 (0.070)	14.24 (0.070)	14.14 (0.071)	13.88 (0.072)
	95	14.08 (0.071)	13.95 (0.072)	13.82 (0.072)	13.50 (0.074)	14.22 (0.070)	14.13 (0.071)	14.03 (0.071)	13.77 (0.073)
	105	13.98 (0.072)	13.86 (0.072)	13.74 (0.073)	13.43 (0.074)	14.11 (0.071)	14.03 (0.071)	13.93 (0.072)	13.68 (0.073)
	115	13.90 (0.072)	13.78 (0.073)	13.66 (0.073)	13.36 (0.075)	14.02 (0.071)	13.93 (0.072)	13.84 (0.072)	13.60 (0.074)
	125	13.82 (0.072)	13.71 (0.073)	13.59 (0.074)	13.30 (0.075)	13.93 (0.072)	13.85 (0.072)	13.76 (0.073)	13.53 (0.074)
	135	13.75 (0.073)	13.64 (0.073)	13.53 (0.074)	13.25 (0.075)	13.85 (0.072)	13.77 (0.073)	13.69 (0.073)	13.46 (0.074)
Polyisocyanurate, 1 1/2 in.	85	16.60 (0.060)	16.48 (0.061)	16.35 (0.061)	16.01 (0.062)	16.76 (0.060)	16.67 (0.060)	16.57 (0.060)	16.31 (0.061)
	95	16.51 (0.061)	16.38 (0.061)	16.25 (0.062)	15.93 (0.063)	16.65 (0.060)	16.56 (0.060)	16.46 (0.061)	16.20 (0.062)
	105	16.41 (0.061)	16.29 (0.061)	16.17 (0.062)	15.86 (0.063)	16.54 (0.060)	16.46 (0.061)	16.36 (0.061)	16.11 (0.062)
	115	16.33 (0.061)	16.21 (0.062)	16.09 (0.062)	15.79 (0.063)	16.45 (0.061)	16.36 (0.061)	16.27 (0.061)	16.03 (0.062)
	125	16.25 (0.062)	16.14 (0.062)	16.02 (0.062)	15.73 (0.064)	16.36 (0.061)	16.28 (0.061)	16.19 (0.062)	15.96 (0.063)
	135	16.18 (0.062)	16.07 (0.062)	15.96 (0.063)	15.68 (0.064)	16.28 (0.061)	16.20 (0.062)	16.12 (0.062)	15.89 (0.063)
Extruded polystyrene, 2 in.	85	14.27 (0.070)	14.15 (0.071)	14.02 (0.071)	13.68 (0.073)	14.43 (0.069)	14.34 (0.070)	14.24 (0.070)	13.98 (0.072)
	95	14.18 (0.071)	14.05 (0.071)	13.92 (0.072)	13.60 (0.074)	14.32 (0.070)	14.23 (0.070)	14.13 (0.071)	13.87 (0.072)
	105	14.08 (0.071)	13.96 (0.072)	13.84 (0.072)	13.53 (0.074)	14.21 (0.070)	14.13 (0.071)	14.03 (0.071)	13.78 (0.073)
	115	14.00 (0.071)	13.88 (0.072)	13.76 (0.073)	13.46 (0.074)	14.12 (0.071)	14.03 (0.071)	13.94 (0.072)	13.70 (0.073)
	125	13.92 (0.072)	13.81 (0.072)	13.69 (0.073)	13.40 (0.075)	14.03 (0.071)	13.95 (0.072)	13.86 (0.072)	13.63 (0.073)
	135	13.85 (0.072)	13.74 (0.073)	13.63 (0.073)	13.35 (0.075)	13.95 (0.072)	13.87 (0.072)	13.79 (0.073)	13.56 (0.074)
Closed cell spray polyurethane foam, 2 in.	85	17.27 (0.058)	17.15 (0.058)	17.02 (0.059)	16.68 (0.060)	17.43 (0.057)	17.34 (0.058)	17.24 (0.058)	16.98 (0.059)
	95	17.18 (0.058)	17.05 (0.059)	16.92 (0.059)	16.60 (0.060)	17.32 (0.058)	17.23 (0.058)	17.13 (0.058)	16.87 (0.059)
	105	17.08 (0.059)	16.96 (0.059)	16.84 (0.059)	16.53 (0.061)	17.21 (0.058)	17.13 (0.058)	17.03 (0.059)	16.78 (0.060)
	115	17.00 (0.059)	16.88 (0.059)	16.76 (0.060)	16.46 (0.061)	17.12 (0.058)	17.03 (0.059)	16.94 (0.059)	16.70 (0.060)
	125	16.92 (0.059)	16.81 (0.059)	16.69 (0.060)	16.40 (0.061)	17.03 (0.059)	16.95 (0.059)	16.86 (0.059)	16.63 (0.060)
	135	16.85 (0.059)	16.74 (0.060)	16.63 (0.060)	16.35 (0.061)	16.95 (0.059)	16.87 (0.059)	16.79 (0.060)	16.56 (0.060)
Polyisocyanurate, 2 in.	85	20.50 (0.049)	20.38 (0.049)	20.25 (0.049)	19.91 (0.050)	20.66 (0.048)	20.57 (0.049)	20.47 (0.049)	20.21 (0.049)
	95	20.41 (0.049)	20.28 (0.049)	20.15 (0.050)	19.83 (0.050)	20.55 (0.049)	20.46 (0.049)	20.36 (0.049)	20.10 (0.050)
	105	20.31 (0.049)	20.19 (0.050)	20.07 (0.050)	19.76 (0.051)	20.44 (0.049)	20.36 (0.049)	20.26 (0.049)	20.01 (0.050)
	115	20.23 (0.049)	20.11 (0.050)	19.99 (0.050)	19.69 (0.051)	20.35 (0.049)	20.26 (0.049)	20.17 (0.050)	19.93 (0.050)
	125	20.15 (0.050)	20.04 (0.050)	19.92 (0.050)	19.63 (0.051)	20.26 (0.049)	20.18 (0.050)	20.09 (0.050)	19.86 (0.050)
	135	20.08 (0.050)	19.97 (0.050)	19.86 (0.050)	19.58 (0.051)	20.18 (0.050)	20.10 (0.050)	20.02 (0.050)	19.79 (0.051)

*Assembly details page 15.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.45 (0.106)	9.40 (0.106)	9.35 (0.107)	9.19 (0.109)	9.46 (0.106)	9.45 (0.106)	9.44 (0.106)	9.41 (0.106)
	95	9.34 (0.107)	9.29 (0.108)	9.24 (0.108)	9.09 (0.110)	9.35 (0.107)	9.34 (0.107)	9.33 (0.107)	9.30 (0.108)
	105	9.24 (0.108)	9.19 (0.109)	9.14 (0.109)	8.99 (0.111)	9.25 (0.108)	9.24 (0.108)	9.23 (0.108)	9.20 (0.109)
	115	9.15 (0.109)	9.10 (0.110)	9.05 (0.110)	8.91 (0.112)	9.16 (0.109)	9.15 (0.109)	9.15 (0.109)	9.12 (0.110)
	125	9.06 (0.110)	9.02 (0.111)	8.97 (0.111)	8.83 (0.113)	9.08 (0.110)	9.08 (0.110)	9.07 (0.110)	9.04 (0.111)
	135	8.99 (0.111)	8.95 (0.112)	8.90 (0.112)	8.77 (0.114)	9.01 (0.111)	9.00 (0.111)	9.00 (0.111)	8.97 (0.111)
Closed cell spray polyurethane foam, 1 in.	85	11.25 (0.089)	11.20 (0.089)	11.15 (0.090)	10.99 (0.091)	11.26 (0.089)	11.25 (0.089)	11.24 (0.089)	11.21 (0.089)
	95	11.14 (0.090)	11.09 (0.090)	11.04 (0.091)	10.89 (0.092)	11.15 (0.090)	11.14 (0.090)	11.13 (0.090)	11.10 (0.090)
	105	11.04 (0.091)	10.99 (0.091)	10.94 (0.091)	10.79 (0.093)	11.05 (0.091)	11.04 (0.091)	11.03 (0.091)	11.00 (0.091)
	115	10.95 (0.091)	10.90 (0.092)	10.85 (0.092)	10.71 (0.093)	10.96 (0.091)	10.95 (0.091)	10.95 (0.091)	10.92 (0.092)
	125	10.86 (0.092)	10.82 (0.092)	10.77 (0.093)	10.63 (0.094)	10.88 (0.092)	10.88 (0.092)	10.87 (0.092)	10.84 (0.092)
	135	10.79 (0.093)	10.75 (0.093)	10.70 (0.093)	10.57 (0.095)	10.81 (0.092)	10.80 (0.093)	10.80 (0.093)	10.77 (0.093)
Polyisocyanurate, 1 in.	85	12.98 (0.077)	12.93 (0.077)	12.88 (0.078)	12.72 (0.079)	12.99 (0.077)	12.98 (0.077)	12.97 (0.077)	12.94 (0.077)
	95	12.87 (0.078)	12.82 (0.078)	12.77 (0.078)	12.62 (0.079)	12.88 (0.078)	12.87 (0.078)	12.86 (0.078)	12.83 (0.078)
	105	12.77 (0.078)	12.72 (0.079)	12.67 (0.079)	12.52 (0.080)	12.78 (0.078)	12.77 (0.078)	12.76 (0.078)	12.73 (0.079)
	115	12.68 (0.079)	12.63 (0.079)	12.58 (0.079)	12.44 (0.080)	12.69 (0.079)	12.68 (0.079)	12.68 (0.079)	12.65 (0.079)
	125	12.59 (0.079)	12.55 (0.080)	12.50 (0.080)	12.36 (0.081)	12.61 (0.079)	12.61 (0.079)	12.60 (0.079)	12.57 (0.080)
	135	12.52 (0.080)	12.48 (0.080)	12.43 (0.080)	12.30 (0.081)	12.54 (0.080)	12.53 (0.080)	12.53 (0.080)	12.50 (0.080)
Extruded polystyrene, 1 1/2 in.	85	11.95 (0.084)	11.90 (0.084)	11.85 (0.084)	11.69 (0.086)	11.96 (0.084)	11.95 (0.084)	11.94 (0.084)	11.91 (0.084)
	95	11.84 (0.084)	11.79 (0.085)	11.74 (0.085)	11.59 (0.086)	11.85 (0.084)	11.84 (0.084)	11.83 (0.085)	11.80 (0.085)
	105	11.74 (0.085)	11.69 (0.086)	11.64 (0.086)	11.49 (0.087)	11.75 (0.085)	11.74 (0.085)	11.73 (0.085)	11.70 (0.085)
	115	11.65 (0.086)	11.60 (0.086)	11.55 (0.087)	11.41 (0.088)	11.66 (0.086)	11.65 (0.086)	11.65 (0.086)	11.62 (0.086)
	125	11.56 (0.086)	11.52 (0.087)	11.47 (0.087)	11.33 (0.088)	11.58 (0.086)	11.58 (0.086)	11.57 (0.086)	11.54 (0.087)
	135	11.49 (0.087)	11.45 (0.087)	11.40 (0.088)	11.27 (0.089)	11.51 (0.087)	11.50 (0.087)	11.50 (0.087)	11.47 (0.087)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.35 (0.070)	14.30 (0.070)	14.25 (0.070)	14.09 (0.071)	14.36 (0.070)	14.35 (0.070)	14.34 (0.070)	14.31 (0.070)
	95	14.24 (0.070)	14.19 (0.070)	14.14 (0.071)	13.99 (0.071)	14.25 (0.070)	14.24 (0.070)	14.23 (0.070)	14.20 (0.070)
	105	14.14 (0.071)	14.09 (0.071)	14.04 (0.071)	13.89 (0.072)	14.15 (0.071)	14.14 (0.071)	14.13 (0.071)	14.10 (0.071)
	115	14.05 (0.071)	14.00 (0.071)	13.95 (0.072)	13.81 (0.072)	14.06 (0.071)	14.05 (0.071)	14.05 (0.071)	14.02 (0.071)
	125	13.96 (0.072)	13.92 (0.072)	13.87 (0.072)	13.73 (0.073)	13.98 (0.072)	13.98 (0.072)	13.97 (0.072)	13.94 (0.072)
	135	13.89 (0.072)	13.85 (0.072)	13.80 (0.072)	13.67 (0.073)	13.91 (0.072)	13.90 (0.072)	13.90 (0.072)	13.87 (0.072)
Polyisocyanurate, 1 1/2 in.	85	16.78 (0.060)	16.73 (0.060)	16.68 (0.060)	16.52 (0.061)	16.79 (0.060)	16.78 (0.060)	16.77 (0.060)	16.74 (0.060)
	95	16.67 (0.060)	16.62 (0.060)	16.57 (0.060)	16.42 (0.061)	16.68 (0.060)	16.67 (0.060)	16.66 (0.060)	16.63 (0.060)
	105	16.57 (0.060)	16.52 (0.061)	16.47 (0.061)	16.32 (0.061)	16.58 (0.060)	16.57 (0.060)	16.56 (0.060)	16.53 (0.060)
	115	16.48 (0.061)	16.43 (0.061)	16.38 (0.061)	16.24 (0.062)	16.49 (0.061)	16.48 (0.061)	16.48 (0.061)	16.45 (0.061)
	125	16.39 (0.061)	16.35 (0.061)	16.30 (0.061)	16.16 (0.062)	16.41 (0.061)	16.41 (0.061)	16.40 (0.061)	16.37 (0.061)
	135	16.32 (0.061)	16.28 (0.061)	16.23 (0.062)	16.10 (0.062)	16.34 (0.061)	16.33 (0.061)	16.33 (0.061)	16.30 (0.061)
Extruded polystyrene, 2 in.	85	14.45 (0.069)	14.40 (0.069)	14.35 (0.070)	14.19 (0.070)	14.46 (0.069)	14.45 (0.069)	14.44 (0.069)	14.41 (0.069)
	95	14.34 (0.070)	14.29 (0.070)	14.24 (0.070)	14.09 (0.071)	14.35 (0.070)	14.34 (0.070)	14.33 (0.070)	14.30 (0.070)
	105	14.24 (0.070)	14.19 (0.070)	14.14 (0.071)	13.99 (0.071)	14.25 (0.070)	14.24 (0.070)	14.23 (0.070)	14.20 (0.070)
	115	14.15 (0.071)	14.10 (0.071)	14.05 (0.071)	13.91 (0.072)	14.16 (0.071)	14.15 (0.071)	14.15 (0.071)	14.12 (0.071)
	125	14.06 (0.071)	14.02 (0.071)	13.97 (0.072)	13.83 (0.072)	14.08 (0.071)	14.08 (0.071)	14.07 (0.071)	14.04 (0.071)
	135	13.99 (0.071)	13.95 (0.072)	13.90 (0.072)	13.77 (0.073)	14.01 (0.071)	14.00 (0.071)	14.00 (0.071)	13.97 (0.072)
Closed cell spray polyurethane foam, 2 in.	85	17.45 (0.057)	17.40 (0.057)	17.35 (0.058)	17.19 (0.058)	17.46 (0.057)	17.45 (0.057)	17.44 (0.057)	17.41 (0.057)
	95	17.34 (0.058)	17.29 (0.058)	17.24 (0.058)	17.09 (0.059)	17.35 (0.058)	17.34 (0.058)	17.33 (0.058)	17.30 (0.058)
	105	17.24 (0.058)	17.19 (0.058)	17.14 (0.058)	16.99 (0.059)	17.25 (0.058)	17.24 (0.058)	17.23 (0.058)	17.20 (0.058)
	115	17.15 (0.058)	17.10 (0.058)	17.05 (0.059)	16.91 (0.059)	17.16 (0.058)	17.15 (0.058)	17.15 (0.058)	17.12 (0.058)
	125	17.06 (0.059)	17.02 (0.059)	16.97 (0.059)	16.83 (0.059)	17.08 (0.059)	17.08 (0.059)	17.07 (0.059)	17.04 (0.059)
	135	16.99 (0.059)	16.95 (0.059)	16.90 (0.059)	16.77 (0.060)	17.01 (0.059)	17.00 (0.059)	17.00 (0.059)	16.97 (0.059)
Polyisocyanurate, 2 in.	85	20.68 (0.048)	20.63 (0.048)	20.58 (0.049)	20.42 (0.049)	20.69 (0.048)	20.68 (0.048)	20.67 (0.048)	20.64 (0.048)
	95	20.57 (0.049)	20.52 (0.049)	20.47 (0.049)	20.32 (0.049)	20.58 (0.049)	20.57 (0.049)	20.56 (0.049)	20.53 (0.049)
	105	20.47 (0.049)	20.42 (0.049)	20.37 (0.049)	20.22 (0.049)	20.48 (0.049)	20.47 (0.049)	20.46 (0.049)	20.43 (0.049)
	115	20.38 (0.049)	20.33 (0.049)	20.28 (0.049)	20.14 (0.050)	20.39 (0.049)	20.38 (0.049)	20.38 (0.049)	20.35 (0.049)
	125	20.29 (0.049)	20.25 (0.049)	20.20 (0.049)	20.06 (0.050)	20.31 (0.049)	20.31 (0.049)	20.30 (0.049)	20.27 (0.049)
	135	20.22 (0.049)	20.18 (0.050)	20.13 (0.050)	20.00 (0.050)	20.24 (0.049)	20.23 (0.049)	20.23 (0.049)	20.20 (0.050)



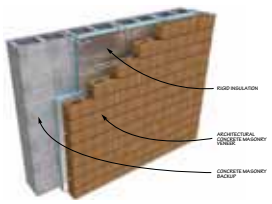
CONCRETE MASONRY CAVITY ASSEMBLIES
NO INTERIOR FINISHES

Assembly 1-9: Continuous insulation in cavity, 4-in. concrete masonry veneer (Continued from previous page)

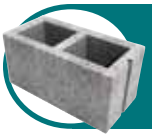
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	16.78 (0.060)	16.66 (0.060)	16.53 (0.060)	16.21 (0.062)	16.97 (0.059)	16.88 (0.059)	16.78 (0.060)	16.52 (0.061)
	95	16.67 (0.060)	16.55 (0.060)	16.43 (0.061)	16.12 (0.062)	16.84 (0.059)	16.75 (0.060)	16.66 (0.060)	16.41 (0.061)
	105	16.56 (0.060)	16.45 (0.061)	16.34 (0.061)	16.04 (0.062)	16.72 (0.060)	16.64 (0.060)	16.55 (0.060)	16.31 (0.061)
	115	16.46 (0.061)	16.35 (0.061)	16.25 (0.062)	15.97 (0.063)	16.61 (0.060)	16.53 (0.060)	16.44 (0.061)	16.22 (0.062)
	125	16.36 (0.061)	16.26 (0.061)	16.16 (0.062)	15.91 (0.063)	16.50 (0.061)	16.43 (0.061)	16.35 (0.061)	16.14 (0.062)
	135	16.26 (0.062)	16.18 (0.062)	16.09 (0.062)	15.86 (0.063)	16.40 (0.061)	16.34 (0.061)	16.26 (0.061)	16.07 (0.062)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.28 (0.049)	20.16 (0.050)	20.03 (0.050)	19.71 (0.051)	20.47 (0.049)	20.38 (0.049)	20.28 (0.049)	20.02 (0.050)
	95	20.17 (0.050)	20.05 (0.050)	19.93 (0.050)	19.62 (0.051)	20.34 (0.049)	20.25 (0.049)	20.16 (0.050)	19.91 (0.050)
	105	20.06 (0.050)	19.95 (0.050)	19.84 (0.050)	19.54 (0.051)	20.22 (0.049)	20.14 (0.050)	20.05 (0.050)	19.81 (0.050)
	115	19.96 (0.050)	19.85 (0.050)	19.75 (0.051)	19.47 (0.051)	20.11 (0.050)	20.03 (0.050)	19.94 (0.050)	19.72 (0.051)
	125	19.86 (0.050)	19.76 (0.051)	19.66 (0.051)	19.41 (0.052)	20.00 (0.050)	19.93 (0.050)	19.85 (0.050)	19.64 (0.051)
	135	19.76 (0.051)	19.68 (0.051)	19.59 (0.051)	19.36 (0.052)	19.90 (0.050)	19.84 (0.050)	19.76 (0.051)	19.57 (0.051)
Polyisocyanurate, 2 1/2 in.	85	23.91 (0.042)	23.79 (0.042)	23.66 (0.042)	23.34 (0.043)	24.10 (0.041)	24.01 (0.042)	23.91 (0.042)	23.65 (0.042)
	95	23.80 (0.042)	23.68 (0.042)	23.56 (0.042)	23.25 (0.043)	23.97 (0.042)	23.88 (0.042)	23.79 (0.042)	23.54 (0.042)
	105	23.69 (0.042)	23.58 (0.042)	23.47 (0.043)	23.17 (0.043)	23.85 (0.042)	23.77 (0.042)	23.68 (0.042)	23.44 (0.043)
	115	23.59 (0.042)	23.48 (0.043)	23.38 (0.043)	23.10 (0.043)	23.74 (0.042)	23.66 (0.042)	23.57 (0.042)	23.35 (0.043)
	125	23.49 (0.043)	23.39 (0.043)	23.29 (0.043)	23.04 (0.043)	23.63 (0.042)	23.56 (0.042)	23.48 (0.043)	23.27 (0.043)
	135	23.39 (0.043)	23.31 (0.043)	23.22 (0.043)	22.99 (0.044)	23.53 (0.042)	23.47 (0.043)	23.39 (0.043)	23.20 (0.043)
Extruded polystyrene, 3 in.	85	19.28 (0.052)	19.16 (0.052)	19.03 (0.053)	18.71 (0.053)	19.47 (0.051)	19.38 (0.052)	19.28 (0.052)	19.02 (0.053)
	95	19.17 (0.052)	19.05 (0.052)	18.93 (0.053)	18.62 (0.054)	19.34 (0.052)	19.25 (0.052)	19.16 (0.052)	18.91 (0.053)
	105	19.06 (0.052)	18.95 (0.053)	18.84 (0.053)	18.54 (0.054)	19.22 (0.052)	19.14 (0.052)	19.05 (0.053)	18.81 (0.053)
	115	18.96 (0.053)	18.85 (0.053)	18.75 (0.053)	18.47 (0.054)	19.11 (0.052)	19.03 (0.053)	18.94 (0.053)	18.72 (0.053)
	125	18.86 (0.053)	18.76 (0.053)	18.66 (0.054)	18.41 (0.054)	19.00 (0.053)	18.93 (0.053)	18.85 (0.053)	18.64 (0.054)
	135	18.76 (0.053)	18.68 (0.054)	18.59 (0.054)	18.36 (0.054)	18.90 (0.053)	18.84 (0.053)	18.76 (0.053)	18.57 (0.054)
Closed cell spray polyurethane foam, 3 in.	85	23.28 (0.043)	23.16 (0.043)	23.03 (0.043)	22.71 (0.044)	23.47 (0.043)	23.38 (0.043)	23.28 (0.043)	23.02 (0.043)
	95	23.17 (0.043)	23.05 (0.043)	22.93 (0.044)	22.62 (0.044)	23.34 (0.043)	23.25 (0.043)	23.16 (0.043)	22.91 (0.044)
	105	23.06 (0.043)	22.95 (0.044)	22.84 (0.044)	22.54 (0.044)	23.22 (0.043)	23.14 (0.043)	23.05 (0.043)	22.81 (0.044)
	115	22.96 (0.044)	22.85 (0.044)	22.75 (0.044)	22.47 (0.044)	23.11 (0.043)	23.03 (0.043)	22.94 (0.044)	22.72 (0.044)
	125	22.86 (0.044)	22.76 (0.044)	22.66 (0.044)	22.41 (0.045)	23.00 (0.043)	22.93 (0.044)	22.85 (0.044)	22.64 (0.044)
	135	22.76 (0.044)	22.68 (0.044)	22.59 (0.044)	22.36 (0.045)	22.90 (0.044)	22.84 (0.044)	22.76 (0.044)	22.57 (0.044)
Polyisocyanurate, 3 in.	85	27.31 (0.037)	27.19 (0.037)	27.06 (0.037)	26.74 (0.037)	27.50 (0.036)	27.41 (0.036)	27.31 (0.037)	27.05 (0.037)
	95	27.20 (0.037)	27.08 (0.037)	26.96 (0.037)	26.65 (0.038)	27.37 (0.037)	27.28 (0.037)	27.19 (0.037)	26.94 (0.037)
	105	27.09 (0.037)	26.98 (0.037)	26.87 (0.037)	26.57 (0.038)	27.25 (0.037)	27.17 (0.037)	27.08 (0.037)	26.84 (0.037)
	115	26.99 (0.037)	26.88 (0.037)	26.78 (0.037)	26.50 (0.038)	27.14 (0.037)	27.06 (0.037)	26.97 (0.037)	26.75 (0.037)
	125	26.89 (0.037)	26.79 (0.037)	26.69 (0.037)	26.44 (0.038)	27.03 (0.037)	26.96 (0.037)	26.88 (0.037)	26.67 (0.037)
	135	26.79 (0.037)	26.71 (0.037)	26.62 (0.038)	26.39 (0.038)	26.93 (0.037)	26.87 (0.037)	26.79 (0.037)	26.60 (0.038)
Extruded polystyrene, 3 1/2 in.	85	21.78 (0.046)	21.66 (0.046)	21.53 (0.046)	21.21 (0.047)	21.97 (0.046)	21.88 (0.046)	21.78 (0.046)	21.52 (0.046)
	95	21.67 (0.046)	21.55 (0.046)	21.43 (0.047)	21.12 (0.047)	21.84 (0.046)	21.75 (0.046)	21.66 (0.046)	21.41 (0.047)
	105	21.56 (0.046)	21.45 (0.047)	21.34 (0.047)	21.04 (0.048)	21.72 (0.046)	21.64 (0.046)	21.55 (0.046)	21.31 (0.047)
	115	21.46 (0.047)	21.35 (0.047)	21.25 (0.047)	20.97 (0.048)	21.61 (0.046)	21.53 (0.046)	21.44 (0.047)	21.22 (0.047)
	125	21.36 (0.047)	21.26 (0.047)	21.16 (0.047)	20.91 (0.048)	21.50 (0.047)	21.43 (0.047)	21.35 (0.047)	21.14 (0.047)
	135	21.26 (0.047)	21.18 (0.047)	21.09 (0.047)	20.86 (0.048)	21.40 (0.047)	21.34 (0.047)	21.26 (0.047)	21.07 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.28 (0.038)	26.16 (0.038)	26.03 (0.038)	25.71 (0.039)	26.47 (0.038)	26.38 (0.038)	26.28 (0.038)	26.02 (0.038)
	95	26.17 (0.038)	26.05 (0.038)	25.93 (0.039)	25.62 (0.039)	26.34 (0.038)	26.25 (0.038)	26.16 (0.038)	25.91 (0.039)
	105	26.06 (0.038)	25.95 (0.039)	25.84 (0.039)	25.54 (0.039)	26.22 (0.038)	26.14 (0.038)	26.05 (0.038)	25.81 (0.039)
	115	25.96 (0.039)	25.85 (0.039)	25.75 (0.039)	25.47 (0.039)	26.11 (0.038)	26.03 (0.038)	25.94 (0.039)	25.72 (0.039)
	125	25.86 (0.039)	25.76 (0.039)	25.66 (0.039)	25.41 (0.039)	26.00 (0.038)	25.93 (0.039)	25.85 (0.039)	25.64 (0.039)
	135	25.76 (0.039)	25.68 (0.039)	25.59 (0.039)	25.36 (0.039)	25.90 (0.039)	25.84 (0.039)	25.76 (0.039)	25.57 (0.039)
Polyisocyanurate, 3 1/2 in.	85	30.71 (0.033)	30.59 (0.033)	30.46 (0.033)	30.14 (0.033)	30.90 (0.032)	30.81 (0.032)	30.71 (0.033)	30.45 (0.033)
	95	30.60 (0.033)	30.48 (0.033)	30.36 (0.033)	30.05 (0.033)	30.77 (0.033)	30.68 (0.033)	30.59 (0.033)	30.34 (0.033)
	105	30.49 (0.033)	30.38 (0.033)	30.27 (0.033)	29.97 (0.033)	30.65 (0.033)	30.57 (0.033)	30.48 (0.033)	30.24 (0.033)
	115	30.39 (0.033)	30.28 (0.033)	30.18 (0.033)	29.90 (0.033)	30.54 (0.033)	30.46 (0.033)	30.37 (0.033)	30.15 (0.033)
	125	30.29 (0.033)	30.19 (0.033)	30.09 (0.033)	29.84 (0.034)	30.43 (0.033)	30.36 (0.033)	30.28 (0.033)	30.07 (0.033)
	135	30.19 (0.033)	30.11 (0.033)	30.02 (0.033)	29.79 (0.034)	30.33 (0.033)	30.27 (0.033)	30.19 (0.033)	30.00 (0.033)

*Assembly details page 15.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	17.02 (0.059)	16.97 (0.059)	16.92 (0.059)	16.76 (0.060)	17.04 (0.059)	17.03 (0.059)	17.02 (0.059)	16.99 (0.059)
	95	16.89 (0.059)	16.85 (0.059)	16.79 (0.060)	16.64 (0.060)	16.92 (0.059)	16.91 (0.059)	16.90 (0.059)	16.87 (0.059)
	105	16.78 (0.060)	16.73 (0.060)	16.68 (0.060)	16.54 (0.060)	16.81 (0.059)	16.80 (0.060)	16.79 (0.060)	16.76 (0.060)
	115	16.67 (0.060)	16.63 (0.060)	16.58 (0.060)	16.44 (0.061)	16.71 (0.060)	16.70 (0.060)	16.69 (0.060)	16.66 (0.060)
	125	16.56 (0.060)	16.53 (0.061)	16.48 (0.061)	16.36 (0.061)	16.61 (0.060)	16.60 (0.060)	16.59 (0.060)	16.57 (0.060)
	135	16.47 (0.061)	16.43 (0.061)	16.39 (0.061)	16.27 (0.061)	16.52 (0.061)	16.51 (0.061)	16.50 (0.061)	16.48 (0.061)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.52 (0.049)	20.47 (0.049)	20.42 (0.049)	20.26 (0.049)	20.54 (0.049)	20.53 (0.049)	20.52 (0.049)	20.49 (0.049)
	95	20.39 (0.049)	20.35 (0.049)	20.29 (0.049)	20.14 (0.050)	20.42 (0.049)	20.41 (0.049)	20.40 (0.049)	20.37 (0.049)
	105	20.28 (0.049)	20.23 (0.049)	20.18 (0.050)	20.04 (0.050)	20.31 (0.049)	20.30 (0.049)	20.29 (0.049)	20.26 (0.049)
	115	20.17 (0.050)	20.13 (0.050)	20.08 (0.050)	19.94 (0.050)	20.21 (0.049)	20.20 (0.050)	20.19 (0.050)	20.16 (0.050)
	125	20.06 (0.050)	20.03 (0.050)	19.98 (0.050)	19.86 (0.050)	20.11 (0.050)	20.10 (0.050)	20.09 (0.050)	20.07 (0.050)
	135	19.97 (0.050)	19.93 (0.050)	19.89 (0.050)	19.77 (0.051)	20.02 (0.050)	20.01 (0.050)	20.00 (0.050)	19.98 (0.050)
Polyisocyanurate, 2 1/2 in.	85	24.15 (0.041)	24.10 (0.041)	24.05 (0.042)	23.89 (0.042)	24.17 (0.041)	24.16 (0.041)	24.15 (0.041)	24.12 (0.041)
	95	24.02 (0.042)	23.98 (0.042)	23.92 (0.042)	23.77 (0.042)	24.05 (0.042)	24.04 (0.042)	24.03 (0.042)	24.00 (0.042)
	105	23.91 (0.042)	23.86 (0.042)	23.81 (0.042)	23.67 (0.042)	23.94 (0.042)	23.93 (0.042)	23.92 (0.042)	23.89 (0.042)
	115	23.80 (0.042)	23.76 (0.042)	23.71 (0.042)	23.57 (0.042)	23.84 (0.042)	23.83 (0.042)	23.82 (0.042)	23.79 (0.042)
	125	23.69 (0.042)	23.66 (0.042)	23.61 (0.042)	23.49 (0.043)	23.74 (0.042)	23.73 (0.042)	23.72 (0.042)	23.70 (0.042)
	135	23.60 (0.042)	23.56 (0.042)	23.52 (0.043)	23.40 (0.043)	23.65 (0.042)	23.64 (0.042)	23.63 (0.042)	23.61 (0.042)
Extruded polystyrene, 3 in.	85	19.52 (0.051)	19.47 (0.051)	19.42 (0.052)	19.26 (0.052)	19.54 (0.051)	19.53 (0.051)	19.52 (0.051)	19.49 (0.051)
	95	19.39 (0.052)	19.35 (0.052)	19.29 (0.052)	19.14 (0.052)	19.42 (0.051)	19.41 (0.052)	19.40 (0.052)	19.37 (0.052)
	105	19.28 (0.052)	19.23 (0.052)	19.18 (0.052)	19.04 (0.053)	19.31 (0.052)	19.30 (0.052)	19.29 (0.052)	19.26 (0.052)
	115	19.17 (0.052)	19.13 (0.052)	19.08 (0.052)	18.94 (0.053)	19.21 (0.052)	19.20 (0.052)	19.19 (0.052)	19.16 (0.052)
	125	19.06 (0.052)	19.03 (0.053)	18.98 (0.053)	18.86 (0.053)	19.11 (0.052)	19.10 (0.052)	19.09 (0.052)	19.07 (0.052)
	135	18.97 (0.053)	18.93 (0.053)	18.89 (0.053)	18.77 (0.053)	19.02 (0.053)	19.01 (0.053)	19.00 (0.053)	18.98 (0.053)
Closed cell spray polyurethane foam, 3 in.	85	23.52 (0.043)	23.47 (0.043)	23.42 (0.043)	23.26 (0.043)	23.54 (0.042)	23.53 (0.042)	23.52 (0.043)	23.49 (0.043)
	95	23.39 (0.043)	23.35 (0.043)	23.29 (0.043)	23.14 (0.043)	23.42 (0.043)	23.41 (0.043)	23.40 (0.043)	23.37 (0.043)
	105	23.28 (0.043)	23.23 (0.043)	23.18 (0.043)	23.04 (0.043)	23.31 (0.043)	23.30 (0.043)	23.29 (0.043)	23.26 (0.043)
	115	23.17 (0.043)	23.13 (0.043)	23.08 (0.043)	22.94 (0.044)	23.21 (0.043)	23.20 (0.043)	23.19 (0.043)	23.16 (0.043)
	125	23.06 (0.043)	23.03 (0.043)	22.98 (0.044)	22.86 (0.044)	23.11 (0.043)	23.10 (0.043)	23.09 (0.043)	23.07 (0.043)
	135	22.97 (0.044)	22.93 (0.044)	22.89 (0.044)	22.77 (0.044)	23.02 (0.043)	23.01 (0.043)	23.00 (0.043)	22.98 (0.044)
Polyisocyanurate, 3 in.	85	27.55 (0.036)	27.50 (0.036)	27.45 (0.036)	27.29 (0.037)	27.57 (0.036)	27.56 (0.036)	27.55 (0.036)	27.52 (0.036)
	95	27.42 (0.036)	27.38 (0.037)	27.32 (0.037)	27.17 (0.037)	27.45 (0.036)	27.44 (0.036)	27.43 (0.036)	27.40 (0.036)
	105	27.31 (0.037)	27.26 (0.037)	27.21 (0.037)	27.07 (0.037)	27.34 (0.037)	27.33 (0.037)	27.32 (0.037)	27.29 (0.037)
	115	27.20 (0.037)	27.16 (0.037)	27.11 (0.037)	26.97 (0.037)	27.24 (0.037)	27.23 (0.037)	27.22 (0.037)	27.19 (0.037)
	125	27.09 (0.037)	27.06 (0.037)	27.01 (0.037)	26.89 (0.037)	27.14 (0.037)	27.13 (0.037)	27.12 (0.037)	27.10 (0.037)
	135	27.00 (0.037)	26.96 (0.037)	26.92 (0.037)	26.80 (0.037)	27.05 (0.037)	27.04 (0.037)	27.03 (0.037)	27.01 (0.037)
Extruded polystyrene, 3 1/2 in.	85	22.02 (0.045)	21.97 (0.046)	21.92 (0.046)	21.76 (0.046)	22.04 (0.045)	22.03 (0.045)	22.02 (0.045)	21.99 (0.045)
	95	21.89 (0.046)	21.85 (0.046)	21.79 (0.046)	21.64 (0.046)	21.92 (0.046)	21.91 (0.046)	21.90 (0.046)	21.87 (0.046)
	105	21.78 (0.046)	21.73 (0.046)	21.68 (0.046)	21.54 (0.046)	21.81 (0.046)	21.80 (0.046)	21.79 (0.046)	21.76 (0.046)
	115	21.67 (0.046)	21.63 (0.046)	21.58 (0.046)	21.44 (0.047)	21.71 (0.046)	21.70 (0.046)	21.69 (0.046)	21.66 (0.046)
	125	21.56 (0.046)	21.53 (0.046)	21.48 (0.047)	21.36 (0.047)	21.61 (0.046)	21.60 (0.046)	21.59 (0.046)	21.57 (0.046)
	135	21.47 (0.047)	21.43 (0.047)	21.39 (0.047)	21.27 (0.047)	21.52 (0.046)	21.51 (0.046)	21.50 (0.047)	21.48 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.52 (0.038)	26.47 (0.038)	26.42 (0.038)	26.26 (0.038)	26.54 (0.038)	26.53 (0.038)	26.52 (0.038)	26.49 (0.038)
	95	26.39 (0.038)	26.35 (0.038)	26.29 (0.038)	26.14 (0.038)	26.42 (0.038)	26.41 (0.038)	26.40 (0.038)	26.37 (0.038)
	105	26.28 (0.038)	26.23 (0.038)	26.18 (0.038)	26.04 (0.038)	26.31 (0.038)	26.30 (0.038)	26.29 (0.038)	26.26 (0.038)
	115	26.17 (0.038)	26.13 (0.038)	26.08 (0.038)	25.94 (0.039)	26.21 (0.038)	26.20 (0.038)	26.19 (0.038)	26.16 (0.038)
	125	26.06 (0.038)	26.03 (0.038)	25.98 (0.038)	25.86 (0.039)	26.11 (0.038)	26.10 (0.038)	26.09 (0.038)	26.07 (0.038)
	135	25.97 (0.039)	25.93 (0.039)	25.89 (0.039)	25.77 (0.039)	26.02 (0.038)	26.01 (0.038)	26.00 (0.038)	25.98 (0.038)
Polyisocyanurate, 3 1/2 in.	85	30.95 (0.032)	30.90 (0.032)	30.85 (0.032)	30.69 (0.033)	30.97 (0.032)	30.96 (0.032)	30.95 (0.032)	30.92 (0.032)
	95	30.82 (0.032)	30.78 (0.032)	30.72 (0.033)	30.57 (0.033)	30.85 (0.032)	30.84 (0.032)	30.83 (0.032)	30.80 (0.032)
	105	30.71 (0.033)	30.66 (0.033)	30.61 (0.033)	30.47 (0.033)	30.74 (0.033)	30.73 (0.033)	30.72 (0.033)	30.69 (0.033)
	115	30.60 (0.033)	30.56 (0.033)	30.51 (0.033)	30.37 (0.033)	30.64 (0.033)	30.63 (0.033)	30.62 (0.033)	30.59 (0.033)
	125	30.49 (0.033)	30.46 (0.033)	30.41 (0.033)	30.29 (0.033)	30.54 (0.033)	30.53 (0.033)	30.52 (0.033)	30.50 (0.033)
	135	30.40 (0.033)	30.36 (0.033)	30.32 (0.033)	30.20 (0.033)	30.45 (0.033)	30.44 (0.033)	30.43 (0.033)	30.41 (0.033)



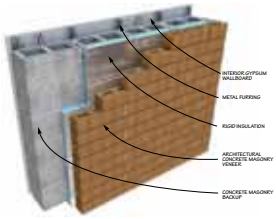
CONCRETE MASONRY CAVITY ASSEMBLIES
INTERIOR WALLBOARD

Assembly 1-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued on next page)

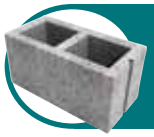
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.38 (0.096)	10.26 (0.097)	10.13 (0.099)	9.81 (0.102)	10.57 (0.095)	10.48 (0.095)	10.38 (0.096)	10.12 (0.099)
	95	10.27 (0.097)	10.15 (0.098)	10.03 (0.100)	9.72 (0.103)	10.44 (0.096)	10.35 (0.097)	10.26 (0.097)	10.01 (0.100)
	105	10.16 (0.098)	10.05 (0.099)	9.94 (0.101)	9.64 (0.104)	10.32 (0.097)	10.24 (0.098)	10.15 (0.099)	9.91 (0.101)
	115	10.06 (0.099)	9.95 (0.100)	9.85 (0.102)	9.57 (0.104)	10.21 (0.098)	10.13 (0.099)	10.04 (0.100)	9.82 (0.102)
	125	9.96 (0.100)	9.86 (0.101)	9.76 (0.102)	9.51 (0.105)	10.10 (0.099)	10.03 (0.100)	9.95 (0.100)	9.74 (0.103)
	135	9.86 (0.101)	9.78 (0.102)	9.69 (0.103)	9.46 (0.106)	10.00 (0.100)	9.94 (0.101)	9.86 (0.101)	9.67 (0.103)
Closed cell spray polyurethane foam, 1 in.	85	12.18 (0.082)	12.06 (0.083)	11.93 (0.084)	11.61 (0.086)	12.37 (0.081)	12.28 (0.081)	12.18 (0.082)	11.92 (0.084)
	95	12.07 (0.083)	11.95 (0.084)	11.83 (0.085)	11.52 (0.087)	12.24 (0.082)	12.15 (0.082)	12.06 (0.083)	11.81 (0.085)
	105	11.96 (0.084)	11.85 (0.084)	11.74 (0.085)	11.44 (0.087)	12.12 (0.083)	12.04 (0.083)	11.95 (0.084)	11.71 (0.085)
	115	11.86 (0.084)	11.75 (0.085)	11.65 (0.086)	11.37 (0.088)	12.01 (0.083)	11.93 (0.084)	11.84 (0.084)	11.62 (0.086)
	125	11.76 (0.085)	11.66 (0.086)	11.56 (0.086)	11.31 (0.088)	11.90 (0.084)	11.83 (0.085)	11.75 (0.085)	11.54 (0.087)
	135	11.66 (0.086)	11.58 (0.086)	11.49 (0.087)	11.26 (0.089)	11.80 (0.085)	11.74 (0.085)	11.66 (0.086)	11.47 (0.087)
Polyisocyanurate, 1 in.	85	13.91 (0.072)	13.79 (0.073)	13.66 (0.073)	13.34 (0.075)	14.10 (0.071)	14.01 (0.071)	13.91 (0.072)	13.65 (0.073)
	95	13.80 (0.072)	13.68 (0.073)	13.56 (0.074)	13.25 (0.075)	13.97 (0.072)	13.88 (0.072)	13.79 (0.073)	13.54 (0.074)
	105	13.69 (0.073)	13.58 (0.074)	13.47 (0.074)	13.17 (0.076)	13.85 (0.072)	13.77 (0.073)	13.68 (0.073)	13.44 (0.074)
	115	13.59 (0.074)	13.48 (0.074)	13.38 (0.075)	13.10 (0.076)	13.74 (0.073)	13.66 (0.073)	13.57 (0.074)	13.35 (0.075)
	125	13.49 (0.074)	13.39 (0.075)	13.29 (0.075)	13.04 (0.077)	13.63 (0.073)	13.56 (0.074)	13.48 (0.074)	13.27 (0.075)
	135	13.39 (0.075)	13.31 (0.075)	13.22 (0.076)	12.99 (0.077)	13.53 (0.074)	13.47 (0.074)	13.39 (0.075)	13.20 (0.076)
Extruded polystyrene, 1 1/2 in.	85	12.88 (0.078)	12.76 (0.078)	12.63 (0.079)	12.31 (0.081)	13.07 (0.077)	12.98 (0.077)	12.88 (0.078)	12.62 (0.079)
	95	12.77 (0.078)	12.65 (0.079)	12.53 (0.080)	12.22 (0.082)	12.94 (0.077)	12.85 (0.078)	12.76 (0.078)	12.51 (0.080)
	105	12.66 (0.079)	12.55 (0.080)	12.44 (0.080)	12.14 (0.082)	12.82 (0.078)	12.74 (0.079)	12.65 (0.079)	12.41 (0.081)
	115	12.56 (0.080)	12.45 (0.080)	12.35 (0.081)	12.07 (0.083)	12.71 (0.079)	12.63 (0.079)	12.54 (0.080)	12.32 (0.081)
	125	12.46 (0.080)	12.36 (0.081)	12.26 (0.082)	12.01 (0.083)	12.60 (0.079)	12.53 (0.080)	12.45 (0.080)	12.24 (0.082)
	135	12.36 (0.081)	12.28 (0.081)	12.19 (0.082)	11.96 (0.084)	12.50 (0.080)	12.44 (0.080)	12.36 (0.081)	12.17 (0.082)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.28 (0.065)	15.16 (0.066)	15.03 (0.067)	14.71 (0.068)	15.47 (0.065)	15.38 (0.065)	15.28 (0.065)	15.02 (0.067)
	95	15.17 (0.066)	15.05 (0.066)	14.93 (0.067)	14.62 (0.068)	15.34 (0.065)	15.25 (0.066)	15.16 (0.066)	14.91 (0.067)
	105	15.06 (0.066)	14.95 (0.067)	14.84 (0.067)	14.54 (0.069)	15.22 (0.066)	15.14 (0.066)	15.05 (0.066)	14.81 (0.068)
	115	14.96 (0.067)	14.85 (0.067)	14.75 (0.068)	14.47 (0.069)	15.11 (0.066)	15.03 (0.067)	14.94 (0.067)	14.72 (0.068)
	125	14.86 (0.067)	14.76 (0.068)	14.66 (0.068)	14.41 (0.069)	15.00 (0.067)	14.93 (0.067)	14.85 (0.067)	14.64 (0.068)
	135	14.76 (0.068)	14.68 (0.068)	14.59 (0.069)	14.36 (0.070)	14.90 (0.067)	14.84 (0.067)	14.76 (0.068)	14.57 (0.069)
Polyisocyanurate, 1 1/2 in.	85	17.71 (0.056)	17.59 (0.057)	17.46 (0.057)	17.14 (0.058)	17.90 (0.056)	17.81 (0.056)	17.71 (0.056)	17.45 (0.057)
	95	17.60 (0.057)	17.48 (0.057)	17.36 (0.058)	17.05 (0.059)	17.77 (0.056)	17.68 (0.057)	17.59 (0.057)	17.34 (0.058)
	105	17.49 (0.057)	17.38 (0.058)	17.27 (0.058)	16.97 (0.059)	17.65 (0.057)	17.57 (0.057)	17.48 (0.057)	17.24 (0.058)
	115	17.39 (0.058)	17.28 (0.058)	17.18 (0.058)	16.90 (0.059)	17.54 (0.057)	17.46 (0.057)	17.37 (0.058)	17.15 (0.058)
	125	17.29 (0.058)	17.19 (0.058)	17.09 (0.059)	16.84 (0.059)	17.43 (0.057)	17.36 (0.058)	17.28 (0.058)	17.07 (0.059)
	135	17.19 (0.058)	17.11 (0.058)	17.02 (0.059)	16.79 (0.060)	17.33 (0.058)	17.27 (0.058)	17.19 (0.058)	17.00 (0.059)
Extruded polystyrene, 2 in.	85	15.38 (0.065)	15.26 (0.066)	15.13 (0.066)	14.81 (0.068)	15.57 (0.064)	15.48 (0.065)	15.38 (0.065)	15.12 (0.066)
	95	15.27 (0.065)	15.15 (0.066)	15.03 (0.067)	14.72 (0.068)	15.44 (0.065)	15.35 (0.065)	15.26 (0.066)	15.01 (0.067)
	105	15.16 (0.066)	15.05 (0.066)	14.94 (0.067)	14.64 (0.068)	15.32 (0.065)	15.24 (0.066)	15.15 (0.066)	14.91 (0.067)
	115	15.06 (0.066)	14.95 (0.067)	14.85 (0.067)	14.57 (0.069)	15.21 (0.066)	15.13 (0.066)	15.04 (0.066)	14.82 (0.067)
	125	14.96 (0.067)	14.86 (0.067)	14.76 (0.068)	14.51 (0.069)	15.10 (0.066)	15.03 (0.067)	14.95 (0.067)	14.74 (0.068)
	135	14.86 (0.067)	14.78 (0.068)	14.69 (0.068)	14.46 (0.069)	15.00 (0.067)	14.94 (0.067)	14.86 (0.067)	14.67 (0.068)
Closed cell spray polyurethane foam, 2 in.	85	18.38 (0.054)	18.26 (0.055)	18.13 (0.055)	17.81 (0.056)	18.57 (0.054)	18.48 (0.054)	18.38 (0.054)	18.12 (0.055)
	95	18.27 (0.055)	18.15 (0.055)	18.03 (0.055)	17.72 (0.056)	18.44 (0.054)	18.35 (0.054)	18.26 (0.055)	18.01 (0.056)
	105	18.16 (0.055)	18.05 (0.055)	17.94 (0.056)	17.64 (0.057)	18.32 (0.055)	18.24 (0.055)	18.15 (0.055)	17.91 (0.056)
	115	18.06 (0.055)	17.95 (0.056)	17.85 (0.056)	17.57 (0.057)	18.21 (0.055)	18.13 (0.055)	18.04 (0.055)	17.82 (0.056)
	125	17.96 (0.056)	17.86 (0.056)	17.76 (0.056)	17.51 (0.057)	18.10 (0.055)	18.03 (0.055)	17.95 (0.056)	17.74 (0.056)
	135	17.86 (0.056)	17.78 (0.056)	17.69 (0.057)	17.46 (0.057)	18.00 (0.056)	17.94 (0.056)	17.86 (0.056)	17.67 (0.057)
Polyisocyanurate, 2 in.	85	21.61 (0.046)	21.49 (0.047)	21.36 (0.047)	21.04 (0.048)	21.80 (0.046)	21.71 (0.046)	21.61 (0.046)	21.35 (0.047)
	95	21.50 (0.047)	21.38 (0.047)	21.26 (0.047)	20.95 (0.048)	21.67 (0.046)	21.58 (0.046)	21.49 (0.047)	21.24 (0.047)
	105	21.39 (0.047)	21.28 (0.047)	21.17 (0.047)	20.87 (0.048)	21.55 (0.046)	21.47 (0.047)	21.38 (0.047)	21.14 (0.047)
	115	21.29 (0.047)	21.18 (0.047)	21.08 (0.047)	20.80 (0.048)	21.44 (0.047)	21.36 (0.047)	21.27 (0.047)	21.05 (0.048)
	125	21.19 (0.047)	21.09 (0.047)	20.99 (0.048)	20.74 (0.048)	21.33 (0.047)	21.26 (0.047)	21.18 (0.047)	20.97 (0.048)
	135	21.09 (0.047)	21.01 (0.048)	20.92 (0.048)	20.69 (0.048)	21.23 (0.047)	21.17 (0.047)	21.09 (0.047)	20.90 (0.048)

*Assembly details page 15.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.62 (0.094)	10.57 (0.095)	10.52 (0.095)	10.36 (0.097)	10.64 (0.094)	10.63 (0.094)	10.62 (0.094)	10.59 (0.094)
	95	10.49 (0.095)	10.45 (0.096)	10.39 (0.096)	10.24 (0.098)	10.52 (0.095)	10.51 (0.095)	10.50 (0.095)	10.47 (0.095)
	105	10.38 (0.096)	10.33 (0.097)	10.28 (0.097)	10.14 (0.099)	10.41 (0.096)	10.40 (0.096)	10.39 (0.096)	10.36 (0.096)
	115	10.27 (0.097)	10.23 (0.098)	10.18 (0.098)	10.04 (0.100)	10.31 (0.097)	10.30 (0.097)	10.29 (0.097)	10.26 (0.097)
	125	10.16 (0.098)	10.13 (0.099)	10.08 (0.099)	9.96 (0.100)	10.21 (0.098)	10.20 (0.098)	10.19 (0.098)	10.17 (0.098)
	135	10.07 (0.099)	10.03 (0.100)	9.99 (0.100)	9.87 (0.101)	10.12 (0.099)	10.11 (0.099)	10.10 (0.099)	10.08 (0.099)
Closed cell spray polyurethane foam, 1 in.	85	12.42 (0.081)	12.37 (0.081)	12.32 (0.081)	12.16 (0.082)	12.44 (0.080)	12.43 (0.080)	12.42 (0.080)	12.39 (0.081)
	95	12.29 (0.081)	12.25 (0.082)	12.19 (0.082)	12.04 (0.083)	12.32 (0.081)	12.31 (0.081)	12.30 (0.081)	12.27 (0.081)
	105	12.18 (0.082)	12.13 (0.082)	12.08 (0.083)	11.94 (0.084)	12.21 (0.082)	12.20 (0.082)	12.19 (0.082)	12.16 (0.082)
	115	12.07 (0.083)	12.03 (0.083)	11.98 (0.083)	11.84 (0.084)	12.11 (0.083)	12.10 (0.083)	12.09 (0.083)	12.06 (0.083)
	125	11.96 (0.084)	11.93 (0.084)	11.88 (0.084)	11.76 (0.085)	12.01 (0.083)	12.00 (0.083)	11.99 (0.083)	11.97 (0.084)
	135	11.87 (0.084)	11.83 (0.085)	11.79 (0.085)	11.67 (0.086)	11.92 (0.084)	11.91 (0.084)	11.90 (0.084)	11.88 (0.084)
Polyisocyanurate, 1 in.	85	14.15 (0.071)	14.10 (0.071)	14.05 (0.071)	13.89 (0.072)	14.17 (0.071)	14.16 (0.071)	14.15 (0.071)	14.12 (0.071)
	95	14.02 (0.071)	13.98 (0.072)	13.92 (0.072)	13.77 (0.073)	14.05 (0.071)	14.04 (0.071)	14.03 (0.071)	14.00 (0.071)
	105	13.91 (0.072)	13.86 (0.072)	13.81 (0.072)	13.67 (0.073)	13.94 (0.072)	13.93 (0.072)	13.92 (0.072)	13.89 (0.072)
	115	13.80 (0.072)	13.76 (0.073)	13.71 (0.073)	13.57 (0.074)	13.84 (0.072)	13.83 (0.072)	13.82 (0.072)	13.79 (0.072)
	125	13.69 (0.073)	13.66 (0.073)	13.61 (0.073)	13.49 (0.074)	13.74 (0.073)	13.73 (0.073)	13.72 (0.073)	13.70 (0.073)
	135	13.60 (0.074)	13.56 (0.074)	13.52 (0.074)	13.40 (0.075)	13.65 (0.073)	13.64 (0.073)	13.63 (0.073)	13.61 (0.073)
Extruded polystyrene, 1 1/2 in.	85	13.12 (0.076)	13.07 (0.077)	13.02 (0.077)	12.86 (0.078)	13.14 (0.076)	13.13 (0.076)	13.12 (0.076)	13.09 (0.076)
	95	12.99 (0.077)	12.95 (0.077)	12.89 (0.078)	12.74 (0.078)	13.02 (0.077)	13.01 (0.077)	13.00 (0.077)	12.97 (0.077)
	105	12.88 (0.078)	12.83 (0.078)	12.78 (0.078)	12.64 (0.079)	12.91 (0.077)	12.90 (0.078)	12.89 (0.078)	12.86 (0.078)
	115	12.77 (0.078)	12.73 (0.079)	12.68 (0.079)	12.54 (0.080)	12.81 (0.078)	12.80 (0.078)	12.79 (0.078)	12.76 (0.078)
	125	12.66 (0.079)	12.63 (0.079)	12.58 (0.079)	12.46 (0.080)	12.71 (0.079)	12.70 (0.079)	12.69 (0.079)	12.67 (0.079)
	135	12.57 (0.080)	12.53 (0.080)	12.49 (0.080)	12.37 (0.081)	12.62 (0.079)	12.61 (0.079)	12.60 (0.079)	12.58 (0.079)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.52 (0.064)	15.47 (0.065)	15.42 (0.065)	15.26 (0.066)	15.54 (0.064)	15.53 (0.064)	15.52 (0.064)	15.49 (0.065)
	95	15.39 (0.065)	15.35 (0.065)	15.29 (0.065)	15.14 (0.066)	15.42 (0.065)	15.41 (0.065)	15.40 (0.065)	15.37 (0.065)
	105	15.28 (0.065)	15.23 (0.066)	15.18 (0.066)	15.04 (0.066)	15.31 (0.065)	15.30 (0.065)	15.29 (0.065)	15.26 (0.066)
	115	15.17 (0.066)	15.13 (0.066)	15.08 (0.066)	14.94 (0.067)	15.21 (0.066)	15.20 (0.066)	15.19 (0.066)	15.16 (0.066)
	125	15.06 (0.066)	15.03 (0.067)	14.98 (0.067)	14.86 (0.067)	15.11 (0.066)	15.10 (0.066)	15.09 (0.066)	15.07 (0.066)
	135	14.97 (0.067)	14.93 (0.067)	14.89 (0.067)	14.77 (0.068)	15.02 (0.067)	15.01 (0.067)	15.00 (0.067)	14.98 (0.067)
Polyisocyanurate, 1 1/2 in.	85	17.95 (0.056)	17.90 (0.056)	17.85 (0.056)	17.69 (0.057)	17.97 (0.056)	17.96 (0.056)	17.95 (0.056)	17.92 (0.056)
	95	17.82 (0.056)	17.78 (0.056)	17.72 (0.056)	17.57 (0.057)	17.85 (0.056)	17.84 (0.056)	17.83 (0.056)	17.80 (0.056)
	105	17.71 (0.056)	17.66 (0.057)	17.61 (0.057)	17.47 (0.057)	17.74 (0.056)	17.73 (0.056)	17.72 (0.056)	17.69 (0.057)
	115	17.60 (0.057)	17.56 (0.057)	17.51 (0.057)	17.37 (0.058)	17.64 (0.057)	17.63 (0.057)	17.62 (0.057)	17.59 (0.057)
	125	17.49 (0.057)	17.46 (0.057)	17.41 (0.057)	17.29 (0.058)	17.54 (0.057)	17.53 (0.057)	17.52 (0.057)	17.50 (0.057)
	135	17.40 (0.057)	17.36 (0.058)	17.32 (0.058)	17.20 (0.058)	17.45 (0.057)	17.44 (0.057)	17.43 (0.057)	17.41 (0.057)
Extruded polystyrene, 2 in.	85	15.62 (0.064)	15.57 (0.064)	15.52 (0.064)	15.36 (0.065)	15.64 (0.064)	15.63 (0.064)	15.62 (0.064)	15.59 (0.064)
	95	15.49 (0.065)	15.45 (0.065)	15.39 (0.065)	15.24 (0.066)	15.52 (0.064)	15.51 (0.064)	15.50 (0.064)	15.47 (0.065)
	105	15.38 (0.065)	15.33 (0.065)	15.28 (0.065)	15.14 (0.066)	15.41 (0.065)	15.40 (0.065)	15.39 (0.065)	15.36 (0.065)
	115	15.27 (0.066)	15.23 (0.066)	15.18 (0.066)	15.04 (0.066)	15.31 (0.065)	15.30 (0.065)	15.29 (0.065)	15.26 (0.066)
	125	15.16 (0.066)	15.13 (0.066)	15.08 (0.066)	14.96 (0.067)	15.21 (0.066)	15.20 (0.066)	15.19 (0.066)	15.17 (0.066)
	135	15.07 (0.066)	15.03 (0.067)	14.99 (0.067)	14.87 (0.067)	15.12 (0.066)	15.11 (0.066)	15.10 (0.066)	15.08 (0.066)
Closed cell spray polyurethane foam, 2 in.	85	18.62 (0.054)	18.57 (0.054)	18.52 (0.054)	18.36 (0.054)	18.64 (0.054)	18.63 (0.054)	18.62 (0.054)	18.59 (0.054)
	95	18.49 (0.054)	18.45 (0.054)	18.39 (0.054)	18.24 (0.055)	18.52 (0.054)	18.51 (0.054)	18.50 (0.054)	18.47 (0.054)
	105	18.38 (0.054)	18.33 (0.055)	18.28 (0.055)	18.14 (0.055)	18.41 (0.054)	18.40 (0.054)	18.39 (0.054)	18.36 (0.054)
	115	18.27 (0.055)	18.23 (0.055)	18.18 (0.055)	18.04 (0.055)	18.31 (0.055)	18.30 (0.055)	18.29 (0.055)	18.26 (0.055)
	125	18.16 (0.055)	18.13 (0.055)	18.08 (0.055)	17.96 (0.056)	18.21 (0.055)	18.20 (0.055)	18.19 (0.055)	18.17 (0.055)
	135	18.07 (0.055)	18.03 (0.055)	17.99 (0.056)	17.87 (0.056)	18.12 (0.055)	18.11 (0.055)	18.10 (0.055)	18.08 (0.055)
Polyisocyanurate, 2 in.	85	21.85 (0.046)	21.80 (0.046)	21.75 (0.046)	21.59 (0.046)	21.87 (0.046)	21.86 (0.046)	21.85 (0.046)	21.82 (0.046)
	95	21.72 (0.046)	21.68 (0.046)	21.62 (0.046)	21.47 (0.047)	21.75 (0.046)	21.74 (0.046)	21.73 (0.046)	21.70 (0.046)
	105	21.61 (0.046)	21.56 (0.046)	21.51 (0.046)	21.37 (0.047)	21.64 (0.046)	21.63 (0.046)	21.62 (0.046)	21.59 (0.046)
	115	21.50 (0.047)	21.46 (0.047)	21.41 (0.047)	21.27 (0.047)	21.54 (0.046)	21.53 (0.046)	21.52 (0.046)	21.49 (0.047)
	125	21.39 (0.047)	21.36 (0.047)	21.31 (0.047)	21.19 (0.047)	21.44 (0.047)	21.43 (0.047)	21.42 (0.047)	21.40 (0.047)
	135	21.30 (0.047)	21.26 (0.047)	21.22 (0.047)	21.10 (0.047)	21.35 (0.047)	21.34 (0.047)	21.33 (0.047)	21.31 (0.047)



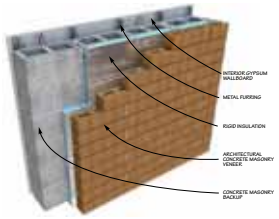
CONCRETE MASONRY CAVITY ASSEMBLIES
INTERIOR WALLBOARD

Assembly 1-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	17.88 (0.056)	17.76 (0.056)	17.63 (0.057)	17.31 (0.058)	18.07 (0.055)	17.98 (0.056)	17.88 (0.056)	17.62 (0.057)
	95	17.77 (0.056)	17.65 (0.057)	17.53 (0.057)	17.22 (0.058)	17.94 (0.056)	17.85 (0.056)	17.76 (0.056)	17.51 (0.057)
	105	17.66 (0.057)	17.55 (0.057)	17.44 (0.057)	17.14 (0.058)	17.82 (0.056)	17.74 (0.056)	17.65 (0.057)	17.41 (0.057)
	115	17.56 (0.057)	17.45 (0.057)	17.35 (0.058)	17.07 (0.059)	17.71 (0.056)	17.63 (0.057)	17.54 (0.057)	17.32 (0.058)
	125	17.46 (0.057)	17.36 (0.058)	17.26 (0.058)	17.01 (0.059)	17.60 (0.057)	17.53 (0.057)	17.45 (0.057)	17.24 (0.058)
	135	17.36 (0.058)	17.28 (0.058)	17.19 (0.058)	16.96 (0.059)	17.50 (0.057)	17.44 (0.057)	17.36 (0.058)	17.17 (0.058)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.38 (0.047)	21.26 (0.047)	21.13 (0.047)	20.81 (0.048)	21.57 (0.046)	21.48 (0.047)	21.38 (0.047)	21.12 (0.047)
	95	21.27 (0.047)	21.15 (0.047)	21.03 (0.048)	20.72 (0.048)	21.44 (0.047)	21.35 (0.047)	21.26 (0.047)	21.01 (0.048)
	105	21.16 (0.047)	21.05 (0.048)	20.94 (0.048)	20.64 (0.048)	21.32 (0.047)	21.24 (0.047)	21.15 (0.047)	20.91 (0.048)
	115	21.06 (0.047)	20.95 (0.048)	20.85 (0.048)	20.57 (0.049)	21.21 (0.047)	21.13 (0.047)	21.04 (0.048)	20.82 (0.048)
	125	20.96 (0.048)	20.86 (0.048)	20.76 (0.048)	20.51 (0.049)	21.10 (0.047)	21.03 (0.048)	20.95 (0.048)	20.74 (0.048)
	135	20.86 (0.048)	20.78 (0.048)	20.69 (0.048)	20.46 (0.049)	21.00 (0.048)	20.94 (0.048)	20.86 (0.048)	20.67 (0.048)
Polyisocyanurate, 2 1/2 in.	85	25.01 (0.040)	24.89 (0.040)	24.76 (0.040)	24.44 (0.041)	25.20 (0.040)	25.11 (0.040)	25.01 (0.040)	24.75 (0.040)
	95	24.90 (0.040)	24.78 (0.040)	24.66 (0.041)	24.35 (0.041)	25.07 (0.040)	24.98 (0.040)	24.89 (0.040)	24.64 (0.041)
	105	24.79 (0.040)	24.68 (0.041)	24.57 (0.041)	24.27 (0.041)	24.95 (0.040)	24.87 (0.040)	24.78 (0.040)	24.54 (0.041)
	115	24.69 (0.041)	24.58 (0.041)	24.48 (0.041)	24.20 (0.041)	24.84 (0.040)	24.76 (0.040)	24.67 (0.041)	24.45 (0.041)
	125	24.59 (0.041)	24.49 (0.041)	24.39 (0.041)	24.14 (0.041)	24.73 (0.040)	24.66 (0.041)	24.58 (0.041)	24.37 (0.041)
	135	24.49 (0.041)	24.41 (0.041)	24.32 (0.041)	24.09 (0.042)	24.63 (0.041)	24.57 (0.041)	24.49 (0.041)	24.30 (0.041)
Extruded polystyrene, 3 in.	85	20.38 (0.049)	20.26 (0.049)	20.13 (0.050)	19.81 (0.050)	20.57 (0.049)	20.48 (0.049)	20.38 (0.049)	20.12 (0.050)
	95	20.27 (0.049)	20.15 (0.050)	20.03 (0.050)	19.72 (0.051)	20.44 (0.049)	20.35 (0.049)	20.26 (0.049)	20.01 (0.050)
	105	20.16 (0.050)	20.05 (0.050)	19.94 (0.050)	19.64 (0.051)	20.32 (0.049)	20.24 (0.049)	20.15 (0.050)	19.91 (0.050)
	115	20.06 (0.050)	19.95 (0.050)	19.85 (0.050)	19.57 (0.051)	20.21 (0.049)	20.13 (0.050)	20.04 (0.050)	19.82 (0.050)
	125	19.96 (0.050)	19.86 (0.050)	19.76 (0.051)	19.51 (0.051)	20.10 (0.050)	20.03 (0.050)	19.95 (0.050)	19.74 (0.051)
	135	19.86 (0.050)	19.78 (0.051)	19.69 (0.051)	19.46 (0.051)	20.00 (0.050)	19.94 (0.050)	19.86 (0.050)	19.67 (0.051)
Closed cell spray polyurethane foam, 3 in.	85	24.38 (0.041)	24.26 (0.041)	24.13 (0.041)	23.81 (0.042)	24.57 (0.041)	24.48 (0.041)	24.38 (0.041)	24.12 (0.041)
	95	24.27 (0.041)	24.15 (0.041)	24.03 (0.042)	23.72 (0.042)	24.44 (0.041)	24.35 (0.041)	24.26 (0.041)	24.01 (0.042)
	105	24.16 (0.041)	24.05 (0.042)	23.94 (0.042)	23.64 (0.042)	24.32 (0.041)	24.24 (0.041)	24.15 (0.041)	23.91 (0.042)
	115	24.06 (0.042)	23.95 (0.042)	23.85 (0.042)	23.57 (0.042)	24.21 (0.041)	24.13 (0.041)	24.04 (0.042)	23.82 (0.042)
	125	23.96 (0.042)	23.86 (0.042)	23.76 (0.042)	23.51 (0.043)	24.10 (0.041)	24.03 (0.042)	23.95 (0.042)	23.74 (0.042)
	135	23.86 (0.042)	23.78 (0.042)	23.69 (0.042)	23.46 (0.043)	24.00 (0.042)	23.94 (0.042)	23.86 (0.042)	23.67 (0.042)
Polyisocyanurate, 3 in.	85	28.41 (0.035)	28.29 (0.035)	28.16 (0.036)	27.84 (0.036)	28.60 (0.035)	28.51 (0.035)	28.41 (0.035)	28.15 (0.036)
	95	28.30 (0.035)	28.18 (0.035)	28.06 (0.036)	27.75 (0.036)	28.47 (0.035)	28.38 (0.035)	28.29 (0.035)	28.04 (0.036)
	105	28.19 (0.035)	28.08 (0.036)	27.97 (0.036)	27.67 (0.036)	28.35 (0.035)	28.27 (0.035)	28.18 (0.035)	27.94 (0.036)
	115	28.09 (0.036)	27.98 (0.036)	27.88 (0.036)	27.60 (0.036)	28.24 (0.035)	28.16 (0.036)	28.07 (0.036)	27.85 (0.036)
	125	27.99 (0.036)	27.89 (0.036)	27.79 (0.036)	27.54 (0.036)	28.13 (0.036)	28.06 (0.036)	27.98 (0.036)	27.77 (0.036)
	135	27.89 (0.036)	27.81 (0.036)	27.72 (0.036)	27.49 (0.036)	28.03 (0.036)	27.97 (0.036)	27.89 (0.036)	27.70 (0.036)
Extruded polystyrene, 3 1/2 in.	85	22.88 (0.044)	22.76 (0.044)	22.63 (0.044)	22.31 (0.045)	23.07 (0.043)	22.98 (0.044)	22.88 (0.044)	22.62 (0.044)
	95	22.77 (0.044)	22.65 (0.044)	22.53 (0.044)	22.22 (0.045)	22.94 (0.044)	22.85 (0.044)	22.76 (0.044)	22.51 (0.044)
	105	22.66 (0.044)	22.55 (0.044)	22.44 (0.045)	22.14 (0.045)	22.82 (0.044)	22.74 (0.044)	22.65 (0.044)	22.41 (0.045)
	115	22.56 (0.044)	22.45 (0.045)	22.35 (0.045)	22.07 (0.045)	22.71 (0.044)	22.63 (0.044)	22.54 (0.044)	22.32 (0.045)
	125	22.46 (0.045)	22.36 (0.045)	22.26 (0.045)	22.01 (0.045)	22.60 (0.044)	22.53 (0.044)	22.45 (0.045)	22.24 (0.045)
	135	22.36 (0.045)	22.28 (0.045)	22.19 (0.045)	21.96 (0.046)	22.50 (0.044)	22.44 (0.045)	22.36 (0.045)	22.17 (0.045)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.38 (0.037)	27.26 (0.037)	27.13 (0.037)	26.81 (0.037)	27.57 (0.036)	27.48 (0.036)	27.38 (0.037)	27.12 (0.037)
	95	27.27 (0.037)	27.15 (0.037)	27.03 (0.037)	26.72 (0.037)	27.44 (0.036)	27.35 (0.037)	27.26 (0.037)	27.01 (0.037)
	105	27.16 (0.037)	27.05 (0.037)	26.94 (0.037)	26.64 (0.038)	27.32 (0.037)	27.24 (0.037)	27.15 (0.037)	26.91 (0.037)
	115	27.06 (0.037)	26.95 (0.037)	26.85 (0.037)	26.57 (0.038)	27.21 (0.037)	27.13 (0.037)	27.04 (0.037)	26.82 (0.037)
	125	26.96 (0.037)	26.86 (0.037)	26.76 (0.037)	26.51 (0.038)	27.10 (0.037)	27.03 (0.037)	26.95 (0.037)	26.74 (0.037)
	135	26.86 (0.037)	26.78 (0.037)	26.69 (0.037)	26.46 (0.038)	27.00 (0.037)	26.94 (0.037)	26.86 (0.037)	26.67 (0.038)
Polyisocyanurate, 3 1/2 in.	85	31.81 (0.031)	31.69 (0.032)	31.56 (0.032)	31.24 (0.032)	32.00 (0.031)	31.91 (0.031)	31.81 (0.031)	31.55 (0.032)
	95	31.70 (0.032)	31.58 (0.032)	31.46 (0.032)	31.15 (0.032)	31.87 (0.031)	31.78 (0.031)	31.69 (0.032)	31.44 (0.032)
	105	31.59 (0.032)	31.48 (0.032)	31.37 (0.032)	31.07 (0.032)	31.75 (0.031)	31.67 (0.032)	31.58 (0.032)	31.34 (0.032)
	115	31.49 (0.032)	31.38 (0.032)	31.28 (0.032)	31.00 (0.032)	31.64 (0.032)	31.56 (0.032)	31.47 (0.032)	31.25 (0.032)
	125	31.39 (0.032)	31.29 (0.032)	31.19 (0.032)	30.94 (0.032)	31.53 (0.032)	31.46 (0.032)	31.38 (0.032)	31.17 (0.032)
	135	31.29 (0.032)	31.21 (0.032)	31.12 (0.032)	30.89 (0.032)	31.43 (0.032)	31.37 (0.032)	31.29 (0.032)	31.10 (0.032)

*Assembly details page 15.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	18.12 (0.055)	18.07 (0.055)	18.02 (0.056)	17.86 (0.056)	18.14 (0.055)	18.13 (0.055)	18.12 (0.055)	18.09 (0.055)
	95	17.99 (0.056)	17.95 (0.056)	17.89 (0.056)	17.74 (0.056)	18.02 (0.055)	18.01 (0.056)	18.00 (0.056)	17.97 (0.056)
	105	17.88 (0.056)	17.83 (0.056)	17.78 (0.056)	17.64 (0.057)	17.91 (0.056)	17.90 (0.056)	17.89 (0.056)	17.86 (0.056)
	115	17.77 (0.056)	17.73 (0.056)	17.68 (0.057)	17.54 (0.057)	17.81 (0.056)	17.80 (0.056)	17.79 (0.056)	17.76 (0.056)
	125	17.66 (0.057)	17.63 (0.057)	17.58 (0.057)	17.46 (0.057)	17.71 (0.056)	17.70 (0.056)	17.69 (0.057)	17.67 (0.057)
	135	17.57 (0.057)	17.53 (0.057)	17.49 (0.057)	17.37 (0.058)	17.62 (0.057)	17.61 (0.057)	17.60 (0.057)	17.58 (0.057)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.62 (0.046)	21.57 (0.046)	21.52 (0.046)	21.36 (0.047)	21.64 (0.046)	21.63 (0.046)	21.62 (0.046)	21.59 (0.046)
	95	21.49 (0.047)	21.45 (0.047)	21.39 (0.047)	21.24 (0.047)	21.52 (0.046)	21.51 (0.046)	21.50 (0.047)	21.47 (0.047)
	105	21.38 (0.047)	21.33 (0.047)	21.28 (0.047)	21.14 (0.047)	21.41 (0.047)	21.40 (0.047)	21.39 (0.047)	21.36 (0.047)
	115	21.27 (0.047)	21.23 (0.047)	21.18 (0.047)	21.04 (0.048)	21.31 (0.047)	21.30 (0.047)	21.29 (0.047)	21.26 (0.047)
	125	21.16 (0.047)	21.13 (0.047)	21.08 (0.047)	20.96 (0.048)	21.21 (0.047)	21.20 (0.047)	21.19 (0.047)	21.17 (0.047)
	135	21.07 (0.047)	21.03 (0.048)	20.99 (0.048)	20.87 (0.048)	21.12 (0.047)	21.11 (0.047)	21.10 (0.047)	21.08 (0.047)
Polyisocyanurate, 2 1/2 in.	85	25.25 (0.040)	25.20 (0.040)	25.15 (0.040)	24.99 (0.040)	25.27 (0.040)	25.26 (0.040)	25.25 (0.040)	25.22 (0.040)
	95	25.12 (0.040)	25.08 (0.040)	25.02 (0.040)	24.87 (0.040)	25.15 (0.040)	25.14 (0.040)	25.13 (0.040)	25.10 (0.040)
	105	25.01 (0.040)	24.96 (0.040)	24.91 (0.040)	24.77 (0.040)	25.04 (0.040)	25.03 (0.040)	25.02 (0.040)	24.99 (0.040)
	115	24.90 (0.040)	24.86 (0.040)	24.81 (0.040)	24.67 (0.041)	24.94 (0.040)	24.93 (0.040)	24.92 (0.040)	24.89 (0.040)
	125	24.79 (0.040)	24.76 (0.040)	24.71 (0.040)	24.59 (0.041)	24.84 (0.040)	24.83 (0.040)	24.82 (0.040)	24.80 (0.040)
	135	24.70 (0.040)	24.66 (0.041)	24.62 (0.041)	24.50 (0.041)	24.75 (0.040)	24.74 (0.040)	24.73 (0.040)	24.71 (0.040)
Extruded polystyrene, 3 in.	85	20.62 (0.049)	20.57 (0.049)	20.52 (0.049)	20.36 (0.049)	20.64 (0.048)	20.63 (0.048)	20.62 (0.048)	20.59 (0.049)
	95	20.49 (0.049)	20.45 (0.049)	20.39 (0.049)	20.24 (0.049)	20.52 (0.049)	20.51 (0.049)	20.50 (0.049)	20.47 (0.049)
	105	20.38 (0.049)	20.33 (0.049)	20.28 (0.049)	20.14 (0.050)	20.41 (0.049)	20.40 (0.049)	20.39 (0.049)	20.36 (0.049)
	115	20.27 (0.049)	20.23 (0.049)	20.18 (0.050)	20.04 (0.050)	20.31 (0.049)	20.30 (0.049)	20.29 (0.049)	20.26 (0.049)
	125	20.16 (0.050)	20.13 (0.050)	20.08 (0.050)	19.96 (0.050)	20.21 (0.049)	20.20 (0.049)	20.19 (0.050)	20.17 (0.050)
	135	20.07 (0.050)	20.03 (0.050)	19.99 (0.050)	19.87 (0.050)	20.12 (0.050)	20.11 (0.050)	20.10 (0.050)	20.08 (0.050)
Closed cell spray polyurethane foam, 3 in.	85	24.62 (0.041)	24.57 (0.041)	24.52 (0.041)	24.36 (0.041)	24.64 (0.041)	24.63 (0.041)	24.62 (0.041)	24.59 (0.041)
	95	24.49 (0.041)	24.45 (0.041)	24.39 (0.041)	24.24 (0.041)	24.52 (0.041)	24.51 (0.041)	24.50 (0.041)	24.47 (0.041)
	105	24.38 (0.041)	24.33 (0.041)	24.28 (0.041)	24.14 (0.041)	24.41 (0.041)	24.40 (0.041)	24.39 (0.041)	24.36 (0.041)
	115	24.27 (0.041)	24.23 (0.041)	24.18 (0.041)	24.04 (0.042)	24.31 (0.041)	24.30 (0.041)	24.29 (0.041)	24.26 (0.041)
	125	24.16 (0.041)	24.13 (0.041)	24.08 (0.042)	23.96 (0.042)	24.21 (0.041)	24.20 (0.041)	24.19 (0.041)	24.17 (0.041)
	135	24.07 (0.042)	24.03 (0.042)	23.99 (0.042)	23.87 (0.042)	24.12 (0.041)	24.11 (0.041)	24.10 (0.041)	24.08 (0.042)
Polyisocyanurate, 3 in.	85	28.65 (0.035)	28.60 (0.035)	28.55 (0.035)	28.39 (0.035)	28.67 (0.035)	28.66 (0.035)	28.65 (0.035)	28.62 (0.035)
	95	28.52 (0.035)	28.48 (0.035)	28.42 (0.035)	28.27 (0.035)	28.55 (0.035)	28.54 (0.035)	28.53 (0.035)	28.50 (0.035)
	105	28.41 (0.035)	28.36 (0.035)	28.31 (0.035)	28.17 (0.035)	28.44 (0.035)	28.43 (0.035)	28.42 (0.035)	28.39 (0.035)
	115	28.30 (0.035)	28.26 (0.035)	28.21 (0.035)	28.07 (0.036)	28.34 (0.035)	28.33 (0.035)	28.32 (0.035)	28.29 (0.035)
	125	28.19 (0.035)	28.16 (0.036)	28.11 (0.036)	27.99 (0.036)	28.24 (0.035)	28.23 (0.035)	28.22 (0.035)	28.20 (0.035)
	135	28.10 (0.036)	28.06 (0.036)	28.02 (0.036)	27.90 (0.036)	28.15 (0.036)	28.14 (0.036)	28.13 (0.036)	28.11 (0.036)
Extruded polystyrene, 3 1/2 in.	85	23.12 (0.043)	23.07 (0.043)	23.02 (0.043)	22.86 (0.044)	23.14 (0.043)	23.13 (0.043)	23.12 (0.043)	23.09 (0.043)
	95	22.99 (0.043)	22.95 (0.044)	22.89 (0.044)	22.74 (0.044)	23.02 (0.043)	23.01 (0.043)	23.00 (0.043)	22.97 (0.044)
	105	22.88 (0.044)	22.83 (0.044)	22.78 (0.044)	22.64 (0.044)	22.91 (0.044)	22.90 (0.044)	22.89 (0.044)	22.86 (0.044)
	115	22.77 (0.044)	22.73 (0.044)	22.68 (0.044)	22.54 (0.044)	22.81 (0.044)	22.80 (0.044)	22.79 (0.044)	22.76 (0.044)
	125	22.66 (0.044)	22.63 (0.044)	22.58 (0.044)	22.46 (0.045)	22.71 (0.044)	22.70 (0.044)	22.69 (0.044)	22.67 (0.044)
	135	22.57 (0.044)	22.53 (0.044)	22.49 (0.044)	22.37 (0.045)	22.62 (0.044)	22.61 (0.044)	22.60 (0.044)	22.58 (0.044)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.62 (0.036)	27.57 (0.036)	27.52 (0.036)	27.36 (0.037)	27.64 (0.036)	27.63 (0.036)	27.62 (0.036)	27.59 (0.036)
	95	27.49 (0.036)	27.45 (0.036)	27.39 (0.037)	27.24 (0.037)	27.52 (0.036)	27.51 (0.036)	27.50 (0.036)	27.47 (0.036)
	105	27.38 (0.037)	27.33 (0.037)	27.28 (0.037)	27.14 (0.037)	27.41 (0.036)	27.40 (0.036)	27.39 (0.037)	27.36 (0.037)
	115	27.27 (0.037)	27.23 (0.037)	27.18 (0.037)	27.04 (0.037)	27.31 (0.037)	27.30 (0.037)	27.29 (0.037)	27.26 (0.037)
	125	27.16 (0.037)	27.13 (0.037)	27.08 (0.037)	26.96 (0.037)	27.21 (0.037)	27.20 (0.037)	27.19 (0.037)	27.17 (0.037)
	135	27.07 (0.037)	27.03 (0.037)	26.99 (0.037)	26.87 (0.037)	27.12 (0.037)	27.11 (0.037)	27.10 (0.037)	27.08 (0.037)
Polyisocyanurate, 3 1/2 in.	85	32.05 (0.031)	32.00 (0.031)	31.95 (0.031)	31.79 (0.031)	32.07 (0.031)	32.06 (0.031)	32.05 (0.031)	32.02 (0.031)
	95	31.92 (0.031)	31.88 (0.031)	31.82 (0.031)	31.67 (0.032)	31.95 (0.031)	31.94 (0.031)	31.93 (0.031)	31.90 (0.031)
	105	31.81 (0.031)	31.76 (0.031)	31.71 (0.032)	31.57 (0.032)	31.84 (0.031)	31.83 (0.031)	31.82 (0.031)	31.79 (0.031)
	115	31.70 (0.032)	31.66 (0.032)	31.61 (0.032)	31.47 (0.032)	31.74 (0.032)	31.73 (0.032)	31.72 (0.032)	31.69 (0.032)
	125	31.59 (0.032)	31.56 (0.032)	31.51 (0.032)	31.39 (0.032)	31.64 (0.032)	31.63 (0.032)	31.62 (0.032)	31.60 (0.032)
	135	31.50 (0.032)	31.46 (0.032)	31.42 (0.032)	31.30 (0.032)	31.55 (0.032)	31.54 (0.032)	31.53 (0.032)	31.51 (0.032)

Section Two of the Thermal Catalog provides calculated R-values and U-Factors for various assemblies using concrete masonry units with two webs. These units are configured to meet the dimensional requirements of current ASTM C90 requirements. The table below shows the relevant configuration of the units used as the basis for this section.

Nominal Width	Specified Width[1]	Specified Height[1]	Specified Length	Face Shell Thickness	Number of Face Shells	Web Thickness	Number of Webs
6-in.	5.625	7.625	15.625	1.00	2	0.75	2
8-in.	7.625	7.625	15.625	1.25	2	0.75	2
10-in.	9.625	7.625	15.625	1.25	2	0.75	2
12-in.	11.625	7.625	15.625	1.25	2	0.75	2

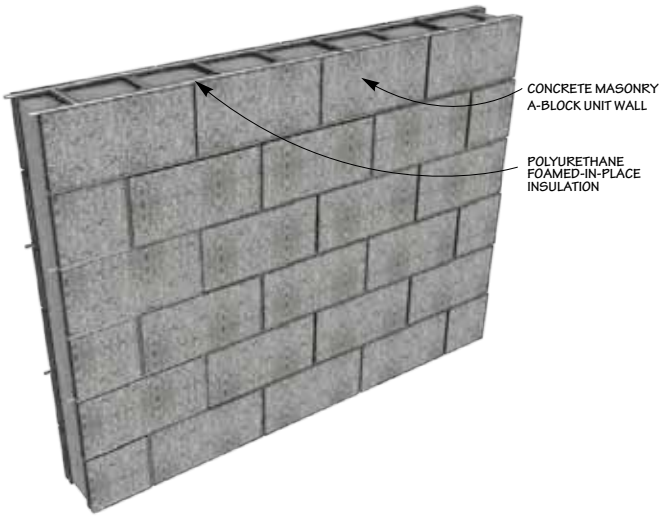
[1] Specified height and length provided for reference. Actual calculations apply to assemblies with other heights and lengths, such as half-high units.

*Certain configurations may not be available in local markets. Producers should be consulted for availability of desired unit configurations.

Figure 2.1 shows a diagram of a typical Section Two single-wythe assembly, with one face shell removed to show the number of webs (and therefore thermal shorts) from one side of the assembly to the other.

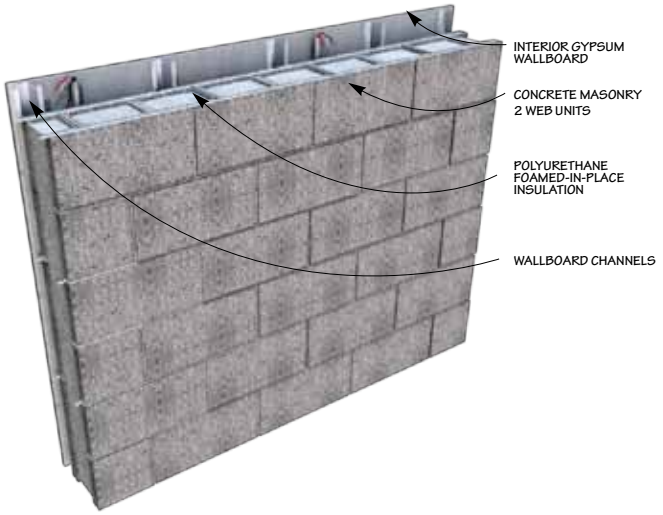
Figure 2.1:
2-web wall-section cut-away illustrating interior web configuration

Assembly 2-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior)



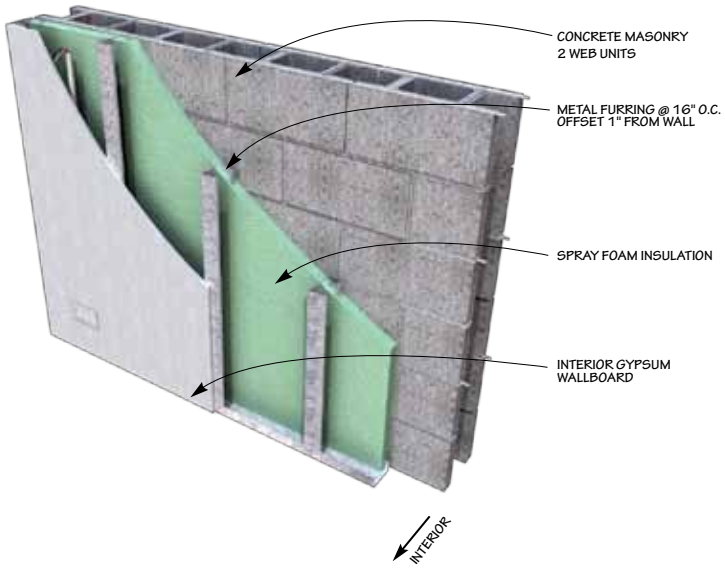
- Masonry exposed on both the interior and exterior provides maximum durability.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulations and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 2-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior



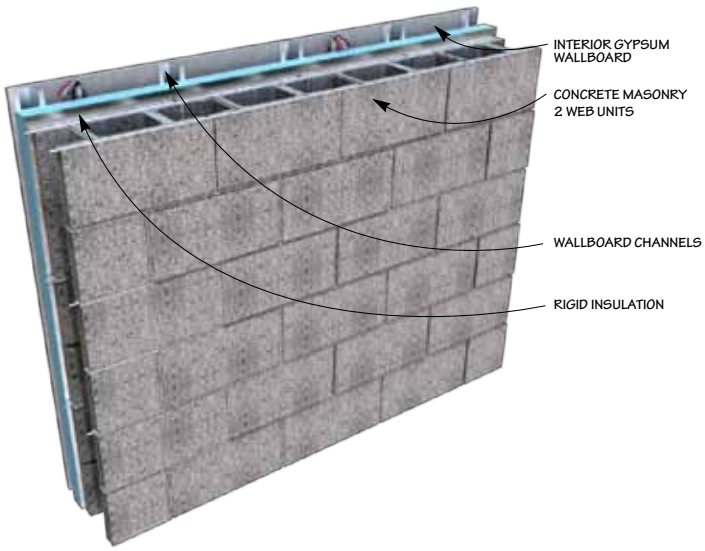
- Interior furring allows for electrical rough-in.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulation, and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 2-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

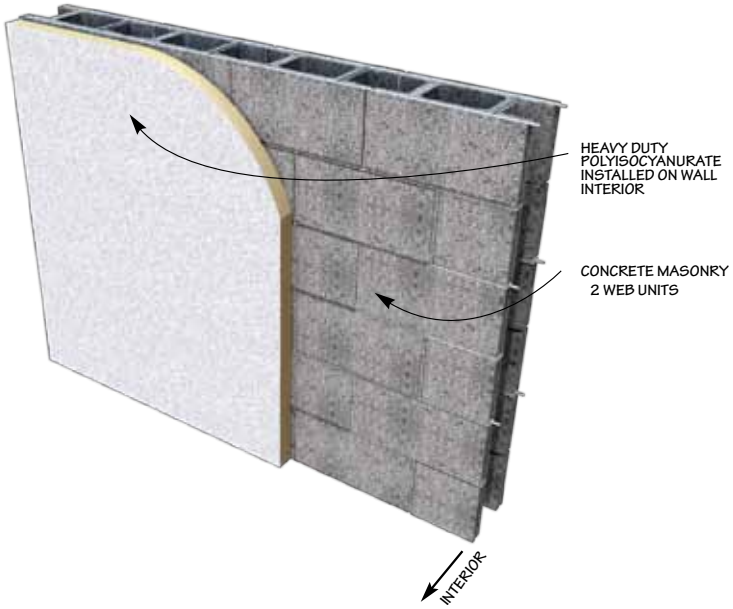
Assembly 2-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

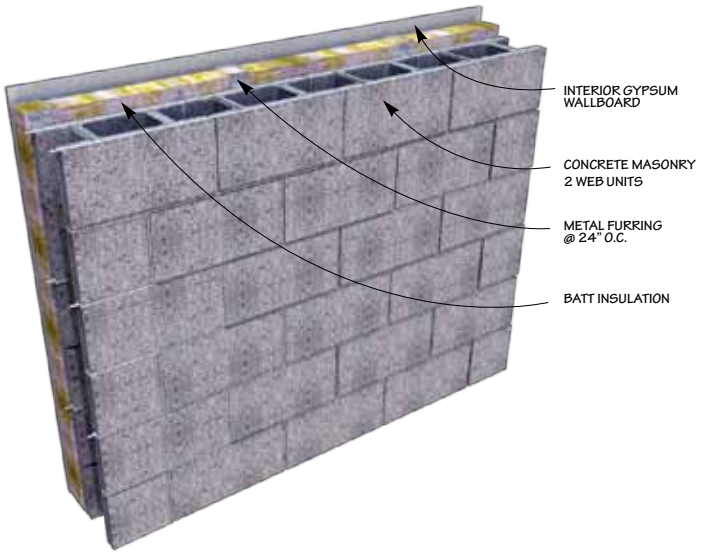
Assembly 2-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

- Joints of the HD polyisocyanurate must be butt-caulked or taped.
- Several types of HD polyisocyanurate are available with various amounts of impact resistance.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

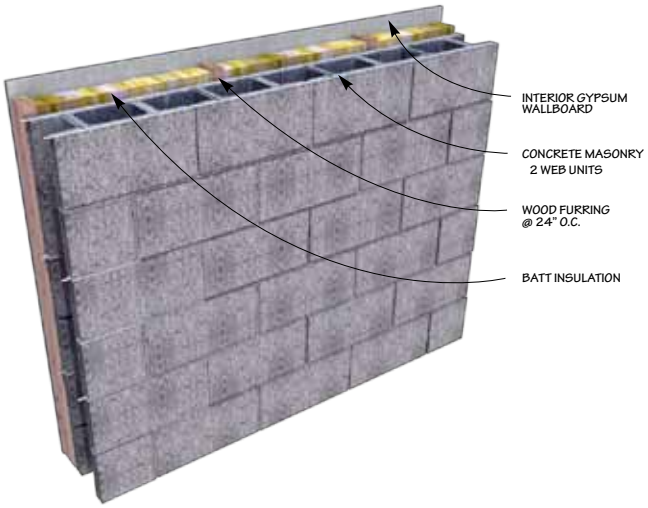


Assembly 2-6: Metal furring at 24 in. o.c. with batt insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

- Note: batt insulation is susceptible to moisture.
- Steel penetrations through insulation significantly affect the thermal resistance by conducting heat from one side of the insulation to the other.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

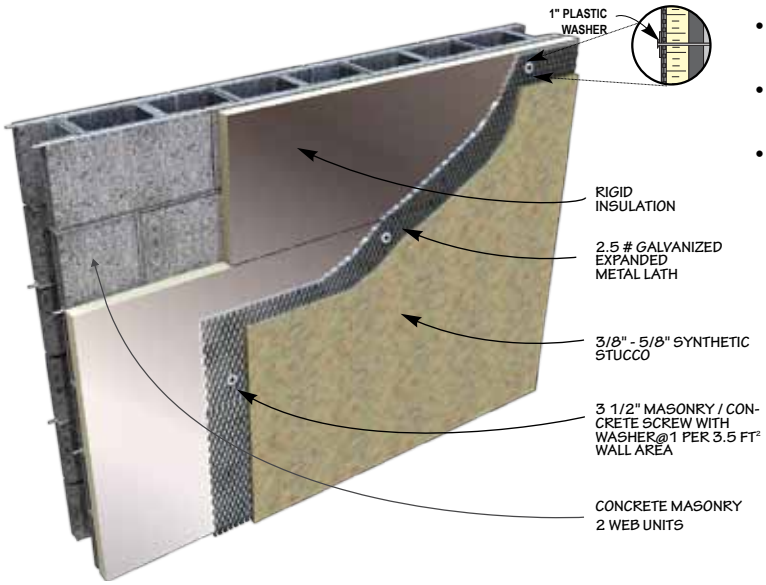


Assembly 2-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



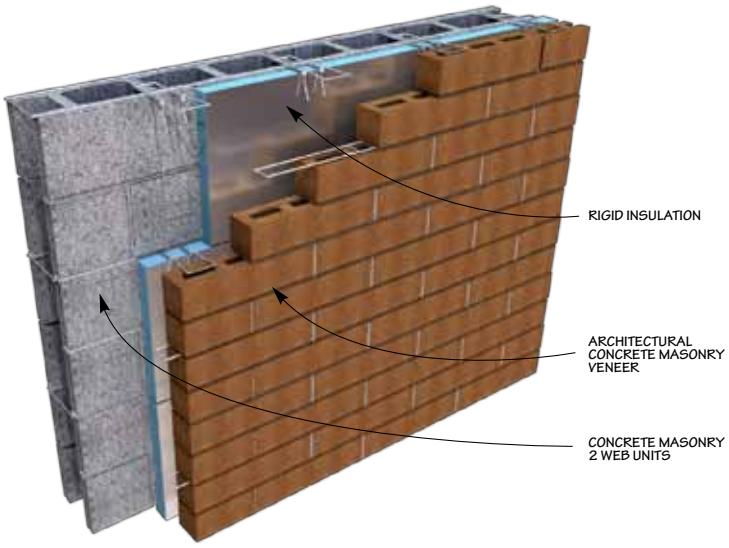
- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- R-values for assemblies with extruded polystyrene insulation include a nonreflective air space.
- Note that batt insulation is susceptible to moisture.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 2-8: Continuous exterior insulation and finish system, exposed interior masonry



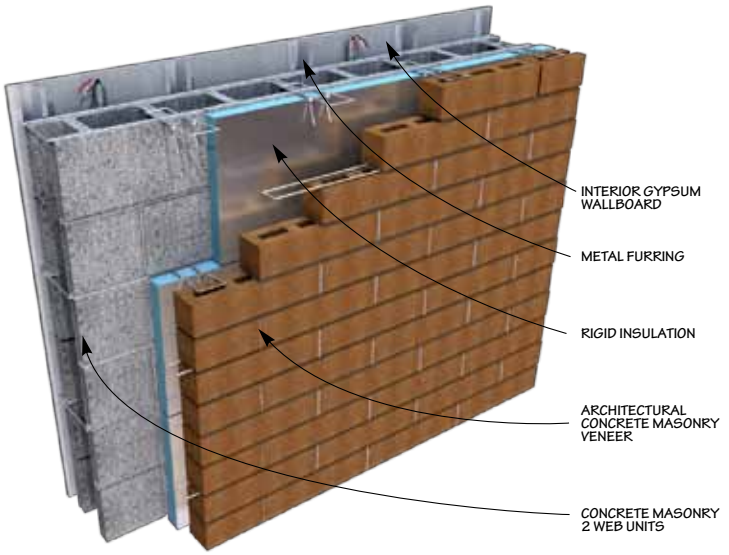
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Exterior insulation negates the aesthetic and durability advantages of exposed masonry.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 2-9: Continuous insulation in cavity, 4-in. concrete masonry veneer

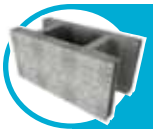


- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed-cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Masonry exposed on both the interior and exterior provides maximum durability.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

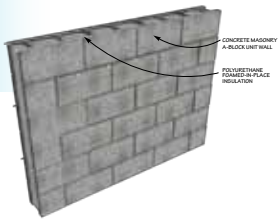
Assembly 2-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring



- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Interior furring allows for electrical rough-in.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
CELL INSULATION



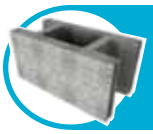
Assembly 2-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

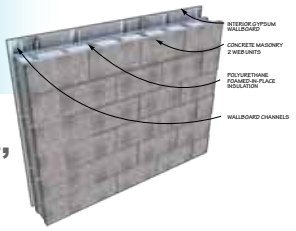
Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	9.48 (0.105)	5.45 (0.183)	3.64 (0.275)	1.77 (0.564)	12.97 (0.077)	6.84 (0.146)	4.40 (0.227)	2.07 (0.483)
95	8.37 (0.119)	5.01 (0.200)	3.40 (0.294)	1.69 (0.592)	11.41 (0.088)	6.28 (0.159)	4.10 (0.244)	1.96 (0.509)
105	7.36 (0.136)	4.59 (0.218)	3.18 (0.315)	1.62 (0.619)	9.98 (0.100)	5.75 (0.174)	3.83 (0.261)	1.87 (0.535)
115	6.43 (0.155)	4.19 (0.239)	2.97 (0.337)	1.55 (0.645)	8.69 (0.115)	5.25 (0.191)	3.58 (0.279)	1.79 (0.559)
125	5.61 (0.178)	3.82 (0.262)	2.78 (0.360)	1.49 (0.670)	7.53 (0.133)	4.78 (0.209)	3.34 (0.299)	1.72 (0.583)
135	4.88 (0.205)	3.47 (0.288)	2.59 (0.386)	1.44 (0.693)	6.51 (0.154)	4.34 (0.230)	3.12 (0.321)	1.65 (0.605)

Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly	Heavily	Fully Grouted	Ungrouted	Lightly	Heavily	Fully Grouted
85	17.44 (0.057)	8.20 (0.122)	5.05 (0.198)	2.28 (0.438)	21.91 (0.046)	9.44 (0.106)	5.66 (0.177)	2.50 (0.400)
95	15.32 (0.065)	7.56 (0.132)	4.74 (0.211)	2.18 (0.459)	19.22 (0.052)	8.75 (0.114)	5.33 (0.187)	2.39 (0.418)
105	13.36 (0.075)	6.96 (0.144)	4.45 (0.225)	2.08 (0.480)	16.74 (0.060)	8.09 (0.124)	5.03 (0.199)	2.29 (0.436)
115	11.59 (0.086)	6.38 (0.157)	4.17 (0.240)	2.00 (0.501)	14.50 (0.069)	7.45 (0.134)	4.74 (0.211)	2.21 (0.453)
125	10.01 (0.100)	5.84 (0.171)	3.92 (0.255)	1.92 (0.520)	12.49 (0.080)	6.84 (0.146)	4.46 (0.224)	2.13 (0.469)
135	8.61 (0.116)	5.32 (0.188)	3.67 (0.272)	1.86 (0.539)	10.71 (0.093)	6.25 (0.160)	4.20 (0.238)	2.06 (0.485)

*Assembly details page 37.



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
CELL INSULATION



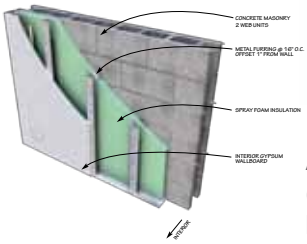
Assembly 2-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	10.58 (0.094)	6.55 (0.153)	4.74 (0.211)	2.87 (0.348)	14.07 (0.071)	7.94 (0.126)	5.50 (0.182)	3.17 (0.316)
95	9.47 (0.106)	6.11 (0.164)	4.50 (0.222)	2.79 (0.358)	12.51 (0.080)	7.38 (0.136)	5.20 (0.192)	3.06 (0.326)
105	8.46 (0.118)	5.69 (0.176)	4.28 (0.234)	2.72 (0.368)	11.08 (0.090)	6.85 (0.146)	4.93 (0.203)	2.97 (0.337)
115	7.53 (0.133)	5.29 (0.189)	4.07 (0.246)	2.65 (0.377)	9.79 (0.102)	6.35 (0.158)	4.68 (0.214)	2.89 (0.346)
125	6.71 (0.149)	4.92 (0.203)	3.88 (0.258)	2.59 (0.386)	8.63 (0.116)	5.88 (0.170)	4.44 (0.225)	2.82 (0.355)
135	5.98 (0.167)	4.57 (0.219)	3.69 (0.271)	2.54 (0.393)	7.61 (0.131)	5.44 (0.184)	4.22 (0.237)	2.75 (0.363)

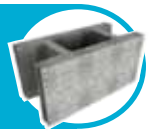
Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	18.54 (0.054)	9.30 (0.108)	6.15 (0.163)	3.38 (0.295)	23.01 (0.043)	10.54 (0.095)	6.76 (0.148)	3.60 (0.278)
95	16.42 (0.061)	8.66 (0.115)	5.84 (0.171)	3.28 (0.305)	20.32 (0.049)	9.85 (0.102)	6.43 (0.155)	3.49 (0.286)
105	14.46 (0.069)	8.06 (0.124)	5.55 (0.180)	3.18 (0.314)	17.84 (0.056)	9.19 (0.109)	6.13 (0.163)	3.39 (0.295)
115	12.69 (0.079)	7.48 (0.134)	5.27 (0.190)	3.10 (0.323)	15.60 (0.064)	8.55 (0.117)	5.84 (0.171)	3.31 (0.302)
125	11.11 (0.090)	6.94 (0.144)	5.02 (0.199)	3.02 (0.331)	13.59 (0.074)	7.94 (0.126)	5.56 (0.180)	3.23 (0.310)
135	9.71 (0.103)	6.42 (0.156)	4.77 (0.210)	2.96 (0.338)	11.81 (0.085)	7.35 (0.136)	5.30 (0.189)	3.16 (0.316)

*Assembly details page 37.



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

INTERIOR INSULATION



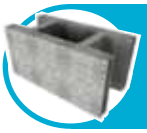
Assembly 2-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.06 (0.077)	12.94 (0.077)	12.81 (0.078)	12.47 (0.080)	13.22 (0.076)	13.13 (0.076)	13.03 (0.077)	12.77 (0.078)
	95	12.97 (0.077)	12.84 (0.078)	12.71 (0.079)	12.39 (0.081)	13.11 (0.076)	13.02 (0.077)	12.92 (0.077)	12.66 (0.079)
	105	12.87 (0.078)	12.75 (0.078)	12.63 (0.079)	12.32 (0.081)	13.00 (0.077)	12.92 (0.077)	12.82 (0.078)	12.57 (0.080)
	115	12.79 (0.078)	12.67 (0.079)	12.55 (0.080)	12.25 (0.082)	12.91 (0.077)	12.82 (0.078)	12.73 (0.079)	12.49 (0.080)
	125	12.71 (0.079)	12.60 (0.079)	12.48 (0.080)	12.19 (0.082)	12.82 (0.078)	12.74 (0.078)	12.65 (0.079)	12.42 (0.081)
	135	12.64 (0.079)	12.53 (0.080)	12.42 (0.081)	12.14 (0.082)	12.74 (0.078)	12.66 (0.079)	12.58 (0.080)	12.35 (0.081)
2 in.	85	14.26 (0.070)	14.14 (0.071)	14.01 (0.071)	13.67 (0.073)	14.42 (0.069)	14.33 (0.070)	14.23 (0.070)	13.97 (0.072)
	95	14.17 (0.071)	14.04 (0.071)	13.91 (0.072)	13.59 (0.074)	14.31 (0.070)	14.22 (0.070)	14.12 (0.071)	13.86 (0.072)
	105	14.07 (0.071)	13.95 (0.072)	13.83 (0.072)	13.52 (0.074)	14.20 (0.070)	14.12 (0.071)	14.02 (0.071)	13.77 (0.073)
	115	13.99 (0.071)	13.87 (0.072)	13.75 (0.073)	13.45 (0.074)	14.11 (0.071)	14.02 (0.071)	13.93 (0.072)	13.69 (0.073)
	125	13.91 (0.072)	13.80 (0.072)	13.68 (0.073)	13.39 (0.075)	14.02 (0.071)	13.94 (0.072)	13.85 (0.072)	13.62 (0.073)
	135	13.84 (0.072)	13.73 (0.073)	13.62 (0.073)	13.34 (0.075)	13.94 (0.072)	13.86 (0.072)	13.78 (0.073)	13.55 (0.074)
3 in.	85	14.86 (0.067)	14.74 (0.068)	14.61 (0.068)	14.27 (0.070)	15.02 (0.067)	14.93 (0.067)	14.83 (0.067)	14.57 (0.069)
	95	14.77 (0.068)	14.64 (0.068)	14.51 (0.069)	14.19 (0.070)	14.91 (0.067)	14.82 (0.067)	14.72 (0.068)	14.46 (0.069)
	105	14.67 (0.068)	14.55 (0.069)	14.43 (0.069)	14.12 (0.071)	14.80 (0.068)	14.72 (0.068)	14.62 (0.068)	14.37 (0.070)
	115	14.59 (0.069)	14.47 (0.069)	14.35 (0.070)	14.05 (0.071)	14.71 (0.068)	14.62 (0.068)	14.53 (0.069)	14.29 (0.070)
	125	14.51 (0.069)	14.40 (0.069)	14.28 (0.070)	13.99 (0.071)	14.62 (0.068)	14.54 (0.069)	14.45 (0.069)	14.22 (0.070)
	135	14.44 (0.069)	14.33 (0.070)	14.22 (0.070)	13.94 (0.072)	14.54 (0.069)	14.46 (0.069)	14.38 (0.070)	14.15 (0.071)
3 1/2 in.	85	15.06 (0.066)	14.94 (0.067)	14.81 (0.068)	14.47 (0.069)	15.22 (0.066)	15.13 (0.066)	15.03 (0.067)	14.77 (0.068)
	95	14.97 (0.067)	14.84 (0.067)	14.71 (0.068)	14.39 (0.069)	15.11 (0.066)	15.02 (0.067)	14.92 (0.067)	14.66 (0.068)
	105	14.87 (0.067)	14.75 (0.068)	14.63 (0.068)	14.32 (0.070)	15.00 (0.067)	14.92 (0.067)	14.82 (0.067)	14.57 (0.069)
	115	14.79 (0.068)	14.67 (0.068)	14.55 (0.069)	14.25 (0.070)	14.91 (0.067)	14.82 (0.067)	14.73 (0.068)	14.49 (0.069)
	125	14.71 (0.068)	14.60 (0.068)	14.48 (0.069)	14.19 (0.070)	14.82 (0.067)	14.74 (0.068)	14.65 (0.068)	14.42 (0.069)
	135	14.64 (0.068)	14.53 (0.069)	14.42 (0.069)	14.14 (0.071)	14.74 (0.068)	14.66 (0.068)	14.58 (0.069)	14.35 (0.070)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.24 (0.076)	13.19 (0.076)	13.14 (0.076)	12.98 (0.077)	13.25 (0.075)	13.24 (0.076)	13.23 (0.076)	13.20 (0.076)
	95	13.13 (0.076)	13.08 (0.076)	13.03 (0.077)	12.88 (0.078)	13.14 (0.076)	13.13 (0.076)	13.12 (0.076)	13.09 (0.076)
	105	13.03 (0.077)	12.98 (0.077)	12.93 (0.077)	12.78 (0.078)	13.04 (0.077)	13.03 (0.077)	13.02 (0.077)	12.99 (0.077)
	115	12.94 (0.077)	12.89 (0.078)	12.84 (0.078)	12.70 (0.079)	12.95 (0.077)	12.94 (0.077)	12.94 (0.077)	12.91 (0.077)
	125	12.85 (0.078)	12.81 (0.078)	12.76 (0.078)	12.62 (0.079)	12.87 (0.078)	12.87 (0.078)	12.86 (0.078)	12.83 (0.078)
	135	12.78 (0.078)	12.74 (0.079)	12.69 (0.079)	12.56 (0.080)	12.80 (0.078)	12.79 (0.078)	12.79 (0.078)	12.76 (0.078)
2 in.	85	14.44 (0.069)	14.39 (0.069)	14.34 (0.070)	14.18 (0.070)	14.45 (0.069)	14.44 (0.069)	14.43 (0.069)	14.40 (0.069)
	95	14.33 (0.070)	14.28 (0.070)	14.23 (0.070)	14.08 (0.071)	14.34 (0.070)	14.33 (0.070)	14.32 (0.070)	14.29 (0.070)
	105	14.23 (0.070)	14.18 (0.071)	14.13 (0.071)	13.98 (0.072)	14.24 (0.070)	14.23 (0.070)	14.22 (0.070)	14.19 (0.070)
	115	14.14 (0.071)	14.09 (0.071)	14.04 (0.071)	13.90 (0.072)	14.15 (0.071)	14.14 (0.071)	14.14 (0.071)	14.11 (0.071)
	125	14.05 (0.071)	14.01 (0.071)	13.96 (0.072)	13.82 (0.072)	14.07 (0.071)	14.07 (0.071)	14.06 (0.071)	14.03 (0.071)
	135	13.98 (0.072)	13.94 (0.072)	13.89 (0.072)	13.76 (0.073)	14.00 (0.071)	13.99 (0.071)	13.99 (0.071)	13.96 (0.072)
3 in.	85	15.04 (0.067)	14.99 (0.067)	14.94 (0.067)	14.78 (0.068)	15.05 (0.066)	15.04 (0.066)	15.03 (0.067)	15.00 (0.067)
	95	14.93 (0.067)	14.88 (0.067)	14.83 (0.067)	14.68 (0.068)	14.94 (0.067)	14.93 (0.067)	14.92 (0.067)	14.89 (0.067)
	105	14.83 (0.067)	14.78 (0.068)	14.73 (0.068)	14.58 (0.069)	14.84 (0.067)	14.83 (0.067)	14.82 (0.067)	14.79 (0.068)
	115	14.74 (0.068)	14.69 (0.068)	14.64 (0.068)	14.50 (0.069)	14.75 (0.068)	14.74 (0.068)	14.74 (0.068)	14.71 (0.068)
	125	14.65 (0.068)	14.61 (0.068)	14.56 (0.069)	14.42 (0.069)	14.67 (0.068)	14.67 (0.068)	14.66 (0.068)	14.63 (0.068)
	135	14.58 (0.069)	14.54 (0.069)	14.49 (0.069)	14.36 (0.070)	14.60 (0.068)	14.59 (0.069)	14.59 (0.069)	14.56 (0.069)
3 1/2 in.	85	15.24 (0.066)	15.19 (0.066)	15.14 (0.066)	14.98 (0.067)	15.25 (0.066)	15.24 (0.066)	15.23 (0.066)	15.20 (0.066)
	95	15.13 (0.066)	15.08 (0.066)	15.03 (0.067)	14.88 (0.067)	15.14 (0.066)	15.13 (0.066)	15.12 (0.066)	15.09 (0.066)
	105	15.03 (0.067)	14.98 (0.067)	14.93 (0.067)	14.78 (0.068)	15.04 (0.066)	15.03 (0.067)	15.02 (0.067)	14.99 (0.067)
	115	14.94 (0.067)	14.89 (0.067)	14.84 (0.067)	14.70 (0.068)	14.95 (0.067)	14.94 (0.067)	14.94 (0.067)	14.91 (0.067)
	125	14.85 (0.067)	14.81 (0.068)	14.76 (0.068)	14.62 (0.068)	14.87 (0.067)	14.87 (0.067)	14.86 (0.067)	14.83 (0.067)
	135	14.78 (0.068)	14.74 (0.068)	14.69 (0.068)	14.56 (0.069)	14.80 (0.068)	14.79 (0.068)	14.79 (0.068)	14.76 (0.068)

*Assembly details page 38.



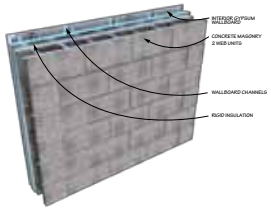
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 2-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry
(Continued on next page)

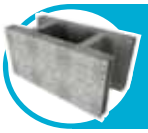
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.21 (0.139)	7.09 (0.141)	6.96 (0.144)	6.62 (0.151)	7.37 (0.136)	7.28 (0.137)	7.18 (0.139)	6.92 (0.145)
	95	7.12 (0.141)	6.99 (0.143)	6.86 (0.146)	6.54 (0.153)	7.26 (0.138)	7.17 (0.140)	7.07 (0.141)	6.81 (0.147)
	105	7.02 (0.142)	6.90 (0.145)	6.78 (0.148)	6.47 (0.155)	7.15 (0.140)	7.07 (0.142)	6.97 (0.143)	6.72 (0.149)
	115	6.94 (0.144)	6.82 (0.147)	6.70 (0.149)	6.40 (0.156)	7.06 (0.142)	6.97 (0.143)	6.88 (0.145)	6.64 (0.151)
	125	6.86 (0.146)	6.75 (0.148)	6.63 (0.151)	6.34 (0.158)	6.97 (0.143)	6.89 (0.145)	6.80 (0.147)	6.57 (0.152)
	135	6.79 (0.147)	6.68 (0.150)	6.57 (0.152)	6.29 (0.159)	6.89 (0.145)	6.81 (0.147)	6.73 (0.149)	6.50 (0.154)
Extruded Polystyrene, 1 in.	85	8.46 (0.118)	8.34 (0.120)	8.21 (0.122)	7.87 (0.127)	8.62 (0.116)	8.53 (0.117)	8.43 (0.119)	8.17 (0.122)
	95	8.37 (0.120)	8.24 (0.121)	8.11 (0.123)	7.79 (0.128)	8.51 (0.118)	8.42 (0.119)	8.32 (0.120)	8.06 (0.124)
	105	8.27 (0.121)	8.15 (0.123)	8.03 (0.125)	7.72 (0.130)	8.40 (0.119)	8.32 (0.120)	8.22 (0.122)	7.97 (0.125)
	115	8.19 (0.122)	8.07 (0.124)	7.95 (0.126)	7.65 (0.131)	8.31 (0.120)	8.22 (0.122)	8.13 (0.123)	7.89 (0.127)
	125	8.11 (0.123)	8.00 (0.125)	7.88 (0.127)	7.59 (0.132)	8.22 (0.122)	8.14 (0.123)	8.05 (0.124)	7.82 (0.128)
	135	8.04 (0.124)	7.93 (0.126)	7.82 (0.128)	7.54 (0.133)	8.14 (0.123)	8.06 (0.124)	7.98 (0.125)	7.75 (0.129)
Extruded Polystyrene, 1 1/2 in.	85	10.96 (0.091)	10.84 (0.092)	10.71 (0.093)	10.37 (0.096)	11.12 (0.090)	11.03 (0.091)	10.93 (0.091)	10.67 (0.094)
	95	10.87 (0.092)	10.74 (0.093)	10.61 (0.094)	10.29 (0.097)	11.01 (0.091)	10.92 (0.092)	10.82 (0.092)	10.56 (0.095)
	105	10.77 (0.093)	10.65 (0.094)	10.53 (0.095)	10.22 (0.098)	10.90 (0.092)	10.82 (0.092)	10.72 (0.093)	10.47 (0.096)
	115	10.69 (0.094)	10.57 (0.095)	10.45 (0.096)	10.15 (0.099)	10.81 (0.093)	10.72 (0.093)	10.63 (0.094)	10.39 (0.096)
	125	10.61 (0.094)	10.50 (0.095)	10.38 (0.096)	10.09 (0.099)	10.72 (0.093)	10.64 (0.094)	10.55 (0.095)	10.32 (0.097)
	135	10.54 (0.095)	10.43 (0.096)	10.32 (0.097)	10.04 (0.100)	10.64 (0.094)	10.56 (0.095)	10.48 (0.095)	10.25 (0.098)
Extruded Polystyrene, 2 in.	85	13.46 (0.074)	13.34 (0.075)	13.21 (0.076)	12.87 (0.078)	13.62 (0.073)	13.53 (0.074)	13.43 (0.074)	13.17 (0.076)
	95	13.37 (0.075)	13.24 (0.076)	13.11 (0.076)	12.79 (0.078)	13.51 (0.074)	13.42 (0.075)	13.32 (0.075)	13.06 (0.077)
	105	13.27 (0.075)	13.15 (0.076)	13.03 (0.077)	12.72 (0.079)	13.40 (0.075)	13.32 (0.075)	13.22 (0.076)	12.97 (0.077)
	115	13.19 (0.076)	13.07 (0.076)	12.95 (0.077)	12.65 (0.079)	13.31 (0.075)	13.22 (0.076)	13.13 (0.076)	12.89 (0.078)
	125	13.11 (0.076)	13.00 (0.077)	12.88 (0.078)	12.59 (0.079)	13.22 (0.076)	13.14 (0.076)	13.05 (0.077)	12.82 (0.078)
	135	13.04 (0.077)	12.93 (0.077)	12.82 (0.078)	12.54 (0.080)	13.14 (0.076)	13.06 (0.077)	12.98 (0.077)	12.75 (0.078)
Extruded Polystyrene, 2 1/2 in.	85	15.96 (0.063)	15.84 (0.063)	15.71 (0.064)	15.37 (0.065)	16.12 (0.062)	16.03 (0.062)	15.93 (0.063)	15.67 (0.064)
	95	15.87 (0.063)	15.74 (0.064)	15.61 (0.064)	15.29 (0.065)	16.01 (0.062)	15.92 (0.063)	15.82 (0.063)	15.56 (0.064)
	105	15.77 (0.063)	15.65 (0.064)	15.53 (0.064)	15.22 (0.066)	15.90 (0.063)	15.82 (0.063)	15.72 (0.064)	15.47 (0.065)
	115	15.69 (0.064)	15.57 (0.064)	15.45 (0.065)	15.15 (0.066)	15.81 (0.063)	15.72 (0.064)	15.63 (0.064)	15.39 (0.065)
	125	15.61 (0.064)	15.50 (0.065)	15.38 (0.065)	15.09 (0.066)	15.72 (0.064)	15.64 (0.064)	15.55 (0.064)	15.32 (0.065)
	135	15.54 (0.064)	15.43 (0.065)	15.32 (0.065)	15.04 (0.066)	15.64 (0.064)	15.56 (0.064)	15.48 (0.065)	15.25 (0.066)
Extruded Polystyrene, 3 in.	85	18.46 (0.054)	18.34 (0.055)	18.21 (0.055)	17.87 (0.056)	18.62 (0.054)	18.53 (0.054)	18.43 (0.054)	18.17 (0.055)
	95	18.37 (0.054)	18.24 (0.055)	18.11 (0.055)	17.79 (0.056)	18.51 (0.054)	18.42 (0.054)	18.32 (0.055)	18.06 (0.055)
	105	18.27 (0.055)	18.15 (0.055)	18.03 (0.055)	17.72 (0.056)	18.40 (0.054)	18.32 (0.055)	18.22 (0.055)	17.97 (0.056)
	115	18.19 (0.055)	18.07 (0.055)	17.95 (0.056)	17.65 (0.057)	18.31 (0.055)	18.22 (0.055)	18.13 (0.055)	17.89 (0.056)
	125	18.11 (0.055)	18.00 (0.056)	17.88 (0.056)	17.59 (0.057)	18.22 (0.055)	18.14 (0.055)	18.05 (0.055)	17.82 (0.056)
	135	18.04 (0.055)	17.93 (0.056)	17.82 (0.056)	17.54 (0.057)	18.14 (0.055)	18.06 (0.055)	17.98 (0.056)	17.75 (0.056)

*Assembly details page 38.



Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.39 (0.135)	7.34 (0.136)	7.29 (0.137)	7.13 (0.140)	7.40 (0.135)	7.39 (0.135)	7.38 (0.136)	7.35 (0.136)
	95	7.28 (0.137)	7.23 (0.138)	7.18 (0.139)	7.03 (0.142)	7.29 (0.137)	7.28 (0.137)	7.27 (0.138)	7.24 (0.138)
	105	7.18 (0.139)	7.13 (0.140)	7.08 (0.141)	6.93 (0.144)	7.19 (0.139)	7.18 (0.139)	7.17 (0.139)	7.14 (0.140)
	115	7.09 (0.141)	7.04 (0.142)	6.99 (0.143)	6.85 (0.146)	7.10 (0.141)	7.09 (0.141)	7.09 (0.141)	7.06 (0.142)
	125	7.00 (0.143)	6.96 (0.144)	6.91 (0.145)	6.77 (0.148)	7.02 (0.142)	7.02 (0.143)	7.01 (0.143)	6.98 (0.143)
	135	6.93 (0.144)	6.89 (0.145)	6.84 (0.146)	6.71 (0.149)	6.95 (0.144)	6.94 (0.144)	6.94 (0.144)	6.91 (0.145)
Extruded Polystyrene, 1 in.	85	8.64 (0.116)	8.59 (0.116)	8.54 (0.117)	8.38 (0.119)	8.65 (0.116)	8.64 (0.116)	8.63 (0.116)	8.60 (0.116)
	95	8.53 (0.117)	8.48 (0.118)	8.43 (0.119)	8.28 (0.121)	8.54 (0.117)	8.53 (0.117)	8.52 (0.117)	8.49 (0.118)
	105	8.43 (0.119)	8.38 (0.119)	8.33 (0.120)	8.18 (0.122)	8.44 (0.118)	8.43 (0.119)	8.42 (0.119)	8.39 (0.119)
	115	8.34 (0.120)	8.29 (0.121)	8.24 (0.121)	8.10 (0.123)	8.35 (0.120)	8.34 (0.120)	8.34 (0.120)	8.31 (0.120)
	125	8.25 (0.121)	8.21 (0.122)	8.16 (0.123)	8.02 (0.125)	8.27 (0.121)	8.27 (0.121)	8.26 (0.121)	8.23 (0.122)
	135	8.18 (0.122)	8.14 (0.123)	8.09 (0.124)	7.96 (0.126)	8.20 (0.122)	8.19 (0.122)	8.19 (0.122)	8.16 (0.123)
Extruded Polystyrene, 1 1/2 in.	85	11.14 (0.090)	11.09 (0.090)	11.04 (0.091)	10.88 (0.092)	11.15 (0.090)	11.14 (0.090)	11.13 (0.090)	11.10 (0.090)
	95	11.03 (0.091)	10.98 (0.091)	10.93 (0.092)	10.78 (0.093)	11.04 (0.091)	11.03 (0.091)	11.02 (0.091)	10.99 (0.091)
	105	10.93 (0.092)	10.88 (0.092)	10.83 (0.092)	10.68 (0.094)	10.94 (0.091)	10.93 (0.091)	10.92 (0.092)	10.89 (0.092)
	115	10.84 (0.092)	10.79 (0.093)	10.74 (0.093)	10.60 (0.094)	10.85 (0.092)	10.84 (0.092)	10.84 (0.092)	10.81 (0.093)
	125	10.75 (0.093)	10.71 (0.093)	10.66 (0.094)	10.52 (0.095)	10.77 (0.093)	10.77 (0.093)	10.76 (0.093)	10.73 (0.093)
	135	10.68 (0.094)	10.64 (0.094)	10.59 (0.094)	10.46 (0.096)	10.70 (0.093)	10.69 (0.094)	10.69 (0.094)	10.66 (0.094)
Extruded Polystyrene, 2 in.	85	13.64 (0.073)	13.59 (0.074)	13.54 (0.074)	13.38 (0.075)	13.65 (0.073)	13.64 (0.073)	13.63 (0.073)	13.60 (0.074)
	95	13.53 (0.074)	13.48 (0.074)	13.43 (0.074)	13.28 (0.075)	13.54 (0.074)	13.53 (0.074)	13.52 (0.074)	13.49 (0.074)
	105	13.43 (0.074)	13.38 (0.075)	13.33 (0.075)	13.18 (0.076)	13.44 (0.074)	13.43 (0.074)	13.42 (0.075)	13.39 (0.075)
	115	13.34 (0.075)	13.29 (0.075)	13.24 (0.076)	13.10 (0.076)	13.35 (0.075)	13.34 (0.075)	13.34 (0.075)	13.31 (0.075)
	125	13.25 (0.075)	13.21 (0.076)	13.16 (0.076)	13.02 (0.077)	13.27 (0.075)	13.27 (0.075)	13.26 (0.075)	13.23 (0.076)
	135	13.18 (0.076)	13.14 (0.076)	13.09 (0.076)	12.96 (0.077)	13.20 (0.076)	13.19 (0.076)	13.19 (0.076)	13.16 (0.076)
Extruded Polystyrene, 2 1/2 in.	85	16.14 (0.062)	16.09 (0.062)	16.04 (0.062)	15.88 (0.063)	16.15 (0.062)	16.14 (0.062)	16.13 (0.062)	16.10 (0.062)
	95	16.03 (0.062)	15.98 (0.063)	15.93 (0.063)	15.78 (0.063)	16.04 (0.062)	16.03 (0.062)	16.02 (0.062)	15.99 (0.063)
	105	15.93 (0.063)	15.88 (0.063)	15.83 (0.063)	15.68 (0.064)	15.94 (0.063)	15.93 (0.063)	15.92 (0.063)	15.89 (0.063)
	115	15.84 (0.063)	15.79 (0.063)	15.74 (0.064)	15.60 (0.064)	15.85 (0.063)	15.84 (0.063)	15.84 (0.063)	15.81 (0.063)
	125	15.75 (0.063)	15.71 (0.064)	15.66 (0.064)	15.52 (0.064)	15.77 (0.063)	15.77 (0.063)	15.76 (0.063)	15.73 (0.064)
	135	15.68 (0.064)	15.64 (0.064)	15.59 (0.064)	15.46 (0.065)	15.70 (0.064)	15.69 (0.064)	15.69 (0.064)	15.66 (0.064)
Extruded Polystyrene, 3 in.	85	18.64 (0.054)	18.59 (0.054)	18.54 (0.054)	18.38 (0.054)	18.65 (0.054)	18.64 (0.054)	18.63 (0.054)	18.60 (0.054)
	95	18.53 (0.054)	18.48 (0.054)	18.43 (0.054)	18.28 (0.055)	18.54 (0.054)	18.53 (0.054)	18.52 (0.054)	18.49 (0.054)
	105	18.43 (0.054)	18.38 (0.054)	18.33 (0.055)	18.18 (0.055)	18.44 (0.054)	18.43 (0.054)	18.42 (0.054)	18.39 (0.054)
	115	18.34 (0.055)	18.29 (0.055)	18.24 (0.055)	18.10 (0.055)	18.35 (0.054)	18.34 (0.055)	18.34 (0.055)	18.31 (0.055)
	125	18.25 (0.055)	18.21 (0.055)	18.16 (0.055)	18.02 (0.055)	18.27 (0.055)	18.27 (0.055)	18.26 (0.055)	18.23 (0.055)
	135	18.18 (0.055)	18.14 (0.055)	18.09 (0.055)	17.96 (0.056)	18.20 (0.055)	18.19 (0.055)	18.19 (0.055)	18.16 (0.055)



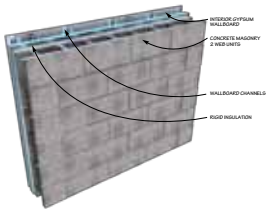
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 2-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry (Continued from previous page)

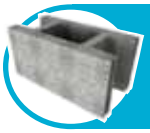
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.72 (0.103)	9.59 (0.104)	9.46 (0.106)	9.13 (0.110)	9.88 (0.101)	9.79 (0.102)	9.69 (0.103)	9.42 (0.106)
	95	9.62 (0.104)	9.50 (0.105)	9.37 (0.107)	9.04 (0.111)	9.76 (0.102)	9.67 (0.103)	9.58 (0.104)	9.32 (0.107)
	105	9.53 (0.105)	9.41 (0.106)	9.28 (0.108)	8.97 (0.111)	9.66 (0.104)	9.57 (0.104)	9.48 (0.106)	9.22 (0.108)
	115	9.44 (0.106)	9.33 (0.107)	9.21 (0.109)	8.91 (0.112)	9.56 (0.105)	9.48 (0.106)	9.39 (0.107)	9.14 (0.109)
	125	9.37 (0.107)	9.25 (0.108)	9.14 (0.109)	8.85 (0.113)	9.48 (0.106)	9.39 (0.106)	9.31 (0.107)	9.07 (0.110)
	135	9.29 (0.108)	9.18 (0.109)	9.07 (0.110)	8.80 (0.114)	9.40 (0.106)	9.32 (0.107)	9.23 (0.108)	9.01 (0.111)
Polyisocyanurate, 1 in.	85	11.39 (0.088)	11.27 (0.089)	11.14 (0.090)	10.80 (0.093)	11.55 (0.087)	11.46 (0.087)	11.36 (0.088)	11.10 (0.090)
	95	11.30 (0.089)	11.17 (0.090)	11.04 (0.091)	10.72 (0.093)	11.44 (0.087)	11.35 (0.088)	11.25 (0.089)	10.99 (0.091)
	105	11.20 (0.089)	11.08 (0.090)	10.96 (0.091)	10.65 (0.094)	11.33 (0.088)	11.25 (0.089)	11.15 (0.090)	10.90 (0.092)
	115	11.12 (0.090)	11.00 (0.091)	10.88 (0.092)	10.58 (0.095)	11.24 (0.089)	11.15 (0.090)	11.06 (0.090)	10.82 (0.092)
	125	11.04 (0.091)	10.93 (0.092)	10.81 (0.092)	10.52 (0.095)	11.15 (0.090)	11.07 (0.090)	10.98 (0.091)	10.75 (0.093)
	135	10.97 (0.091)	10.86 (0.092)	10.75 (0.093)	10.47 (0.095)	11.07 (0.090)	10.99 (0.091)	10.91 (0.092)	10.68 (0.094)
Polyisocyanurate, 1 1/2 in.	85	15.19 (0.066)	15.07 (0.066)	14.94 (0.067)	14.60 (0.068)	15.35 (0.065)	15.26 (0.066)	15.16 (0.066)	14.90 (0.067)
	95	15.10 (0.066)	14.97 (0.067)	14.84 (0.067)	14.52 (0.069)	15.24 (0.066)	15.15 (0.066)	15.05 (0.066)	14.79 (0.068)
	105	15.00 (0.067)	14.88 (0.067)	14.76 (0.068)	14.45 (0.069)	15.13 (0.066)	15.05 (0.066)	14.95 (0.067)	14.70 (0.068)
	115	14.92 (0.067)	14.80 (0.068)	14.68 (0.068)	14.38 (0.070)	15.04 (0.066)	14.95 (0.067)	14.86 (0.067)	14.62 (0.068)
	125	14.84 (0.067)	14.73 (0.068)	14.61 (0.068)	14.32 (0.070)	14.95 (0.067)	14.87 (0.067)	14.78 (0.068)	14.55 (0.069)
	135	14.77 (0.068)	14.66 (0.068)	14.55 (0.069)	14.27 (0.070)	14.87 (0.067)	14.79 (0.068)	14.71 (0.068)	14.48 (0.069)
Polyisocyanurate, 2 in.	85	19.09 (0.052)	18.97 (0.053)	18.84 (0.053)	18.50 (0.054)	19.25 (0.052)	19.16 (0.052)	19.06 (0.052)	18.80 (0.053)
	95	19.00 (0.053)	18.87 (0.053)	18.74 (0.053)	18.42 (0.054)	19.14 (0.052)	19.05 (0.053)	18.95 (0.053)	18.69 (0.053)
	105	18.90 (0.053)	18.78 (0.053)	18.66 (0.054)	18.35 (0.055)	19.03 (0.053)	18.95 (0.053)	18.85 (0.053)	18.60 (0.054)
	115	18.82 (0.053)	18.70 (0.053)	18.58 (0.054)	18.28 (0.055)	18.94 (0.053)	18.85 (0.053)	18.76 (0.053)	18.52 (0.054)
	125	18.74 (0.053)	18.63 (0.054)	18.51 (0.054)	18.22 (0.055)	18.85 (0.053)	18.77 (0.053)	18.68 (0.054)	18.45 (0.054)
	135	18.67 (0.054)	18.56 (0.054)	18.45 (0.054)	18.17 (0.055)	18.77 (0.053)	18.69 (0.053)	18.61 (0.054)	18.38 (0.054)
Polyisocyanurate, 2 1/2 in.	85	22.49 (0.044)	22.37 (0.045)	22.24 (0.045)	21.90 (0.046)	22.65 (0.044)	22.56 (0.044)	22.46 (0.045)	22.20 (0.045)
	95	22.40 (0.045)	22.27 (0.045)	22.14 (0.045)	21.82 (0.046)	22.54 (0.044)	22.45 (0.045)	22.35 (0.045)	22.09 (0.045)
	105	22.30 (0.045)	22.18 (0.045)	22.06 (0.045)	21.75 (0.046)	22.43 (0.045)	22.35 (0.045)	22.25 (0.045)	22.00 (0.045)
	115	22.22 (0.045)	22.10 (0.045)	21.98 (0.045)	21.68 (0.046)	22.34 (0.045)	22.25 (0.045)	22.16 (0.045)	21.92 (0.046)
	125	22.14 (0.045)	22.03 (0.045)	21.91 (0.046)	21.62 (0.046)	22.25 (0.045)	22.17 (0.045)	22.08 (0.045)	21.85 (0.046)
	135	22.07 (0.045)	21.96 (0.046)	21.85 (0.046)	21.57 (0.046)	22.17 (0.045)	22.09 (0.045)	22.01 (0.045)	21.78 (0.046)
Polyisocyanurate, 3 in.	85	25.89 (0.039)	25.77 (0.039)	25.64 (0.039)	25.30 (0.040)	26.05 (0.038)	25.96 (0.039)	25.86 (0.039)	25.60 (0.039)
	95	25.80 (0.039)	25.67 (0.039)	25.54 (0.039)	25.22 (0.040)	25.94 (0.039)	25.85 (0.039)	25.75 (0.039)	25.49 (0.039)
	105	25.70 (0.039)	25.58 (0.039)	25.46 (0.039)	25.15 (0.040)	25.83 (0.039)	25.75 (0.039)	25.65 (0.039)	25.40 (0.039)
	115	25.62 (0.039)	25.50 (0.039)	25.38 (0.039)	25.08 (0.040)	25.74 (0.039)	25.65 (0.039)	25.56 (0.039)	25.32 (0.039)
	125	25.54 (0.039)	25.43 (0.039)	25.31 (0.040)	25.02 (0.040)	25.65 (0.039)	25.57 (0.039)	25.48 (0.039)	25.25 (0.040)
	135	25.47 (0.039)	25.36 (0.039)	25.25 (0.040)	24.97 (0.040)	25.57 (0.039)	25.49 (0.039)	25.41 (0.039)	25.18 (0.040)

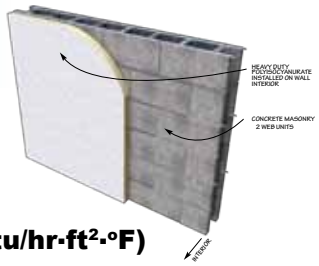
*Assembly details page 38.



Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.89 (0.101)	9.85 (0.102)	9.79 (0.102)	9.64 (0.104)	9.90 (0.101)	9.89 (0.101)	9.88 (0.101)	9.86 (0.101)
	95	9.78 (0.102)	9.73 (0.103)	9.68 (0.103)	9.53 (0.105)	9.79 (0.102)	9.78 (0.102)	9.78 (0.102)	9.75 (0.103)
	105	9.68 (0.103)	9.64 (0.104)	9.58 (0.104)	9.44 (0.106)	9.69 (0.103)	9.69 (0.103)	9.68 (0.103)	9.65 (0.104)
	115	9.59 (0.104)	9.55 (0.105)	9.50 (0.105)	9.35 (0.107)	9.61 (0.104)	9.60 (0.104)	9.59 (0.104)	9.56 (0.105)
	125	9.51 (0.105)	9.47 (0.106)	9.42 (0.106)	9.28 (0.108)	9.53 (0.105)	9.52 (0.105)	9.51 (0.105)	9.49 (0.105)
	135	9.43 (0.106)	9.39 (0.106)	9.35 (0.107)	9.21 (0.109)	9.46 (0.106)	9.45 (0.106)	9.44 (0.106)	9.42 (0.106)
Polyisocyanurate, 1 in.	85	11.57 (0.086)	11.52 (0.087)	11.47 (0.087)	11.31 (0.088)	11.58 (0.086)	11.57 (0.086)	11.56 (0.087)	11.53 (0.087)
	95	11.46 (0.087)	11.41 (0.088)	11.36 (0.088)	11.21 (0.089)	11.47 (0.087)	11.46 (0.087)	11.45 (0.087)	11.42 (0.088)
	105	11.36 (0.088)	11.31 (0.088)	11.26 (0.089)	11.11 (0.090)	11.37 (0.088)	11.36 (0.088)	11.35 (0.088)	11.32 (0.088)
	115	11.27 (0.089)	11.22 (0.089)	11.17 (0.090)	11.03 (0.091)	11.28 (0.089)	11.27 (0.089)	11.27 (0.089)	11.24 (0.089)
	125	11.18 (0.089)	11.14 (0.090)	11.09 (0.090)	10.95 (0.091)	11.20 (0.089)	11.20 (0.089)	11.19 (0.089)	11.16 (0.090)
	135	11.11 (0.090)	11.07 (0.090)	11.02 (0.091)	10.89 (0.092)	11.13 (0.090)	11.12 (0.090)	11.12 (0.090)	11.09 (0.090)
Polyisocyanurate, 1 1/2 in.	85	15.37 (0.065)	15.32 (0.065)	15.27 (0.065)	15.11 (0.066)	15.38 (0.065)	15.37 (0.065)	15.36 (0.065)	15.33 (0.065)
	95	15.26 (0.066)	15.21 (0.066)	15.16 (0.066)	15.01 (0.067)	15.27 (0.065)	15.26 (0.066)	15.25 (0.066)	15.22 (0.066)
	105	15.16 (0.066)	15.11 (0.066)	15.06 (0.066)	14.91 (0.067)	15.17 (0.066)	15.16 (0.066)	15.15 (0.066)	15.12 (0.066)
	115	15.07 (0.066)	15.02 (0.067)	14.97 (0.067)	14.83 (0.067)	15.08 (0.066)	15.07 (0.066)	15.07 (0.066)	15.04 (0.066)
	125	14.98 (0.067)	14.94 (0.067)	14.89 (0.067)	14.75 (0.068)	15.00 (0.067)	15.00 (0.067)	14.99 (0.067)	14.96 (0.067)
	135	14.91 (0.067)	14.87 (0.067)	14.82 (0.067)	14.69 (0.068)	14.93 (0.067)	14.92 (0.067)	14.92 (0.067)	14.89 (0.067)
Polyisocyanurate, 2 in.	85	19.27 (0.052)	19.22 (0.052)	19.17 (0.052)	19.01 (0.053)	19.28 (0.052)	19.27 (0.052)	19.26 (0.052)	19.23 (0.052)
	95	19.16 (0.052)	19.11 (0.052)	19.06 (0.052)	18.91 (0.053)	19.17 (0.052)	19.16 (0.052)	19.15 (0.052)	19.12 (0.052)
	105	19.06 (0.052)	19.01 (0.053)	18.96 (0.053)	18.81 (0.053)	19.07 (0.052)	19.06 (0.052)	19.05 (0.052)	19.02 (0.053)
	115	18.97 (0.053)	18.92 (0.053)	18.87 (0.053)	18.73 (0.053)	18.98 (0.053)	18.97 (0.053)	18.97 (0.053)	18.94 (0.053)
	125	18.88 (0.053)	18.84 (0.053)	18.79 (0.053)	18.65 (0.054)	18.90 (0.053)	18.90 (0.053)	18.89 (0.053)	18.86 (0.053)
	135	18.81 (0.053)	18.77 (0.053)	18.72 (0.053)	18.59 (0.054)	18.83 (0.053)	18.82 (0.053)	18.82 (0.053)	18.79 (0.053)
Polyisocyanurate, 2 1/2 in.	85	22.67 (0.044)	22.62 (0.044)	22.57 (0.044)	22.41 (0.045)	22.68 (0.044)	22.67 (0.044)	22.66 (0.044)	22.63 (0.044)
	95	22.56 (0.044)	22.51 (0.044)	22.46 (0.045)	22.31 (0.045)	22.57 (0.044)	22.56 (0.044)	22.55 (0.044)	22.52 (0.044)
	105	22.46 (0.045)	22.41 (0.045)	22.36 (0.045)	22.21 (0.045)	22.47 (0.045)	22.46 (0.045)	22.45 (0.045)	22.42 (0.045)
	115	22.37 (0.045)	22.32 (0.045)	22.27 (0.045)	22.13 (0.045)	22.38 (0.045)	22.37 (0.045)	22.37 (0.045)	22.34 (0.045)
	125	22.28 (0.045)	22.24 (0.045)	22.19 (0.045)	22.05 (0.045)	22.30 (0.045)	22.30 (0.045)	22.29 (0.045)	22.26 (0.045)
	135	22.21 (0.045)	22.17 (0.045)	22.12 (0.045)	21.99 (0.045)	22.23 (0.045)	22.22 (0.045)	22.22 (0.045)	22.19 (0.045)
Polyisocyanurate, 3 in.	85	26.07 (0.038)	26.02 (0.038)	25.97 (0.039)	25.81 (0.039)	26.08 (0.038)	26.07 (0.038)	26.06 (0.038)	26.03 (0.038)
	95	25.96 (0.039)	25.91 (0.039)	25.86 (0.039)	25.71 (0.039)	25.97 (0.039)	25.96 (0.039)	25.95 (0.039)	25.92 (0.039)
	105	25.86 (0.039)	25.81 (0.039)	25.76 (0.039)	25.61 (0.039)	25.87 (0.039)	25.86 (0.039)	25.85 (0.039)	25.82 (0.039)
	115	25.77 (0.039)	25.72 (0.039)	25.67 (0.039)	25.53 (0.039)	25.78 (0.039)	25.77 (0.039)	25.77 (0.039)	25.74 (0.039)
	125	25.68 (0.039)	25.64 (0.039)	25.59 (0.039)	25.45 (0.039)	25.70 (0.039)	25.70 (0.039)	25.69 (0.039)	25.66 (0.039)
	135	25.61 (0.039)	25.57 (0.039)	25.52 (0.039)	25.39 (0.039)	25.63 (0.039)	25.62 (0.039)	25.62 (0.039)	25.59 (0.039)



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION



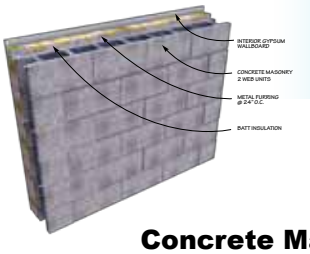
Assembly 2-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of HD polyisocyanurate:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	16.76 (0.060)	16.64 (0.060)	16.51 (0.061)	16.17 (0.062)	16.92 (0.059)	16.83 (0.059)	16.73 (0.060)	16.47 (0.061)
	95	16.67 (0.060)	16.54 (0.060)	16.41 (0.061)	16.09 (0.062)	16.81 (0.060)	16.72 (0.060)	16.62 (0.060)	16.36 (0.061)
	105	16.57 (0.060)	16.45 (0.061)	16.33 (0.061)	16.02 (0.062)	16.70 (0.060)	16.62 (0.060)	16.52 (0.061)	16.27 (0.061)
	115	16.49 (0.061)	16.37 (0.061)	16.25 (0.062)	15.95 (0.063)	16.61 (0.060)	16.52 (0.061)	16.43 (0.061)	16.19 (0.062)
	125	16.41 (0.061)	16.30 (0.061)	16.18 (0.062)	15.89 (0.063)	16.52 (0.061)	16.44 (0.061)	16.35 (0.061)	16.12 (0.062)
	135	16.34 (0.061)	16.23 (0.062)	16.12 (0.062)	15.84 (0.063)	16.44 (0.061)	16.36 (0.061)	16.28 (0.061)	16.05 (0.062)
2 1/2 in.	85	20.16 (0.050)	20.04 (0.050)	19.91 (0.050)	19.57 (0.051)	20.32 (0.049)	20.23 (0.049)	20.13 (0.050)	19.87 (0.050)
	95	20.07 (0.050)	19.94 (0.050)	19.81 (0.050)	19.49 (0.051)	20.21 (0.049)	20.12 (0.050)	20.02 (0.050)	19.76 (0.051)
	105	19.97 (0.050)	19.85 (0.050)	19.73 (0.051)	19.42 (0.052)	20.10 (0.050)	20.02 (0.050)	19.92 (0.050)	19.67 (0.051)
	115	19.89 (0.050)	19.77 (0.051)	19.65 (0.051)	19.35 (0.052)	20.01 (0.050)	19.92 (0.050)	19.83 (0.050)	19.59 (0.051)
	125	19.81 (0.050)	19.70 (0.051)	19.58 (0.051)	19.29 (0.052)	19.92 (0.050)	19.84 (0.050)	19.75 (0.051)	19.52 (0.051)
	135	19.74 (0.051)	19.63 (0.051)	19.52 (0.051)	19.24 (0.052)	19.84 (0.050)	19.76 (0.051)	19.68 (0.051)	19.45 (0.051)
3 in.	85	23.56 (0.042)	23.44 (0.043)	23.31 (0.043)	22.97 (0.044)	23.72 (0.042)	23.63 (0.042)	23.53 (0.042)	23.27 (0.043)
	95	23.47 (0.043)	23.34 (0.043)	23.21 (0.043)	22.89 (0.044)	23.61 (0.042)	23.52 (0.043)	23.42 (0.043)	23.16 (0.043)
	105	23.37 (0.043)	23.25 (0.043)	23.13 (0.043)	22.82 (0.044)	23.50 (0.043)	23.42 (0.043)	23.32 (0.043)	23.07 (0.043)
	115	23.29 (0.043)	23.17 (0.043)	23.05 (0.043)	22.75 (0.044)	23.41 (0.043)	23.32 (0.043)	23.23 (0.043)	22.99 (0.044)
	125	23.21 (0.043)	23.10 (0.043)	22.98 (0.044)	22.69 (0.044)	23.32 (0.043)	23.24 (0.043)	23.15 (0.043)	22.92 (0.044)
	135	23.14 (0.043)	23.03 (0.043)	22.92 (0.044)	22.64 (0.044)	23.24 (0.043)	23.16 (0.043)	23.08 (0.043)	22.85 (0.044)
3 1/2 in.	85	26.96 (0.037)	26.84 (0.037)	26.71 (0.037)	26.37 (0.038)	27.12 (0.037)	27.03 (0.037)	26.93 (0.037)	26.67 (0.037)
	95	26.87 (0.037)	26.74 (0.037)	26.61 (0.038)	26.29 (0.038)	27.01 (0.037)	26.92 (0.037)	26.82 (0.037)	26.56 (0.038)
	105	26.77 (0.037)	26.65 (0.038)	26.53 (0.038)	26.22 (0.038)	26.90 (0.037)	26.82 (0.037)	26.72 (0.037)	26.47 (0.038)
	115	26.69 (0.037)	26.57 (0.038)	26.45 (0.038)	26.15 (0.038)	26.81 (0.037)	26.72 (0.037)	26.63 (0.038)	26.39 (0.038)
	125	26.61 (0.038)	26.50 (0.038)	26.38 (0.038)	26.09 (0.038)	26.72 (0.037)	26.64 (0.038)	26.55 (0.038)	26.32 (0.038)
	135	26.54 (0.038)	26.43 (0.038)	26.32 (0.038)	26.04 (0.038)	26.64 (0.038)	26.56 (0.038)	26.48 (0.038)	26.25 (0.038)

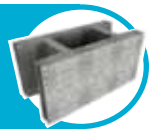
Thickness of HD polyisocyanurate:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	16.94 (0.059)	16.89 (0.059)	16.84 (0.059)	16.68 (0.060)	16.95 (0.059)	16.94 (0.059)	16.93 (0.059)	16.90 (0.059)
	95	16.83 (0.059)	16.78 (0.060)	16.73 (0.060)	16.58 (0.060)	16.84 (0.059)	16.83 (0.059)	16.82 (0.059)	16.79 (0.060)
	105	16.73 (0.060)	16.68 (0.060)	16.63 (0.060)	16.48 (0.061)	16.74 (0.060)	16.73 (0.060)	16.72 (0.060)	16.69 (0.060)
	115	16.64 (0.060)	16.59 (0.060)	16.54 (0.060)	16.40 (0.061)	16.65 (0.060)	16.64 (0.060)	16.64 (0.060)	16.61 (0.060)
	125	16.55 (0.060)	16.51 (0.061)	16.46 (0.061)	16.32 (0.061)	16.57 (0.060)	16.57 (0.060)	16.56 (0.060)	16.53 (0.060)
	135	16.48 (0.061)	16.44 (0.061)	16.39 (0.061)	16.26 (0.062)	16.50 (0.061)	16.49 (0.061)	16.49 (0.061)	16.46 (0.061)
2 1/2 in.	85	20.34 (0.049)	20.29 (0.049)	20.24 (0.049)	20.08 (0.050)	20.35 (0.049)	20.34 (0.049)	20.33 (0.049)	20.30 (0.049)
	95	20.23 (0.049)	20.18 (0.050)	20.13 (0.050)	19.98 (0.050)	20.24 (0.049)	20.23 (0.049)	20.22 (0.049)	20.19 (0.050)
	105	20.13 (0.050)	20.08 (0.050)	20.03 (0.050)	19.88 (0.050)	20.14 (0.050)	20.13 (0.050)	20.12 (0.050)	20.09 (0.050)
	115	20.04 (0.050)	19.99 (0.050)	19.94 (0.050)	19.80 (0.051)	20.05 (0.050)	20.04 (0.050)	20.04 (0.050)	20.01 (0.050)
	125	19.95 (0.050)	19.91 (0.050)	19.86 (0.050)	19.72 (0.051)	19.97 (0.050)	19.97 (0.050)	19.96 (0.050)	19.93 (0.050)
	135	19.88 (0.050)	19.84 (0.050)	19.79 (0.051)	19.66 (0.051)	19.90 (0.050)	19.89 (0.050)	19.89 (0.050)	19.86 (0.050)
3 in.	85	23.74 (0.042)	23.69 (0.042)	23.64 (0.042)	23.48 (0.043)	23.75 (0.042)	23.74 (0.042)	23.73 (0.042)	23.70 (0.042)
	95	23.63 (0.042)	23.58 (0.042)	23.53 (0.043)	23.38 (0.043)	23.64 (0.042)	23.63 (0.042)	23.62 (0.042)	23.59 (0.042)
	105	23.53 (0.043)	23.48 (0.043)	23.43 (0.043)	23.28 (0.043)	23.54 (0.042)	23.53 (0.042)	23.52 (0.043)	23.49 (0.043)
	115	23.44 (0.043)	23.39 (0.043)	23.34 (0.043)	23.20 (0.043)	23.45 (0.043)	23.44 (0.043)	23.44 (0.043)	23.41 (0.043)
	125	23.35 (0.043)	23.31 (0.043)	23.26 (0.043)	23.12 (0.043)	23.37 (0.043)	23.37 (0.043)	23.36 (0.043)	23.33 (0.043)
	135	23.28 (0.043)	23.24 (0.043)	23.19 (0.043)	23.06 (0.043)	23.30 (0.043)	23.29 (0.043)	23.29 (0.043)	23.26 (0.043)
3 1/2 in.	85	27.14 (0.037)	27.09 (0.037)	27.04 (0.037)	26.88 (0.037)	27.15 (0.037)	27.14 (0.037)	27.13 (0.037)	27.10 (0.037)
	95	27.03 (0.037)	26.98 (0.037)	26.93 (0.037)	26.78 (0.037)	27.04 (0.037)	27.03 (0.037)	27.02 (0.037)	26.99 (0.037)
	105	26.93 (0.037)	26.88 (0.037)	26.83 (0.037)	26.68 (0.037)	26.94 (0.037)	26.93 (0.037)	26.92 (0.037)	26.89 (0.037)
	115	26.84 (0.037)	26.79 (0.037)	26.74 (0.037)	26.60 (0.038)	26.85 (0.037)	26.84 (0.037)	26.84 (0.037)	26.81 (0.037)
	125	26.75 (0.037)	26.71 (0.037)	26.66 (0.038)	26.52 (0.038)	26.77 (0.037)	26.77 (0.037)	26.76 (0.037)	26.73 (0.037)
	135	26.68 (0.037)	26.64 (0.038)	26.59 (0.038)	26.46 (0.038)	26.70 (0.037)	26.69 (0.037)	26.69 (0.037)	26.66 (0.038)

*Assembly details page 39.



SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

INTERIOR INSULATION



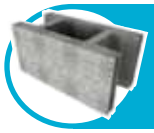
Assembly 2-6: Metal furring at 24 in. o.c. with batt insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation Type	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.41 (0.106)	9.29 (0.108)	9.16 (0.109)	8.82 (0.113)	9.57 (0.104)	9.48 (0.105)	9.38 (0.107)	9.12 (0.110)
	95	9.32 (0.107)	9.19 (0.109)	9.06 (0.110)	8.74 (0.114)	9.46 (0.106)	9.37 (0.107)	9.27 (0.108)	9.01 (0.111)
	105	9.22 (0.108)	9.10 (0.110)	8.98 (0.111)	8.67 (0.115)	9.35 (0.107)	9.27 (0.108)	9.17 (0.109)	8.92 (0.112)
	115	9.14 (0.109)	9.02 (0.111)	8.90 (0.112)	8.60 (0.116)	9.26 (0.108)	9.17 (0.109)	9.08 (0.110)	8.84 (0.113)
	125	9.06 (0.110)	8.95 (0.112)	8.83 (0.113)	8.54 (0.117)	9.17 (0.109)	9.09 (0.110)	9.00 (0.111)	8.77 (0.114)
	135	8.99 (0.111)	8.88 (0.113)	8.77 (0.114)	8.49 (0.118)	9.09 (0.110)	9.01 (0.111)	8.93 (0.112)	8.70 (0.115)
R13 Batt	85	10.01 (0.100)	9.89 (0.101)	9.76 (0.103)	9.42 (0.106)	10.17 (0.098)	10.08 (0.099)	9.98 (0.100)	9.72 (0.103)
	95	9.92 (0.101)	9.79 (0.102)	9.66 (0.103)	9.34 (0.107)	10.06 (0.099)	9.97 (0.100)	9.87 (0.101)	9.61 (0.104)
	105	9.82 (0.102)	9.70 (0.103)	9.58 (0.104)	9.27 (0.108)	9.95 (0.100)	9.87 (0.101)	9.77 (0.102)	9.52 (0.105)
	115	9.74 (0.103)	9.62 (0.104)	9.50 (0.105)	9.20 (0.109)	9.86 (0.101)	9.77 (0.102)	9.68 (0.103)	9.44 (0.106)
	125	9.66 (0.104)	9.55 (0.105)	9.43 (0.106)	9.14 (0.109)	9.77 (0.102)	9.69 (0.103)	9.60 (0.104)	9.37 (0.107)
	135	9.59 (0.104)	9.48 (0.105)	9.37 (0.107)	9.09 (0.110)	9.69 (0.103)	9.61 (0.104)	9.53 (0.105)	9.30 (0.108)
R15 Batt	85	10.61 (0.094)	10.49 (0.095)	10.36 (0.097)	10.02 (0.100)	10.77 (0.093)	10.68 (0.094)	10.58 (0.094)	10.32 (0.097)
	95	10.52 (0.095)	10.39 (0.096)	10.26 (0.097)	9.94 (0.101)	10.66 (0.094)	10.57 (0.095)	10.47 (0.096)	10.21 (0.098)
	105	10.42 (0.096)	10.30 (0.097)	10.18 (0.098)	9.87 (0.101)	10.55 (0.095)	10.47 (0.096)	10.37 (0.096)	10.12 (0.099)
	115	10.34 (0.097)	10.22 (0.098)	10.10 (0.099)	9.80 (0.102)	10.46 (0.096)	10.37 (0.096)	10.28 (0.097)	10.04 (0.100)
	125	10.26 (0.097)	10.15 (0.099)	10.03 (0.100)	9.74 (0.103)	10.37 (0.096)	10.29 (0.097)	10.20 (0.098)	9.97 (0.100)
	135	10.19 (0.098)	10.08 (0.099)	9.97 (0.100)	9.69 (0.103)	10.29 (0.097)	10.21 (0.098)	10.13 (0.099)	9.90 (0.101)
R19 Batt	85	11.41 (0.088)	11.29 (0.089)	11.16 (0.090)	10.82 (0.092)	11.57 (0.086)	11.48 (0.087)	11.38 (0.088)	11.12 (0.090)
	95	11.32 (0.088)	11.19 (0.089)	11.06 (0.090)	10.74 (0.093)	11.46 (0.087)	11.37 (0.088)	11.27 (0.089)	11.01 (0.091)
	105	11.22 (0.089)	11.10 (0.090)	10.98 (0.091)	10.67 (0.094)	11.35 (0.088)	11.27 (0.089)	11.17 (0.090)	10.92 (0.092)
	115	11.14 (0.090)	11.02 (0.091)	10.90 (0.092)	10.60 (0.094)	11.26 (0.089)	11.17 (0.090)	11.08 (0.090)	10.84 (0.092)
	125	11.06 (0.090)	10.95 (0.091)	10.83 (0.092)	10.54 (0.095)	11.17 (0.090)	11.09 (0.090)	11.00 (0.091)	10.77 (0.093)
	135	10.99 (0.091)	10.88 (0.092)	10.77 (0.093)	10.49 (0.095)	11.09 (0.090)	11.01 (0.091)	10.93 (0.092)	10.70 (0.093)
R21 Batt	85	11.81 (0.085)	11.69 (0.086)	11.56 (0.087)	11.22 (0.089)	11.97 (0.084)	11.88 (0.084)	11.78 (0.085)	11.52 (0.087)
	95	11.72 (0.085)	11.59 (0.086)	11.46 (0.087)	11.14 (0.090)	11.86 (0.084)	11.77 (0.085)	11.67 (0.086)	11.41 (0.088)
	105	11.62 (0.086)	11.50 (0.087)	11.38 (0.088)	11.07 (0.090)	11.75 (0.085)	11.67 (0.086)	11.57 (0.086)	11.32 (0.088)
	115	11.54 (0.087)	11.42 (0.088)	11.30 (0.088)	11.00 (0.091)	11.66 (0.086)	11.57 (0.086)	11.48 (0.087)	11.24 (0.089)
	125	11.46 (0.087)	11.35 (0.088)	11.23 (0.089)	10.94 (0.091)	11.57 (0.086)	11.49 (0.087)	11.40 (0.088)	11.17 (0.090)
	135	11.39 (0.088)	11.28 (0.089)	11.17 (0.090)	10.89 (0.092)	11.49 (0.087)	11.41 (0.088)	11.33 (0.088)	11.10 (0.090)

Insulation Type	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.59 (0.104)	9.54 (0.105)	9.49 (0.105)	9.33 (0.107)	9.60 (0.104)	9.59 (0.104)	9.58 (0.104)	9.55 (0.105)
	95	9.48 (0.106)	9.43 (0.106)	9.38 (0.107)	9.23 (0.108)	9.49 (0.105)	9.48 (0.105)	9.47 (0.106)	9.44 (0.106)
	105	9.38 (0.107)	9.33 (0.107)	9.28 (0.108)	9.13 (0.110)	9.39 (0.107)	9.38 (0.107)	9.37 (0.107)	9.34 (0.107)
	115	9.29 (0.108)	9.24 (0.108)	9.19 (0.109)	9.05 (0.111)	9.30 (0.108)	9.29 (0.108)	9.29 (0.108)	9.26 (0.108)
	125	9.20 (0.109)	9.16 (0.109)	9.11 (0.110)	8.97 (0.111)	9.22 (0.108)	9.22 (0.109)	9.21 (0.109)	9.18 (0.109)
	135	9.13 (0.110)	9.09 (0.110)	9.04 (0.111)	8.91 (0.112)	9.15 (0.109)	9.14 (0.109)	9.14 (0.109)	9.11 (0.110)
R13 Batt	85	10.19 (0.098)	10.14 (0.099)	10.09 (0.099)	9.93 (0.101)	10.20 (0.098)	10.19 (0.098)	10.18 (0.098)	10.15 (0.099)
	95	10.08 (0.099)	10.03 (0.100)	9.98 (0.100)	9.83 (0.102)	10.09 (0.099)	10.08 (0.099)	10.07 (0.099)	10.04 (0.100)
	105	9.98 (0.100)	9.93 (0.101)	9.88 (0.101)	9.73 (0.103)	9.99 (0.100)	9.98 (0.100)	9.97 (0.100)	9.94 (0.101)
	115	9.89 (0.101)	9.84 (0.102)	9.79 (0.102)	9.65 (0.104)	9.90 (0.101)	9.89 (0.101)	9.89 (0.101)	9.86 (0.101)
	125	9.80 (0.102)	9.76 (0.102)	9.71 (0.103)	9.57 (0.104)	9.82 (0.102)	9.82 (0.102)	9.81 (0.102)	9.78 (0.102)
	135	9.73 (0.103)	9.69 (0.103)	9.64 (0.104)	9.51 (0.105)	9.75 (0.103)	9.74 (0.103)	9.74 (0.103)	9.71 (0.103)
R15 Batt	85	10.79 (0.093)	10.74 (0.093)	10.69 (0.094)	10.53 (0.095)	10.80 (0.093)	10.79 (0.093)	10.78 (0.093)	10.75 (0.093)
	95	10.68 (0.094)	10.63 (0.094)	10.58 (0.095)	10.43 (0.096)	10.69 (0.094)	10.68 (0.094)	10.67 (0.094)	10.64 (0.094)
	105	10.58 (0.095)	10.53 (0.095)	10.48 (0.095)	10.33 (0.097)	10.59 (0.094)	10.58 (0.095)	10.57 (0.095)	10.54 (0.095)
	115	10.49 (0.095)	10.44 (0.096)	10.39 (0.096)	10.25 (0.098)	10.50 (0.095)	10.49 (0.095)	10.49 (0.095)	10.46 (0.096)
	125	10.40 (0.096)	10.36 (0.097)	10.31 (0.097)	10.17 (0.098)	10.42 (0.096)	10.42 (0.096)	10.41 (0.096)	10.38 (0.096)
	135	10.33 (0.097)	10.29 (0.097)	10.24 (0.098)	10.11 (0.099)	10.35 (0.097)	10.34 (0.097)	10.34 (0.097)	10.31 (0.097)
R19 Batt	85	11.59 (0.086)	11.54 (0.087)	11.49 (0.087)	11.33 (0.088)	11.60 (0.086)	11.59 (0.086)	11.58 (0.086)	11.55 (0.087)
	95	11.48 (0.087)	11.43 (0.087)	11.38 (0.088)	11.23 (0.089)	11.49 (0.087)	11.48 (0.087)	11.47 (0.087)	11.44 (0.087)
	105	11.38 (0.088)	11.33 (0.088)	11.28 (0.089)	11.13 (0.090)	11.39 (0.088)	11.38 (0.088)	11.37 (0.088)	11.34 (0.088)
	115	11.29 (0.089)	11.24 (0.089)	11.19 (0.089)	11.05 (0.091)	11.30 (0.088)	11.29 (0.089)	11.29 (0.089)	11.26 (0.089)
	125	11.20 (0.089)	11.16 (0.090)	11.11 (0.090)	10.97 (0.091)	11.22 (0.089)	11.22 (0.089)	11.21 (0.089)	11.18 (0.089)
	135	11.13 (0.090)	11.09 (0.090)	11.04 (0.091)	10.91 (0.092)	11.15 (0.090)	11.14 (0.090)	11.14 (0.090)	11.11 (0.090)
R21 Batt	85	11.99 (0.083)	11.94 (0.084)	11.89 (0.084)	11.73 (0.085)	12.00 (0.083)	11.99 (0.083)	11.98 (0.083)	11.95 (0.084)
	95	11.88 (0.084)	11.83 (0.085)	11.78 (0.085)	11.63 (0.086)	11.89 (0.084)	11.88 (0.084)	11.87 (0.084)	11.84 (0.084)
	105	11.78 (0.085)	11.73 (0.085)	11.68 (0.086)	11.53 (0.087)	11.79 (0.085)	11.78 (0.085)	11.77 (0.085)	11.74 (0.085)
	115	11.69 (0.086)	11.64 (0.086)	11.59 (0.086)	11.45 (0.087)	11.70 (0.085)	11.69 (0.086)	11.69 (0.086)	11.66 (0.086)
	125	11.60 (0.086)	11.56 (0.086)	11.51 (0.087)	11.37 (0.088)	11.62 (0.086)	11.62 (0.086)	11.61 (0.086)	11.58 (0.086)
	135	11.53 (0.087)	11.49 (0.087)	11.44 (0.087)	11.31 (0.088)	11.55 (0.087)	11.54 (0.087)	11.54 (0.087)	11.51 (0.087)

*Assembly details page 39.



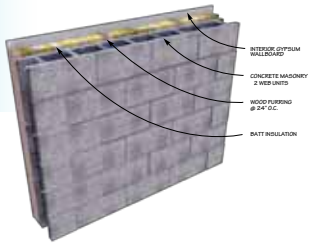
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 2-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

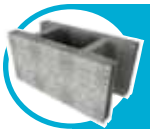
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.38 (0.157)	6.25 (0.160)	6.12 (0.163)	5.79 (0.173)	6.53 (0.153)	6.44 (0.155)	6.34 (0.158)	6.08 (0.164)
	95	6.28 (0.159)	6.15 (0.162)	6.02 (0.166)	5.70 (0.175)	6.42 (0.156)	6.33 (0.158)	6.23 (0.160)	5.98 (0.167)
	105	6.19 (0.162)	6.07 (0.165)	5.94 (0.168)	5.63 (0.178)	6.31 (0.158)	6.23 (0.161)	6.13 (0.163)	5.88 (0.170)
	115	6.10 (0.164)	5.99 (0.167)	5.86 (0.171)	5.56 (0.180)	6.22 (0.161)	6.14 (0.163)	6.04 (0.165)	5.80 (0.172)
	125	6.02 (0.166)	5.91 (0.169)	5.79 (0.173)	5.51 (0.182)	6.13 (0.163)	6.05 (0.165)	5.96 (0.168)	5.73 (0.175)
	135	5.95 (0.168)	5.84 (0.171)	5.73 (0.175)	5.46 (0.183)	6.05 (0.165)	5.98 (0.167)	5.89 (0.170)	5.66 (0.177)
Polyisocyanurate, 3/4 in.	85	7.57 (0.132)	7.45 (0.134)	7.31 (0.137)	6.98 (0.143)	7.73 (0.129)	7.64 (0.131)	7.54 (0.133)	7.28 (0.137)
	95	7.47 (0.134)	7.35 (0.136)	7.22 (0.139)	6.90 (0.145)	7.61 (0.131)	7.53 (0.133)	7.43 (0.135)	7.17 (0.139)
	105	7.38 (0.135)	7.26 (0.138)	7.14 (0.140)	6.82 (0.147)	7.51 (0.133)	7.42 (0.135)	7.33 (0.136)	7.08 (0.141)
	115	7.30 (0.137)	7.18 (0.139)	7.06 (0.142)	6.76 (0.148)	7.42 (0.135)	7.33 (0.136)	7.24 (0.138)	7.00 (0.143)
	125	7.22 (0.139)	7.11 (0.141)	6.99 (0.143)	6.70 (0.149)	7.33 (0.136)	7.25 (0.138)	7.16 (0.140)	6.92 (0.144)
	135	7.14 (0.140)	7.04 (0.142)	6.93 (0.144)	6.65 (0.150)	7.25 (0.138)	7.17 (0.139)	7.09 (0.141)	6.86 (0.146)
Extruded Polystyrene, 3/4 in.	85	9.94 (0.101)	9.81 (0.102)	9.68 (0.103)	9.35 (0.107)	10.10 (0.099)	10.01 (0.100)	9.91 (0.101)	9.64 (0.104)
	95	9.84 (0.102)	9.72 (0.103)	9.59 (0.104)	9.26 (0.108)	9.98 (0.100)	9.89 (0.101)	9.80 (0.102)	9.54 (0.105)
	105	9.75 (0.103)	9.63 (0.104)	9.50 (0.105)	9.19 (0.109)	9.88 (0.101)	9.79 (0.102)	9.70 (0.103)	9.44 (0.106)
	115	9.66 (0.103)	9.55 (0.105)	9.43 (0.106)	9.13 (0.110)	9.78 (0.102)	9.70 (0.103)	9.61 (0.104)	9.36 (0.107)
	125	9.59 (0.104)	9.47 (0.106)	9.36 (0.107)	9.07 (0.110)	9.70 (0.103)	9.61 (0.104)	9.53 (0.105)	9.29 (0.108)
	135	9.51 (0.105)	9.40 (0.106)	9.29 (0.108)	9.02 (0.111)	9.62 (0.104)	9.54 (0.105)	9.45 (0.106)	9.23 (0.108)
Polyisocyanurate, 3/4 in.	85	12.75 (0.078)	12.63 (0.079)	12.49 (0.080)	12.16 (0.082)	12.91 (0.077)	12.82 (0.078)	12.72 (0.079)	12.46 (0.080)
	95	12.65 (0.079)	12.53 (0.080)	12.40 (0.081)	12.08 (0.083)	12.79 (0.078)	12.70 (0.079)	12.61 (0.079)	12.35 (0.081)
	105	12.56 (0.080)	12.44 (0.080)	12.32 (0.081)	12.00 (0.083)	12.69 (0.079)	12.60 (0.079)	12.51 (0.080)	12.26 (0.082)
	115	12.48 (0.080)	12.36 (0.081)	12.24 (0.082)	11.94 (0.084)	12.60 (0.079)	12.51 (0.080)	12.42 (0.081)	12.18 (0.082)
	125	12.40 (0.081)	12.29 (0.081)	12.17 (0.082)	11.88 (0.084)	12.51 (0.080)	12.43 (0.080)	12.34 (0.081)	12.10 (0.083)
	135	12.32 (0.081)	12.22 (0.082)	12.11 (0.083)	11.83 (0.085)	12.43 (0.080)	12.35 (0.081)	12.26 (0.082)	12.04 (0.083)
R11 Batt	85	13.41 (0.075)	13.29 (0.075)	13.16 (0.076)	12.82 (0.078)	13.57 (0.074)	13.48 (0.074)	13.38 (0.075)	13.12 (0.076)
	95	13.32 (0.075)	13.19 (0.076)	13.06 (0.077)	12.74 (0.078)	13.46 (0.074)	13.37 (0.075)	13.27 (0.075)	13.01 (0.077)
	105	13.22 (0.076)	13.10 (0.076)	12.98 (0.077)	12.67 (0.079)	13.35 (0.075)	13.27 (0.075)	13.17 (0.076)	12.92 (0.077)
	115	13.14 (0.076)	13.02 (0.077)	12.90 (0.078)	12.60 (0.079)	13.26 (0.075)	13.17 (0.076)	13.08 (0.076)	12.84 (0.078)
	125	13.06 (0.077)	12.95 (0.077)	12.83 (0.078)	12.54 (0.080)	13.17 (0.076)	13.09 (0.076)	13.00 (0.077)	12.77 (0.078)
	135	12.99 (0.077)	12.88 (0.078)	12.77 (0.078)	12.49 (0.080)	13.09 (0.076)	13.01 (0.077)	12.93 (0.077)	12.70 (0.079)
R13 Batt	85	14.41 (0.069)	14.29 (0.070)	14.16 (0.071)	13.82 (0.072)	14.57 (0.069)	14.48 (0.069)	14.38 (0.070)	14.12 (0.071)
	95	14.32 (0.070)	14.19 (0.070)	14.06 (0.071)	13.74 (0.073)	14.46 (0.069)	14.37 (0.070)	14.27 (0.070)	14.01 (0.071)
	105	14.22 (0.070)	14.10 (0.071)	13.98 (0.072)	13.67 (0.073)	14.35 (0.070)	14.27 (0.070)	14.17 (0.071)	13.92 (0.072)
	115	14.14 (0.071)	14.02 (0.071)	13.90 (0.072)	13.60 (0.074)	14.26 (0.070)	14.17 (0.071)	14.08 (0.071)	13.84 (0.072)
	125	14.06 (0.071)	13.95 (0.072)	13.83 (0.072)	13.54 (0.074)	14.17 (0.071)	14.09 (0.071)	14.00 (0.071)	13.77 (0.073)
	135	13.99 (0.072)	13.88 (0.072)	13.77 (0.073)	13.49 (0.074)	14.09 (0.071)	14.01 (0.071)	13.93 (0.072)	13.70 (0.073)
R15 Batt	85	15.31 (0.065)	15.19 (0.066)	15.06 (0.066)	14.72 (0.068)	15.47 (0.065)	15.38 (0.065)	15.28 (0.065)	15.02 (0.067)
	95	15.22 (0.066)	15.09 (0.066)	14.96 (0.067)	14.64 (0.068)	15.36 (0.065)	15.27 (0.065)	15.17 (0.066)	14.91 (0.067)
	105	15.12 (0.066)	15.00 (0.067)	14.88 (0.067)	14.57 (0.069)	15.25 (0.066)	15.17 (0.066)	15.07 (0.066)	14.82 (0.067)
	115	15.04 (0.066)	14.92 (0.067)	14.80 (0.068)	14.50 (0.069)	15.16 (0.066)	15.07 (0.066)	14.98 (0.067)	14.74 (0.068)
	125	14.96 (0.067)	14.85 (0.067)	14.73 (0.068)	14.44 (0.069)	15.07 (0.066)	14.99 (0.067)	14.90 (0.067)	14.67 (0.068)
	135	14.89 (0.067)	14.78 (0.068)	14.67 (0.068)	14.39 (0.069)	14.99 (0.067)	14.91 (0.067)	14.83 (0.067)	14.60 (0.068)
R19 Batt	85	18.21 (0.055)	18.09 (0.055)	17.96 (0.056)	17.62 (0.057)	18.37 (0.054)	18.28 (0.055)	18.18 (0.055)	17.92 (0.056)
	95	18.12 (0.055)	17.99 (0.056)	17.86 (0.056)	17.54 (0.057)	18.26 (0.055)	18.17 (0.055)	18.07 (0.055)	17.81 (0.056)
	105	18.02 (0.055)	17.90 (0.056)	17.78 (0.056)	17.47 (0.057)	18.15 (0.055)	18.07 (0.055)	17.97 (0.056)	17.72 (0.056)
	115	17.94 (0.056)	17.82 (0.056)	17.70 (0.056)	17.40 (0.057)	18.06 (0.055)	17.97 (0.056)	17.88 (0.056)	17.64 (0.057)
	125	17.86 (0.056)	17.75 (0.056)	17.63 (0.057)	17.34 (0.058)	17.97 (0.056)	17.89 (0.056)	17.80 (0.056)	17.57 (0.057)
	135	17.79 (0.056)	17.68 (0.057)	17.57 (0.057)	17.29 (0.058)	17.89 (0.056)	17.81 (0.056)	17.73 (0.056)	17.50 (0.057)
R21 Batt	85	19.51 (0.051)	19.39 (0.052)	19.26 (0.052)	18.92 (0.053)	19.67 (0.051)	19.58 (0.051)	19.48 (0.051)	19.22 (0.052)
	95	19.42 (0.052)	19.29 (0.052)	19.16 (0.052)	18.84 (0.053)	19.56 (0.051)	19.47 (0.051)	19.37 (0.052)	19.11 (0.052)
	105	19.32 (0.052)	19.20 (0.052)	19.08 (0.052)	18.77 (0.053)	19.45 (0.051)	19.37 (0.052)	19.27 (0.052)	19.02 (0.053)
	115	19.24 (0.052)	19.12 (0.052)	19.00 (0.053)	18.70 (0.053)	19.36 (0.052)	19.27 (0.052)	19.18 (0.052)	18.94 (0.053)
	125	19.16 (0.052)	19.05 (0.052)	18.93 (0.053)	18.64 (0.054)	19.27 (0.052)	19.19 (0.052)	19.10 (0.052)	18.87 (0.053)
	135	19.09 (0.052)	18.98 (0.053)	18.87 (0.053)	18.59 (0.054)	19.19 (0.052)	19.11 (0.052)	19.03 (0.053)	18.80 (0.053)

*Assembly details page 40.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.55 (0.153)	6.50 (0.154)	6.45 (0.155)	6.30 (0.159)	6.56 (0.152)	6.55 (0.153)	6.54 (0.153)	6.51 (0.154)
	95	6.44 (0.155)	6.39 (0.156)	6.34 (0.158)	6.19 (0.162)	6.45 (0.155)	6.44 (0.155)	6.43 (0.155)	6.40 (0.156)
	105	6.34 (0.158)	6.29 (0.159)	6.24 (0.160)	6.09 (0.164)	6.35 (0.157)	6.34 (0.158)	6.33 (0.158)	6.31 (0.159)
	115	6.25 (0.160)	6.20 (0.161)	6.15 (0.163)	6.01 (0.166)	6.26 (0.160)	6.26 (0.160)	6.25 (0.160)	6.22 (0.161)
	125	6.17 (0.162)	6.12 (0.163)	6.07 (0.165)	5.94 (0.168)	6.19 (0.162)	6.18 (0.162)	6.17 (0.162)	6.14 (0.163)
	135	6.09 (0.164)	6.05 (0.165)	6.00 (0.167)	5.87 (0.170)	6.11 (0.164)	6.11 (0.164)	6.10 (0.164)	6.07 (0.165)
Polyisocyanurate, 3/4 in.	85	7.75 (0.129)	7.70 (0.130)	7.65 (0.131)	7.49 (0.133)	7.75 (0.129)	7.75 (0.129)	7.74 (0.129)	7.71 (0.130)
	95	7.63 (0.131)	7.59 (0.132)	7.54 (0.133)	7.39 (0.135)	7.65 (0.131)	7.64 (0.131)	7.63 (0.131)	7.60 (0.132)
	105	7.53 (0.133)	7.49 (0.134)	7.44 (0.134)	7.29 (0.137)	7.55 (0.133)	7.54 (0.133)	7.53 (0.133)	7.50 (0.133)
	115	7.44 (0.134)	7.40 (0.135)	7.35 (0.136)	7.21 (0.139)	7.46 (0.134)	7.45 (0.134)	7.44 (0.134)	7.42 (0.135)
	125	7.36 (0.136)	7.32 (0.137)	7.27 (0.138)	7.13 (0.140)	7.38 (0.135)	7.37 (0.136)	7.36 (0.136)	7.34 (0.136)
	135	7.29 (0.137)	7.25 (0.138)	7.20 (0.139)	7.06 (0.142)	7.31 (0.137)	7.30 (0.137)	7.29 (0.137)	7.27 (0.138)
Extruded Polystyrene, 3/4 in.	85	10.11 (0.099)	10.07 (0.099)	10.01 (0.100)	9.86 (0.101)	10.12 (0.099)	10.11 (0.099)	10.10 (0.099)	10.08 (0.099)
	95	10.00 (0.100)	9.95 (0.100)	9.90 (0.101)	9.75 (0.103)	10.01 (0.100)	10.00 (0.100)	10.00 (0.100)	9.97 (0.100)
	105	9.90 (0.101)	9.86 (0.101)	9.80 (0.102)	9.66 (0.104)	9.91 (0.101)	9.91 (0.101)	9.90 (0.101)	9.87 (0.101)
	115	9.81 (0.102)	9.77 (0.102)	9.72 (0.103)	9.57 (0.104)	9.83 (0.102)	9.82 (0.102)	9.81 (0.102)	9.78 (0.102)
	125	9.73 (0.103)	9.69 (0.103)	9.64 (0.104)	9.50 (0.105)	9.75 (0.103)	9.74 (0.103)	9.73 (0.103)	9.71 (0.103)
	135	9.65 (0.104)	9.61 (0.104)	9.57 (0.105)	9.43 (0.106)	9.68 (0.103)	9.67 (0.103)	9.66 (0.104)	9.64 (0.104)
Polyisocyanurate, 3/4 in.	85	12.92 (0.077)	12.88 (0.078)	12.83 (0.078)	12.67 (0.079)	12.93 (0.077)	12.93 (0.077)	12.92 (0.077)	12.89 (0.078)
	95	12.81 (0.078)	12.77 (0.078)	12.72 (0.079)	12.56 (0.080)	12.82 (0.078)	12.82 (0.078)	12.81 (0.078)	12.78 (0.078)
	105	12.71 (0.079)	12.67 (0.079)	12.62 (0.079)	12.47 (0.080)	12.73 (0.079)	12.72 (0.079)	12.71 (0.079)	12.68 (0.079)
	115	12.62 (0.079)	12.58 (0.079)	12.53 (0.080)	12.39 (0.081)	12.64 (0.079)	12.63 (0.079)	12.62 (0.079)	12.60 (0.079)
	125	12.54 (0.080)	12.50 (0.080)	12.45 (0.080)	12.31 (0.081)	12.56 (0.080)	12.55 (0.080)	12.54 (0.080)	12.52 (0.080)
	135	12.47 (0.080)	12.43 (0.080)	12.38 (0.081)	12.24 (0.082)	12.49 (0.080)	12.48 (0.080)	12.47 (0.080)	12.45 (0.080)
R11 Batt	85	13.59 (0.074)	13.54 (0.074)	13.49 (0.074)	13.33 (0.075)	13.60 (0.074)	13.59 (0.074)	13.58 (0.074)	13.55 (0.074)
	95	13.48 (0.074)	13.43 (0.074)	13.38 (0.075)	13.23 (0.076)	13.49 (0.074)	13.48 (0.074)	13.47 (0.074)	13.44 (0.074)
	105	13.38 (0.075)	13.33 (0.075)	13.28 (0.075)	13.13 (0.076)	13.39 (0.075)	13.38 (0.075)	13.37 (0.075)	13.34 (0.075)
	115	13.29 (0.075)	13.24 (0.076)	13.19 (0.076)	13.05 (0.077)	13.30 (0.075)	13.29 (0.075)	13.29 (0.075)	13.26 (0.075)
	125	13.20 (0.076)	13.16 (0.076)	13.11 (0.076)	12.97 (0.077)	13.22 (0.076)	13.22 (0.076)	13.21 (0.076)	13.18 (0.076)
	135	13.13 (0.076)	13.09 (0.076)	13.04 (0.077)	12.91 (0.077)	13.15 (0.076)	13.14 (0.076)	13.14 (0.076)	13.11 (0.076)
R13 Batt	85	14.59 (0.069)	14.54 (0.069)	14.49 (0.069)	14.33 (0.070)	14.60 (0.069)	14.59 (0.069)	14.58 (0.069)	14.55 (0.069)
	95	14.48 (0.069)	14.43 (0.069)	14.38 (0.070)	14.23 (0.070)	14.49 (0.069)	14.48 (0.069)	14.47 (0.069)	14.44 (0.069)
	105	14.38 (0.070)	14.33 (0.070)	14.28 (0.070)	14.13 (0.071)	14.39 (0.069)	14.38 (0.070)	14.37 (0.070)	14.34 (0.070)
	115	14.29 (0.070)	14.24 (0.070)	14.19 (0.070)	14.05 (0.071)	14.30 (0.070)	14.29 (0.070)	14.29 (0.070)	14.26 (0.070)
	125	14.20 (0.070)	14.16 (0.071)	14.11 (0.071)	13.97 (0.072)	14.22 (0.070)	14.22 (0.070)	14.21 (0.070)	14.18 (0.071)
	135	14.13 (0.071)	14.09 (0.071)	14.04 (0.071)	13.91 (0.072)	14.15 (0.071)	14.14 (0.071)	14.14 (0.071)	14.11 (0.071)
R15 Batt	85	15.49 (0.065)	15.44 (0.065)	15.39 (0.065)	15.23 (0.066)	15.50 (0.065)	15.49 (0.065)	15.48 (0.065)	15.45 (0.065)
	95	15.38 (0.065)	15.33 (0.065)	15.28 (0.065)	15.13 (0.066)	15.39 (0.065)	15.38 (0.065)	15.37 (0.065)	15.34 (0.065)
	105	15.28 (0.065)	15.23 (0.066)	15.18 (0.066)	15.03 (0.067)	15.29 (0.065)	15.28 (0.065)	15.27 (0.065)	15.24 (0.066)
	115	15.19 (0.066)	15.14 (0.066)	15.09 (0.066)	14.95 (0.067)	15.20 (0.066)	15.19 (0.066)	15.19 (0.066)	15.16 (0.066)
	125	15.10 (0.066)	15.06 (0.066)	15.01 (0.067)	14.87 (0.067)	15.12 (0.066)	15.12 (0.066)	15.11 (0.066)	15.08 (0.066)
	135	15.03 (0.067)	14.99 (0.067)	14.94 (0.067)	14.81 (0.068)	15.05 (0.066)	15.04 (0.066)	15.04 (0.067)	15.01 (0.067)
R19 Batt	85	18.39 (0.054)	18.34 (0.055)	18.29 (0.055)	18.13 (0.055)	18.40 (0.054)	18.39 (0.054)	18.38 (0.054)	18.35 (0.054)
	95	18.28 (0.055)	18.23 (0.055)	18.18 (0.055)	18.03 (0.055)	18.29 (0.055)	18.28 (0.055)	18.27 (0.055)	18.24 (0.055)
	105	18.18 (0.055)	18.13 (0.055)	18.08 (0.055)	17.93 (0.056)	18.19 (0.055)	18.18 (0.055)	18.17 (0.055)	18.14 (0.055)
	115	18.09 (0.055)	18.04 (0.055)	17.99 (0.056)	17.85 (0.056)	18.10 (0.055)	18.09 (0.055)	18.09 (0.055)	18.06 (0.055)
	125	18.00 (0.056)	17.96 (0.056)	17.91 (0.056)	17.77 (0.056)	18.02 (0.055)	18.02 (0.056)	18.01 (0.056)	17.98 (0.056)
	135	17.93 (0.056)	17.89 (0.056)	17.84 (0.056)	17.71 (0.056)	17.95 (0.056)	17.94 (0.056)	17.94 (0.056)	17.91 (0.056)
R21 Batt	85	19.69 (0.051)	19.64 (0.051)	19.59 (0.051)	19.43 (0.051)	19.70 (0.051)	19.69 (0.051)	19.68 (0.051)	19.65 (0.051)
	95	19.58 (0.051)	19.53 (0.051)	19.48 (0.051)	19.33 (0.052)	19.59 (0.051)	19.58 (0.051)	19.57 (0.051)	19.54 (0.051)
	105	19.48 (0.051)	19.43 (0.051)	19.38 (0.052)	19.23 (0.052)	19.49 (0.051)	19.48 (0.051)	19.47 (0.051)	19.44 (0.051)
	115	19.39 (0.052)	19.34 (0.052)	19.29 (0.052)	19.15 (0.052)	19.40 (0.052)	19.39 (0.052)	19.39 (0.052)	19.36 (0.052)
	125	19.30 (0.052)	19.26 (0.052)	19.21 (0.052)	19.07 (0.052)	19.32 (0.052)	19.32 (0.052)	19.31 (0.052)	19.28 (0.052)
	135	19.23 (0.052)	19.19 (0.052)	19.14 (0.052)	19.01 (0.053)	19.25 (0.052)	19.24 (0.052)	19.24 (0.052)	19.21 (0.052)



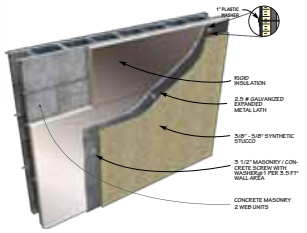
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
EXTERIOR INSULATION

Assembly 2-8: Continuous exterior insulation and finish system, exposed interior masonry

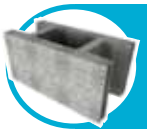
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Rigid insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.26 (0.108)	9.14 (0.109)	9.01 (0.111)	8.67 (0.115)	9.42 (0.106)	9.33 (0.107)	9.23 (0.108)	8.97 (0.111)
	95	9.17 (0.109)	9.04 (0.111)	8.91 (0.112)	8.59 (0.116)	9.31 (0.107)	9.22 (0.108)	9.12 (0.110)	8.86 (0.113)
	105	9.07 (0.110)	8.95 (0.112)	8.83 (0.113)	8.52 (0.117)	9.20 (0.109)	9.12 (0.110)	9.02 (0.111)	8.77 (0.114)
	115	8.99 (0.111)	8.87 (0.113)	8.75 (0.114)	8.45 (0.118)	9.11 (0.110)	9.02 (0.111)	8.93 (0.112)	8.69 (0.115)
	125	8.91 (0.112)	8.80 (0.114)	8.68 (0.115)	8.39 (0.119)	9.02 (0.111)	8.94 (0.112)	8.85 (0.113)	8.62 (0.116)
	135	8.84 (0.113)	8.73 (0.115)	8.62 (0.116)	8.34 (0.120)	8.94 (0.112)	8.86 (0.113)	8.78 (0.114)	8.55 (0.117)
Expanded polystyrene, 1 1/2 in.	85	8.56 (0.117)	8.44 (0.119)	8.31 (0.120)	7.97 (0.125)	8.72 (0.115)	8.63 (0.116)	8.53 (0.117)	8.27 (0.121)
	95	8.47 (0.118)	8.34 (0.120)	8.21 (0.122)	7.89 (0.127)	8.61 (0.116)	8.52 (0.117)	8.42 (0.119)	8.16 (0.122)
	105	8.37 (0.119)	8.25 (0.121)	8.13 (0.123)	7.82 (0.128)	8.50 (0.118)	8.42 (0.119)	8.32 (0.120)	8.07 (0.124)
	115	8.29 (0.121)	8.17 (0.122)	8.05 (0.124)	7.75 (0.129)	8.41 (0.119)	8.32 (0.120)	8.23 (0.121)	7.99 (0.125)
	125	8.21 (0.122)	8.10 (0.123)	7.98 (0.125)	7.69 (0.130)	8.32 (0.120)	8.24 (0.121)	8.15 (0.123)	7.92 (0.126)
	135	8.14 (0.123)	8.03 (0.125)	7.92 (0.126)	7.64 (0.131)	8.24 (0.121)	8.16 (0.123)	8.08 (0.124)	7.85 (0.127)
Expanded polystyrene, 2 in.	85	10.56 (0.095)	10.44 (0.096)	10.31 (0.097)	9.97 (0.100)	10.72 (0.093)	10.63 (0.094)	10.53 (0.095)	10.27 (0.097)
	95	10.47 (0.096)	10.34 (0.097)	10.21 (0.098)	9.89 (0.101)	10.61 (0.094)	10.52 (0.095)	10.42 (0.096)	10.16 (0.098)
	105	10.37 (0.096)	10.25 (0.098)	10.13 (0.099)	9.82 (0.102)	10.50 (0.095)	10.42 (0.096)	10.32 (0.097)	10.07 (0.099)
	115	10.29 (0.097)	10.17 (0.098)	10.05 (0.099)	9.75 (0.103)	10.41 (0.096)	10.32 (0.097)	10.23 (0.098)	9.99 (0.100)
	125	10.21 (0.098)	10.10 (0.099)	9.98 (0.100)	9.69 (0.103)	10.32 (0.097)	10.24 (0.098)	10.15 (0.099)	9.92 (0.101)
	135	10.14 (0.099)	10.03 (0.100)	9.92 (0.101)	9.64 (0.104)	10.24 (0.098)	10.16 (0.098)	10.08 (0.099)	9.85 (0.102)
Extruded polystyrene, 2 in.	85	12.56 (0.080)	12.44 (0.080)	12.31 (0.081)	11.97 (0.084)	12.72 (0.079)	12.63 (0.079)	12.53 (0.080)	12.27 (0.082)
	95	12.47 (0.080)	12.34 (0.081)	12.21 (0.082)	11.89 (0.084)	12.61 (0.079)	12.52 (0.080)	12.42 (0.081)	12.16 (0.082)
	105	12.37 (0.081)	12.25 (0.082)	12.13 (0.082)	11.82 (0.085)	12.50 (0.080)	12.42 (0.081)	12.32 (0.081)	12.07 (0.083)
	115	12.29 (0.081)	12.17 (0.082)	12.05 (0.083)	11.75 (0.085)	12.41 (0.081)	12.32 (0.081)	12.23 (0.082)	11.99 (0.083)
	125	12.21 (0.082)	12.10 (0.083)	11.98 (0.083)	11.69 (0.086)	12.32 (0.081)	12.24 (0.082)	12.15 (0.082)	11.92 (0.084)
	135	12.14 (0.082)	12.03 (0.083)	11.92 (0.084)	11.64 (0.086)	12.24 (0.082)	12.16 (0.082)	12.08 (0.083)	11.85 (0.084)
Polyisocyanurate, 2 in.	85	16.96 (0.059)	16.84 (0.059)	16.71 (0.060)	16.37 (0.061)	17.12 (0.058)	17.03 (0.059)	16.93 (0.059)	16.67 (0.060)
	95	16.87 (0.059)	16.74 (0.060)	16.61 (0.060)	16.29 (0.061)	17.01 (0.059)	16.92 (0.059)	16.82 (0.059)	16.56 (0.060)
	105	16.77 (0.060)	16.65 (0.060)	16.53 (0.061)	16.22 (0.062)	16.90 (0.059)	16.82 (0.059)	16.72 (0.060)	16.47 (0.061)
	115	16.69 (0.060)	16.57 (0.060)	16.45 (0.061)	16.15 (0.062)	16.81 (0.059)	16.72 (0.060)	16.63 (0.060)	16.39 (0.061)
	125	16.61 (0.060)	16.50 (0.061)	16.38 (0.061)	16.09 (0.062)	16.72 (0.060)	16.64 (0.060)	16.55 (0.060)	16.32 (0.061)
	135	16.54 (0.060)	16.43 (0.061)	16.32 (0.061)	16.04 (0.062)	16.64 (0.060)	16.56 (0.060)	16.48 (0.061)	16.25 (0.062)
Extruded Polystyrene, 2 1/2 in	85	15.06 (0.066)	14.94 (0.067)	14.81 (0.068)	14.47 (0.069)	15.22 (0.066)	15.13 (0.066)	15.03 (0.067)	14.77 (0.068)
	95	14.97 (0.067)	14.84 (0.067)	14.71 (0.068)	14.39 (0.069)	15.11 (0.066)	15.02 (0.067)	14.92 (0.067)	14.66 (0.068)
	105	14.87 (0.067)	14.75 (0.068)	14.63 (0.068)	14.32 (0.070)	15.00 (0.067)	14.92 (0.067)	14.82 (0.067)	14.57 (0.069)
	115	14.79 (0.068)	14.67 (0.068)	14.55 (0.069)	14.25 (0.070)	14.91 (0.067)	14.82 (0.067)	14.73 (0.068)	14.49 (0.069)
	125	14.71 (0.068)	14.60 (0.068)	14.48 (0.069)	14.19 (0.070)	14.82 (0.067)	14.74 (0.068)	14.65 (0.068)	14.42 (0.069)
	135	14.64 (0.068)	14.53 (0.069)	14.42 (0.069)	14.14 (0.071)	14.74 (0.068)	14.66 (0.068)	14.58 (0.069)	14.35 (0.070)
Expanded polystyrene, 3 in.	85	14.56 (0.069)	14.44 (0.069)	14.31 (0.070)	13.97 (0.072)	14.72 (0.068)	14.63 (0.068)	14.53 (0.069)	14.27 (0.070)
	95	14.47 (0.069)	14.34 (0.070)	14.21 (0.070)	13.89 (0.072)	14.61 (0.068)	14.52 (0.069)	14.42 (0.069)	14.16 (0.071)
	105	14.37 (0.070)	14.25 (0.070)	14.13 (0.071)	13.82 (0.072)	14.50 (0.069)	14.42 (0.069)	14.32 (0.070)	14.07 (0.071)
	115	14.29 (0.070)	14.17 (0.071)	14.05 (0.071)	13.75 (0.073)	14.41 (0.069)	14.32 (0.070)	14.23 (0.070)	13.99 (0.071)
	125	14.21 (0.070)	14.10 (0.071)	13.98 (0.072)	13.69 (0.073)	14.32 (0.070)	14.24 (0.070)	14.15 (0.071)	13.92 (0.072)
	135	14.14 (0.071)	14.03 (0.071)	13.92 (0.072)	13.64 (0.073)	14.24 (0.070)	14.16 (0.071)	14.08 (0.071)	13.85 (0.072)
Polyisocyanurate, 3 in.	85	23.76 (0.042)	23.64 (0.042)	23.51 (0.043)	23.17 (0.043)	23.92 (0.042)	23.83 (0.042)	23.73 (0.042)	23.47 (0.043)
	95	23.67 (0.042)	23.54 (0.042)	23.41 (0.043)	23.09 (0.043)	23.81 (0.042)	23.72 (0.042)	23.62 (0.042)	23.36 (0.043)
	105	23.57 (0.042)	23.45 (0.043)	23.33 (0.043)	23.02 (0.043)	23.70 (0.042)	23.62 (0.042)	23.52 (0.043)	23.27 (0.043)
	115	23.49 (0.043)	23.37 (0.043)	23.25 (0.043)	22.95 (0.044)	23.61 (0.042)	23.52 (0.043)	23.43 (0.043)	23.19 (0.043)
	125	23.41 (0.043)	23.30 (0.043)	23.18 (0.043)	22.89 (0.044)	23.52 (0.043)	23.44 (0.043)	23.35 (0.043)	23.12 (0.043)
	135	23.34 (0.043)	23.23 (0.043)	23.12 (0.043)	22.84 (0.044)	23.44 (0.043)	23.36 (0.043)	23.28 (0.043)	23.05 (0.043)

*Assembly details page 40.



Rigid insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.44 (0.106)	9.39 (0.106)	9.34 (0.107)	9.18 (0.109)	9.45 (0.106)	9.44 (0.106)	9.43 (0.106)	9.40 (0.106)
	95	9.33 (0.107)	9.28 (0.108)	9.23 (0.108)	9.08 (0.110)	9.34 (0.107)	9.33 (0.107)	9.32 (0.107)	9.29 (0.108)
	105	9.23 (0.108)	9.18 (0.109)	9.13 (0.110)	8.98 (0.111)	9.24 (0.108)	9.23 (0.108)	9.22 (0.108)	9.19 (0.109)
	115	9.14 (0.109)	9.09 (0.110)	9.04 (0.111)	8.90 (0.112)	9.15 (0.109)	9.14 (0.109)	9.14 (0.109)	9.11 (0.110)
	125	9.05 (0.110)	9.01 (0.111)	8.96 (0.112)	8.82 (0.113)	9.07 (0.110)	9.07 (0.110)	9.06 (0.110)	9.03 (0.111)
	135	8.98 (0.111)	8.94 (0.112)	8.89 (0.112)	8.76 (0.114)	9.00 (0.111)	8.99 (0.111)	8.99 (0.111)	8.96 (0.112)
Expanded polystyrene, 1 1/2 in.	85	8.74 (0.114)	8.69 (0.115)	8.64 (0.116)	8.48 (0.118)	8.75 (0.114)	8.74 (0.114)	8.73 (0.115)	8.70 (0.115)
	95	8.63 (0.116)	8.58 (0.117)	8.53 (0.117)	8.38 (0.119)	8.64 (0.116)	8.63 (0.116)	8.62 (0.116)	8.59 (0.116)
	105	8.53 (0.117)	8.48 (0.118)	8.43 (0.119)	8.28 (0.121)	8.54 (0.117)	8.53 (0.117)	8.52 (0.117)	8.49 (0.118)
	115	8.44 (0.119)	8.39 (0.119)	8.34 (0.120)	8.20 (0.122)	8.45 (0.118)	8.44 (0.118)	8.44 (0.119)	8.41 (0.119)
	125	8.35 (0.120)	8.31 (0.120)	8.26 (0.121)	8.12 (0.123)	8.37 (0.119)	8.37 (0.120)	8.36 (0.120)	8.33 (0.120)
	135	8.28 (0.121)	8.24 (0.121)	8.19 (0.122)	8.06 (0.124)	8.30 (0.120)	8.29 (0.121)	8.29 (0.121)	8.26 (0.121)
Expanded polystyrene, 2 in.	85	10.74 (0.093)	10.69 (0.094)	10.64 (0.094)	10.48 (0.095)	10.75 (0.093)	10.74 (0.093)	10.73 (0.093)	10.70 (0.093)
	95	10.63 (0.094)	10.58 (0.095)	10.53 (0.095)	10.38 (0.096)	10.64 (0.094)	10.63 (0.094)	10.62 (0.094)	10.59 (0.094)
	105	10.53 (0.095)	10.48 (0.095)	10.43 (0.096)	10.28 (0.097)	10.54 (0.095)	10.53 (0.095)	10.52 (0.095)	10.49 (0.095)
	115	10.44 (0.096)	10.39 (0.096)	10.34 (0.097)	10.20 (0.098)	10.45 (0.096)	10.44 (0.096)	10.44 (0.096)	10.41 (0.096)
	125	10.35 (0.097)	10.31 (0.097)	10.26 (0.097)	10.12 (0.099)	10.37 (0.096)	10.37 (0.096)	10.36 (0.097)	10.33 (0.097)
	135	10.28 (0.097)	10.24 (0.098)	10.19 (0.098)	10.06 (0.099)	10.30 (0.097)	10.29 (0.097)	10.29 (0.097)	10.26 (0.097)
Extruded polystyrene, 2 in.	85	12.74 (0.079)	12.69 (0.079)	12.64 (0.079)	12.48 (0.080)	12.75 (0.078)	12.74 (0.079)	12.73 (0.079)	12.70 (0.079)
	95	12.63 (0.079)	12.58 (0.079)	12.53 (0.080)	12.38 (0.081)	12.64 (0.079)	12.63 (0.079)	12.62 (0.079)	12.59 (0.079)
	105	12.53 (0.080)	12.48 (0.080)	12.43 (0.080)	12.28 (0.081)	12.54 (0.080)	12.53 (0.080)	12.52 (0.080)	12.49 (0.080)
	115	12.44 (0.080)	12.39 (0.081)	12.34 (0.081)	12.20 (0.082)	12.45 (0.080)	12.44 (0.080)	12.44 (0.080)	12.41 (0.081)
	125	12.35 (0.081)	12.31 (0.081)	12.26 (0.082)	12.12 (0.082)	12.37 (0.081)	12.37 (0.081)	12.36 (0.081)	12.33 (0.081)
	135	12.28 (0.081)	12.24 (0.082)	12.19 (0.082)	12.06 (0.083)	12.30 (0.081)	12.29 (0.081)	12.29 (0.081)	12.26 (0.082)
Polyisocyanurate, 2 in.	85	17.14 (0.058)	17.09 (0.059)	17.04 (0.059)	16.88 (0.059)	17.15 (0.058)	17.14 (0.058)	17.13 (0.058)	17.10 (0.058)
	95	17.03 (0.059)	16.98 (0.059)	16.93 (0.059)	16.78 (0.060)	17.04 (0.059)	17.03 (0.059)	17.02 (0.059)	16.99 (0.059)
	105	16.93 (0.059)	16.88 (0.059)	16.83 (0.059)	16.68 (0.060)	16.94 (0.059)	16.93 (0.059)	16.92 (0.059)	16.89 (0.059)
	115	16.84 (0.059)	16.79 (0.060)	16.74 (0.060)	16.60 (0.060)	16.85 (0.059)	16.84 (0.059)	16.84 (0.059)	16.81 (0.059)
	125	16.75 (0.060)	16.71 (0.060)	16.66 (0.060)	16.52 (0.061)	16.77 (0.060)	16.77 (0.060)	16.76 (0.060)	16.73 (0.060)
	135	16.68 (0.060)	16.64 (0.060)	16.59 (0.060)	16.46 (0.061)	16.70 (0.060)	16.69 (0.060)	16.69 (0.060)	16.66 (0.060)
Extruded Polystyrene, 2 1/2 in	85	15.24 (0.066)	15.19 (0.066)	15.14 (0.066)	14.98 (0.067)	15.25 (0.066)	15.24 (0.066)	15.23 (0.066)	15.20 (0.066)
	95	15.13 (0.066)	15.08 (0.066)	15.03 (0.067)	14.88 (0.067)	15.14 (0.066)	15.13 (0.066)	15.12 (0.066)	15.09 (0.066)
	105	15.03 (0.067)	14.98 (0.067)	14.93 (0.067)	14.78 (0.068)	15.04 (0.066)	15.03 (0.067)	15.02 (0.067)	14.99 (0.067)
	115	14.94 (0.067)	14.89 (0.067)	14.84 (0.067)	14.70 (0.068)	14.95 (0.067)	14.94 (0.067)	14.94 (0.067)	14.91 (0.067)
	125	14.85 (0.067)	14.81 (0.068)	14.76 (0.068)	14.62 (0.068)	14.87 (0.067)	14.87 (0.067)	14.86 (0.067)	14.83 (0.067)
	135	14.78 (0.068)	14.74 (0.068)	14.69 (0.068)	14.56 (0.069)	14.80 (0.068)	14.79 (0.068)	14.79 (0.068)	14.76 (0.068)
Expanded polystyrene, 3 in.	85	14.74 (0.068)	14.69 (0.068)	14.64 (0.068)	14.48 (0.069)	14.75 (0.068)	14.74 (0.068)	14.73 (0.068)	14.70 (0.068)
	95	14.63 (0.068)	14.58 (0.069)	14.53 (0.069)	14.38 (0.070)	14.64 (0.068)	14.63 (0.068)	14.62 (0.068)	14.59 (0.069)
	105	14.53 (0.069)	14.48 (0.069)	14.43 (0.069)	14.28 (0.070)	14.54 (0.069)	14.53 (0.069)	14.52 (0.069)	14.49 (0.069)
	115	14.44 (0.069)	14.39 (0.069)	14.34 (0.070)	14.20 (0.070)	14.45 (0.069)	14.44 (0.069)	14.44 (0.069)	14.41 (0.069)
	125	14.35 (0.070)	14.31 (0.070)	14.26 (0.070)	14.12 (0.071)	14.37 (0.070)	14.37 (0.070)	14.36 (0.070)	14.33 (0.070)
	135	14.28 (0.070)	14.24 (0.070)	14.19 (0.070)	14.06 (0.071)	14.30 (0.070)	14.29 (0.070)	14.29 (0.070)	14.26 (0.070)
Polyisocyanurate, 3 in.	85	23.94 (0.042)	23.89 (0.042)	23.84 (0.042)	23.68 (0.042)	23.95 (0.042)	23.94 (0.042)	23.93 (0.042)	23.90 (0.042)
	95	23.83 (0.042)	23.78 (0.042)	23.73 (0.042)	23.58 (0.042)	23.84 (0.042)	23.83 (0.042)	23.82 (0.042)	23.79 (0.042)
	105	23.73 (0.042)	23.68 (0.042)	23.63 (0.042)	23.48 (0.043)	23.74 (0.042)	23.73 (0.042)	23.72 (0.042)	23.69 (0.042)
	115	23.64 (0.042)	23.59 (0.042)	23.54 (0.042)	23.40 (0.043)	23.65 (0.042)	23.64 (0.042)	23.64 (0.042)	23.61 (0.042)
	125	23.55 (0.042)	23.51 (0.043)	23.46 (0.043)	23.32 (0.043)	23.57 (0.042)	23.57 (0.042)	23.56 (0.042)	23.53 (0.042)
	135	23.48 (0.043)	23.44 (0.043)	23.39 (0.043)	23.26 (0.043)	23.50 (0.043)	23.49 (0.043)	23.49 (0.043)	23.46 (0.043)



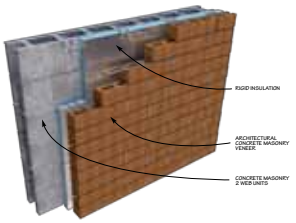
CONCRETE MASONRY CAVITY ASSEMBLIES
NO INTERIOR FINISHES

Assembly 2-9: Continuous insulation in cavity, 4-in. concrete masonry veneer
(Continued on next page)

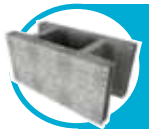
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.27 (0.108)	9.15 (0.109)	9.02 (0.111)	8.68 (0.115)	9.43 (0.106)	9.34 (0.107)	9.24 (0.108)	8.98 (0.111)
	95	9.18 (0.109)	9.05 (0.110)	8.92 (0.112)	8.60 (0.116)	9.32 (0.107)	9.23 (0.108)	9.13 (0.110)	8.87 (0.113)
	105	9.08 (0.110)	8.96 (0.112)	8.84 (0.113)	8.53 (0.117)	9.21 (0.109)	9.13 (0.110)	9.03 (0.111)	8.78 (0.114)
	115	9.00 (0.111)	8.88 (0.113)	8.76 (0.114)	8.46 (0.118)	9.12 (0.110)	9.03 (0.111)	8.94 (0.112)	8.70 (0.115)
	125	8.92 (0.112)	8.81 (0.114)	8.69 (0.115)	8.40 (0.119)	9.03 (0.111)	8.95 (0.112)	8.86 (0.113)	8.63 (0.116)
	135	8.85 (0.113)	8.74 (0.114)	8.63 (0.116)	8.35 (0.120)	8.95 (0.112)	8.87 (0.113)	8.79 (0.114)	8.56 (0.117)
Closed cell spray polyurethane foam, 1 in.	85	11.07 (0.090)	10.95 (0.091)	10.82 (0.092)	10.48 (0.095)	11.23 (0.089)	11.14 (0.090)	11.04 (0.091)	10.78 (0.093)
	95	10.98 (0.091)	10.85 (0.092)	10.72 (0.093)	10.40 (0.096)	11.12 (0.090)	11.03 (0.091)	10.93 (0.091)	10.67 (0.094)
	105	10.88 (0.092)	10.76 (0.093)	10.64 (0.094)	10.33 (0.097)	11.01 (0.091)	10.93 (0.092)	10.83 (0.092)	10.58 (0.095)
	115	10.80 (0.093)	10.68 (0.094)	10.56 (0.095)	10.26 (0.097)	10.92 (0.092)	10.83 (0.092)	10.74 (0.093)	10.50 (0.095)
	125	10.72 (0.093)	10.61 (0.094)	10.49 (0.095)	10.20 (0.098)	10.83 (0.092)	10.75 (0.093)	10.66 (0.094)	10.43 (0.096)
	135	10.65 (0.094)	10.54 (0.095)	10.43 (0.096)	10.15 (0.098)	10.75 (0.093)	10.67 (0.094)	10.59 (0.094)	10.36 (0.097)
Polyisocyanurate, 1 in.	85	12.80 (0.078)	12.68 (0.079)	12.55 (0.080)	12.21 (0.082)	12.96 (0.077)	12.87 (0.078)	12.77 (0.078)	12.51 (0.080)
	95	12.71 (0.079)	12.58 (0.079)	12.45 (0.080)	12.13 (0.082)	12.85 (0.078)	12.76 (0.078)	12.66 (0.079)	12.40 (0.081)
	105	12.61 (0.079)	12.49 (0.080)	12.37 (0.081)	12.06 (0.083)	12.74 (0.078)	12.66 (0.079)	12.56 (0.080)	12.31 (0.081)
	115	12.53 (0.080)	12.41 (0.081)	12.29 (0.081)	11.99 (0.083)	12.65 (0.079)	12.56 (0.080)	12.47 (0.080)	12.23 (0.082)
	125	12.45 (0.080)	12.34 (0.081)	12.22 (0.082)	11.93 (0.084)	12.56 (0.080)	12.48 (0.080)	12.39 (0.081)	12.16 (0.082)
	135	12.38 (0.081)	12.27 (0.082)	12.16 (0.082)	11.88 (0.084)	12.48 (0.080)	12.40 (0.081)	12.32 (0.081)	12.09 (0.083)
Extruded polystyrene, 1 1/2 in.	85	11.77 (0.085)	11.65 (0.086)	11.52 (0.087)	11.18 (0.089)	11.93 (0.084)	11.84 (0.084)	11.74 (0.085)	11.48 (0.087)
	95	11.68 (0.086)	11.55 (0.087)	11.42 (0.088)	11.10 (0.090)	11.82 (0.085)	11.73 (0.085)	11.63 (0.086)	11.37 (0.088)
	105	11.58 (0.086)	11.46 (0.087)	11.34 (0.088)	11.03 (0.091)	11.71 (0.085)	11.63 (0.086)	11.53 (0.087)	11.28 (0.089)
	115	11.50 (0.087)	11.38 (0.088)	11.26 (0.089)	10.96 (0.091)	11.62 (0.086)	11.53 (0.087)	11.44 (0.087)	11.20 (0.089)
	125	11.42 (0.088)	11.31 (0.088)	11.19 (0.089)	10.90 (0.092)	11.53 (0.087)	11.45 (0.087)	11.36 (0.088)	11.13 (0.090)
	135	11.35 (0.088)	11.24 (0.089)	11.13 (0.090)	10.85 (0.092)	11.45 (0.087)	11.37 (0.088)	11.29 (0.089)	11.06 (0.090)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.17 (0.071)	14.05 (0.071)	13.92 (0.072)	13.58 (0.074)	14.33 (0.070)	14.24 (0.070)	14.14 (0.071)	13.88 (0.072)
	95	14.08 (0.071)	13.95 (0.072)	13.82 (0.072)	13.50 (0.074)	14.22 (0.070)	14.13 (0.071)	14.03 (0.071)	13.77 (0.073)
	105	13.98 (0.072)	13.86 (0.072)	13.74 (0.073)	13.43 (0.074)	14.11 (0.071)	14.03 (0.071)	13.93 (0.072)	13.68 (0.073)
	115	13.90 (0.072)	13.78 (0.073)	13.66 (0.073)	13.36 (0.075)	14.02 (0.071)	13.93 (0.072)	13.84 (0.072)	13.60 (0.074)
	125	13.82 (0.072)	13.71 (0.073)	13.59 (0.074)	13.30 (0.075)	13.93 (0.072)	13.85 (0.072)	13.76 (0.073)	13.53 (0.074)
	135	13.75 (0.073)	13.64 (0.073)	13.53 (0.074)	13.25 (0.075)	13.85 (0.072)	13.77 (0.073)	13.69 (0.073)	13.46 (0.074)
Polyisocyanurate, 1 1/2 in.	85	16.60 (0.060)	16.48 (0.061)	16.35 (0.061)	16.01 (0.062)	16.76 (0.060)	16.67 (0.060)	16.57 (0.060)	16.31 (0.061)
	95	16.51 (0.061)	16.38 (0.061)	16.25 (0.062)	15.93 (0.063)	16.65 (0.060)	16.56 (0.060)	16.46 (0.061)	16.20 (0.062)
	105	16.41 (0.061)	16.29 (0.061)	16.17 (0.062)	15.86 (0.063)	16.54 (0.060)	16.46 (0.061)	16.36 (0.061)	16.11 (0.062)
	115	16.33 (0.061)	16.21 (0.062)	16.09 (0.062)	15.79 (0.063)	16.45 (0.061)	16.36 (0.061)	16.27 (0.061)	16.03 (0.062)
	125	16.25 (0.062)	16.14 (0.062)	16.02 (0.062)	15.73 (0.064)	16.36 (0.061)	16.28 (0.061)	16.19 (0.062)	15.96 (0.063)
	135	16.18 (0.062)	16.07 (0.062)	15.96 (0.063)	15.68 (0.064)	16.28 (0.061)	16.20 (0.062)	16.12 (0.062)	15.89 (0.063)
Extruded polystyrene, 2 in.	85	14.27 (0.070)	14.15 (0.071)	14.02 (0.071)	13.68 (0.073)	14.43 (0.069)	14.34 (0.070)	14.24 (0.070)	13.98 (0.072)
	95	14.18 (0.071)	14.05 (0.071)	13.92 (0.072)	13.60 (0.074)	14.32 (0.070)	14.23 (0.070)	14.13 (0.071)	13.87 (0.072)
	105	14.08 (0.071)	13.96 (0.072)	13.84 (0.072)	13.53 (0.074)	14.21 (0.070)	14.13 (0.071)	14.03 (0.071)	13.78 (0.073)
	115	14.00 (0.071)	13.88 (0.072)	13.76 (0.073)	13.46 (0.074)	14.12 (0.071)	14.03 (0.071)	13.94 (0.072)	13.70 (0.073)
	125	13.92 (0.072)	13.81 (0.072)	13.69 (0.073)	13.40 (0.075)	14.03 (0.071)	13.95 (0.072)	13.86 (0.072)	13.63 (0.073)
	135	13.85 (0.072)	13.74 (0.073)	13.63 (0.073)	13.35 (0.075)	13.95 (0.072)	13.87 (0.072)	13.79 (0.073)	13.56 (0.074)
Closed cell spray polyurethane foam, 2 in.	85	17.27 (0.058)	17.15 (0.058)	17.02 (0.059)	16.68 (0.060)	17.43 (0.057)	17.34 (0.058)	17.24 (0.058)	16.98 (0.059)
	95	17.18 (0.058)	17.05 (0.059)	16.92 (0.059)	16.60 (0.060)	17.32 (0.058)	17.23 (0.058)	17.13 (0.058)	16.87 (0.059)
	105	17.08 (0.059)	16.96 (0.059)	16.84 (0.059)	16.53 (0.061)	17.21 (0.058)	17.13 (0.058)	17.03 (0.059)	16.78 (0.060)
	115	17.00 (0.059)	16.88 (0.059)	16.76 (0.060)	16.46 (0.061)	17.12 (0.058)	17.03 (0.059)	16.94 (0.059)	16.70 (0.060)
	125	16.92 (0.059)	16.81 (0.059)	16.69 (0.060)	16.40 (0.061)	17.03 (0.059)	16.95 (0.059)	16.86 (0.059)	16.63 (0.060)
	135	16.85 (0.059)	16.74 (0.060)	16.63 (0.060)	16.35 (0.061)	16.95 (0.059)	16.87 (0.059)	16.79 (0.060)	16.56 (0.060)
Polyisocyanurate, 2 in.	85	20.50 (0.049)	20.38 (0.049)	20.25 (0.049)	19.91 (0.050)	20.66 (0.048)	20.57 (0.049)	20.47 (0.049)	20.21 (0.049)
	95	20.41 (0.049)	20.28 (0.049)	20.15 (0.050)	19.83 (0.050)	20.55 (0.049)	20.46 (0.049)	20.36 (0.049)	20.10 (0.050)
	105	20.31 (0.049)	20.19 (0.050)	20.07 (0.050)	19.76 (0.051)	20.44 (0.049)	20.36 (0.049)	20.26 (0.049)	20.01 (0.050)
	115	20.23 (0.049)	20.11 (0.050)	19.99 (0.050)	19.69 (0.051)	20.35 (0.049)	20.26 (0.049)	20.17 (0.050)	19.93 (0.050)
	125	20.15 (0.050)	20.04 (0.050)	19.92 (0.050)	19.63 (0.051)	20.26 (0.049)	20.18 (0.050)	20.09 (0.050)	19.86 (0.050)
	135	20.08 (0.050)	19.97 (0.050)	19.86 (0.050)	19.58 (0.051)	20.18 (0.050)	20.10 (0.050)	20.02 (0.050)	19.79 (0.051)

*Assembly details page 41.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.45 (0.106)	9.40 (0.106)	9.35 (0.107)	9.19 (0.109)	9.46 (0.106)	9.45 (0.106)	9.44 (0.106)	9.41 (0.106)
	95	9.34 (0.107)	9.29 (0.108)	9.24 (0.108)	9.09 (0.110)	9.35 (0.107)	9.34 (0.107)	9.33 (0.107)	9.30 (0.108)
	105	9.24 (0.108)	9.19 (0.109)	9.14 (0.109)	8.99 (0.111)	9.25 (0.108)	9.24 (0.108)	9.23 (0.108)	9.20 (0.109)
	115	9.15 (0.109)	9.10 (0.110)	9.05 (0.110)	8.91 (0.112)	9.16 (0.109)	9.15 (0.109)	9.15 (0.109)	9.12 (0.110)
	125	9.06 (0.110)	9.02 (0.111)	8.97 (0.111)	8.83 (0.113)	9.08 (0.110)	9.08 (0.110)	9.07 (0.110)	9.04 (0.111)
	135	8.99 (0.111)	8.95 (0.112)	8.90 (0.112)	8.77 (0.114)	9.01 (0.111)	9.00 (0.111)	9.00 (0.111)	8.97 (0.111)
Closed cell spray polyurethane foam, 1 in.	85	11.25 (0.089)	11.20 (0.089)	11.15 (0.090)	10.99 (0.091)	11.26 (0.089)	11.25 (0.089)	11.24 (0.089)	11.21 (0.089)
	95	11.14 (0.090)	11.09 (0.090)	11.04 (0.091)	10.89 (0.092)	11.15 (0.090)	11.14 (0.090)	11.13 (0.090)	11.10 (0.090)
	105	11.04 (0.091)	10.99 (0.091)	10.94 (0.091)	10.79 (0.093)	11.05 (0.091)	11.04 (0.091)	11.03 (0.091)	11.00 (0.091)
	115	10.95 (0.091)	10.90 (0.092)	10.85 (0.092)	10.71 (0.093)	10.96 (0.091)	10.95 (0.091)	10.95 (0.091)	10.92 (0.092)
	125	10.86 (0.092)	10.82 (0.092)	10.77 (0.093)	10.63 (0.094)	10.88 (0.092)	10.88 (0.092)	10.87 (0.092)	10.84 (0.092)
	135	10.79 (0.093)	10.75 (0.093)	10.70 (0.093)	10.57 (0.095)	10.81 (0.092)	10.80 (0.093)	10.80 (0.093)	10.77 (0.093)
Polyisocyanurate, 1 in.	85	12.98 (0.077)	12.93 (0.077)	12.88 (0.078)	12.72 (0.079)	12.99 (0.077)	12.98 (0.077)	12.97 (0.077)	12.94 (0.077)
	95	12.87 (0.078)	12.82 (0.078)	12.77 (0.078)	12.62 (0.079)	12.88 (0.078)	12.87 (0.078)	12.86 (0.078)	12.83 (0.078)
	105	12.77 (0.078)	12.72 (0.079)	12.67 (0.079)	12.52 (0.080)	12.78 (0.078)	12.77 (0.078)	12.76 (0.078)	12.73 (0.079)
	115	12.68 (0.079)	12.63 (0.079)	12.58 (0.079)	12.44 (0.080)	12.69 (0.079)	12.68 (0.079)	12.68 (0.079)	12.65 (0.079)
	125	12.59 (0.079)	12.55 (0.080)	12.50 (0.080)	12.36 (0.081)	12.61 (0.079)	12.61 (0.079)	12.60 (0.079)	12.57 (0.080)
	135	12.52 (0.080)	12.48 (0.080)	12.43 (0.080)	12.30 (0.081)	12.54 (0.080)	12.53 (0.080)	12.53 (0.080)	12.50 (0.080)
Extruded polystyrene, 1 1/2 in.	85	11.95 (0.084)	11.90 (0.084)	11.85 (0.084)	11.69 (0.086)	11.96 (0.084)	11.95 (0.084)	11.94 (0.084)	11.91 (0.084)
	95	11.84 (0.084)	11.79 (0.085)	11.74 (0.085)	11.59 (0.086)	11.85 (0.084)	11.84 (0.084)	11.83 (0.085)	11.80 (0.085)
	105	11.74 (0.085)	11.69 (0.086)	11.64 (0.086)	11.49 (0.087)	11.75 (0.085)	11.74 (0.085)	11.73 (0.085)	11.70 (0.085)
	115	11.65 (0.086)	11.60 (0.086)	11.55 (0.087)	11.41 (0.088)	11.66 (0.086)	11.65 (0.086)	11.65 (0.086)	11.62 (0.086)
	125	11.56 (0.086)	11.52 (0.087)	11.47 (0.087)	11.33 (0.088)	11.58 (0.086)	11.58 (0.086)	11.57 (0.086)	11.54 (0.087)
	135	11.49 (0.087)	11.45 (0.087)	11.40 (0.088)	11.27 (0.089)	11.51 (0.087)	11.50 (0.087)	11.50 (0.087)	11.47 (0.087)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.35 (0.070)	14.30 (0.070)	14.25 (0.070)	14.09 (0.071)	14.36 (0.070)	14.35 (0.070)	14.34 (0.070)	14.31 (0.070)
	95	14.24 (0.070)	14.19 (0.070)	14.14 (0.071)	13.99 (0.071)	14.25 (0.070)	14.24 (0.070)	14.23 (0.070)	14.20 (0.070)
	105	14.14 (0.071)	14.09 (0.071)	14.04 (0.071)	13.89 (0.072)	14.15 (0.071)	14.14 (0.071)	14.13 (0.071)	14.10 (0.071)
	115	14.05 (0.071)	14.00 (0.071)	13.95 (0.072)	13.81 (0.072)	14.06 (0.071)	14.05 (0.071)	14.05 (0.071)	14.02 (0.071)
	125	13.96 (0.072)	13.92 (0.072)	13.87 (0.072)	13.73 (0.073)	13.98 (0.072)	13.98 (0.072)	13.97 (0.072)	13.94 (0.072)
	135	13.89 (0.072)	13.85 (0.072)	13.80 (0.072)	13.67 (0.073)	13.91 (0.072)	13.90 (0.072)	13.90 (0.072)	13.87 (0.072)
Polyisocyanurate, 1 1/2 in.	85	16.78 (0.060)	16.73 (0.060)	16.68 (0.060)	16.52 (0.061)	16.79 (0.060)	16.78 (0.060)	16.77 (0.060)	16.74 (0.060)
	95	16.67 (0.060)	16.62 (0.060)	16.57 (0.060)	16.42 (0.061)	16.68 (0.060)	16.67 (0.060)	16.66 (0.060)	16.63 (0.060)
	105	16.57 (0.060)	16.52 (0.061)	16.47 (0.061)	16.32 (0.061)	16.58 (0.060)	16.57 (0.060)	16.56 (0.060)	16.53 (0.060)
	115	16.48 (0.061)	16.43 (0.061)	16.38 (0.061)	16.24 (0.062)	16.49 (0.061)	16.48 (0.061)	16.48 (0.061)	16.45 (0.061)
	125	16.39 (0.061)	16.35 (0.061)	16.30 (0.061)	16.16 (0.062)	16.41 (0.061)	16.41 (0.061)	16.40 (0.061)	16.37 (0.061)
	135	16.32 (0.061)	16.28 (0.061)	16.23 (0.062)	16.10 (0.062)	16.34 (0.061)	16.33 (0.061)	16.33 (0.061)	16.30 (0.061)
Extruded polystyrene, 2 in.	85	14.45 (0.069)	14.40 (0.069)	14.35 (0.070)	14.19 (0.070)	14.46 (0.069)	14.45 (0.069)	14.44 (0.069)	14.41 (0.069)
	95	14.34 (0.070)	14.29 (0.070)	14.24 (0.070)	14.09 (0.071)	14.35 (0.070)	14.34 (0.070)	14.33 (0.070)	14.30 (0.070)
	105	14.24 (0.070)	14.19 (0.070)	14.14 (0.071)	13.99 (0.071)	14.25 (0.070)	14.24 (0.070)	14.23 (0.070)	14.20 (0.070)
	115	14.15 (0.071)	14.10 (0.071)	14.05 (0.071)	13.91 (0.072)	14.16 (0.071)	14.15 (0.071)	14.15 (0.071)	14.12 (0.071)
	125	14.06 (0.071)	14.02 (0.071)	13.97 (0.072)	13.83 (0.072)	14.08 (0.071)	14.08 (0.071)	14.07 (0.071)	14.04 (0.071)
	135	13.99 (0.071)	13.95 (0.072)	13.90 (0.072)	13.77 (0.073)	14.01 (0.071)	14.00 (0.071)	14.00 (0.071)	13.97 (0.072)
Closed cell spray polyurethane foam, 2 in.	85	17.45 (0.057)	17.40 (0.057)	17.35 (0.058)	17.19 (0.058)	17.46 (0.057)	17.45 (0.057)	17.44 (0.057)	17.41 (0.057)
	95	17.34 (0.058)	17.29 (0.058)	17.24 (0.058)	17.09 (0.059)	17.35 (0.058)	17.34 (0.058)	17.33 (0.058)	17.30 (0.058)
	105	17.24 (0.058)	17.19 (0.058)	17.14 (0.058)	16.99 (0.059)	17.25 (0.058)	17.24 (0.058)	17.23 (0.058)	17.20 (0.058)
	115	17.15 (0.058)	17.10 (0.058)	17.05 (0.059)	16.91 (0.059)	17.16 (0.058)	17.15 (0.058)	17.15 (0.058)	17.12 (0.058)
	125	17.06 (0.059)	17.02 (0.059)	16.97 (0.059)	16.83 (0.059)	17.08 (0.059)	17.08 (0.059)	17.07 (0.059)	17.04 (0.059)
	135	16.99 (0.059)	16.95 (0.059)	16.90 (0.059)	16.77 (0.060)	17.01 (0.059)	17.00 (0.059)	17.00 (0.059)	16.97 (0.059)
Polyisocyanurate, 2 in.	85	20.68 (0.048)	20.63 (0.048)	20.58 (0.049)	20.42 (0.049)	20.69 (0.048)	20.68 (0.048)	20.67 (0.048)	20.64 (0.048)
	95	20.57 (0.049)	20.52 (0.049)	20.47 (0.049)	20.32 (0.049)	20.58 (0.049)	20.57 (0.049)	20.56 (0.049)	20.53 (0.049)
	105	20.47 (0.049)	20.42 (0.049)	20.37 (0.049)	20.22 (0.049)	20.48 (0.049)	20.47 (0.049)	20.46 (0.049)	20.43 (0.049)
	115	20.38 (0.049)	20.33 (0.049)	20.28 (0.049)	20.14 (0.050)	20.39 (0.049)	20.38 (0.049)	20.38 (0.049)	20.35 (0.049)
	125	20.29 (0.049)	20.25 (0.049)	20.20 (0.049)	20.06 (0.050)	20.31 (0.049)	20.31 (0.049)	20.30 (0.049)	20.27 (0.049)
	135	20.22 (0.049)	20.18 (0.050)	20.13 (0.050)	20.00 (0.050)	20.24 (0.049)	20.23 (0.049)	20.23 (0.049)	20.20 (0.050)



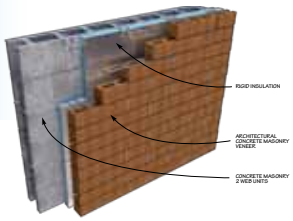
CONCRETE MASONRY CAVITY ASSEMBLIES
NO INTERIOR FINISHES

Assembly 2-9: Continuous insulation in cavity, 4-in. concrete masonry veneer (Continued from previous page)

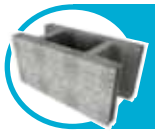
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Extruded polystyrene, 2 1/2 in.	85	16.77 (0.060)	16.65 (0.060)	16.52 (0.061)	16.18 (0.062)	16.93 (0.059)	16.84 (0.059)	16.74 (0.060)	16.48 (0.061)
	95	16.68 (0.060)	16.55 (0.060)	16.42 (0.061)	16.10 (0.062)	16.82 (0.059)	16.73 (0.060)	16.63 (0.060)	16.37 (0.061)
	105	16.58 (0.060)	16.46 (0.061)	16.34 (0.061)	16.03 (0.062)	16.71 (0.060)	16.63 (0.060)	16.53 (0.060)	16.28 (0.061)
	115	16.50 (0.061)	16.38 (0.061)	16.26 (0.061)	15.96 (0.063)	16.62 (0.060)	16.53 (0.060)	16.44 (0.061)	16.20 (0.062)
	125	16.42 (0.061)	16.31 (0.061)	16.19 (0.062)	15.90 (0.063)	16.53 (0.060)	16.45 (0.061)	16.36 (0.061)	16.13 (0.062)
	135	16.35 (0.061)	16.24 (0.062)	16.13 (0.062)	15.85 (0.063)	16.45 (0.061)	16.37 (0.061)	16.29 (0.061)	16.06 (0.062)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.27 (0.049)	20.15 (0.050)	20.02 (0.050)	19.68 (0.051)	20.43 (0.049)	20.34 (0.049)	20.24 (0.049)	19.98 (0.050)
	95	20.18 (0.050)	20.05 (0.050)	19.92 (0.050)	19.60 (0.051)	20.32 (0.049)	20.23 (0.049)	20.13 (0.050)	19.87 (0.050)
	105	20.08 (0.050)	19.96 (0.050)	19.84 (0.050)	19.53 (0.051)	20.21 (0.049)	20.13 (0.050)	20.03 (0.050)	19.78 (0.051)
	115	20.00 (0.050)	19.88 (0.050)	19.76 (0.051)	19.46 (0.051)	20.12 (0.050)	20.03 (0.050)	19.94 (0.050)	19.70 (0.051)
	125	19.92 (0.050)	19.81 (0.050)	19.69 (0.051)	19.40 (0.052)	20.03 (0.050)	19.95 (0.050)	19.86 (0.050)	19.63 (0.051)
	135	19.85 (0.050)	19.74 (0.051)	19.63 (0.051)	19.35 (0.052)	19.95 (0.050)	19.87 (0.050)	19.79 (0.051)	19.56 (0.051)
Polyisocyanurate, 2 1/2 in.	85	23.90 (0.042)	23.78 (0.042)	23.65 (0.042)	23.31 (0.043)	24.06 (0.042)	23.97 (0.042)	23.87 (0.042)	23.61 (0.042)
	95	23.81 (0.042)	23.68 (0.042)	23.55 (0.042)	23.23 (0.043)	23.95 (0.042)	23.86 (0.042)	23.76 (0.042)	23.50 (0.043)
	105	23.71 (0.042)	23.59 (0.042)	23.47 (0.043)	23.16 (0.043)	23.84 (0.042)	23.76 (0.042)	23.66 (0.042)	23.41 (0.043)
	115	23.63 (0.042)	23.51 (0.043)	23.39 (0.043)	23.09 (0.043)	23.75 (0.042)	23.66 (0.042)	23.57 (0.042)	23.33 (0.043)
	125	23.55 (0.042)	23.44 (0.043)	23.32 (0.043)	23.03 (0.043)	23.66 (0.042)	23.58 (0.042)	23.49 (0.043)	23.26 (0.043)
	135	23.48 (0.043)	23.37 (0.043)	23.26 (0.043)	22.98 (0.044)	23.58 (0.042)	23.50 (0.043)	23.42 (0.043)	23.19 (0.043)
Extruded polystyrene, 3 in.	85	19.27 (0.052)	19.15 (0.052)	19.02 (0.053)	18.68 (0.054)	19.43 (0.051)	19.34 (0.052)	19.24 (0.052)	18.98 (0.053)
	95	19.18 (0.052)	19.05 (0.052)	18.92 (0.053)	18.60 (0.054)	19.32 (0.052)	19.23 (0.052)	19.13 (0.052)	18.87 (0.053)
	105	19.08 (0.052)	18.96 (0.053)	18.84 (0.053)	18.53 (0.054)	19.21 (0.052)	19.13 (0.052)	19.03 (0.053)	18.78 (0.053)
	115	19.00 (0.053)	18.88 (0.053)	18.76 (0.053)	18.46 (0.054)	19.12 (0.052)	19.03 (0.053)	18.94 (0.053)	18.70 (0.053)
	125	18.92 (0.053)	18.81 (0.053)	18.69 (0.053)	18.40 (0.054)	19.03 (0.053)	18.95 (0.053)	18.86 (0.053)	18.63 (0.054)
	135	18.85 (0.053)	18.74 (0.053)	18.63 (0.054)	18.35 (0.054)	18.95 (0.053)	18.87 (0.053)	18.79 (0.053)	18.56 (0.054)
Closed cell spray polyurethane foam, 3 in.	85	23.27 (0.043)	23.15 (0.043)	23.02 (0.043)	22.68 (0.044)	23.43 (0.043)	23.34 (0.043)	23.24 (0.043)	22.98 (0.044)
	95	23.18 (0.043)	23.05 (0.043)	22.92 (0.044)	22.60 (0.044)	23.32 (0.043)	23.23 (0.043)	23.13 (0.043)	22.87 (0.044)
	105	23.08 (0.043)	22.96 (0.044)	22.84 (0.044)	22.53 (0.044)	23.21 (0.043)	23.13 (0.043)	23.03 (0.043)	22.78 (0.044)
	115	23.00 (0.043)	22.88 (0.044)	22.76 (0.044)	22.46 (0.045)	23.12 (0.043)	23.03 (0.043)	22.94 (0.044)	22.70 (0.044)
	125	22.92 (0.044)	22.81 (0.044)	22.69 (0.044)	22.40 (0.045)	23.03 (0.043)	22.95 (0.044)	22.86 (0.044)	22.63 (0.044)
	135	22.85 (0.044)	22.74 (0.044)	22.63 (0.044)	22.35 (0.045)	22.95 (0.044)	22.87 (0.044)	22.79 (0.044)	22.56 (0.044)
Polyisocyanurate, 3 in.	85	27.30 (0.037)	27.18 (0.037)	27.05 (0.037)	26.71 (0.037)	27.46 (0.036)	27.37 (0.037)	27.27 (0.037)	27.01 (0.037)
	95	27.21 (0.037)	27.08 (0.037)	26.95 (0.037)	26.63 (0.038)	27.35 (0.037)	27.26 (0.037)	27.16 (0.037)	26.90 (0.037)
	105	27.11 (0.037)	26.99 (0.037)	26.87 (0.037)	26.56 (0.038)	27.24 (0.037)	27.16 (0.037)	27.06 (0.037)	26.81 (0.037)
	115	27.03 (0.037)	26.91 (0.037)	26.79 (0.037)	26.49 (0.038)	27.15 (0.037)	27.06 (0.037)	26.97 (0.037)	26.73 (0.037)
	125	26.95 (0.037)	26.84 (0.037)	26.72 (0.037)	26.43 (0.038)	27.06 (0.037)	26.98 (0.037)	26.89 (0.037)	26.66 (0.038)
	135	26.88 (0.037)	26.77 (0.037)	26.66 (0.038)	26.38 (0.038)	26.98 (0.037)	26.90 (0.037)	26.82 (0.037)	26.59 (0.038)
Extruded polystyrene, 3 1/2 in.	85	21.77 (0.046)	21.65 (0.046)	21.52 (0.046)	21.18 (0.047)	21.93 (0.046)	21.84 (0.046)	21.74 (0.046)	21.48 (0.047)
	95	21.68 (0.046)	21.55 (0.046)	21.42 (0.047)	21.10 (0.047)	21.82 (0.046)	21.73 (0.046)	21.63 (0.046)	21.37 (0.047)
	105	21.58 (0.046)	21.46 (0.047)	21.34 (0.047)	21.03 (0.048)	21.71 (0.046)	21.63 (0.046)	21.53 (0.046)	21.28 (0.047)
	115	21.50 (0.047)	21.38 (0.047)	21.26 (0.047)	20.96 (0.048)	21.62 (0.046)	21.53 (0.046)	21.44 (0.047)	21.20 (0.047)
	125	21.42 (0.047)	21.31 (0.047)	21.19 (0.047)	20.90 (0.048)	21.53 (0.046)	21.45 (0.047)	21.36 (0.047)	21.13 (0.047)
	135	21.35 (0.047)	21.24 (0.047)	21.13 (0.047)	20.85 (0.048)	21.45 (0.047)	21.37 (0.047)	21.29 (0.047)	21.06 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.27 (0.038)	26.15 (0.038)	26.02 (0.038)	25.68 (0.039)	26.43 (0.038)	26.34 (0.038)	26.24 (0.038)	25.98 (0.038)
	95	26.18 (0.038)	26.05 (0.038)	25.92 (0.039)	25.60 (0.039)	26.32 (0.038)	26.23 (0.038)	26.13 (0.038)	25.87 (0.039)
	105	26.08 (0.038)	25.96 (0.039)	25.84 (0.039)	25.53 (0.039)	26.21 (0.038)	26.13 (0.038)	26.03 (0.038)	25.78 (0.039)
	115	26.00 (0.038)	25.88 (0.039)	25.76 (0.039)	25.46 (0.039)	26.12 (0.038)	26.03 (0.038)	25.94 (0.039)	25.70 (0.039)
	125	25.92 (0.039)	25.81 (0.039)	25.69 (0.039)	25.40 (0.039)	26.03 (0.038)	25.95 (0.039)	25.86 (0.039)	25.63 (0.039)
	135	25.85 (0.039)	25.74 (0.039)	25.63 (0.039)	25.35 (0.039)	25.95 (0.039)	25.87 (0.039)	25.79 (0.039)	25.56 (0.039)
Polyisocyanurate, 3 1/2 in.	85	30.70 (0.033)	30.58 (0.033)	30.45 (0.033)	30.11 (0.033)	30.86 (0.032)	30.77 (0.032)	30.67 (0.033)	30.41 (0.033)
	95	30.61 (0.033)	30.48 (0.033)	30.35 (0.033)	30.03 (0.033)	30.75 (0.033)	30.66 (0.033)	30.56 (0.033)	30.30 (0.033)
	105	30.51 (0.033)	30.39 (0.033)	30.27 (0.033)	29.96 (0.033)	30.64 (0.033)	30.56 (0.033)	30.46 (0.033)	30.21 (0.033)
	115	30.43 (0.033)	30.31 (0.033)	30.19 (0.033)	29.89 (0.033)	30.55 (0.033)	30.46 (0.033)	30.37 (0.033)	30.13 (0.033)
	125	30.35 (0.033)	30.24 (0.033)	30.12 (0.033)	29.83 (0.034)	30.46 (0.033)	30.38 (0.033)	30.29 (0.033)	30.06 (0.033)
	135	30.28 (0.033)	30.17 (0.033)	30.06 (0.033)	29.78 (0.034)	30.38 (0.033)	30.30 (0.033)	30.22 (0.033)	29.99 (0.033)

*Assembly details page 41.



Extruded polystyrene, 2 1/2 in.	85	16.95 (0.059)	16.90 (0.059)	16.85 (0.059)	16.69 (0.060)	16.96 (0.059)	16.95 (0.059)	16.94 (0.059)	16.91 (0.059)
	95	16.84 (0.059)	16.79 (0.060)	16.74 (0.060)	16.59 (0.060)	16.85 (0.059)	16.84 (0.059)	16.83 (0.059)	16.80 (0.060)
	105	16.74 (0.060)	16.69 (0.060)	16.64 (0.060)	16.49 (0.061)	16.75 (0.060)	16.74 (0.060)	16.73 (0.060)	16.70 (0.060)
	115	16.65 (0.060)	16.60 (0.060)	16.55 (0.060)	16.41 (0.061)	16.66 (0.060)	16.65 (0.060)	16.65 (0.060)	16.62 (0.060)
	125	16.56 (0.060)	16.52 (0.061)	16.47 (0.061)	16.33 (0.061)	16.58 (0.060)	16.58 (0.060)	16.57 (0.060)	16.54 (0.060)
	135	16.49 (0.061)	16.45 (0.061)	16.40 (0.061)	16.27 (0.061)	16.51 (0.061)	16.50 (0.061)	16.50 (0.061)	16.47 (0.061)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.45 (0.049)	20.40 (0.049)	20.35 (0.049)	20.19 (0.050)	20.46 (0.049)	20.45 (0.049)	20.44 (0.049)	20.41 (0.049)
	95	20.34 (0.049)	20.29 (0.049)	20.24 (0.049)	20.09 (0.050)	20.35 (0.049)	20.34 (0.049)	20.33 (0.049)	20.30 (0.049)
	105	20.24 (0.049)	20.19 (0.050)	20.14 (0.050)	19.99 (0.050)	20.25 (0.049)	20.24 (0.049)	20.23 (0.049)	20.20 (0.049)
	115	20.15 (0.050)	20.10 (0.050)	20.05 (0.050)	19.91 (0.050)	20.16 (0.050)	20.15 (0.050)	20.15 (0.050)	20.12 (0.050)
	125	20.06 (0.050)	20.02 (0.050)	19.97 (0.050)	19.83 (0.050)	20.08 (0.050)	20.08 (0.050)	20.07 (0.050)	20.04 (0.050)
	135	19.99 (0.050)	19.95 (0.050)	19.90 (0.050)	19.77 (0.051)	20.01 (0.050)	20.00 (0.050)	20.00 (0.050)	19.97 (0.050)
Polyisocyanurate, 2 1/2 in.	85	24.08 (0.042)	24.03 (0.042)	23.98 (0.042)	23.82 (0.042)	24.09 (0.042)	24.08 (0.042)	24.07 (0.042)	24.04 (0.042)
	95	23.97 (0.042)	23.92 (0.042)	23.87 (0.042)	23.72 (0.042)	23.98 (0.042)	23.97 (0.042)	23.96 (0.042)	23.93 (0.042)
	105	23.87 (0.042)	23.82 (0.042)	23.77 (0.042)	23.62 (0.042)	23.88 (0.042)	23.87 (0.042)	23.86 (0.042)	23.83 (0.042)
	115	23.78 (0.042)	23.73 (0.042)	23.68 (0.042)	23.54 (0.042)	23.79 (0.042)	23.78 (0.042)	23.78 (0.042)	23.75 (0.042)
	125	23.69 (0.042)	23.65 (0.042)	23.60 (0.042)	23.46 (0.043)	23.71 (0.042)	23.71 (0.042)	23.70 (0.042)	23.67 (0.042)
	135	23.62 (0.042)	23.58 (0.042)	23.53 (0.042)	23.40 (0.043)	23.64 (0.042)	23.63 (0.042)	23.63 (0.042)	23.60 (0.042)
Extruded polystyrene, 3 in.	85	19.45 (0.051)	19.40 (0.052)	19.35 (0.052)	19.19 (0.052)	19.46 (0.051)	19.45 (0.051)	19.44 (0.051)	19.41 (0.052)
	95	19.34 (0.052)	19.29 (0.052)	19.24 (0.052)	19.09 (0.052)	19.35 (0.052)	19.34 (0.052)	19.33 (0.052)	19.30 (0.052)
	105	19.24 (0.052)	19.19 (0.052)	19.14 (0.052)	18.99 (0.053)	19.25 (0.052)	19.24 (0.052)	19.23 (0.052)	19.20 (0.052)
	115	19.15 (0.052)	19.10 (0.052)	19.05 (0.052)	18.91 (0.053)	19.16 (0.052)	19.15 (0.052)	19.15 (0.052)	19.12 (0.052)
	125	19.06 (0.052)	19.02 (0.053)	18.97 (0.053)	18.83 (0.053)	19.08 (0.052)	19.08 (0.052)	19.07 (0.052)	19.04 (0.053)
	135	18.99 (0.053)	18.95 (0.053)	18.90 (0.053)	18.77 (0.053)	19.01 (0.053)	19.00 (0.053)	19.00 (0.053)	18.97 (0.053)
Closed cell spray polyurethane foam, 3 in.	85	23.45 (0.043)	23.40 (0.043)	23.35 (0.043)	23.19 (0.043)	23.46 (0.043)	23.45 (0.043)	23.44 (0.043)	23.41 (0.043)
	95	23.34 (0.043)	23.29 (0.043)	23.24 (0.043)	23.09 (0.043)	23.35 (0.043)	23.34 (0.043)	23.33 (0.043)	23.30 (0.043)
	105	23.24 (0.043)	23.19 (0.043)	23.14 (0.043)	22.99 (0.043)	23.25 (0.043)	23.24 (0.043)	23.23 (0.043)	23.20 (0.043)
	115	23.15 (0.043)	23.10 (0.043)	23.05 (0.043)	22.91 (0.044)	23.16 (0.043)	23.15 (0.043)	23.15 (0.043)	23.12 (0.043)
	125	23.06 (0.043)	23.02 (0.043)	22.97 (0.044)	22.83 (0.044)	23.08 (0.043)	23.08 (0.043)	23.07 (0.043)	23.04 (0.043)
	135	22.99 (0.043)	22.95 (0.044)	22.90 (0.044)	22.77 (0.044)	23.01 (0.043)	23.00 (0.043)	23.00 (0.043)	22.97 (0.044)
Polyisocyanurate, 3 in.	85	27.48 (0.036)	27.43 (0.036)	27.38 (0.037)	27.22 (0.037)	27.49 (0.036)	27.48 (0.036)	27.47 (0.036)	27.44 (0.036)
	95	27.37 (0.037)	27.32 (0.037)	27.27 (0.037)	27.12 (0.037)	27.38 (0.037)	27.37 (0.037)	27.36 (0.037)	27.33 (0.037)
	105	27.27 (0.037)	27.22 (0.037)	27.17 (0.037)	27.02 (0.037)	27.28 (0.037)	27.27 (0.037)	27.26 (0.037)	27.23 (0.037)
	115	27.18 (0.037)	27.13 (0.037)	27.08 (0.037)	26.94 (0.037)	27.19 (0.037)	27.18 (0.037)	27.18 (0.037)	27.15 (0.037)
	125	27.09 (0.037)	27.05 (0.037)	27.00 (0.037)	26.86 (0.037)	27.11 (0.037)	27.11 (0.037)	27.10 (0.037)	27.07 (0.037)
	135	27.02 (0.037)	26.98 (0.037)	26.93 (0.037)	26.80 (0.037)	27.04 (0.037)	27.03 (0.037)	27.03 (0.037)	27.00 (0.037)
Extruded polystyrene, 3 1/2 in.	85	21.95 (0.046)	21.90 (0.046)	21.85 (0.046)	21.69 (0.046)	21.96 (0.046)	21.95 (0.046)	21.94 (0.046)	21.91 (0.046)
	95	21.84 (0.046)	21.79 (0.046)	21.74 (0.046)	21.59 (0.046)	21.85 (0.046)	21.84 (0.046)	21.83 (0.046)	21.80 (0.046)
	105	21.74 (0.046)	21.69 (0.046)	21.64 (0.046)	21.49 (0.047)	21.75 (0.046)	21.74 (0.046)	21.73 (0.046)	21.70 (0.046)
	115	21.65 (0.046)	21.60 (0.046)	21.55 (0.046)	21.41 (0.047)	21.66 (0.046)	21.65 (0.046)	21.65 (0.046)	21.62 (0.046)
	125	21.56 (0.046)	21.52 (0.046)	21.47 (0.047)	21.33 (0.047)	21.58 (0.046)	21.58 (0.046)	21.57 (0.046)	21.54 (0.046)
	135	21.49 (0.047)	21.45 (0.047)	21.40 (0.047)	21.27 (0.047)	21.51 (0.046)	21.50 (0.047)	21.50 (0.047)	21.47 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.45 (0.038)	26.40 (0.038)	26.35 (0.038)	26.19 (0.038)	26.46 (0.038)	26.45 (0.038)	26.44 (0.038)	26.41 (0.038)
	95	26.34 (0.038)	26.29 (0.038)	26.24 (0.038)	26.09 (0.038)	26.35 (0.038)	26.34 (0.038)	26.33 (0.038)	26.30 (0.038)
	105	26.24 (0.038)	26.19 (0.038)	26.14 (0.038)	25.99 (0.038)	26.25 (0.038)	26.24 (0.038)	26.23 (0.038)	26.20 (0.038)
	115	26.15 (0.038)	26.10 (0.038)	26.05 (0.038)	25.91 (0.039)	26.16 (0.038)	26.15 (0.038)	26.15 (0.038)	26.12 (0.038)
	125	26.06 (0.038)	26.02 (0.038)	25.97 (0.039)	25.83 (0.039)	26.08 (0.038)	26.08 (0.038)	26.07 (0.038)	26.04 (0.038)
	135	25.99 (0.038)	25.95 (0.039)	25.90 (0.039)	25.77 (0.039)	26.01 (0.038)	26.00 (0.038)	26.00 (0.038)	25.97 (0.039)
Polyisocyanurate, 3 1/2 in.	85	30.88 (0.032)	30.83 (0.032)	30.78 (0.032)	30.62 (0.033)	30.89 (0.032)	30.88 (0.032)	30.87 (0.032)	30.84 (0.032)
	95	30.77 (0.033)	30.72 (0.033)	30.67 (0.033)	30.52 (0.033)	30.78 (0.032)	30.77 (0.032)	30.76 (0.033)	30.73 (0.033)
	105	30.67 (0.033)	30.62 (0.033)	30.57 (0.033)	30.42 (0.033)	30.68 (0.033)	30.67 (0.033)	30.66 (0.033)	30.63 (0.033)
	115	30.58 (0.033)	30.53 (0.033)	30.48 (0.033)	30.34 (0.033)	30.59 (0.033)	30.58 (0.033)	30.58 (0.033)	30.55 (0.033)
	125	30.49 (0.033)	30.45 (0.033)	30.40 (0.033)	30.26 (0.033)	30.51 (0.033)	30.51 (0.033)	30.50 (0.033)	30.47 (0.033)
	135	30.42 (0.033)	30.38 (0.033)	30.33 (0.033)	30.20 (0.033)	30.44 (0.033)	30.43 (0.033)	30.43 (0.033)	30.40 (0.033)



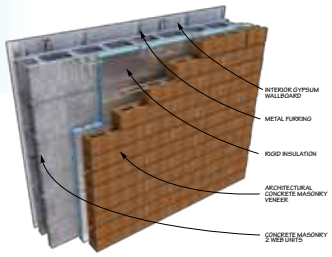
CONCRETE MASONRY CAVITY ASSEMBLIES
INTERIOR WALLBOARD

Assembly 2-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued on next page)

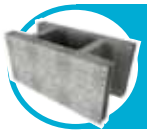
Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.37 (0.096)	10.25 (0.098)	10.12 (0.099)	9.78 (0.102)	10.53 (0.095)	10.44 (0.096)	10.34 (0.097)	10.08 (0.099)
	95	10.28 (0.097)	10.15 (0.099)	10.02 (0.100)	9.70 (0.103)	10.42 (0.096)	10.33 (0.097)	10.23 (0.098)	9.97 (0.100)
	105	10.18 (0.098)	10.06 (0.099)	9.94 (0.101)	9.63 (0.104)	10.31 (0.097)	10.23 (0.098)	10.13 (0.099)	9.88 (0.101)
	115	10.10 (0.099)	9.98 (0.100)	9.86 (0.101)	9.56 (0.105)	10.22 (0.098)	10.13 (0.099)	10.04 (0.100)	9.80 (0.102)
	125	10.02 (0.100)	9.91 (0.101)	9.79 (0.102)	9.50 (0.105)	10.13 (0.099)	10.05 (0.100)	9.96 (0.100)	9.73 (0.103)
	135	9.95 (0.101)	9.84 (0.102)	9.73 (0.103)	9.45 (0.106)	10.05 (0.099)	9.97 (0.100)	9.89 (0.101)	9.66 (0.104)
Closed cell spray polyurethane foam, 1 in.	85	12.17 (0.082)	12.05 (0.083)	11.92 (0.084)	11.58 (0.086)	12.33 (0.081)	12.24 (0.082)	12.14 (0.082)	11.88 (0.084)
	95	12.08 (0.083)	11.95 (0.084)	11.82 (0.085)	11.50 (0.087)	12.22 (0.082)	12.13 (0.082)	12.03 (0.083)	11.77 (0.085)
	105	11.98 (0.083)	11.86 (0.084)	11.74 (0.085)	11.43 (0.088)	12.11 (0.083)	12.03 (0.083)	11.93 (0.084)	11.68 (0.086)
	115	11.90 (0.084)	11.78 (0.085)	11.66 (0.086)	11.36 (0.088)	12.02 (0.083)	11.93 (0.084)	11.84 (0.084)	11.60 (0.086)
	125	11.82 (0.085)	11.71 (0.085)	11.59 (0.086)	11.30 (0.088)	11.93 (0.084)	11.85 (0.084)	11.76 (0.085)	11.53 (0.087)
	135	11.75 (0.085)	11.64 (0.086)	11.53 (0.087)	11.25 (0.089)	11.85 (0.084)	11.77 (0.085)	11.69 (0.086)	11.46 (0.087)
Polyisocyanurate, 1 in.	85	13.90 (0.072)	13.78 (0.073)	13.65 (0.073)	13.31 (0.075)	14.06 (0.071)	13.97 (0.072)	13.87 (0.072)	13.61 (0.073)
	95	13.81 (0.072)	13.68 (0.073)	13.55 (0.074)	13.23 (0.076)	13.95 (0.072)	13.86 (0.072)	13.76 (0.073)	13.50 (0.074)
	105	13.71 (0.073)	13.59 (0.074)	13.47 (0.074)	13.16 (0.076)	13.84 (0.072)	13.76 (0.073)	13.66 (0.073)	13.41 (0.075)
	115	13.63 (0.073)	13.51 (0.074)	13.39 (0.075)	13.09 (0.076)	13.75 (0.073)	13.66 (0.073)	13.57 (0.074)	13.33 (0.075)
	125	13.55 (0.074)	13.44 (0.074)	13.32 (0.075)	13.03 (0.077)	13.66 (0.073)	13.58 (0.074)	13.49 (0.074)	13.26 (0.075)
	135	13.48 (0.074)	13.37 (0.075)	13.26 (0.075)	12.98 (0.077)	13.58 (0.074)	13.50 (0.074)	13.42 (0.075)	13.19 (0.076)
Extruded polystyrene, 1 1/2 in.	85	12.87 (0.078)	12.75 (0.078)	12.62 (0.079)	12.28 (0.081)	13.03 (0.077)	12.94 (0.077)	12.84 (0.078)	12.58 (0.079)
	95	12.78 (0.078)	12.65 (0.079)	12.52 (0.080)	12.20 (0.082)	12.92 (0.077)	12.83 (0.078)	12.73 (0.079)	12.47 (0.080)
	105	12.68 (0.079)	12.56 (0.080)	12.44 (0.080)	12.13 (0.082)	12.81 (0.078)	12.73 (0.079)	12.63 (0.079)	12.38 (0.081)
	115	12.60 (0.079)	12.48 (0.080)	12.36 (0.081)	12.06 (0.083)	12.72 (0.079)	12.63 (0.079)	12.54 (0.080)	12.30 (0.081)
	125	12.52 (0.080)	12.41 (0.081)	12.29 (0.081)	12.00 (0.083)	12.63 (0.079)	12.55 (0.080)	12.46 (0.080)	12.23 (0.082)
	135	12.45 (0.080)	12.34 (0.081)	12.23 (0.082)	11.95 (0.084)	12.55 (0.080)	12.47 (0.080)	12.39 (0.081)	12.16 (0.082)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.27 (0.065)	15.15 (0.066)	15.02 (0.067)	14.68 (0.068)	15.43 (0.065)	15.34 (0.065)	15.24 (0.066)	14.98 (0.067)
	95	15.18 (0.066)	15.05 (0.066)	14.92 (0.067)	14.60 (0.068)	15.32 (0.065)	15.23 (0.066)	15.13 (0.066)	14.87 (0.067)
	105	15.08 (0.066)	14.96 (0.067)	14.84 (0.067)	14.53 (0.069)	15.21 (0.066)	15.13 (0.066)	15.03 (0.067)	14.78 (0.068)
	115	15.00 (0.067)	14.88 (0.067)	14.76 (0.068)	14.46 (0.069)	15.12 (0.066)	15.03 (0.067)	14.94 (0.067)	14.70 (0.068)
	125	14.92 (0.067)	14.81 (0.068)	14.69 (0.068)	14.40 (0.069)	15.03 (0.067)	14.95 (0.067)	14.86 (0.067)	14.63 (0.068)
	135	14.85 (0.067)	14.74 (0.068)	14.63 (0.068)	14.35 (0.070)	14.95 (0.067)	14.87 (0.067)	14.79 (0.068)	14.56 (0.069)
Polyisocyanurate, 1 1/2 in.	85	17.70 (0.056)	17.58 (0.057)	17.45 (0.057)	17.11 (0.058)	17.86 (0.056)	17.77 (0.056)	17.67 (0.057)	17.41 (0.057)
	95	17.61 (0.057)	17.48 (0.057)	17.35 (0.058)	17.03 (0.059)	17.75 (0.056)	17.66 (0.057)	17.56 (0.057)	17.30 (0.058)
	105	17.51 (0.057)	17.39 (0.057)	17.27 (0.058)	16.96 (0.059)	17.64 (0.057)	17.56 (0.057)	17.46 (0.057)	17.21 (0.058)
	115	17.43 (0.057)	17.31 (0.058)	17.19 (0.058)	16.89 (0.059)	17.55 (0.057)	17.46 (0.057)	17.37 (0.058)	17.13 (0.058)
	125	17.35 (0.058)	17.24 (0.058)	17.12 (0.058)	16.83 (0.059)	17.46 (0.057)	17.38 (0.058)	17.29 (0.058)	17.06 (0.059)
	135	17.28 (0.058)	17.17 (0.058)	17.06 (0.059)	16.78 (0.060)	17.38 (0.058)	17.30 (0.058)	17.22 (0.058)	16.99 (0.059)
Extruded polystyrene, 2 in.	85	15.37 (0.065)	15.25 (0.066)	15.12 (0.066)	14.78 (0.068)	15.53 (0.064)	15.44 (0.065)	15.34 (0.065)	15.08 (0.066)
	95	15.28 (0.065)	15.15 (0.066)	15.02 (0.067)	14.70 (0.068)	15.42 (0.065)	15.33 (0.065)	15.23 (0.066)	14.97 (0.067)
	105	15.18 (0.066)	15.06 (0.066)	14.94 (0.067)	14.63 (0.068)	15.31 (0.065)	15.23 (0.066)	15.13 (0.066)	14.88 (0.067)
	115	15.10 (0.066)	14.98 (0.067)	14.86 (0.067)	14.56 (0.069)	15.22 (0.066)	15.13 (0.066)	15.04 (0.066)	14.80 (0.068)
	125	15.02 (0.067)	14.91 (0.067)	14.79 (0.068)	14.50 (0.069)	15.13 (0.066)	15.05 (0.066)	14.96 (0.067)	14.73 (0.068)
	135	14.95 (0.067)	14.84 (0.067)	14.73 (0.068)	14.45 (0.069)	15.05 (0.066)	14.97 (0.067)	14.89 (0.067)	14.66 (0.068)
Closed cell spray polyurethane foam, 2 in.	85	18.37 (0.054)	18.25 (0.055)	18.12 (0.055)	17.78 (0.056)	18.53 (0.054)	18.44 (0.054)	18.34 (0.055)	18.08 (0.055)
	95	18.28 (0.055)	18.15 (0.055)	18.02 (0.055)	17.70 (0.056)	18.42 (0.054)	18.33 (0.055)	18.23 (0.055)	17.97 (0.056)
	105	18.18 (0.055)	18.06 (0.055)	17.94 (0.056)	17.63 (0.057)	18.31 (0.055)	18.23 (0.055)	18.13 (0.055)	17.88 (0.056)
	115	18.10 (0.055)	17.98 (0.056)	17.86 (0.056)	17.56 (0.057)	18.22 (0.055)	18.13 (0.055)	18.04 (0.055)	17.80 (0.056)
	125	18.02 (0.055)	17.91 (0.056)	17.79 (0.056)	17.50 (0.057)	18.13 (0.055)	18.05 (0.055)	17.96 (0.056)	17.73 (0.056)
	135	17.95 (0.056)	17.84 (0.056)	17.73 (0.056)	17.45 (0.057)	18.05 (0.055)	17.97 (0.056)	17.89 (0.056)	17.66 (0.057)
Polyisocyanurate, 2 in.	85	21.60 (0.046)	21.48 (0.047)	21.35 (0.047)	21.01 (0.048)	21.76 (0.046)	21.67 (0.046)	21.57 (0.046)	21.31 (0.047)
	95	21.51 (0.046)	21.38 (0.047)	21.25 (0.047)	20.93 (0.048)	21.65 (0.046)	21.56 (0.046)	21.46 (0.047)	21.20 (0.047)
	105	21.41 (0.047)	21.29 (0.047)	21.17 (0.047)	20.86 (0.048)	21.54 (0.046)	21.46 (0.047)	21.36 (0.047)	21.11 (0.047)
	115	21.33 (0.047)	21.21 (0.047)	21.09 (0.047)	20.79 (0.048)	21.45 (0.047)	21.36 (0.047)	21.27 (0.047)	21.03 (0.048)
	125	21.25 (0.047)	21.14 (0.047)	21.02 (0.048)	20.73 (0.048)	21.36 (0.047)	21.28 (0.047)	21.19 (0.047)	20.96 (0.048)
	135	21.18 (0.047)	21.07 (0.047)	20.96 (0.048)	20.68 (0.048)	21.28 (0.047)	21.20 (0.047)	21.12 (0.047)	20.89 (0.048)

*Assembly details page 41.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.55 (0.095)	10.50 (0.095)	10.45 (0.096)	10.29 (0.097)	10.56 (0.095)	10.55 (0.095)	10.54 (0.095)	10.51 (0.095)
	95	10.44 (0.096)	10.39 (0.096)	10.34 (0.097)	10.19 (0.098)	10.45 (0.096)	10.44 (0.096)	10.43 (0.096)	10.40 (0.096)
	105	10.34 (0.097)	10.29 (0.097)	10.24 (0.098)	10.09 (0.099)	10.35 (0.097)	10.34 (0.097)	10.33 (0.097)	10.30 (0.097)
	115	10.25 (0.098)	10.20 (0.098)	10.15 (0.099)	10.01 (0.100)	10.26 (0.097)	10.25 (0.098)	10.25 (0.098)	10.22 (0.098)
	125	10.16 (0.098)	10.12 (0.099)	10.07 (0.099)	9.93 (0.101)	10.18 (0.098)	10.18 (0.098)	10.17 (0.098)	10.14 (0.099)
	135	10.09 (0.099)	10.05 (0.100)	10.00 (0.100)	9.87 (0.101)	10.11 (0.099)	10.10 (0.099)	10.10 (0.099)	10.07 (0.099)
Closed cell spray polyurethane foam, 1 in.	85	12.35 (0.081)	12.30 (0.081)	12.25 (0.082)	12.09 (0.083)	12.36 (0.081)	12.35 (0.081)	12.34 (0.081)	12.31 (0.081)
	95	12.24 (0.082)	12.19 (0.082)	12.14 (0.082)	11.99 (0.083)	12.25 (0.082)	12.24 (0.082)	12.23 (0.082)	12.20 (0.082)
	105	12.14 (0.082)	12.09 (0.083)	12.04 (0.083)	11.89 (0.084)	12.15 (0.082)	12.14 (0.082)	12.13 (0.082)	12.10 (0.083)
	115	12.05 (0.083)	12.00 (0.083)	11.95 (0.084)	11.81 (0.085)	12.06 (0.083)	12.05 (0.083)	12.05 (0.083)	12.02 (0.083)
	125	11.96 (0.084)	11.92 (0.084)	11.87 (0.084)	11.73 (0.085)	11.98 (0.083)	11.98 (0.084)	11.97 (0.084)	11.94 (0.084)
	135	11.89 (0.084)	11.85 (0.084)	11.80 (0.085)	11.67 (0.086)	11.91 (0.084)	11.90 (0.084)	11.90 (0.084)	11.87 (0.084)
Polyisocyanurate, 1 in.	85	14.08 (0.071)	14.03 (0.071)	13.98 (0.072)	13.82 (0.072)	14.09 (0.071)	14.08 (0.071)	14.07 (0.071)	14.04 (0.071)
	95	13.97 (0.072)	13.92 (0.072)	13.87 (0.072)	13.72 (0.073)	13.98 (0.072)	13.97 (0.072)	13.96 (0.072)	13.93 (0.072)
	105	13.87 (0.072)	13.82 (0.072)	13.77 (0.073)	13.62 (0.073)	13.88 (0.072)	13.87 (0.072)	13.86 (0.072)	13.83 (0.072)
	115	13.78 (0.073)	13.73 (0.073)	13.68 (0.073)	13.54 (0.074)	13.79 (0.073)	13.78 (0.073)	13.78 (0.073)	13.75 (0.073)
	125	13.69 (0.073)	13.65 (0.073)	13.60 (0.074)	13.46 (0.074)	13.71 (0.073)	13.71 (0.073)	13.70 (0.073)	13.67 (0.073)
	135	13.62 (0.073)	13.58 (0.074)	13.53 (0.074)	13.40 (0.075)	13.64 (0.073)	13.63 (0.073)	13.63 (0.073)	13.60 (0.074)
Extruded polystyrene, 1 1/2 in.	85	13.05 (0.077)	13.00 (0.077)	12.95 (0.077)	12.79 (0.078)	13.06 (0.077)	13.05 (0.077)	13.04 (0.077)	13.01 (0.077)
	95	12.94 (0.077)	12.89 (0.078)	12.84 (0.078)	12.69 (0.079)	12.95 (0.077)	12.94 (0.077)	12.93 (0.077)	12.90 (0.078)
	105	12.84 (0.078)	12.79 (0.078)	12.74 (0.078)	12.59 (0.079)	12.85 (0.078)	12.84 (0.078)	12.83 (0.078)	12.80 (0.078)
	115	12.75 (0.078)	12.70 (0.079)	12.65 (0.079)	12.51 (0.080)	12.76 (0.078)	12.75 (0.078)	12.75 (0.078)	12.72 (0.079)
	125	12.66 (0.079)	12.62 (0.079)	12.57 (0.080)	12.43 (0.080)	12.68 (0.079)	12.68 (0.079)	12.67 (0.079)	12.64 (0.079)
	135	12.59 (0.079)	12.55 (0.080)	12.50 (0.080)	12.37 (0.081)	12.61 (0.079)	12.60 (0.079)	12.60 (0.079)	12.57 (0.080)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.45 (0.065)	15.40 (0.065)	15.35 (0.065)	15.19 (0.066)	15.46 (0.065)	15.45 (0.065)	15.44 (0.065)	15.41 (0.065)
	95	15.34 (0.065)	15.29 (0.065)	15.24 (0.066)	15.09 (0.066)	15.35 (0.065)	15.34 (0.065)	15.33 (0.065)	15.30 (0.065)
	105	15.24 (0.066)	15.19 (0.066)	15.14 (0.066)	14.99 (0.067)	15.25 (0.066)	15.24 (0.066)	15.23 (0.066)	15.20 (0.066)
	115	15.15 (0.066)	15.10 (0.066)	15.05 (0.066)	14.91 (0.067)	15.16 (0.066)	15.15 (0.066)	15.15 (0.066)	15.12 (0.066)
	125	15.06 (0.066)	15.02 (0.067)	14.97 (0.067)	14.83 (0.067)	15.08 (0.066)	15.08 (0.066)	15.07 (0.066)	15.04 (0.066)
	135	14.99 (0.067)	14.95 (0.067)	14.90 (0.067)	14.77 (0.068)	15.01 (0.067)	15.00 (0.067)	15.00 (0.067)	14.97 (0.067)
Polyisocyanurate, 1 1/2 in.	85	17.88 (0.056)	17.83 (0.056)	17.78 (0.056)	17.62 (0.057)	17.89 (0.056)	17.88 (0.056)	17.87 (0.056)	17.84 (0.056)
	95	17.77 (0.056)	17.72 (0.056)	17.67 (0.057)	17.52 (0.057)	17.78 (0.056)	17.77 (0.056)	17.76 (0.056)	17.73 (0.056)
	105	17.67 (0.057)	17.62 (0.057)	17.57 (0.057)	17.42 (0.057)	17.68 (0.057)	17.67 (0.057)	17.66 (0.057)	17.63 (0.057)
	115	17.58 (0.057)	17.53 (0.057)	17.48 (0.057)	17.34 (0.058)	17.59 (0.057)	17.58 (0.057)	17.58 (0.057)	17.55 (0.057)
	125	17.49 (0.057)	17.45 (0.057)	17.40 (0.057)	17.26 (0.058)	17.51 (0.057)	17.51 (0.057)	17.50 (0.057)	17.47 (0.057)
	135	17.42 (0.057)	17.38 (0.058)	17.33 (0.058)	17.20 (0.058)	17.44 (0.057)	17.43 (0.057)	17.43 (0.057)	17.40 (0.057)
Extruded polystyrene, 2 in.	85	15.55 (0.064)	15.50 (0.065)	15.45 (0.065)	15.29 (0.065)	15.56 (0.064)	15.55 (0.064)	15.54 (0.064)	15.51 (0.064)
	95	15.44 (0.065)	15.39 (0.065)	15.34 (0.065)	15.19 (0.066)	15.45 (0.065)	15.44 (0.065)	15.43 (0.065)	15.40 (0.065)
	105	15.34 (0.065)	15.29 (0.065)	15.24 (0.066)	15.09 (0.066)	15.35 (0.065)	15.34 (0.065)	15.33 (0.065)	15.30 (0.065)
	115	15.25 (0.066)	15.20 (0.066)	15.15 (0.066)	15.01 (0.067)	15.26 (0.066)	15.25 (0.066)	15.25 (0.066)	15.22 (0.066)
	125	15.16 (0.066)	15.12 (0.066)	15.07 (0.066)	14.93 (0.067)	15.18 (0.066)	15.18 (0.066)	15.17 (0.066)	15.14 (0.066)
	135	15.09 (0.066)	15.05 (0.066)	15.00 (0.067)	14.87 (0.067)	15.11 (0.066)	15.10 (0.066)	15.10 (0.066)	15.07 (0.066)
Closed cell spray polyurethane foam, 2 in.	85	18.55 (0.054)	18.50 (0.054)	18.45 (0.054)	18.29 (0.055)	18.56 (0.054)	18.55 (0.054)	18.54 (0.054)	18.51 (0.054)
	95	18.44 (0.054)	18.39 (0.054)	18.34 (0.055)	18.19 (0.055)	18.45 (0.054)	18.44 (0.054)	18.43 (0.054)	18.40 (0.054)
	105	18.34 (0.055)	18.29 (0.055)	18.24 (0.055)	18.09 (0.055)	18.35 (0.054)	18.34 (0.055)	18.33 (0.055)	18.30 (0.055)
	115	18.25 (0.055)	18.20 (0.055)	18.15 (0.055)	18.01 (0.056)	18.26 (0.055)	18.25 (0.055)	18.25 (0.055)	18.22 (0.055)
	125	18.16 (0.055)	18.12 (0.055)	18.07 (0.055)	17.93 (0.056)	18.18 (0.055)	18.18 (0.055)	18.17 (0.055)	18.14 (0.055)
	135	18.09 (0.055)	18.05 (0.055)	18.00 (0.056)	17.87 (0.056)	18.11 (0.055)	18.10 (0.055)	18.10 (0.055)	18.07 (0.055)
Polyisocyanurate, 2 in.	85	21.78 (0.046)	21.73 (0.046)	21.68 (0.046)	21.52 (0.046)	21.79 (0.046)	21.78 (0.046)	21.77 (0.046)	21.74 (0.046)
	95	21.67 (0.046)	21.62 (0.046)	21.57 (0.046)	21.42 (0.047)	21.68 (0.046)	21.67 (0.046)	21.66 (0.046)	21.63 (0.046)
	105	21.57 (0.046)	21.52 (0.046)	21.47 (0.047)	21.32 (0.047)	21.58 (0.046)	21.57 (0.046)	21.56 (0.046)	21.53 (0.046)
	115	21.48 (0.047)	21.43 (0.047)	21.38 (0.047)	21.24 (0.047)	21.49 (0.047)	21.48 (0.047)	21.48 (0.047)	21.45 (0.047)
	125	21.39 (0.047)	21.35 (0.047)	21.30 (0.047)	21.16 (0.047)	21.41 (0.047)	21.41 (0.047)	21.40 (0.047)	21.37 (0.047)
	135	21.32 (0.047)	21.28 (0.047)	21.23 (0.047)	21.10 (0.047)	21.34 (0.047)	21.33 (0.047)	21.33 (0.047)	21.30 (0.047)



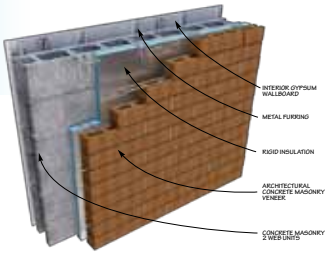
CONCRETE MASONRY CAVITY ASSEMBLIES
INTERIOR WALLBOARD

Assembly 2-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	17.87 (0.056)	17.75 (0.056)	17.62 (0.057)	17.28 (0.058)	18.03 (0.055)	17.94 (0.056)	17.84 (0.056)	17.58 (0.057)
	95	17.78 (0.056)	17.65 (0.057)	17.52 (0.057)	17.20 (0.058)	17.92 (0.056)	17.83 (0.056)	17.73 (0.056)	17.47 (0.057)
	105	17.68 (0.057)	17.56 (0.057)	17.44 (0.057)	17.13 (0.058)	17.81 (0.056)	17.73 (0.056)	17.63 (0.057)	17.38 (0.058)
	115	17.60 (0.057)	17.48 (0.057)	17.36 (0.058)	17.06 (0.059)	17.72 (0.056)	17.63 (0.057)	17.54 (0.057)	17.30 (0.058)
	125	17.52 (0.057)	17.41 (0.057)	17.29 (0.058)	17.00 (0.059)	17.63 (0.057)	17.55 (0.057)	17.46 (0.057)	17.23 (0.058)
	135	17.45 (0.057)	17.34 (0.058)	17.23 (0.058)	16.95 (0.059)	17.55 (0.057)	17.47 (0.057)	17.39 (0.058)	17.16 (0.058)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.37 (0.047)	21.25 (0.047)	21.12 (0.047)	20.78 (0.048)	21.53 (0.046)	21.44 (0.047)	21.34 (0.047)	21.08 (0.047)
	95	21.28 (0.047)	21.15 (0.047)	21.02 (0.048)	20.70 (0.048)	21.42 (0.047)	21.33 (0.047)	21.23 (0.047)	20.97 (0.048)
	105	21.18 (0.047)	21.06 (0.047)	20.94 (0.048)	20.63 (0.048)	21.31 (0.047)	21.23 (0.047)	21.13 (0.047)	20.88 (0.048)
	115	21.10 (0.047)	20.98 (0.048)	20.86 (0.048)	20.56 (0.049)	21.22 (0.047)	21.13 (0.047)	21.04 (0.048)	20.80 (0.048)
	125	21.02 (0.048)	20.91 (0.048)	20.79 (0.048)	20.50 (0.049)	21.13 (0.047)	21.05 (0.048)	20.96 (0.048)	20.73 (0.048)
	135	20.95 (0.048)	20.84 (0.048)	20.73 (0.048)	20.45 (0.049)	21.05 (0.048)	20.97 (0.048)	20.89 (0.048)	20.66 (0.048)
Polyisocyanurate, 2 1/2 in.	85	25.00 (0.040)	24.88 (0.040)	24.75 (0.040)	24.41 (0.041)	25.16 (0.040)	25.07 (0.040)	24.97 (0.040)	24.71 (0.040)
	95	24.91 (0.040)	24.78 (0.040)	24.65 (0.041)	24.33 (0.041)	25.05 (0.040)	24.96 (0.040)	24.86 (0.040)	24.60 (0.041)
	105	24.81 (0.040)	24.69 (0.040)	24.57 (0.041)	24.26 (0.041)	24.94 (0.040)	24.86 (0.040)	24.76 (0.040)	24.51 (0.041)
	115	24.73 (0.040)	24.61 (0.041)	24.49 (0.041)	24.19 (0.041)	24.85 (0.040)	24.76 (0.040)	24.67 (0.041)	24.43 (0.041)
	125	24.65 (0.041)	24.54 (0.041)	24.42 (0.041)	24.13 (0.041)	24.76 (0.040)	24.68 (0.041)	24.59 (0.041)	24.36 (0.041)
	135	24.58 (0.041)	24.47 (0.041)	24.36 (0.041)	24.08 (0.042)	24.68 (0.041)	24.60 (0.041)	24.52 (0.041)	24.29 (0.041)
Extruded polystyrene, 3 in.	85	20.37 (0.049)	20.25 (0.049)	20.12 (0.050)	19.78 (0.051)	20.53 (0.049)	20.44 (0.049)	20.34 (0.049)	20.08 (0.050)
	95	20.28 (0.049)	20.15 (0.050)	20.02 (0.050)	19.70 (0.051)	20.42 (0.049)	20.33 (0.049)	20.23 (0.049)	19.97 (0.050)
	105	20.18 (0.050)	20.06 (0.050)	19.94 (0.050)	19.63 (0.051)	20.31 (0.049)	20.23 (0.049)	20.13 (0.050)	19.88 (0.050)
	115	20.10 (0.050)	19.98 (0.050)	19.86 (0.050)	19.56 (0.051)	20.22 (0.049)	20.13 (0.050)	20.04 (0.050)	19.80 (0.051)
	125	20.02 (0.050)	19.91 (0.050)	19.79 (0.051)	19.50 (0.051)	20.13 (0.050)	20.05 (0.050)	19.96 (0.050)	19.73 (0.051)
	135	19.95 (0.050)	19.84 (0.050)	19.73 (0.051)	19.45 (0.051)	20.05 (0.050)	19.97 (0.050)	19.89 (0.050)	19.66 (0.051)
Closed cell spray polyurethane foam, 3 in.	85	24.37 (0.041)	24.25 (0.041)	24.12 (0.041)	23.78 (0.042)	24.53 (0.041)	24.44 (0.041)	24.34 (0.041)	24.08 (0.042)
	95	24.28 (0.041)	24.15 (0.041)	24.02 (0.042)	23.70 (0.042)	24.42 (0.041)	24.33 (0.041)	24.23 (0.041)	23.97 (0.042)
	105	24.18 (0.041)	24.06 (0.042)	23.94 (0.042)	23.63 (0.042)	24.31 (0.041)	24.23 (0.041)	24.13 (0.041)	23.88 (0.042)
	115	24.10 (0.041)	23.98 (0.042)	23.86 (0.042)	23.56 (0.042)	24.22 (0.041)	24.13 (0.041)	24.04 (0.042)	23.80 (0.042)
	125	24.02 (0.042)	23.91 (0.042)	23.79 (0.042)	23.50 (0.043)	24.13 (0.041)	24.05 (0.042)	23.96 (0.042)	23.73 (0.042)
	135	23.95 (0.042)	23.84 (0.042)	23.73 (0.042)	23.45 (0.043)	24.05 (0.042)	23.97 (0.042)	23.89 (0.042)	23.66 (0.042)
Polyisocyanurate, 3 in.	85	28.40 (0.035)	28.28 (0.035)	28.15 (0.036)	27.81 (0.036)	28.56 (0.035)	28.47 (0.035)	28.37 (0.035)	28.11 (0.036)
	95	28.31 (0.035)	28.18 (0.035)	28.05 (0.036)	27.73 (0.036)	28.45 (0.035)	28.36 (0.035)	28.26 (0.035)	28.00 (0.036)
	105	28.21 (0.035)	28.09 (0.036)	27.97 (0.036)	27.66 (0.036)	28.34 (0.035)	28.26 (0.035)	28.16 (0.036)	27.91 (0.036)
	115	28.13 (0.036)	28.01 (0.036)	27.89 (0.036)	27.59 (0.036)	28.25 (0.035)	28.16 (0.036)	28.07 (0.036)	27.83 (0.036)
	125	28.05 (0.036)	27.94 (0.036)	27.82 (0.036)	27.53 (0.036)	28.16 (0.036)	28.08 (0.036)	27.99 (0.036)	27.76 (0.036)
	135	27.98 (0.036)	27.87 (0.036)	27.76 (0.036)	27.48 (0.036)	28.08 (0.036)	28.00 (0.036)	27.92 (0.036)	27.69 (0.036)
Extruded polystyrene, 3 1/2 in.	85	22.87 (0.044)	22.75 (0.044)	22.62 (0.044)	22.28 (0.045)	23.03 (0.043)	22.94 (0.044)	22.84 (0.044)	22.58 (0.044)
	95	22.78 (0.044)	22.65 (0.044)	22.52 (0.044)	22.20 (0.045)	22.92 (0.044)	22.83 (0.044)	22.73 (0.044)	22.47 (0.044)
	105	22.68 (0.044)	22.56 (0.044)	22.44 (0.045)	22.13 (0.045)	22.81 (0.044)	22.73 (0.044)	22.63 (0.044)	22.38 (0.045)
	115	22.60 (0.044)	22.48 (0.044)	22.36 (0.045)	22.06 (0.045)	22.72 (0.044)	22.63 (0.044)	22.54 (0.044)	22.30 (0.045)
	125	22.52 (0.044)	22.41 (0.045)	22.29 (0.045)	22.00 (0.045)	22.63 (0.044)	22.55 (0.044)	22.46 (0.045)	22.23 (0.045)
	135	22.45 (0.045)	22.34 (0.045)	22.23 (0.045)	21.95 (0.046)	22.55 (0.044)	22.47 (0.044)	22.39 (0.045)	22.16 (0.045)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.37 (0.037)	27.25 (0.037)	27.12 (0.037)	26.78 (0.037)	27.53 (0.036)	27.44 (0.036)	27.34 (0.037)	27.08 (0.037)
	95	27.28 (0.037)	27.15 (0.037)	27.02 (0.037)	26.70 (0.037)	27.42 (0.036)	27.33 (0.037)	27.23 (0.037)	26.97 (0.037)
	105	27.18 (0.037)	27.06 (0.037)	26.94 (0.037)	26.63 (0.038)	27.31 (0.037)	27.23 (0.037)	27.13 (0.037)	26.88 (0.037)
	115	27.10 (0.037)	26.98 (0.037)	26.86 (0.037)	26.56 (0.038)	27.22 (0.037)	27.13 (0.037)	27.04 (0.037)	26.80 (0.037)
	125	27.02 (0.037)	26.91 (0.037)	26.79 (0.037)	26.50 (0.038)	27.13 (0.037)	27.05 (0.037)	26.96 (0.037)	26.73 (0.037)
	135	26.95 (0.037)	26.84 (0.037)	26.73 (0.037)	26.45 (0.038)	27.05 (0.037)	26.97 (0.037)	26.89 (0.037)	26.66 (0.038)
Polyisocyanurate, 3 1/2 in.	85	31.80 (0.031)	31.68 (0.032)	31.55 (0.032)	31.21 (0.032)	31.96 (0.031)	31.87 (0.031)	31.77 (0.031)	31.51 (0.032)
	95	31.71 (0.032)	31.58 (0.032)	31.45 (0.032)	31.13 (0.032)	31.85 (0.031)	31.76 (0.031)	31.66 (0.032)	31.40 (0.032)
	105	31.61 (0.032)	31.49 (0.032)	31.37 (0.032)	31.06 (0.032)	31.74 (0.032)	31.66 (0.032)	31.56 (0.032)	31.31 (0.032)
	115	31.53 (0.032)	31.41 (0.032)	31.29 (0.032)	30.99 (0.032)	31.65 (0.032)	31.56 (0.032)	31.47 (0.032)	31.23 (0.032)
	125	31.45 (0.032)	31.34 (0.032)	31.22 (0.032)	30.93 (0.032)	31.56 (0.032)	31.48 (0.032)	31.39 (0.032)	31.16 (0.032)
	135	31.38 (0.032)	31.27 (0.032)	31.16 (0.032)	30.88 (0.032)	31.48 (0.032)	31.40 (0.032)	31.32 (0.032)	31.09 (0.032)

*Assembly details page 41.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	18.05 (0.055)	18.00 (0.056)	17.95 (0.056)	17.79 (0.056)	18.06 (0.055)	18.05 (0.055)	18.04 (0.055)	18.01 (0.056)
	95	17.94 (0.056)	17.89 (0.056)	17.84 (0.056)	17.69 (0.057)	17.95 (0.056)	17.94 (0.056)	17.93 (0.056)	17.90 (0.056)
	105	17.84 (0.056)	17.79 (0.056)	17.74 (0.056)	17.59 (0.057)	17.85 (0.056)	17.84 (0.056)	17.83 (0.056)	17.80 (0.056)
	115	17.75 (0.056)	17.70 (0.056)	17.65 (0.057)	17.51 (0.057)	17.76 (0.056)	17.75 (0.056)	17.75 (0.056)	17.72 (0.056)
	125	17.66 (0.057)	17.62 (0.057)	17.57 (0.057)	17.43 (0.057)	17.68 (0.057)	17.68 (0.057)	17.67 (0.057)	17.64 (0.057)
	135	17.59 (0.057)	17.55 (0.057)	17.50 (0.057)	17.37 (0.058)	17.61 (0.057)	17.60 (0.057)	17.60 (0.057)	17.57 (0.057)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.55 (0.046)	21.50 (0.047)	21.45 (0.047)	21.29 (0.047)	21.56 (0.046)	21.55 (0.046)	21.54 (0.046)	21.51 (0.046)
	95	21.44 (0.047)	21.39 (0.047)	21.34 (0.047)	21.19 (0.047)	21.45 (0.047)	21.44 (0.047)	21.43 (0.047)	21.40 (0.047)
	105	21.34 (0.047)	21.29 (0.047)	21.24 (0.047)	21.09 (0.047)	21.35 (0.047)	21.34 (0.047)	21.33 (0.047)	21.30 (0.047)
	115	21.25 (0.047)	21.20 (0.047)	21.15 (0.047)	21.01 (0.048)	21.26 (0.047)	21.25 (0.047)	21.25 (0.047)	21.22 (0.047)
	125	21.16 (0.047)	21.12 (0.047)	21.07 (0.047)	20.93 (0.048)	21.18 (0.047)	21.18 (0.047)	21.17 (0.047)	21.14 (0.047)
	135	21.09 (0.047)	21.05 (0.048)	21.00 (0.048)	20.87 (0.048)	21.11 (0.047)	21.10 (0.047)	21.10 (0.047)	21.07 (0.047)
Polyisocyanurate, 2 1/2 in.	85	25.18 (0.040)	25.13 (0.040)	25.08 (0.040)	24.92 (0.040)	25.19 (0.040)	25.18 (0.040)	25.17 (0.040)	25.14 (0.040)
	95	25.07 (0.040)	25.02 (0.040)	24.97 (0.040)	24.82 (0.040)	25.08 (0.040)	25.07 (0.040)	25.06 (0.040)	25.03 (0.040)
	105	24.97 (0.040)	24.92 (0.040)	24.87 (0.040)	24.72 (0.040)	24.98 (0.040)	24.97 (0.040)	24.96 (0.040)	24.93 (0.040)
	115	24.88 (0.040)	24.83 (0.040)	24.78 (0.040)	24.64 (0.041)	24.89 (0.040)	24.88 (0.040)	24.88 (0.040)	24.85 (0.040)
	125	24.79 (0.040)	24.75 (0.040)	24.70 (0.040)	24.56 (0.041)	24.81 (0.040)	24.81 (0.040)	24.80 (0.040)	24.77 (0.040)
	135	24.72 (0.040)	24.68 (0.041)	24.63 (0.041)	24.50 (0.041)	24.74 (0.040)	24.73 (0.040)	24.73 (0.040)	24.70 (0.040)
Extruded polystyrene, 3 in.	85	20.55 (0.049)	20.50 (0.049)	20.45 (0.049)	20.29 (0.049)	20.56 (0.049)	20.55 (0.049)	20.54 (0.049)	20.51 (0.049)
	95	20.44 (0.049)	20.39 (0.049)	20.34 (0.049)	20.19 (0.050)	20.45 (0.049)	20.44 (0.049)	20.43 (0.049)	20.40 (0.049)
	105	20.34 (0.049)	20.29 (0.049)	20.24 (0.049)	20.09 (0.050)	20.35 (0.049)	20.34 (0.049)	20.33 (0.049)	20.30 (0.049)
	115	20.25 (0.049)	20.20 (0.050)	20.15 (0.050)	20.01 (0.050)	20.26 (0.049)	20.25 (0.049)	20.25 (0.049)	20.22 (0.049)
	125	20.16 (0.050)	20.12 (0.050)	20.07 (0.050)	19.93 (0.050)	20.18 (0.050)	20.18 (0.050)	20.17 (0.050)	20.14 (0.050)
	135	20.09 (0.050)	20.05 (0.050)	20.00 (0.050)	19.87 (0.050)	20.11 (0.050)	20.10 (0.050)	20.10 (0.050)	20.07 (0.050)
Closed cell spray polyurethane foam, 3 in.	85	24.55 (0.041)	24.50 (0.041)	24.45 (0.041)	24.29 (0.041)	24.56 (0.041)	24.55 (0.041)	24.54 (0.041)	24.51 (0.041)
	95	24.44 (0.041)	24.39 (0.041)	24.34 (0.041)	24.19 (0.041)	24.45 (0.041)	24.44 (0.041)	24.43 (0.041)	24.40 (0.041)
	105	24.34 (0.041)	24.29 (0.041)	24.24 (0.041)	24.09 (0.042)	24.35 (0.041)	24.34 (0.041)	24.33 (0.041)	24.30 (0.041)
	115	24.25 (0.041)	24.20 (0.041)	24.15 (0.041)	24.01 (0.042)	24.26 (0.041)	24.25 (0.041)	24.25 (0.041)	24.22 (0.041)
	125	24.16 (0.041)	24.12 (0.041)	24.07 (0.042)	23.93 (0.042)	24.18 (0.041)	24.18 (0.041)	24.17 (0.041)	24.14 (0.041)
	135	24.09 (0.042)	24.05 (0.042)	24.00 (0.042)	23.87 (0.042)	24.11 (0.041)	24.10 (0.041)	24.10 (0.041)	24.07 (0.042)
Polyisocyanurate, 3 in.	85	28.58 (0.035)	28.53 (0.035)	28.48 (0.035)	28.32 (0.035)	28.59 (0.035)	28.58 (0.035)	28.57 (0.035)	28.54 (0.035)
	95	28.47 (0.035)	28.42 (0.035)	28.37 (0.035)	28.22 (0.035)	28.48 (0.035)	28.47 (0.035)	28.46 (0.035)	28.43 (0.035)
	105	28.37 (0.035)	28.32 (0.035)	28.27 (0.035)	28.12 (0.036)	28.38 (0.035)	28.37 (0.035)	28.36 (0.035)	28.33 (0.035)
	115	28.28 (0.035)	28.23 (0.035)	28.18 (0.035)	28.04 (0.036)	28.29 (0.035)	28.28 (0.035)	28.28 (0.035)	28.25 (0.035)
	125	28.19 (0.035)	28.15 (0.036)	28.10 (0.036)	27.96 (0.036)	28.21 (0.035)	28.21 (0.035)	28.20 (0.035)	28.17 (0.035)
	135	28.12 (0.036)	28.08 (0.036)	28.03 (0.036)	27.90 (0.036)	28.14 (0.036)	28.13 (0.036)	28.13 (0.036)	28.10 (0.036)
Extruded polystyrene, 3 1/2 in.	85	23.05 (0.043)	23.00 (0.043)	22.95 (0.044)	22.79 (0.044)	23.06 (0.043)	23.05 (0.043)	23.04 (0.043)	23.01 (0.043)
	95	22.94 (0.044)	22.89 (0.044)	22.84 (0.044)	22.69 (0.044)	22.95 (0.044)	22.94 (0.044)	22.93 (0.044)	22.90 (0.044)
	105	22.84 (0.044)	22.79 (0.044)	22.74 (0.044)	22.59 (0.044)	22.85 (0.044)	22.84 (0.044)	22.83 (0.044)	22.80 (0.044)
	115	22.75 (0.044)	22.70 (0.044)	22.65 (0.044)	22.51 (0.044)	22.76 (0.044)	22.75 (0.044)	22.75 (0.044)	22.72 (0.044)
	125	22.66 (0.044)	22.62 (0.044)	22.57 (0.044)	22.43 (0.045)	22.68 (0.044)	22.68 (0.044)	22.67 (0.044)	22.64 (0.044)
	135	22.59 (0.044)	22.55 (0.044)	22.50 (0.044)	22.37 (0.045)	22.61 (0.044)	22.60 (0.044)	22.60 (0.044)	22.57 (0.044)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.55 (0.036)	27.50 (0.036)	27.45 (0.036)	27.29 (0.037)	27.56 (0.036)	27.55 (0.036)	27.54 (0.036)	27.51 (0.036)
	95	27.44 (0.036)	27.39 (0.037)	27.34 (0.037)	27.19 (0.037)	27.45 (0.036)	27.44 (0.036)	27.43 (0.036)	27.40 (0.036)
	105	27.34 (0.037)	27.29 (0.037)	27.24 (0.037)	27.09 (0.037)	27.35 (0.037)	27.34 (0.037)	27.33 (0.037)	27.30 (0.037)
	115	27.25 (0.037)	27.20 (0.037)	27.15 (0.037)	27.01 (0.037)	27.26 (0.037)	27.25 (0.037)	27.25 (0.037)	27.22 (0.037)
	125	27.16 (0.037)	27.12 (0.037)	27.07 (0.037)	26.93 (0.037)	27.18 (0.037)	27.18 (0.037)	27.17 (0.037)	27.14 (0.037)
	135	27.09 (0.037)	27.05 (0.037)	27.00 (0.037)	26.87 (0.037)	27.11 (0.037)	27.10 (0.037)	27.10 (0.037)	27.07 (0.037)
Polyisocyanurate, 3 1/2 in.	85	31.98 (0.031)	31.93 (0.031)	31.88 (0.031)	31.72 (0.032)	31.99 (0.031)	31.98 (0.031)	31.97 (0.031)	31.94 (0.031)
	95	31.87 (0.031)	31.82 (0.031)	31.77 (0.031)	31.62 (0.032)	31.88 (0.031)	31.87 (0.031)	31.86 (0.031)	31.83 (0.031)
	105	31.77 (0.031)	31.72 (0.032)	31.67 (0.032)	31.52 (0.032)	31.78 (0.031)	31.77 (0.031)	31.76 (0.031)	31.73 (0.032)
	115	31.68 (0.032)	31.63 (0.032)	31.58 (0.032)	31.44 (0.032)	31.69 (0.032)	31.68 (0.032)	31.68 (0.032)	31.65 (0.032)
	125	31.59 (0.032)	31.55 (0.032)	31.50 (0.032)	31.36 (0.032)	31.61 (0.032)	31.61 (0.032)	31.60 (0.032)	31.57 (0.032)
	135	31.52 (0.032)	31.48 (0.032)	31.43 (0.032)	31.30 (0.032)	31.54 (0.032)	31.53 (0.032)	31.53 (0.032)	31.50 (0.032)

SECTION THREE
HYBRID ASSEMBLIES

Section Three of the Thermal Catalog provides calculated R-values and U-Factors for various assemblies using two configurations of concrete units. In some areas of the assemblies, two-web units are used while in other areas one-web units are used. These one-web units are configured to meet the absolute minimum dimensional requirements of current ASTM C90 requirements. The tables below show the relevant configuration of the units used in this section.

Two-web units

Nominal Width	Specified Width[1]	Specified Height[1]	Specified Length	Face Shell Thickness	Number of Face Shells	Web Thickness	Number of Webs
6-in.	5.625	7.625	15.625	1.00	2	0.75	2
8-in.	7.625	7.625	15.625	1.25	2	0.75	2
10-in.	9.625	7.625	15.625	1.25	2	0.75	2
12-in.	11.625	7.625	15.625	1.25	2	0.75	2

One-web Units

Nominal Width	Specified Width	Specified Height[1]	Specified Length[1]	Face Shell Thickness	Number of Face Shells	Web Thickness	Number of Webs
6-in.	5.625	7.625	15.625	1.00	2	0.76	1
8-in.	7.625	7.625	15.625	1.25	2	0.76	1
10-in.	9.625	7.625	15.625	1.25	2	0.76	1
12-in.	11.625	7.625	15.625	1.25	2	0.76	1

[1] Specified height and length provided for reference. Actual calculations apply to assemblies with other heights and lengths, such as half-high units.

*Certain configurations may not be available in local markets. Producers should be consulted for availability of desired unit configurations.

Figure 3.1 shows a diagram of a typical Section Three single-wythe assembly consisting of only single web units, with one face shell removed to show the number of webs (and therefore thermal shorts) from one side of the assembly to the other. Two web units are assumed at grouted cell locations.

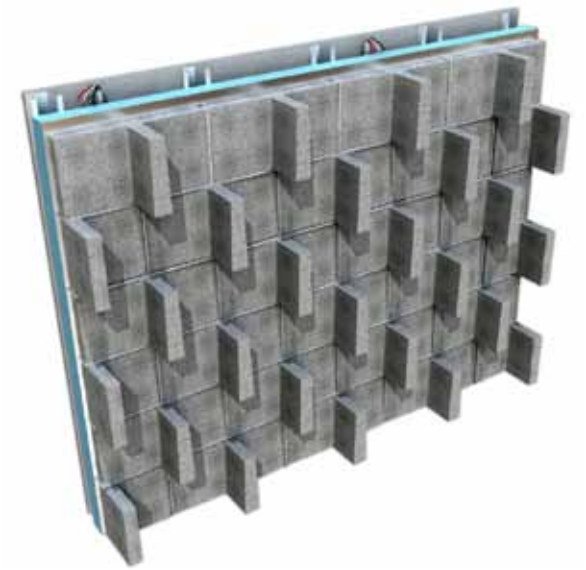
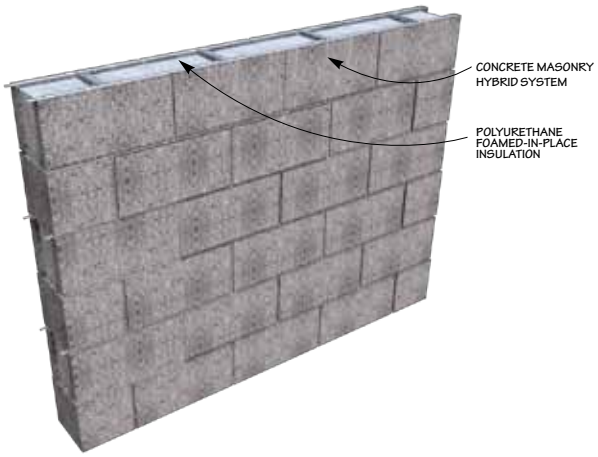


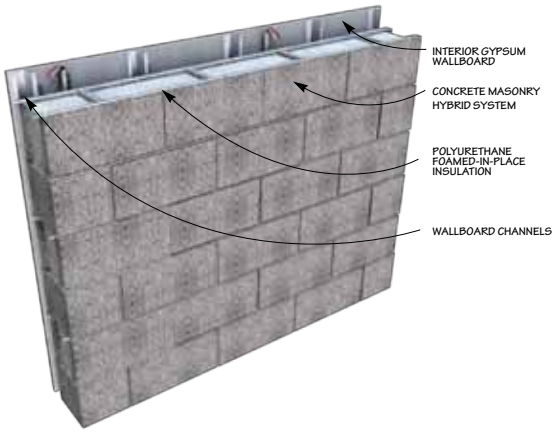
Figure 3.1:
Hybrid Wall-cross section cut-away illustrating interior web configuration

Assembly 3-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior)



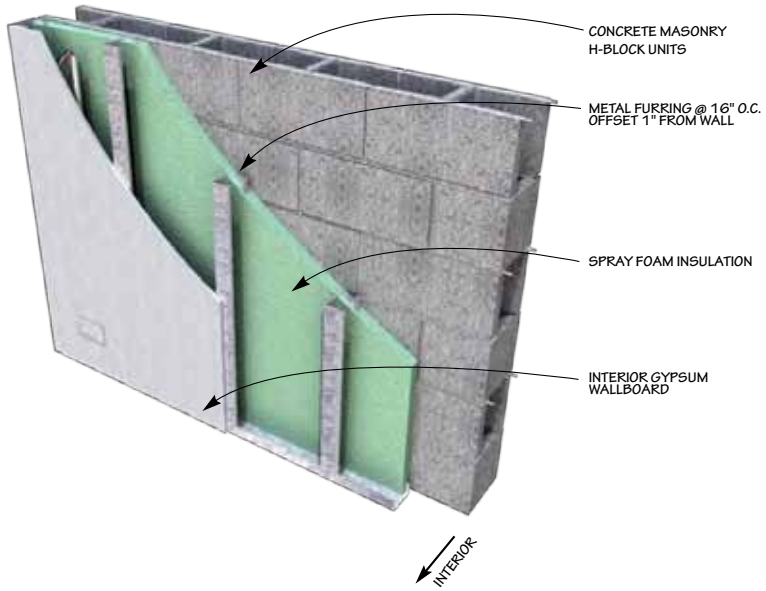
- Masonry exposed on both the interior and exterior provides maximum durability.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulations and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 3-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior



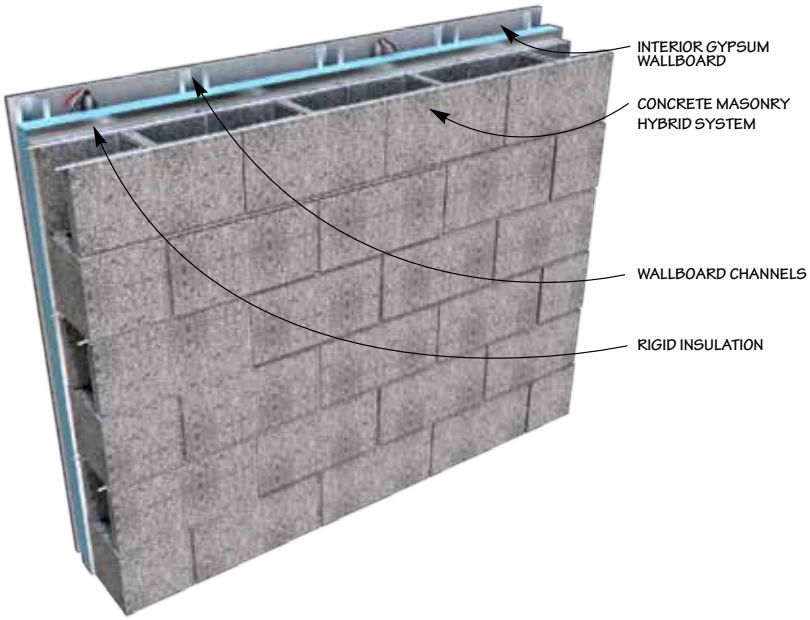
- Interior furring allows for electrical rough-in.
- Values in table assume no insulation in grouted cells. Note that some rigid inserts are configured to accommodate insulation, reinforcing steel and grout in the same cell, which can improve R-values.
- Other masonry cell insulations include molded polystyrene inserts, other types of foamed-in-place insulation, and expanded perlite or vermiculite granular fills. These insulations will have different thermal properties than polyurethane which will affect the resulting R-value.
- Cell insulation, in contrast to additional insulation on either side of the wall, allows some of the thermal mass (masonry) to be in direct contact with the indoor air, providing excellent thermal mass benefits.
- Insulation should occupy all ungrouted cells.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 3-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

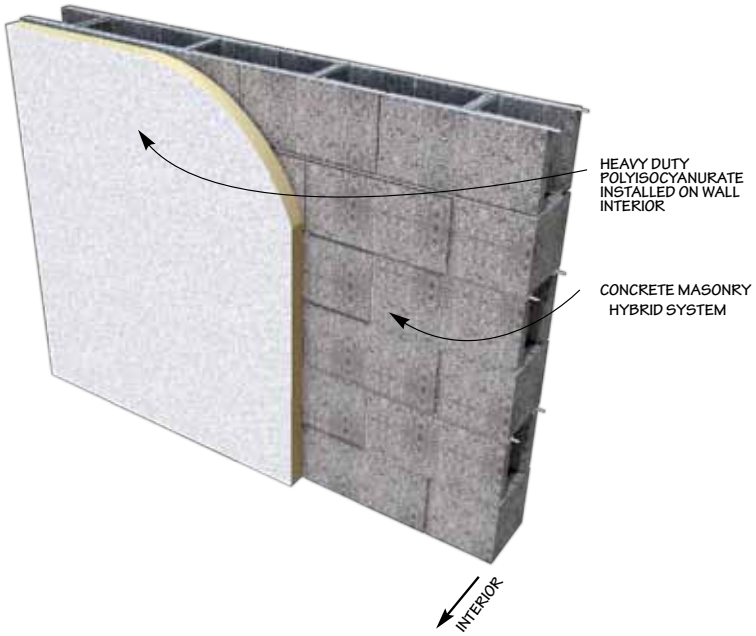
Assembly 3-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- Interior furring allows for electrical rough-in.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

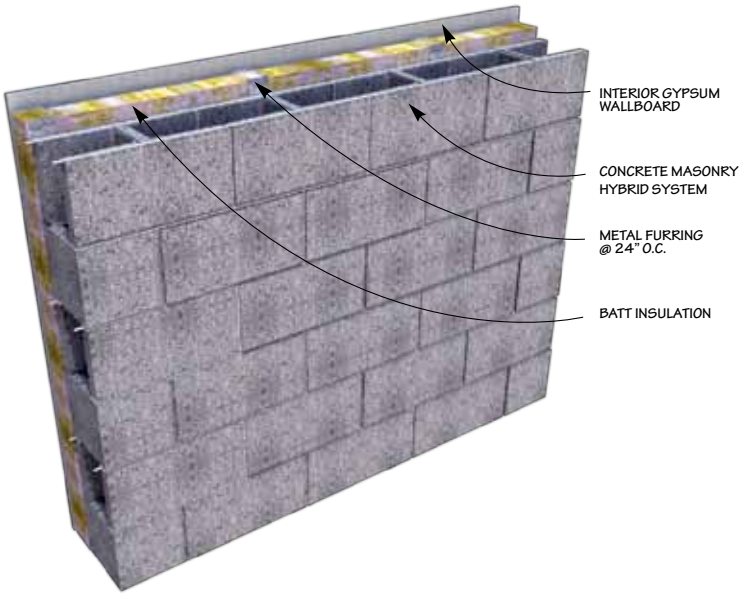
Assembly 3-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

- Joints of the HD polyisocyanurate must be butt-caulked or taped.
- Several types of HD polyisocyanurate are available with various amounts of impact resistance.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

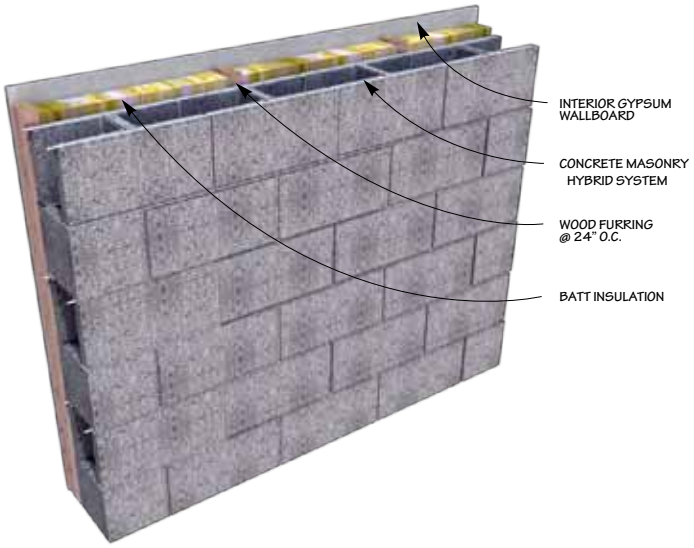


Assembly 3-6: Metal furring at 24 in. o.c. with batt insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

- Note: batt insulation is susceptible to moisture.
- Steel penetrations through insulation significantly affect the thermal resistance by conducting heat from one side of the insulation to the other.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

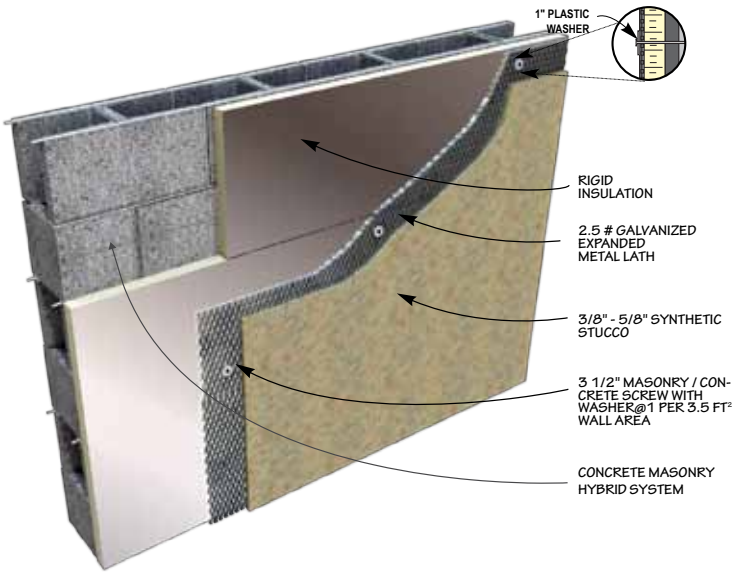


Assembly 3-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry



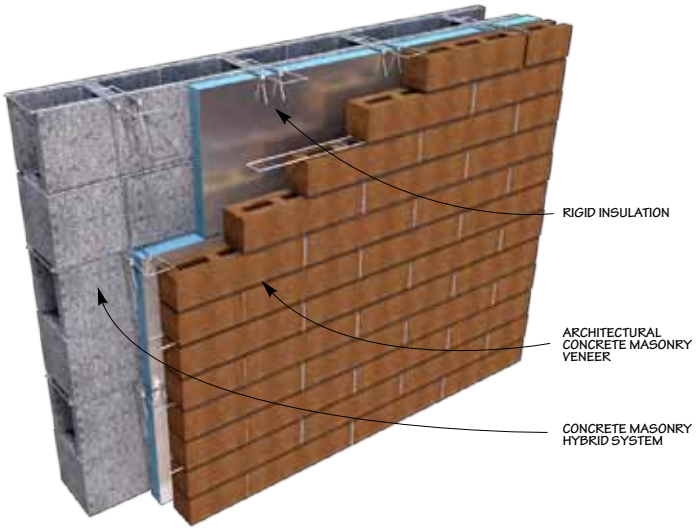
- Note that R-values for walls with polyisocyanurate insulation include a reflective air space (i.e. polyisocyanurate is foil-faced and foil-faced side faces the air space).
- R-values for assemblies with extruded polystyrene insulation include a nonreflective air space.
- Note that batt insulation is susceptible to moisture.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Interior insulation reduces the benefits of thermal mass.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 3-8: Continuous exterior insulation and finish system, exposed interior masonry



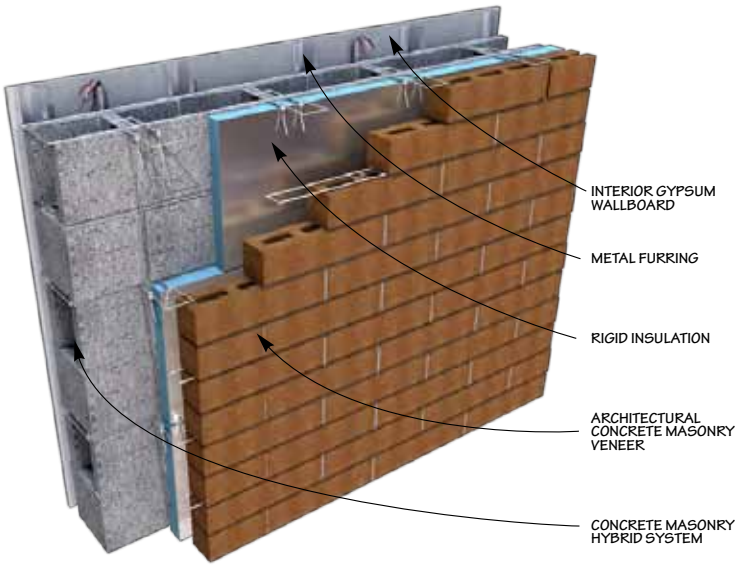
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Reinforcement and grouting schedule has little effect on assembly R-values.
- Exterior insulation negates the aesthetic and durability advantages of exposed masonry.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

Assembly 3-9: Continuous insulation in cavity, 4-in. concrete masonry veneer



- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed-cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Masonry exposed on both the interior and exterior provides maximum durability.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

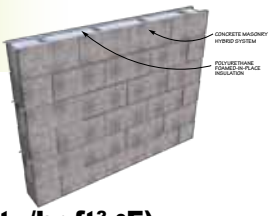
Assembly 3-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring



- For assemblies with clay brick veneer, subtract 0.50 from the R-values listed. For 4-in. solid concrete masonry veneer, subtract 0.53.
- Note that R-values for assemblies with polyisocyanurate include a reflective air space (i.e. polyisocyanurate is foil-faced and the foil-faced side faces the air space).
- When using closed cell spray polyurethane foam insulation, use one approved for contact with water.
- Thermal mass exposed to the conditioned space maximizes the benefits of thermal mass.
- Interior furring allows for electrical rough-in.
- The cavity width can be varied to accommodate various insulation thicknesses, achieving a wide range of R-values.
- Reinforcement and grouting schedule has little effect on assembly R-values
- Cavity insulation can reduce heat loss and moisture movement due to air leakage when joints between the insulation boards are sealed.
- "Lightly reinforced" = grout 8 ft o.c. both vertically and horizontally (or vertical reinforcement only at 48 in. o.c.). "Heavily reinforced" = grout 32 in o.c. vertically and 48 in. o.c. horizontally (or vertical reinforcement only at 24 in. o.c.).

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

CELL INSULATION



Assembly 3-1: Polyurethane foamed-in-place insulation in ungrouted cells, exposed masonry (interior and exterior)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

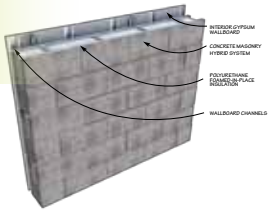
Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	13.07 (0.077)	6.30 (0.159)	4.24 (0.236)	1.76 (0.567)	18.04 (0.055)	7.85 (0.127)	5.12 (0.195)	2.05 (0.487)
95	11.87 (0.084)	5.89 (0.170)	3.99 (0.250)	1.68 (0.595)	16.35 (0.061)	7.32 (0.137)	4.81 (0.208)	1.95 (0.513)
105	10.69 (0.094)	5.49 (0.182)	3.76 (0.266)	1.61 (0.622)	14.69 (0.068)	6.81 (0.147)	4.53 (0.221)	1.86 (0.538)
115	9.55 (0.105)	5.10 (0.196)	3.55 (0.282)	1.54 (0.648)	13.10 (0.076)	6.33 (0.158)	4.26 (0.235)	1.78 (0.562)
125	8.48 (0.118)	4.73 (0.211)	3.34 (0.299)	1.49 (0.672)	11.59 (0.086)	5.87 (0.170)	4.01 (0.249)	1.71 (0.585)
135	7.48 (0.134)	4.37 (0.229)	3.14 (0.318)	1.44 (0.694)	10.19 (0.098)	5.43 (0.184)	3.77 (0.265)	1.65 (0.606)

Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	24.48 (0.041)	9.30 (0.107)	5.87 (0.170)	2.26 (0.442)	30.93 (0.032)	10.64 (0.094)	6.58 (0.152)	2.47 (0.405)
95	22.18 (0.045)	8.72 (0.115)	5.55 (0.180)	2.16 (0.464)	28.01 (0.036)	10.01 (0.100)	6.24 (0.160)	2.37 (0.423)
105	19.91 (0.050)	8.15 (0.123)	5.24 (0.191)	2.06 (0.484)	25.13 (0.040)	9.40 (0.106)	5.92 (0.169)	2.27 (0.440)
115	17.72 (0.056)	7.61 (0.131)	4.95 (0.202)	1.98 (0.504)	22.35 (0.045)	8.81 (0.114)	5.61 (0.178)	2.19 (0.456)
125	15.65 (0.064)	7.09 (0.141)	4.68 (0.214)	1.91 (0.522)	19.71 (0.051)	8.23 (0.121)	5.32 (0.188)	2.12 (0.472)
135	13.72 (0.073)	6.58 (0.152)	4.42 (0.226)	1.85 (0.540)	17.26 (0.058)	7.67 (0.130)	5.03 (0.199)	2.06 (0.486)

*Assembly details page 63.

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

CELL INSULATION



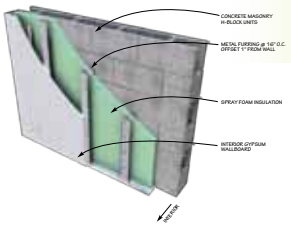
Assembly 3-2: Polyurethane foamed-in-place insulation in ungrouted cells, exposed exterior masonry, 1/2 in. gypsum wallboard on furring on interior

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	14.17 (0.071)	7.40 (0.135)	5.34 (0.187)	2.86 (0.349)	19.14 (0.052)	8.95 (0.112)	6.22 (0.161)	3.15 (0.317)
95	12.97 (0.077)	6.99 (0.143)	5.09 (0.196)	2.78 (0.360)	17.45 (0.057)	8.42 (0.119)	5.91 (0.169)	3.05 (0.328)
105	11.79 (0.085)	6.59 (0.152)	4.86 (0.206)	2.71 (0.369)	15.79 (0.063)	7.91 (0.126)	5.63 (0.178)	2.96 (0.338)
115	10.65 (0.094)	6.20 (0.161)	4.65 (0.215)	2.64 (0.378)	14.20 (0.070)	7.43 (0.135)	5.36 (0.187)	2.88 (0.347)
125	9.58 (0.104)	5.83 (0.172)	4.44 (0.225)	2.59 (0.386)	12.69 (0.079)	6.97 (0.143)	5.11 (0.196)	2.81 (0.356)
135	8.58 (0.117)	5.47 (0.183)	4.24 (0.236)	2.54 (0.394)	11.29 (0.089)	6.53 (0.153)	4.87 (0.205)	2.75 (0.364)

Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
85	25.58 (0.039)	10.40 (0.096)	6.97 (0.143)	3.36 (0.297)	32.03 (0.031)	11.74 (0.085)	7.68 (0.130)	3.57 (0.280)
95	23.28 (0.043)	9.82 (0.102)	6.65 (0.150)	3.26 (0.307)	29.11 (0.034)	11.11 (0.090)	7.34 (0.136)	3.47 (0.289)
105	21.01 (0.048)	9.25 (0.108)	6.34 (0.158)	3.16 (0.316)	26.23 (0.038)	10.50 (0.095)	7.02 (0.143)	3.37 (0.297)
115	18.82 (0.053)	8.71 (0.115)	6.05 (0.165)	3.08 (0.324)	23.45 (0.043)	9.91 (0.101)	6.71 (0.149)	3.29 (0.304)
125	16.75 (0.060)	8.19 (0.122)	5.78 (0.173)	3.01 (0.332)	20.81 (0.048)	9.33 (0.107)	6.42 (0.156)	3.22 (0.311)
135	14.82 (0.067)	7.68 (0.130)	5.52 (0.181)	2.95 (0.339)	18.36 (0.054)	8.77 (0.114)	6.13 (0.163)	3.16 (0.317)

*Assembly details page 63.



Assembly 3-3: 1-in. continuous closed-cell spray polyurethane foam (SPF) interior insulation, metal furring with additional SPF insulation between the furring, and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.06 (0.077)	12.94 (0.077)	12.83 (0.078)	12.46 (0.080)	13.20 (0.076)	13.12 (0.076)	13.05 (0.077)	12.75 (0.078)
	95	12.97 (0.077)	12.85 (0.078)	12.74 (0.078)	12.38 (0.081)	13.10 (0.076)	13.01 (0.077)	12.94 (0.077)	12.65 (0.079)
	105	12.89 (0.078)	12.77 (0.078)	12.66 (0.079)	12.31 (0.081)	13.00 (0.077)	12.92 (0.077)	12.84 (0.078)	12.56 (0.080)
	115	12.81 (0.078)	12.69 (0.079)	12.59 (0.079)	12.24 (0.082)	12.91 (0.077)	12.83 (0.078)	12.76 (0.078)	12.48 (0.080)
	125	12.75 (0.078)	12.63 (0.079)	12.53 (0.080)	12.19 (0.082)	12.84 (0.078)	12.75 (0.078)	12.68 (0.079)	12.41 (0.081)
	135	12.68 (0.079)	12.57 (0.080)	12.47 (0.080)	12.14 (0.082)	12.77 (0.078)	12.68 (0.079)	12.61 (0.079)	12.35 (0.081)
2 in.	85	14.26 (0.070)	14.14 (0.071)	14.03 (0.071)	13.66 (0.073)	14.40 (0.069)	14.32 (0.070)	14.25 (0.070)	13.95 (0.072)
	95	14.17 (0.071)	14.05 (0.071)	13.94 (0.072)	13.58 (0.074)	14.30 (0.070)	14.21 (0.070)	14.14 (0.071)	13.85 (0.072)
	105	14.09 (0.071)	13.97 (0.072)	13.86 (0.072)	13.51 (0.074)	14.20 (0.070)	14.12 (0.071)	14.04 (0.071)	13.76 (0.073)
	115	14.01 (0.071)	13.89 (0.072)	13.79 (0.073)	13.44 (0.074)	14.11 (0.071)	14.03 (0.071)	13.96 (0.072)	13.68 (0.073)
	125	13.95 (0.072)	13.83 (0.072)	13.73 (0.073)	13.39 (0.075)	14.04 (0.071)	13.95 (0.072)	13.88 (0.072)	13.61 (0.073)
	135	13.88 (0.072)	13.77 (0.073)	13.67 (0.073)	13.34 (0.075)	13.97 (0.072)	13.88 (0.072)	13.81 (0.072)	13.55 (0.074)
3 in.	85	14.86 (0.067)	14.74 (0.068)	14.63 (0.068)	14.26 (0.070)	15.00 (0.067)	14.92 (0.067)	14.85 (0.067)	14.55 (0.069)
	95	14.77 (0.068)	14.65 (0.068)	14.54 (0.069)	14.18 (0.071)	14.90 (0.067)	14.81 (0.068)	14.74 (0.068)	14.45 (0.069)
	105	14.69 (0.068)	14.57 (0.069)	14.46 (0.069)	14.11 (0.071)	14.80 (0.068)	14.72 (0.068)	14.64 (0.068)	14.36 (0.070)
	115	14.61 (0.068)	14.49 (0.069)	14.39 (0.069)	14.04 (0.071)	14.71 (0.068)	14.63 (0.068)	14.56 (0.069)	14.28 (0.070)
	125	14.55 (0.069)	14.43 (0.069)	14.33 (0.070)	13.99 (0.071)	14.64 (0.068)	14.55 (0.069)	14.48 (0.069)	14.21 (0.070)
	135	14.48 (0.069)	14.37 (0.070)	14.27 (0.070)	13.94 (0.072)	14.57 (0.069)	14.48 (0.069)	14.41 (0.069)	14.15 (0.071)
3 1/2 in.	85	15.06 (0.066)	14.94 (0.067)	14.83 (0.067)	14.46 (0.069)	15.20 (0.066)	15.12 (0.066)	15.05 (0.066)	14.75 (0.068)
	95	14.97 (0.067)	14.85 (0.067)	14.74 (0.068)	14.38 (0.070)	15.10 (0.066)	15.01 (0.067)	14.94 (0.067)	14.65 (0.068)
	105	14.89 (0.067)	14.77 (0.068)	14.66 (0.068)	14.31 (0.070)	15.00 (0.067)	14.92 (0.067)	14.84 (0.067)	14.56 (0.069)
	115	14.81 (0.068)	14.69 (0.068)	14.59 (0.069)	14.24 (0.070)	14.91 (0.067)	14.83 (0.067)	14.76 (0.068)	14.48 (0.069)
	125	14.75 (0.068)	14.63 (0.068)	14.53 (0.069)	14.19 (0.070)	14.84 (0.067)	14.75 (0.068)	14.68 (0.068)	14.41 (0.069)
	135	14.68 (0.068)	14.57 (0.069)	14.47 (0.069)	14.14 (0.071)	14.77 (0.068)	14.68 (0.068)	14.61 (0.068)	14.35 (0.070)

Thickness of SPF Insulation between furring:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
1 in.	85	13.21 (0.076)	13.17 (0.076)	13.14 (0.076)	12.96 (0.077)	13.22 (0.076)	13.22 (0.076)	13.22 (0.076)	13.17 (0.076)
	95	13.11 (0.076)	13.07 (0.077)	13.03 (0.077)	12.86 (0.078)	13.11 (0.076)	13.11 (0.076)	13.11 (0.076)	13.07 (0.077)
	105	13.01 (0.077)	12.97 (0.077)	12.94 (0.077)	12.76 (0.078)	13.02 (0.077)	13.02 (0.077)	13.02 (0.077)	12.97 (0.077)
	115	12.93 (0.077)	12.89 (0.078)	12.85 (0.078)	12.68 (0.079)	12.94 (0.077)	12.93 (0.077)	12.93 (0.077)	12.89 (0.078)
	125	12.85 (0.078)	12.81 (0.078)	12.78 (0.078)	12.61 (0.079)	12.86 (0.078)	12.86 (0.078)	12.86 (0.078)	12.82 (0.078)
	135	12.79 (0.078)	12.75 (0.078)	12.71 (0.079)	12.55 (0.080)	12.80 (0.078)	12.79 (0.078)	12.79 (0.078)	12.76 (0.078)
2 in.	85	14.41 (0.069)	14.37 (0.070)	14.34 (0.070)	14.16 (0.071)	14.42 (0.069)	14.42 (0.069)	14.42 (0.069)	14.37 (0.070)
	95	14.31 (0.070)	14.27 (0.070)	14.23 (0.070)	14.06 (0.071)	14.31 (0.070)	14.31 (0.070)	14.31 (0.070)	14.27 (0.070)
	105	14.21 (0.070)	14.17 (0.071)	14.14 (0.071)	13.96 (0.072)	14.22 (0.070)	14.22 (0.070)	14.22 (0.070)	14.17 (0.071)
	115	14.13 (0.071)	14.09 (0.071)	14.05 (0.071)	13.88 (0.072)	14.14 (0.071)	14.13 (0.071)	14.13 (0.071)	14.09 (0.071)
	125	14.05 (0.071)	14.01 (0.071)	13.98 (0.072)	13.81 (0.072)	14.06 (0.071)	14.06 (0.071)	14.06 (0.071)	14.02 (0.071)
	135	13.99 (0.071)	13.95 (0.072)	13.91 (0.072)	13.75 (0.073)	14.00 (0.071)	13.99 (0.071)	13.99 (0.071)	13.96 (0.072)
3 in.	85	15.01 (0.067)	14.97 (0.067)	14.94 (0.067)	14.76 (0.068)	15.02 (0.067)	15.02 (0.067)	15.02 (0.067)	14.97 (0.067)
	95	14.91 (0.067)	14.87 (0.067)	14.83 (0.067)	14.66 (0.068)	14.91 (0.067)	14.91 (0.067)	14.91 (0.067)	14.87 (0.067)
	105	14.81 (0.068)	14.77 (0.068)	14.74 (0.068)	14.56 (0.069)	14.82 (0.067)	14.82 (0.067)	14.82 (0.067)	14.77 (0.068)
	115	14.73 (0.068)	14.69 (0.068)	14.65 (0.068)	14.48 (0.069)	14.74 (0.068)	14.73 (0.068)	14.73 (0.068)	14.69 (0.068)
	125	14.65 (0.068)	14.61 (0.068)	14.58 (0.069)	14.41 (0.069)	14.66 (0.068)	14.66 (0.068)	14.66 (0.068)	14.62 (0.068)
	135	14.59 (0.069)	14.55 (0.069)	14.51 (0.069)	14.35 (0.070)	14.60 (0.068)	14.59 (0.069)	14.59 (0.069)	14.56 (0.069)
3 1/2 in.	85	15.21 (0.066)	15.17 (0.066)	15.14 (0.066)	14.96 (0.067)	15.22 (0.066)	15.22 (0.066)	15.22 (0.066)	15.17 (0.066)
	95	15.11 (0.066)	15.07 (0.066)	15.03 (0.067)	14.86 (0.067)	15.11 (0.066)	15.11 (0.066)	15.11 (0.066)	15.07 (0.066)
	105	15.01 (0.067)	14.97 (0.067)	14.94 (0.067)	14.76 (0.068)	15.02 (0.067)	15.02 (0.067)	15.02 (0.067)	14.97 (0.067)
	115	14.93 (0.067)	14.89 (0.067)	14.85 (0.067)	14.68 (0.068)	14.94 (0.067)	14.93 (0.067)	14.93 (0.067)	14.89 (0.067)
	125	14.85 (0.067)	14.81 (0.068)	14.78 (0.068)	14.61 (0.068)	14.86 (0.067)	14.86 (0.067)	14.86 (0.067)	14.82 (0.067)
	135	14.79 (0.068)	14.75 (0.068)	14.71 (0.068)	14.55 (0.069)	14.80 (0.068)	14.79 (0.068)	14.79 (0.068)	14.76 (0.068)

*Assembly details page 64.

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

INTERIOR INSULATION

Assembly 3-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.21 (0.139)	7.09 (0.141)	6.98 (0.143)	6.61 (0.151)	7.35 (0.136)	7.27 (0.138)	7.20 (0.139)	6.90 (0.145)
	95	7.12 (0.140)	7.00 (0.143)	6.89 (0.145)	6.53 (0.153)	7.25 (0.138)	7.16 (0.140)	7.09 (0.141)	6.80 (0.147)
	105	7.04 (0.142)	6.92 (0.145)	6.81 (0.147)	6.46 (0.155)	7.15 (0.140)	7.07 (0.142)	6.99 (0.143)	6.71 (0.149)
	115	6.96 (0.144)	6.84 (0.146)	6.74 (0.148)	6.39 (0.156)	7.06 (0.142)	6.98 (0.143)	6.91 (0.145)	6.63 (0.151)
	125	6.90 (0.145)	6.78 (0.148)	6.68 (0.150)	6.34 (0.158)	6.99 (0.143)	6.90 (0.145)	6.83 (0.146)	6.56 (0.152)
	135	6.83 (0.146)	6.72 (0.149)	6.62 (0.151)	6.29 (0.159)	6.92 (0.145)	6.83 (0.146)	6.76 (0.148)	6.50 (0.154)
Extruded Polystyrene, 1 in.	85	8.46 (0.118)	8.34 (0.120)	8.23 (0.121)	7.86 (0.127)	8.60 (0.116)	8.52 (0.117)	8.45 (0.118)	8.15 (0.123)
	95	8.37 (0.119)	8.25 (0.121)	8.14 (0.123)	7.78 (0.129)	8.50 (0.118)	8.41 (0.119)	8.34 (0.120)	8.05 (0.124)
	105	8.29 (0.121)	8.17 (0.122)	8.06 (0.124)	7.71 (0.130)	8.40 (0.119)	8.32 (0.120)	8.24 (0.121)	7.96 (0.126)
	115	8.21 (0.122)	8.09 (0.124)	7.99 (0.125)	7.64 (0.131)	8.31 (0.120)	8.23 (0.122)	8.16 (0.123)	7.88 (0.127)
	125	8.15 (0.123)	8.03 (0.125)	7.93 (0.126)	7.59 (0.132)	8.24 (0.121)	8.15 (0.123)	8.08 (0.124)	7.81 (0.128)
	135	8.08 (0.124)	7.97 (0.126)	7.87 (0.127)	7.54 (0.133)	8.17 (0.122)	8.08 (0.124)	8.01 (0.125)	7.75 (0.129)
Extruded Polystyrene, 1 1/2 in.	85	10.96 (0.091)	10.84 (0.092)	10.73 (0.093)	10.36 (0.097)	11.10 (0.090)	11.02 (0.091)	10.95 (0.091)	10.65 (0.094)
	95	10.87 (0.092)	10.75 (0.093)	10.64 (0.094)	10.28 (0.097)	11.00 (0.091)	10.91 (0.092)	10.84 (0.092)	10.55 (0.095)
	105	10.79 (0.093)	10.67 (0.094)	10.56 (0.095)	10.21 (0.098)	10.90 (0.092)	10.82 (0.092)	10.74 (0.093)	10.46 (0.096)
	115	10.71 (0.093)	10.59 (0.094)	10.49 (0.095)	10.14 (0.099)	10.81 (0.092)	10.73 (0.093)	10.66 (0.094)	10.38 (0.096)
	125	10.65 (0.094)	10.53 (0.095)	10.43 (0.096)	10.09 (0.099)	10.74 (0.093)	10.65 (0.094)	10.58 (0.095)	10.31 (0.097)
	135	10.58 (0.094)	10.47 (0.096)	10.37 (0.096)	10.04 (0.100)	10.67 (0.094)	10.58 (0.094)	10.51 (0.095)	10.25 (0.098)
Extruded Polystyrene, 2 in.	85	13.46 (0.074)	13.34 (0.075)	13.23 (0.076)	12.86 (0.078)	13.60 (0.074)	13.52 (0.074)	13.45 (0.074)	13.15 (0.076)
	95	13.37 (0.075)	13.25 (0.075)	13.14 (0.076)	12.78 (0.078)	13.50 (0.074)	13.41 (0.075)	13.34 (0.075)	13.05 (0.077)
	105	13.29 (0.075)	13.17 (0.076)	13.06 (0.077)	12.71 (0.079)	13.40 (0.075)	13.32 (0.075)	13.24 (0.076)	12.96 (0.077)
	115	13.21 (0.076)	13.09 (0.076)	12.99 (0.077)	12.64 (0.079)	13.31 (0.075)	13.23 (0.076)	13.16 (0.076)	12.88 (0.078)
	125	13.15 (0.076)	13.03 (0.077)	12.93 (0.077)	12.59 (0.079)	13.24 (0.076)	13.15 (0.076)	13.08 (0.076)	12.81 (0.078)
	135	13.08 (0.076)	12.97 (0.077)	12.87 (0.078)	12.54 (0.080)	13.17 (0.076)	13.08 (0.076)	13.01 (0.077)	12.75 (0.078)
Extruded Polystyrene, 2 1/2 in.	85	15.96 (0.063)	15.84 (0.063)	15.73 (0.064)	15.36 (0.065)	16.10 (0.062)	16.02 (0.062)	15.95 (0.063)	15.65 (0.064)
	95	15.87 (0.063)	15.75 (0.064)	15.64 (0.064)	15.28 (0.065)	16.00 (0.063)	15.91 (0.063)	15.84 (0.063)	15.55 (0.064)
	105	15.79 (0.063)	15.67 (0.064)	15.56 (0.064)	15.21 (0.066)	15.90 (0.063)	15.82 (0.063)	15.74 (0.064)	15.46 (0.065)
	115	15.71 (0.064)	15.59 (0.064)	15.49 (0.065)	15.14 (0.066)	15.81 (0.063)	15.73 (0.064)	15.66 (0.064)	15.38 (0.065)
	125	15.65 (0.064)	15.53 (0.064)	15.43 (0.065)	15.09 (0.066)	15.74 (0.064)	15.65 (0.064)	15.58 (0.064)	15.31 (0.065)
	135	15.58 (0.064)	15.47 (0.065)	15.37 (0.065)	15.04 (0.066)	15.67 (0.064)	15.58 (0.064)	15.51 (0.064)	15.25 (0.066)
Extruded Polystyrene, 3 in.	85	18.46 (0.054)	18.34 (0.055)	18.23 (0.055)	17.86 (0.056)	18.60 (0.054)	18.52 (0.054)	18.45 (0.054)	18.15 (0.055)
	95	18.37 (0.054)	18.25 (0.055)	18.14 (0.055)	17.78 (0.056)	18.50 (0.054)	18.41 (0.054)	18.34 (0.055)	18.05 (0.055)
	105	18.29 (0.055)	18.17 (0.055)	18.06 (0.055)	17.71 (0.056)	18.40 (0.054)	18.32 (0.055)	18.24 (0.055)	17.96 (0.056)
	115	18.21 (0.055)	18.09 (0.055)	17.99 (0.056)	17.64 (0.057)	18.31 (0.055)	18.23 (0.055)	18.16 (0.055)	17.88 (0.056)
	125	18.15 (0.055)	18.03 (0.055)	17.93 (0.056)	17.59 (0.057)	18.24 (0.055)	18.15 (0.055)	18.08 (0.055)	17.81 (0.056)
	135	18.08 (0.055)	17.97 (0.056)	17.87 (0.056)	17.54 (0.057)	18.17 (0.055)	18.08 (0.055)	18.01 (0.056)	17.75 (0.056)

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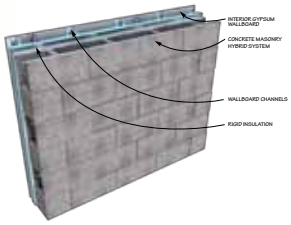


Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	7.36 (0.136)	7.32 (0.137)	7.29 (0.137)	7.11 (0.141)	7.37 (0.136)	7.37 (0.136)	7.37 (0.136)	7.32 (0.137)
	95	7.26 (0.138)	7.22 (0.139)	7.18 (0.139)	7.01 (0.143)	7.26 (0.138)	7.26 (0.138)	7.26 (0.138)	7.22 (0.139)
	105	7.16 (0.140)	7.12 (0.140)	7.09 (0.141)	6.91 (0.145)	7.17 (0.140)	7.17 (0.140)	7.17 (0.140)	7.12 (0.140)
	115	7.08 (0.141)	7.04 (0.142)	7.00 (0.143)	6.83 (0.146)	7.09 (0.141)	7.08 (0.141)	7.08 (0.141)	7.04 (0.142)
	125	7.00 (0.143)	6.96 (0.144)	6.93 (0.144)	6.76 (0.148)	7.01 (0.143)	7.01 (0.143)	7.01 (0.143)	6.97 (0.143)
	135	6.94 (0.144)	6.90 (0.145)	6.86 (0.146)	6.70 (0.149)	6.95 (0.144)	6.94 (0.144)	6.94 (0.144)	6.91 (0.145)
Extruded Polystyrene, 1 in.	85	8.61 (0.116)	8.57 (0.117)	8.54 (0.117)	8.36 (0.120)	8.62 (0.116)	8.62 (0.116)	8.62 (0.116)	8.57 (0.117)
	95	8.51 (0.118)	8.47 (0.118)	8.43 (0.119)	8.26 (0.121)	8.51 (0.117)	8.51 (0.117)	8.51 (0.117)	8.47 (0.118)
	105	8.41 (0.119)	8.37 (0.119)	8.34 (0.120)	8.16 (0.122)	8.42 (0.119)	8.42 (0.119)	8.42 (0.119)	8.37 (0.119)
	115	8.33 (0.120)	8.29 (0.121)	8.25 (0.121)	8.08 (0.124)	8.34 (0.120)	8.33 (0.120)	8.33 (0.120)	8.29 (0.121)
	125	8.25 (0.121)	8.21 (0.122)	8.18 (0.122)	8.01 (0.125)	8.26 (0.121)	8.26 (0.121)	8.26 (0.121)	8.22 (0.122)
	135	8.19 (0.122)	8.15 (0.123)	8.11 (0.123)	7.95 (0.126)	8.20 (0.122)	8.19 (0.122)	8.19 (0.122)	8.16 (0.123)
Extruded Polystyrene, 1 1/2 in.	85	11.11 (0.090)	11.07 (0.090)	11.04 (0.091)	10.86 (0.092)	11.12 (0.090)	11.12 (0.090)	11.12 (0.090)	11.07 (0.090)
	95	11.01 (0.091)	10.97 (0.091)	10.93 (0.091)	10.76 (0.093)	11.01 (0.091)	11.01 (0.091)	11.01 (0.091)	10.97 (0.091)
	105	10.91 (0.092)	10.87 (0.092)	10.84 (0.092)	10.66 (0.094)	10.92 (0.092)	10.92 (0.092)	10.92 (0.092)	10.87 (0.092)
	115	10.83 (0.092)	10.79 (0.093)	10.75 (0.093)	10.58 (0.094)	10.84 (0.092)	10.83 (0.092)	10.83 (0.092)	10.79 (0.093)
	125	10.75 (0.093)	10.71 (0.093)	10.68 (0.094)	10.51 (0.095)	10.76 (0.093)	10.76 (0.093)	10.76 (0.093)	10.72 (0.093)
	135	10.69 (0.094)	10.65 (0.094)	10.61 (0.094)	10.45 (0.096)	10.70 (0.093)	10.69 (0.094)	10.69 (0.094)	10.66 (0.094)
Extruded Polystyrene, 2 in.	85	13.61 (0.073)	13.57 (0.074)	13.54 (0.074)	13.36 (0.075)	13.62 (0.073)	13.62 (0.073)	13.62 (0.073)	13.57 (0.074)
	95	13.51 (0.074)	13.47 (0.074)	13.43 (0.074)	13.26 (0.075)	13.51 (0.074)	13.51 (0.074)	13.51 (0.074)	13.47 (0.074)
	105	13.41 (0.075)	13.37 (0.075)	13.34 (0.075)	13.16 (0.076)	13.42 (0.075)	13.42 (0.075)	13.42 (0.075)	13.37 (0.075)
	115	13.33 (0.075)	13.29 (0.075)	13.25 (0.075)	13.08 (0.076)	13.34 (0.075)	13.33 (0.075)	13.33 (0.075)	13.29 (0.075)
	125	13.25 (0.075)	13.21 (0.076)	13.18 (0.076)	13.01 (0.077)	13.26 (0.075)	13.26 (0.075)	13.26 (0.075)	13.22 (0.076)
	135	13.19 (0.076)	13.15 (0.076)	13.11 (0.076)	12.95 (0.077)	13.20 (0.076)	13.19 (0.076)	13.19 (0.076)	13.16 (0.076)
Extruded Polystyrene, 2 1/2 in.	85	16.11 (0.062)	16.07 (0.062)	16.04 (0.062)	15.86 (0.063)	16.12 (0.062)	16.12 (0.062)	16.12 (0.062)	16.07 (0.062)
	95	16.01 (0.062)	15.97 (0.063)	15.93 (0.063)	15.76 (0.063)	16.01 (0.062)	16.01 (0.062)	16.01 (0.062)	15.97 (0.063)
	105	15.91 (0.063)	15.87 (0.063)	15.84 (0.063)	15.66 (0.064)	15.92 (0.063)	15.92 (0.063)	15.92 (0.063)	15.87 (0.063)
	115	15.83 (0.063)	15.79 (0.063)	15.75 (0.063)	15.58 (0.064)	15.84 (0.063)	15.83 (0.063)	15.83 (0.063)	15.79 (0.063)
	125	15.75 (0.063)	15.71 (0.064)	15.68 (0.064)	15.51 (0.064)	15.76 (0.063)	15.76 (0.063)	15.76 (0.063)	15.72 (0.064)
	135	15.69 (0.064)	15.65 (0.064)	15.61 (0.064)	15.45 (0.065)	15.70 (0.064)	15.69 (0.064)	15.69 (0.064)	15.66 (0.064)
Extruded Polystyrene, 3 in.	85	18.61 (0.054)	18.57 (0.054)	18.54 (0.054)	18.36 (0.054)	18.62 (0.054)	18.62 (0.054)	18.62 (0.054)	18.57 (0.054)
	95	18.51 (0.054)	18.47 (0.054)	18.43 (0.054)	18.26 (0.055)	18.51 (0.054)	18.51 (0.054)	18.51 (0.054)	18.47 (0.054)
	105	18.41 (0.054)	18.37 (0.054)	18.34 (0.055)	18.16 (0.055)	18.42 (0.054)	18.42 (0.054)	18.42 (0.054)	18.37 (0.054)
	115	18.33 (0.055)	18.29 (0.055)	18.25 (0.055)	18.08 (0.055)	18.34 (0.055)	18.33 (0.055)	18.33 (0.055)	18.29 (0.055)
	125	18.25 (0.055)	18.21 (0.055)	18.18 (0.055)	18.01 (0.056)	18.26 (0.055)	18.26 (0.055)	18.26 (0.055)	18.22 (0.055)
	135	18.19 (0.055)	18.15 (0.055)	18.11 (0.055)	17.95 (0.056)	18.20 (0.055)	18.19 (0.055)	18.19 (0.055)	18.16 (0.055)

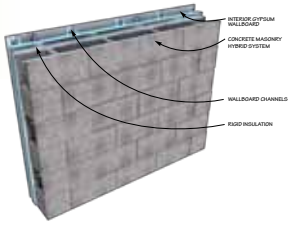
SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES
INTERIOR INSULATION

Assembly 3-4: Continuous rigid interior insulation 1-1/2 in. metal furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry (Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Ridgid Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.71 (0.103)	9.59 (0.104)	9.49 (0.105)	9.12 (0.110)	9.86 (0.101)	9.78 (0.102)	9.70 (0.103)	9.41 (0.106)
	95	9.62 (0.104)	9.50 (0.105)	9.40 (0.106)	9.03 (0.111)	9.75 (0.103)	9.67 (0.103)	9.60 (0.104)	9.30 (0.107)
	105	9.54 (0.105)	9.42 (0.106)	9.32 (0.107)	8.96 (0.112)	9.65 (0.104)	9.57 (0.104)	9.50 (0.105)	9.21 (0.109)
	115	9.47 (0.106)	9.35 (0.107)	9.25 (0.108)	8.90 (0.112)	9.57 (0.105)	9.48 (0.105)	9.41 (0.106)	9.13 (0.109)
	125	9.40 (0.106)	9.28 (0.108)	9.18 (0.109)	8.84 (0.113)	9.49 (0.105)	9.41 (0.106)	9.33 (0.107)	9.06 (0.110)
	135	9.34 (0.107)	9.22 (0.108)	9.12 (0.110)	8.80 (0.114)	9.42 (0.106)	9.34 (0.107)	9.27 (0.108)	9.00 (0.111)
Polyisocyanurate, 1 in.	85	11.39 (0.088)	11.27 (0.089)	11.16 (0.090)	10.79 (0.093)	11.53 (0.087)	11.45 (0.087)	11.38 (0.088)	11.08 (0.090)
	95	11.30 (0.089)	11.18 (0.089)	11.07 (0.090)	10.71 (0.093)	11.43 (0.088)	11.34 (0.088)	11.27 (0.089)	10.98 (0.091)
	105	11.22 (0.089)	11.10 (0.090)	10.99 (0.091)	10.64 (0.094)	11.33 (0.088)	11.25 (0.089)	11.17 (0.090)	10.89 (0.092)
	115	11.14 (0.090)	11.02 (0.091)	10.92 (0.092)	10.57 (0.095)	11.24 (0.089)	11.16 (0.090)	11.09 (0.090)	10.81 (0.093)
	125	11.08 (0.090)	10.96 (0.091)	10.86 (0.092)	10.52 (0.095)	11.17 (0.090)	11.08 (0.090)	11.01 (0.091)	10.74 (0.093)
	135	11.01 (0.091)	10.90 (0.092)	10.80 (0.093)	10.47 (0.096)	11.10 (0.090)	11.01 (0.091)	10.94 (0.091)	10.68 (0.094)
Polyisocyanurate, 1 1/2 in.	85	15.19 (0.066)	15.07 (0.066)	14.96 (0.067)	14.59 (0.069)	15.33 (0.065)	15.25 (0.066)	15.18 (0.066)	14.88 (0.067)
	95	15.10 (0.066)	14.98 (0.067)	14.87 (0.067)	14.51 (0.069)	15.23 (0.066)	15.14 (0.066)	15.07 (0.066)	14.78 (0.068)
	105	15.02 (0.067)	14.90 (0.067)	14.79 (0.068)	14.44 (0.069)	15.13 (0.066)	15.05 (0.066)	14.97 (0.067)	14.69 (0.068)
	115	14.94 (0.067)	14.82 (0.067)	14.72 (0.068)	14.37 (0.070)	15.04 (0.066)	14.96 (0.067)	14.89 (0.067)	14.61 (0.068)
	125	14.88 (0.067)	14.76 (0.068)	14.66 (0.068)	14.32 (0.070)	14.97 (0.067)	14.88 (0.067)	14.81 (0.068)	14.54 (0.069)
	135	14.81 (0.068)	14.70 (0.068)	14.60 (0.069)	14.27 (0.070)	14.90 (0.067)	14.81 (0.068)	14.74 (0.068)	14.48 (0.069)
Polyisocyanurate, 2 in.	85	19.09 (0.052)	18.97 (0.053)	18.86 (0.053)	18.49 (0.054)	19.23 (0.052)	19.15 (0.052)	19.08 (0.052)	18.78 (0.053)
	95	19.00 (0.053)	18.88 (0.053)	18.77 (0.053)	18.41 (0.054)	19.13 (0.052)	19.04 (0.053)	18.97 (0.053)	18.68 (0.054)
	105	18.92 (0.053)	18.80 (0.053)	18.69 (0.053)	18.34 (0.055)	19.03 (0.053)	18.95 (0.053)	18.87 (0.053)	18.59 (0.054)
	115	18.84 (0.053)	18.72 (0.053)	18.62 (0.054)	18.27 (0.055)	18.94 (0.053)	18.86 (0.053)	18.79 (0.053)	18.51 (0.054)
	125	18.78 (0.053)	18.66 (0.054)	18.56 (0.054)	18.22 (0.055)	18.87 (0.053)	18.78 (0.053)	18.71 (0.053)	18.44 (0.054)
	135	18.71 (0.053)	18.60 (0.054)	18.50 (0.054)	18.17 (0.055)	18.80 (0.053)	18.71 (0.053)	18.64 (0.054)	18.38 (0.054)
Polyisocyanurate, 2 1/2 in.	85	22.49 (0.044)	22.37 (0.045)	22.26 (0.045)	21.89 (0.046)	22.63 (0.044)	22.55 (0.044)	22.48 (0.044)	22.18 (0.045)
	95	22.40 (0.045)	22.28 (0.045)	22.17 (0.045)	21.81 (0.046)	22.53 (0.044)	22.44 (0.045)	22.37 (0.045)	22.08 (0.045)
	105	22.32 (0.045)	22.20 (0.045)	22.09 (0.045)	21.74 (0.046)	22.43 (0.045)	22.35 (0.045)	22.27 (0.045)	21.99 (0.045)
	115	22.24 (0.045)	22.12 (0.045)	22.02 (0.045)	21.67 (0.046)	22.34 (0.045)	22.26 (0.045)	22.19 (0.045)	21.91 (0.046)
	125	22.18 (0.045)	22.06 (0.045)	21.96 (0.046)	21.62 (0.046)	22.27 (0.045)	22.18 (0.045)	22.11 (0.045)	21.84 (0.046)
	135	22.11 (0.045)	22.00 (0.045)	21.90 (0.046)	21.57 (0.046)	22.20 (0.045)	22.11 (0.045)	22.04 (0.045)	21.78 (0.046)
Polyisocyanurate, 3 in.	85	25.89 (0.039)	25.77 (0.039)	25.66 (0.039)	25.29 (0.040)	26.03 (0.038)	25.95 (0.039)	25.88 (0.039)	25.58 (0.039)
	95	25.80 (0.039)	25.68 (0.039)	25.57 (0.039)	25.21 (0.040)	25.93 (0.039)	25.84 (0.039)	25.77 (0.039)	25.48 (0.039)
	105	25.72 (0.039)	25.60 (0.039)	25.49 (0.039)	25.14 (0.040)	25.83 (0.039)	25.75 (0.039)	25.67 (0.039)	25.39 (0.039)
	115	25.64 (0.039)	25.52 (0.039)	25.42 (0.039)	25.07 (0.040)	25.74 (0.039)	25.66 (0.039)	25.59 (0.039)	25.31 (0.040)
	125	25.58 (0.039)	25.46 (0.039)	25.36 (0.039)	25.02 (0.040)	25.67 (0.039)	25.58 (0.039)	25.51 (0.039)	25.24 (0.040)
	135	25.51 (0.039)	25.40 (0.039)	25.30 (0.040)	24.97 (0.040)	25.60 (0.039)	25.51 (0.039)	25.44 (0.039)	25.18 (0.040)

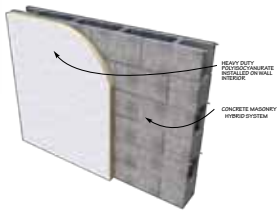
*Assembly details page 64.



Ridgid Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 3/4 in.	85	9.87 (0.101)	9.83 (0.102)	9.80 (0.102)	9.62 (0.104)	9.87 (0.101)	9.87 (0.101)	9.88 (0.101)	9.83 (0.102)
	95	9.76 (0.102)	9.72 (0.103)	9.69 (0.103)	9.51 (0.105)	9.77 (0.102)	9.77 (0.102)	9.77 (0.102)	9.72 (0.103)
	105	9.67 (0.103)	9.63 (0.104)	9.59 (0.104)	9.42 (0.106)	9.67 (0.103)	9.67 (0.103)	9.67 (0.103)	9.63 (0.104)
	115	9.58 (0.104)	9.54 (0.105)	9.51 (0.105)	9.34 (0.107)	9.59 (0.104)	9.59 (0.104)	9.59 (0.104)	9.55 (0.105)
	125	9.51 (0.105)	9.47 (0.106)	9.43 (0.106)	9.27 (0.108)	9.52 (0.105)	9.51 (0.105)	9.51 (0.105)	9.47 (0.106)
	135	9.44 (0.106)	9.40 (0.106)	9.36 (0.107)	9.21 (0.109)	9.45 (0.106)	9.45 (0.106)	9.44 (0.106)	9.41 (0.106)
Polyisocyanurate, 1 in.	85	11.54 (0.087)	11.50 (0.087)	11.47 (0.087)	11.29 (0.089)	11.55 (0.087)	11.55 (0.087)	11.55 (0.087)	11.50 (0.087)
	95	11.44 (0.087)	11.40 (0.088)	11.36 (0.088)	11.19 (0.089)	11.44 (0.087)	11.44 (0.087)	11.44 (0.087)	11.40 (0.088)
	105	11.34 (0.088)	11.30 (0.088)	11.27 (0.089)	11.09 (0.090)	11.35 (0.088)	11.35 (0.088)	11.35 (0.088)	11.30 (0.088)
	115	11.26 (0.089)	11.22 (0.089)	11.18 (0.089)	11.01 (0.091)	11.27 (0.089)	11.26 (0.089)	11.26 (0.089)	11.22 (0.089)
	125	11.18 (0.089)	11.14 (0.090)	11.11 (0.090)	10.94 (0.091)	11.19 (0.089)	11.19 (0.089)	11.19 (0.089)	11.15 (0.090)
	135	11.12 (0.090)	11.08 (0.090)	11.04 (0.091)	10.88 (0.092)	11.13 (0.090)	11.12 (0.090)	11.12 (0.090)	11.09 (0.090)
Polyisocyanurate, 1 1/2 in.	85	15.34 (0.065)	15.30 (0.065)	15.27 (0.065)	15.09 (0.066)	15.35 (0.065)	15.35 (0.065)	15.35 (0.065)	15.30 (0.065)
	95	15.24 (0.066)	15.20 (0.066)	15.16 (0.066)	14.99 (0.067)	15.24 (0.066)	15.24 (0.066)	15.24 (0.066)	15.20 (0.066)
	105	15.14 (0.066)	15.10 (0.066)	15.07 (0.066)	14.89 (0.067)	15.15 (0.066)	15.15 (0.066)	15.15 (0.066)	15.10 (0.066)
	115	15.06 (0.066)	15.02 (0.067)	14.98 (0.067)	14.81 (0.068)	15.07 (0.066)	15.06 (0.066)	15.06 (0.066)	15.02 (0.067)
	125	14.98 (0.067)	14.94 (0.067)	14.91 (0.067)	14.74 (0.068)	14.99 (0.067)	14.99 (0.067)	14.99 (0.067)	14.95 (0.067)
	135	14.92 (0.067)	14.88 (0.067)	14.84 (0.067)	14.68 (0.068)	14.93 (0.067)	14.92 (0.067)	14.92 (0.067)	14.89 (0.067)
Polyisocyanurate, 2 in.	85	19.24 (0.052)	19.20 (0.052)	19.17 (0.052)	18.99 (0.053)	19.25 (0.052)	19.25 (0.052)	19.25 (0.052)	19.20 (0.052)
	95	19.14 (0.052)	19.10 (0.052)	19.06 (0.052)	18.89 (0.053)	19.14 (0.052)	19.14 (0.052)	19.14 (0.052)	19.10 (0.052)
	105	19.04 (0.053)	19.00 (0.053)	18.97 (0.053)	18.79 (0.053)	19.05 (0.053)	19.05 (0.053)	19.05 (0.053)	19.00 (0.053)
	115	18.96 (0.053)	18.92 (0.053)	18.88 (0.053)	18.71 (0.053)	18.97 (0.053)	18.96 (0.053)	18.96 (0.053)	18.92 (0.053)
	125	18.88 (0.053)	18.84 (0.053)	18.81 (0.053)	18.64 (0.054)	18.89 (0.053)	18.89 (0.053)	18.89 (0.053)	18.85 (0.053)
	135	18.82 (0.053)	18.78 (0.053)	18.74 (0.053)	18.58 (0.054)	18.83 (0.053)	18.82 (0.053)	18.82 (0.053)	18.79 (0.053)
Polyisocyanurate, 2 1/2 in.	85	22.64 (0.044)	22.60 (0.044)	22.57 (0.044)	22.39 (0.045)	22.65 (0.044)	22.65 (0.044)	22.65 (0.044)	22.60 (0.044)
	95	22.54 (0.044)	22.50 (0.044)	22.46 (0.045)	22.29 (0.045)	22.54 (0.044)	22.54 (0.044)	22.54 (0.044)	22.50 (0.044)
	105	22.44 (0.045)	22.40 (0.045)	22.37 (0.045)	22.19 (0.045)	22.45 (0.045)	22.45 (0.045)	22.45 (0.045)	22.40 (0.045)
	115	22.36 (0.045)	22.32 (0.045)	22.28 (0.045)	22.11 (0.045)	22.37 (0.045)	22.36 (0.045)	22.36 (0.045)	22.32 (0.045)
	125	22.28 (0.045)	22.24 (0.045)	22.21 (0.045)	22.04 (0.045)	22.29 (0.045)	22.29 (0.045)	22.29 (0.045)	22.25 (0.045)
	135	22.22 (0.045)	22.18 (0.045)	22.14 (0.045)	21.98 (0.045)	22.23 (0.045)	22.22 (0.045)	22.22 (0.045)	22.19 (0.045)
Polyisocyanurate, 3 in.	85	26.04 (0.038)	26.00 (0.038)	25.97 (0.039)	25.79 (0.039)	26.05 (0.038)	26.05 (0.038)	26.05 (0.038)	26.00 (0.038)
	95	25.94 (0.039)	25.90 (0.039)	25.86 (0.039)	25.69 (0.039)	25.94 (0.039)	25.94 (0.039)	25.94 (0.039)	25.90 (0.039)
	105	25.84 (0.039)	25.80 (0.039)	25.77 (0.039)	25.59 (0.039)	25.85 (0.039)	25.85 (0.039)	25.85 (0.039)	25.80 (0.039)
	115	25.76 (0.039)	25.72 (0.039)	25.68 (0.039)	25.51 (0.039)	25.77 (0.039)	25.76 (0.039)	25.76 (0.039)	25.72 (0.039)
	125	25.68 (0.039)	25.64 (0.039)	25.61 (0.039)	25.44 (0.039)	25.69 (0.039)	25.69 (0.039)	25.69 (0.039)	25.65 (0.039)
	135	25.62 (0.039)	25.58 (0.039)	25.54 (0.039)	25.38 (0.039)	25.63 (0.039)	25.62 (0.039)	25.62 (0.039)	25.59 (0.039)

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

INTERIOR INSULATION



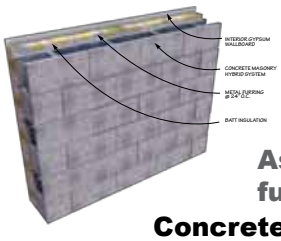
Assembly 3-5: Continuous polyisocyanurate heavy duty (HD) attached directly to masonry, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Thickness of HD polyisocyanurate:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	16.76 (0.060)	16.64 (0.060)	16.53 (0.060)	16.16 (0.062)	16.90 (0.059)	16.82 (0.059)	16.75 (0.060)	16.45 (0.061)
	95	16.67 (0.060)	16.55 (0.060)	16.44 (0.061)	16.08 (0.062)	16.80 (0.060)	16.71 (0.060)	16.64 (0.060)	16.35 (0.061)
	105	16.59 (0.060)	16.47 (0.061)	16.36 (0.061)	16.01 (0.062)	16.70 (0.060)	16.62 (0.060)	16.54 (0.060)	16.26 (0.062)
	115	16.51 (0.061)	16.39 (0.061)	16.29 (0.061)	15.94 (0.063)	16.61 (0.060)	16.53 (0.060)	16.46 (0.061)	16.18 (0.062)
	125	16.45 (0.061)	16.33 (0.061)	16.23 (0.062)	15.89 (0.063)	16.54 (0.060)	16.45 (0.061)	16.38 (0.061)	16.11 (0.062)
	135	16.38 (0.061)	16.27 (0.061)	16.17 (0.062)	15.84 (0.063)	16.47 (0.061)	16.38 (0.061)	16.31 (0.061)	16.05 (0.062)
2 1/2 in.	85	20.16 (0.050)	20.04 (0.050)	19.93 (0.050)	19.56 (0.051)	20.30 (0.049)	20.22 (0.049)	20.15 (0.050)	19.85 (0.050)
	95	20.07 (0.050)	19.95 (0.050)	19.84 (0.050)	19.48 (0.051)	20.20 (0.050)	20.11 (0.050)	20.04 (0.050)	19.75 (0.051)
	105	19.99 (0.050)	19.87 (0.050)	19.76 (0.051)	19.41 (0.052)	20.10 (0.050)	20.02 (0.050)	19.94 (0.050)	19.66 (0.051)
	115	19.91 (0.050)	19.79 (0.051)	19.69 (0.051)	19.34 (0.052)	20.01 (0.050)	19.93 (0.050)	19.86 (0.050)	19.58 (0.051)
	125	19.85 (0.050)	19.73 (0.051)	19.63 (0.051)	19.29 (0.052)	19.94 (0.050)	19.85 (0.050)	19.78 (0.051)	19.51 (0.051)
	135	19.78 (0.051)	19.67 (0.051)	19.57 (0.051)	19.24 (0.052)	19.87 (0.050)	19.78 (0.051)	19.71 (0.051)	19.45 (0.051)
3 in.	85	23.56 (0.042)	23.44 (0.043)	23.33 (0.043)	22.96 (0.044)	23.70 (0.042)	23.62 (0.042)	23.55 (0.042)	23.25 (0.043)
	95	23.47 (0.043)	23.35 (0.043)	23.24 (0.043)	22.88 (0.044)	23.60 (0.042)	23.51 (0.043)	23.44 (0.043)	23.15 (0.043)
	105	23.39 (0.043)	23.27 (0.043)	23.16 (0.043)	22.81 (0.044)	23.50 (0.043)	23.42 (0.043)	23.34 (0.043)	23.06 (0.043)
	115	23.31 (0.043)	23.19 (0.043)	23.09 (0.043)	22.74 (0.044)	23.41 (0.043)	23.33 (0.043)	23.26 (0.043)	22.98 (0.044)
	125	23.25 (0.043)	23.13 (0.043)	23.03 (0.043)	22.69 (0.044)	23.34 (0.043)	23.25 (0.043)	23.18 (0.043)	22.91 (0.044)
	135	23.18 (0.043)	23.07 (0.043)	22.97 (0.044)	22.64 (0.044)	23.27 (0.043)	23.18 (0.043)	23.11 (0.043)	22.85 (0.044)
3 1/2 in.	85	26.96 (0.037)	26.84 (0.037)	26.73 (0.037)	26.36 (0.038)	27.10 (0.037)	27.02 (0.037)	26.95 (0.037)	26.65 (0.038)
	95	26.87 (0.037)	26.75 (0.037)	26.64 (0.038)	26.28 (0.038)	27.00 (0.037)	26.91 (0.037)	26.84 (0.037)	26.55 (0.038)
	105	26.79 (0.037)	26.67 (0.038)	26.56 (0.038)	26.21 (0.038)	26.90 (0.037)	26.82 (0.037)	26.74 (0.037)	26.46 (0.038)
	115	26.71 (0.037)	26.59 (0.038)	26.49 (0.038)	26.14 (0.038)	26.81 (0.037)	26.73 (0.037)	26.66 (0.038)	26.38 (0.038)
	125	26.65 (0.038)	26.53 (0.038)	26.43 (0.038)	26.09 (0.038)	26.74 (0.037)	26.65 (0.038)	26.58 (0.038)	26.31 (0.038)
	135	26.58 (0.038)	26.47 (0.038)	26.37 (0.038)	26.04 (0.038)	26.67 (0.037)	26.58 (0.038)	26.51 (0.038)	26.25 (0.038)

Thickness of HD polyisocyanurate:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
2 in.	85	16.91 (0.059)	16.87 (0.059)	16.84 (0.059)	16.66 (0.060)	16.92 (0.059)	16.92 (0.059)	16.92 (0.059)	16.87 (0.059)
	95	16.81 (0.060)	16.77 (0.060)	16.73 (0.060)	16.56 (0.060)	16.81 (0.059)	16.81 (0.059)	16.81 (0.059)	16.77 (0.060)
	105	16.71 (0.060)	16.67 (0.060)	16.64 (0.060)	16.46 (0.061)	16.72 (0.060)	16.72 (0.060)	16.72 (0.060)	16.67 (0.060)
	115	16.63 (0.060)	16.59 (0.060)	16.55 (0.060)	16.38 (0.061)	16.64 (0.060)	16.63 (0.060)	16.63 (0.060)	16.59 (0.060)
	125	16.55 (0.060)	16.51 (0.061)	16.48 (0.061)	16.31 (0.061)	16.56 (0.060)	16.56 (0.060)	16.56 (0.060)	16.52 (0.061)
	135	16.49 (0.061)	16.45 (0.061)	16.41 (0.061)	16.25 (0.062)	16.50 (0.061)	16.49 (0.061)	16.49 (0.061)	16.46 (0.061)
2 1/2 in.	85	20.31 (0.049)	20.27 (0.049)	20.24 (0.049)	20.06 (0.050)	20.32 (0.049)	20.32 (0.049)	20.32 (0.049)	20.27 (0.049)
	95	20.21 (0.049)	20.17 (0.050)	20.13 (0.050)	19.96 (0.050)	20.21 (0.049)	20.21 (0.049)	20.21 (0.049)	20.17 (0.050)
	105	20.11 (0.050)	20.07 (0.050)	20.04 (0.050)	19.86 (0.050)	20.12 (0.050)	20.12 (0.050)	20.12 (0.050)	20.07 (0.050)
	115	20.03 (0.050)	19.99 (0.050)	19.95 (0.050)	19.78 (0.051)	20.04 (0.050)	20.03 (0.050)	20.03 (0.050)	19.99 (0.050)
	125	19.95 (0.050)	19.91 (0.050)	19.88 (0.050)	19.71 (0.051)	19.96 (0.050)	19.96 (0.050)	19.96 (0.050)	19.92 (0.050)
	135	19.89 (0.050)	19.85 (0.050)	19.81 (0.050)	19.65 (0.051)	19.90 (0.050)	19.89 (0.050)	19.89 (0.050)	19.86 (0.050)
3 in.	85	23.71 (0.042)	23.67 (0.042)	23.64 (0.042)	23.46 (0.043)	23.72 (0.042)	23.72 (0.042)	23.72 (0.042)	23.67 (0.042)
	95	23.61 (0.042)	23.57 (0.042)	23.53 (0.042)	23.36 (0.043)	23.61 (0.042)	23.61 (0.042)	23.61 (0.042)	23.57 (0.042)
	105	23.51 (0.043)	23.47 (0.043)	23.44 (0.043)	23.26 (0.043)	23.52 (0.043)	23.52 (0.043)	23.52 (0.043)	23.47 (0.043)
	115	23.43 (0.043)	23.39 (0.043)	23.35 (0.043)	23.18 (0.043)	23.44 (0.043)	23.43 (0.043)	23.43 (0.043)	23.39 (0.043)
	125	23.35 (0.043)	23.31 (0.043)	23.28 (0.043)	23.11 (0.043)	23.36 (0.043)	23.36 (0.043)	23.36 (0.043)	23.32 (0.043)
	135	23.29 (0.043)	23.25 (0.043)	23.21 (0.043)	23.05 (0.043)	23.30 (0.043)	23.29 (0.043)	23.29 (0.043)	23.26 (0.043)
3 1/2 in.	85	27.11 (0.037)	27.07 (0.037)	27.04 (0.037)	26.86 (0.037)	27.12 (0.037)	27.12 (0.037)	27.12 (0.037)	27.07 (0.037)
	95	27.01 (0.037)	26.97 (0.037)	26.93 (0.037)	26.76 (0.037)	27.01 (0.037)	27.01 (0.037)	27.01 (0.037)	26.97 (0.037)
	105	26.91 (0.037)	26.87 (0.037)	26.84 (0.037)	26.66 (0.038)	26.92 (0.037)	26.92 (0.037)	26.92 (0.037)	26.87 (0.037)
	115	26.83 (0.037)	26.79 (0.037)	26.75 (0.037)	26.58 (0.038)	26.84 (0.037)	26.83 (0.037)	26.83 (0.037)	26.79 (0.037)
	125	26.75 (0.037)	26.71 (0.037)	26.68 (0.037)	26.51 (0.038)	26.76 (0.037)	26.76 (0.037)	26.76 (0.037)	26.72 (0.037)
	135	26.69 (0.037)	26.65 (0.038)	26.61 (0.038)	26.45 (0.038)	26.70 (0.037)	26.69 (0.037)	26.69 (0.037)	26.66 (0.038)

*Assembly details page 65.



Assembly 3-6: Metal furring at 24 in. o.c. with batt insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation Type	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.41 (0.106)	9.29 (0.108)	9.18 (0.109)	8.81 (0.113)	9.55 (0.105)	9.47 (0.106)	9.40 (0.106)	9.10 (0.110)
	95	9.32 (0.107)	9.20 (0.109)	9.09 (0.110)	8.73 (0.115)	9.45 (0.106)	9.36 (0.107)	9.29 (0.108)	9.00 (0.111)
	105	9.24 (0.108)	9.12 (0.110)	9.01 (0.111)	8.66 (0.116)	9.35 (0.107)	9.27 (0.108)	9.19 (0.109)	8.91 (0.112)
	115	9.16 (0.109)	9.04 (0.111)	8.94 (0.112)	8.59 (0.116)	9.26 (0.108)	9.18 (0.109)	9.11 (0.110)	8.83 (0.113)
	125	9.10 (0.110)	8.98 (0.111)	8.88 (0.113)	8.54 (0.117)	9.19 (0.109)	9.10 (0.110)	9.03 (0.111)	8.76 (0.114)
	135	9.03 (0.111)	8.92 (0.112)	8.82 (0.113)	8.49 (0.118)	9.12 (0.110)	9.03 (0.111)	8.96 (0.112)	8.70 (0.115)
R13 Batt	85	10.01 (0.100)	9.89 (0.101)	9.78 (0.102)	9.41 (0.106)	10.15 (0.098)	10.07 (0.099)	10.00 (0.100)	9.70 (0.103)
	95	9.92 (0.101)	9.80 (0.102)	9.69 (0.103)	9.33 (0.107)	10.05 (0.100)	9.96 (0.100)	9.89 (0.101)	9.60 (0.104)
	105	9.84 (0.102)	9.72 (0.103)	9.61 (0.104)	9.26 (0.108)	9.95 (0.101)	9.87 (0.101)	9.79 (0.102)	9.51 (0.105)
	115	9.76 (0.102)	9.64 (0.104)	9.54 (0.105)	9.19 (0.109)	9.86 (0.101)	9.78 (0.102)	9.71 (0.103)	9.43 (0.106)
	125	9.70 (0.103)	9.58 (0.104)	9.48 (0.106)	9.14 (0.109)	9.79 (0.102)	9.70 (0.103)	9.63 (0.104)	9.36 (0.107)
	135	9.63 (0.104)	9.52 (0.105)	9.42 (0.106)	9.09 (0.110)	9.72 (0.103)	9.63 (0.104)	9.56 (0.105)	9.30 (0.108)
R15 Batt	85	10.61 (0.094)	10.49 (0.095)	10.38 (0.096)	10.01 (0.100)	10.75 (0.093)	10.67 (0.094)	10.60 (0.094)	10.30 (0.097)
	95	10.52 (0.095)	10.40 (0.096)	10.29 (0.097)	9.93 (0.101)	10.65 (0.094)	10.56 (0.095)	10.49 (0.095)	10.20 (0.098)
	105	10.44 (0.096)	10.32 (0.097)	10.21 (0.098)	9.86 (0.101)	10.55 (0.095)	10.47 (0.096)	10.39 (0.096)	10.11 (0.099)
	115	10.36 (0.096)	10.24 (0.098)	10.14 (0.099)	9.79 (0.102)	10.46 (0.096)	10.38 (0.096)	10.31 (0.097)	10.03 (0.100)
	125	10.30 (0.097)	10.18 (0.098)	10.08 (0.099)	9.74 (0.103)	10.39 (0.096)	10.30 (0.097)	10.23 (0.098)	9.96 (0.100)
	135	10.23 (0.098)	10.12 (0.099)	10.02 (0.100)	9.69 (0.103)	10.32 (0.097)	10.23 (0.098)	10.16 (0.098)	9.90 (0.101)
R19 Batt	85	11.41 (0.088)	11.29 (0.089)	11.18 (0.089)	10.81 (0.092)	11.55 (0.087)	11.47 (0.087)	11.40 (0.088)	11.10 (0.090)
	95	11.32 (0.088)	11.20 (0.089)	11.09 (0.090)	10.73 (0.093)	11.45 (0.087)	11.36 (0.088)	11.29 (0.089)	11.00 (0.091)
	105	11.24 (0.089)	11.12 (0.090)	11.01 (0.091)	10.66 (0.094)	11.35 (0.088)	11.27 (0.089)	11.19 (0.089)	10.91 (0.092)
	115	11.16 (0.090)	11.04 (0.091)	10.94 (0.091)	10.59 (0.094)	11.26 (0.089)	11.18 (0.089)	11.11 (0.090)	10.83 (0.092)
	125	11.10 (0.090)	10.98 (0.091)	10.88 (0.092)	10.54 (0.095)	11.19 (0.089)	11.10 (0.090)	11.03 (0.091)	10.76 (0.093)
	135	11.03 (0.091)	10.92 (0.092)	10.82 (0.092)	10.49 (0.095)	11.12 (0.090)	11.03 (0.091)	10.96 (0.091)	10.70 (0.093)
R21 Batt	85	11.81 (0.085)	11.69 (0.086)	11.58 (0.086)	11.21 (0.089)	11.95 (0.084)	11.87 (0.084)	11.80 (0.085)	11.50 (0.087)
	95	11.72 (0.085)	11.60 (0.086)	11.49 (0.087)	11.13 (0.090)	11.85 (0.084)	11.76 (0.085)	11.69 (0.086)	11.40 (0.088)
	105	11.64 (0.086)	11.52 (0.087)	11.41 (0.088)	11.06 (0.090)	11.75 (0.085)	11.67 (0.086)	11.59 (0.086)	11.31 (0.088)
	115	11.56 (0.086)	11.44 (0.087)	11.34 (0.088)	10.99 (0.091)	11.66 (0.086)	11.58 (0.086)	11.51 (0.087)	11.23 (0.089)
	125	11.50 (0.087)	11.38 (0.088)	11.28 (0.089)	10.94 (0.091)	11.59 (0.086)	11.50 (0.087)	11.43 (0.087)	11.16 (0.090)
	135	11.43 (0.087)	11.32 (0.088)	11.22 (0.089)	10.89 (0.092)	11.52 (0.087)	11.43 (0.087)	11.36 (0.088)	11.10 (0.090)

Insulation Type	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
R11 Batt	85	9.56 (0.105)	9.52 (0.105)	9.49 (0.105)	9.31 (0.107)	9.57 (0.105)	9.57 (0.105)	9.57 (0.104)	9.52 (0.105)
	95	9.46 (0.106)	9.42 (0.106)	9.38 (0.107)	9.21 (0.109)	9.46 (0.106)	9.46 (0.106)	9.46 (0.106)	9.42 (0.106)
	105	9.36 (0.107)	9.32 (0.107)	9.29 (0.108)	9.11 (0.110)	9.37 (0.107)	9.37 (0.107)	9.37 (0.107)	9.32 (0.107)
	115	9.28 (0.108)	9.24 (0.108)	9.20 (0.109)	9.03 (0.111)	9.29 (0.108)	9.28 (0.108)	9.28 (0.108)	9.24 (0.108)
	125	9.20 (0.109)	9.16 (0.109)	9.13 (0.110)	8.96 (0.112)	9.21 (0.109)	9.21 (0.109)	9.21 (0.109)	9.17 (0.109)
	135	9.14 (0.109)	9.10 (0.110)	9.06 (0.110)	8.90 (0.112)	9.15 (0.109)	9.14 (0.109)	9.14 (0.109)	9.11 (0.110)
R13 Batt	85	10.16 (0.098)	10.12 (0.099)	10.09 (0.099)	9.91 (0.101)	10.17 (0.098)	10.17 (0.098)	10.17 (0.098)	10.12 (0.099)
	95	10.06 (0.099)	10.02 (0.100)	9.98 (0.100)	9.81 (0.102)	10.06 (0.099)	10.06 (0.099)	10.06 (0.099)	10.02 (0.100)
	105	9.96 (0.100)	9.92 (0.101)	9.89 (0.101)	9.71 (0.103)	9.97 (0.100)	9.97 (0.100)	9.97 (0.100)	9.92 (0.101)
	115	9.88 (0.101)	9.84 (0.102)	9.80 (0.102)	9.63 (0.104)	9.89 (0.101)	9.88 (0.101)	9.88 (0.101)	9.84 (0.102)
	125	9.80 (0.102)	9.76 (0.102)	9.73 (0.103)	9.56 (0.105)	9.81 (0.102)	9.81 (0.102)	9.81 (0.102)	9.77 (0.102)
	135	9.74 (0.103)	9.70 (0.103)	9.66 (0.104)	9.50 (0.105)	9.75 (0.103)	9.74 (0.103)	9.74 (0.103)	9.71 (0.103)
R15 Batt	85	10.76 (0.093)	10.72 (0.093)	10.69 (0.094)	10.51 (0.095)	10.77 (0.093)	10.77 (0.093)	10.77 (0.093)	10.72 (0.093)
	95	10.66 (0.094)	10.62 (0.094)	10.58 (0.094)	10.41 (0.096)	10.66 (0.094)	10.66 (0.094)	10.66 (0.094)	10.62 (0.094)
	105	10.56 (0.095)	10.52 (0.095)	10.49 (0.095)	10.31 (0.097)	10.57 (0.095)	10.57 (0.095)	10.57 (0.095)	10.52 (0.095)
	115	10.48 (0.095)	10.44 (0.096)	10.40 (0.096)	10.23 (0.098)	10.49 (0.095)	10.48 (0.095)	10.48 (0.095)	10.44 (0.096)
	125	10.40 (0.096)	10.36 (0.097)	10.33 (0.097)	10.16 (0.098)	10.41 (0.096)	10.41 (0.096)	10.41 (0.096)	10.37 (0.096)
	135	10.34 (0.097)	10.30 (0.097)	10.26 (0.097)	10.10 (0.099)	10.35 (0.097)	10.34 (0.097)	10.34 (0.097)	10.31 (0.097)
R19 Batt	85	11.56 (0.086)	11.52 (0.087)	11.49 (0.087)	11.31 (0.088)	11.57 (0.086)	11.57 (0.086)	11.57 (0.086)	11.52 (0.087)
	95	11.46 (0.087)	11.42 (0.088)	11.38 (0.088)	11.21 (0.089)	11.46 (0.087)	11.46 (0.087)	11.46 (0.087)	11.42 (0.088)
	105	11.36 (0.088)	11.32 (0.088)	11.29 (0.089)	11.11 (0.090)	11.37 (0.088)	11.37 (0.088)	11.37 (0.088)	11.32 (0.088)
	115	11.28 (0.089)	11.24 (0.089)	11.20 (0.089)	11.03 (0.091)	11.29 (0.089)	11.28 (0.089)	11.28 (0.089)	11.24 (0.089)
	125	11.20 (0.089)	11.16 (0.090)	11.13 (0.090)	10.96 (0.091)	11.21 (0.089)	11.21 (0.089)	11.21 (0.089)	11.17 (0.090)
	135	11.14 (0.090)	11.10 (0.090)	11.06 (0.090)	10.90 (0.092)	11.15 (0.090)	11.14 (0.090)	11.14 (0.090)	11.11 (0.090)
R21 Batt	85	11.96 (0.084)	11.92 (0.084)	11.89 (0.084)	11.71 (0.085)	11.97 (0.084)	11.97 (0.084)	11.97 (0.084)	11.92 (0.084)
	95	11.86 (0.084)	11.82 (0.085)	11.78 (0.085)	11.61 (0.086)	11.86 (0.084)	11.86 (0.084)	11.86 (0.084)	11.82 (0.085)
	105	11.76 (0.085)	11.72 (0.085)	11.69 (0.086)	11.51 (0.087)	11.77 (0.085)	11.77 (0.085)	11.77 (0.085)	11.72 (0.085)
	115	11.68 (0.086)	11.64 (0.086)	11.60 (0.086)	11.43 (0.087)	11.69 (0.086)	11.68 (0.086)	11.68 (0.086)	11.64 (0.086)
	125	11.60 (0.086)	11.56 (0.086)	11.53 (0.087)	11.36 (0.088)	11.61 (0.086)	11.61 (0.086)	11.61 (0.086)	11.57 (0.086)
	135	11.54 (0.087)	11.50 (0.087)	11.46 (0.087)	11.30 (0.088)	11.55 (0.087)	11.54 (0.087)	11.54 (0.087)	11.51 (0.087)

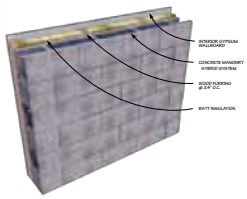
*Assembly details page 65.

Assembly 3-7: Wood furring at 24 in. o.c. with insulation between furring and 1/2 in. gypsum wallboard on interior, exposed exterior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.37 (0.157)	6.25 (0.160)	6.15 (0.163)	5.77 (0.173)	6.52 (0.153)	6.43 (0.155)	6.36 (0.157)	6.06 (0.165)
	95	6.28 (0.159)	6.16 (0.162)	6.06 (0.165)	5.69 (0.176)	6.41 (0.156)	6.33 (0.158)	6.25 (0.160)	5.96 (0.168)
	105	6.20 (0.161)	6.08 (0.165)	5.98 (0.167)	5.62 (0.178)	6.31 (0.158)	6.23 (0.161)	6.16 (0.162)	5.87 (0.170)
	115	6.13 (0.163)	6.01 (0.167)	5.90 (0.169)	5.56 (0.180)	6.23 (0.161)	6.14 (0.163)	6.07 (0.165)	5.79 (0.173)
	125	6.06 (0.165)	5.94 (0.168)	5.84 (0.171)	5.50 (0.182)	6.15 (0.163)	6.07 (0.165)	5.99 (0.167)	5.72 (0.175)
	135	6.00 (0.167)	5.88 (0.170)	5.78 (0.173)	5.45 (0.183)	6.08 (0.164)	6.00 (0.167)	5.92 (0.169)	5.66 (0.177)
Polyisocyanurate, 3/4 in.	85	7.57 (0.132)	7.44 (0.134)	7.34 (0.136)	6.97 (0.143)	7.71 (0.130)	7.63 (0.131)	7.56 (0.132)	7.26 (0.138)
	95	7.48 (0.134)	7.35 (0.136)	7.25 (0.138)	6.89 (0.145)	7.60 (0.132)	7.52 (0.133)	7.45 (0.134)	7.16 (0.140)
	105	7.40 (0.135)	7.27 (0.137)	7.17 (0.139)	6.81 (0.147)	7.51 (0.133)	7.42 (0.135)	7.35 (0.136)	7.07 (0.142)
	115	7.32 (0.137)	7.20 (0.139)	7.10 (0.141)	6.75 (0.148)	7.42 (0.135)	7.34 (0.136)	7.26 (0.138)	6.99 (0.143)
	125	7.25 (0.138)	7.13 (0.140)	7.03 (0.142)	6.70 (0.149)	7.34 (0.136)	7.26 (0.138)	7.19 (0.139)	6.92 (0.145)
	135	7.19 (0.139)	7.07 (0.141)	6.97 (0.143)	6.65 (0.150)	7.28 (0.137)	7.19 (0.139)	7.12 (0.140)	6.86 (0.146)
Extruded Polystyrene, 3/4 in.	85	9.93 (0.101)	9.81 (0.102)	9.71 (0.103)	9.34 (0.107)	10.08 (0.099)	10.00 (0.100)	9.92 (0.101)	9.63 (0.104)
	95	9.84 (0.102)	9.72 (0.103)	9.62 (0.104)	9.25 (0.108)	9.97 (0.100)	9.89 (0.101)	9.82 (0.102)	9.52 (0.105)
	105	9.76 (0.102)	9.64 (0.104)	9.54 (0.105)	9.18 (0.109)	9.87 (0.101)	9.79 (0.102)	9.72 (0.103)	9.43 (0.106)
	115	9.69 (0.103)	9.57 (0.105)	9.47 (0.106)	9.12 (0.110)	9.79 (0.102)	9.70 (0.103)	9.63 (0.104)	9.35 (0.107)
	125	9.62 (0.104)	9.50 (0.105)	9.40 (0.106)	9.06 (0.110)	9.71 (0.103)	9.63 (0.104)	9.55 (0.105)	9.28 (0.108)
	135	9.56 (0.105)	9.44 (0.106)	9.34 (0.107)	9.02 (0.111)	9.64 (0.104)	9.56 (0.105)	9.49 (0.105)	9.22 (0.108)
Polyisocyanurate, 3/4 in.	85	12.75 (0.078)	12.62 (0.079)	12.52 (0.080)	12.15 (0.082)	12.89 (0.078)	12.81 (0.078)	12.74 (0.079)	12.44 (0.080)
	95	12.66 (0.079)	12.53 (0.080)	12.43 (0.080)	12.07 (0.083)	12.78 (0.078)	12.70 (0.079)	12.63 (0.079)	12.34 (0.081)
	105	12.57 (0.080)	12.45 (0.080)	12.35 (0.081)	11.99 (0.083)	12.69 (0.079)	12.60 (0.079)	12.53 (0.080)	12.24 (0.082)
	115	12.50 (0.080)	12.38 (0.081)	12.28 (0.081)	11.93 (0.084)	12.60 (0.079)	12.52 (0.080)	12.44 (0.080)	12.17 (0.082)
	125	12.43 (0.080)	12.31 (0.081)	12.21 (0.082)	11.88 (0.084)	12.52 (0.080)	12.44 (0.080)	12.37 (0.081)	12.10 (0.083)
	135	12.37 (0.081)	12.25 (0.082)	12.15 (0.082)	11.83 (0.085)	12.46 (0.080)	12.37 (0.081)	12.30 (0.081)	12.04 (0.083)
R11 Batt	85	13.41 (0.075)	13.29 (0.075)	13.18 (0.076)	12.81 (0.078)	13.55 (0.074)	13.47 (0.074)	13.40 (0.075)	13.10 (0.076)
	95	13.32 (0.075)	13.20 (0.076)	13.09 (0.076)	12.73 (0.079)	13.45 (0.074)	13.36 (0.075)	13.29 (0.075)	13.00 (0.077)
	105	13.24 (0.076)	13.12 (0.076)	13.01 (0.077)	12.66 (0.079)	13.35 (0.075)	13.27 (0.075)	13.19 (0.076)	12.91 (0.077)
	115	13.16 (0.076)	13.04 (0.077)	12.94 (0.077)	12.59 (0.079)	13.26 (0.075)	13.18 (0.076)	13.11 (0.076)	12.83 (0.078)
	125	13.10 (0.076)	12.98 (0.077)	12.88 (0.078)	12.54 (0.080)	13.19 (0.076)	13.10 (0.076)	13.03 (0.077)	12.76 (0.078)
	135	13.03 (0.077)	12.92 (0.077)	12.82 (0.078)	12.49 (0.080)	13.12 (0.076)	13.03 (0.077)	12.96 (0.077)	12.70 (0.079)
R13 Batt	85	14.41 (0.069)	14.29 (0.070)	14.18 (0.071)	13.81 (0.072)	14.55 (0.069)	14.47 (0.069)	14.40 (0.069)	14.10 (0.071)
	95	14.32 (0.070)	14.20 (0.070)	14.09 (0.071)	13.73 (0.073)	14.45 (0.069)	14.36 (0.070)	14.29 (0.070)	14.00 (0.071)
	105	14.24 (0.070)	14.12 (0.071)	14.01 (0.071)	13.66 (0.073)	14.35 (0.070)	14.27 (0.070)	14.19 (0.070)	13.91 (0.072)
	115	14.16 (0.071)	14.04 (0.071)	13.94 (0.072)	13.59 (0.074)	14.26 (0.070)	14.18 (0.071)	14.11 (0.071)	13.83 (0.072)
	125	14.10 (0.071)	13.98 (0.072)	13.88 (0.072)	13.54 (0.074)	14.19 (0.070)	14.10 (0.071)	14.03 (0.071)	13.76 (0.073)
	135	14.03 (0.071)	13.92 (0.072)	13.82 (0.072)	13.49 (0.074)	14.12 (0.071)	14.03 (0.071)	13.96 (0.072)	13.70 (0.073)
R15 Batt	85	15.31 (0.065)	15.19 (0.066)	15.08 (0.066)	14.71 (0.068)	15.45 (0.065)	15.37 (0.065)	15.30 (0.065)	15.00 (0.067)
	95	15.22 (0.066)	15.10 (0.066)	14.99 (0.067)	14.63 (0.068)	15.35 (0.065)	15.26 (0.066)	15.19 (0.066)	14.90 (0.067)
	105	15.14 (0.066)	15.02 (0.067)	14.91 (0.067)	14.56 (0.069)	15.25 (0.066)	15.17 (0.066)	15.09 (0.066)	14.81 (0.068)
	115	15.06 (0.066)	14.94 (0.067)	14.84 (0.067)	14.49 (0.069)	15.16 (0.066)	15.08 (0.066)	15.01 (0.067)	14.73 (0.068)
	125	15.00 (0.067)	14.88 (0.067)	14.78 (0.068)	14.44 (0.069)	15.09 (0.066)	15.00 (0.067)	14.93 (0.067)	14.66 (0.068)
	135	14.93 (0.067)	14.82 (0.067)	14.72 (0.068)	14.39 (0.069)	15.02 (0.067)	14.93 (0.067)	14.86 (0.067)	14.60 (0.068)
R19 Batt	85	18.21 (0.055)	18.09 (0.055)	17.98 (0.056)	17.61 (0.057)	18.35 (0.054)	18.27 (0.055)	18.20 (0.055)	17.90 (0.056)
	95	18.12 (0.055)	18.00 (0.056)	17.89 (0.056)	17.53 (0.057)	18.25 (0.055)	18.16 (0.055)	18.09 (0.055)	17.80 (0.056)
	105	18.04 (0.055)	17.92 (0.056)	17.81 (0.056)	17.46 (0.057)	18.15 (0.055)	18.07 (0.055)	17.99 (0.056)	17.71 (0.056)
	115	17.96 (0.056)	17.84 (0.056)	17.74 (0.056)	17.39 (0.057)	18.06 (0.055)	17.98 (0.056)	17.91 (0.056)	17.63 (0.057)
	125	17.90 (0.056)	17.78 (0.056)	17.68 (0.057)	17.34 (0.058)	17.99 (0.056)	17.90 (0.056)	17.83 (0.056)	17.56 (0.057)
	135	17.83 (0.056)	17.72 (0.056)	17.62 (0.057)	17.29 (0.058)	17.92 (0.056)	17.83 (0.056)	17.76 (0.056)	17.50 (0.057)
R21 Batt	85	19.51 (0.051)	19.39 (0.052)	19.28 (0.052)	18.91 (0.053)	19.65 (0.051)	19.57 (0.051)	19.50 (0.051)	19.20 (0.052)
	95	19.42 (0.051)	19.30 (0.052)	19.19 (0.052)	18.83 (0.053)	19.55 (0.051)	19.46 (0.051)	19.39 (0.052)	19.10 (0.052)
	105	19.34 (0.052)	19.22 (0.052)	19.11 (0.052)	18.76 (0.053)	19.45 (0.051)	19.37 (0.052)	19.29 (0.052)	19.01 (0.053)
	115	19.26 (0.052)	19.14 (0.052)	19.04 (0.053)	18.69 (0.053)	19.36 (0.052)	19.28 (0.052)	19.21 (0.052)	18.93 (0.053)
	125	19.20 (0.052)	19.08 (0.052)	18.98 (0.053)	18.64 (0.054)	19.29 (0.052)	19.20 (0.052)	19.13 (0.052)	18.86 (0.053)
	135	19.13 (0.052)	19.02 (0.053)	18.92 (0.053)	18.59 (0.054)	19.22 (0.052)	19.13 (0.052)	19.06 (0.052)	18.80 (0.053)

*Assembly details page 66.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded Polystyrene, 3/4 in.	85	6.52 (0.153)	6.49 (0.154)	6.45 (0.155)	6.27 (0.159)	6.53 (0.153)	6.53 (0.153)	6.53 (0.153)	6.48 (0.154)
	95	6.42 (0.156)	6.38 (0.157)	6.35 (0.158)	6.17 (0.162)	6.42 (0.156)	6.42 (0.156)	6.43 (0.156)	6.38 (0.157)
	105	6.32 (0.158)	6.28 (0.159)	6.25 (0.160)	6.08 (0.165)	6.33 (0.158)	6.33 (0.158)	6.33 (0.158)	6.28 (0.159)
	115	6.24 (0.160)	6.20 (0.161)	6.16 (0.162)	6.00 (0.167)	6.25 (0.160)	6.25 (0.160)	6.24 (0.160)	6.20 (0.161)
	125	6.17 (0.162)	6.12 (0.163)	6.09 (0.164)	5.93 (0.169)	6.18 (0.162)	6.17 (0.162)	6.17 (0.162)	6.13 (0.163)
	135	6.10 (0.164)	6.06 (0.165)	6.02 (0.166)	5.87 (0.170)	6.11 (0.164)	6.11 (0.164)	6.10 (0.164)	6.07 (0.165)
Polyisocyanurate, 3/4 in.	85	7.72 (0.130)	7.68 (0.130)	7.65 (0.131)	7.47 (0.134)	7.72 (0.129)	7.73 (0.129)	7.73 (0.129)	7.68 (0.130)
	95	7.61 (0.131)	7.58 (0.132)	7.54 (0.133)	7.36 (0.136)	7.62 (0.131)	7.62 (0.131)	7.62 (0.131)	7.57 (0.132)
	105	7.52 (0.133)	7.48 (0.134)	7.44 (0.134)	7.27 (0.138)	7.53 (0.133)	7.53 (0.133)	7.53 (0.133)	7.48 (0.134)
	115	7.44 (0.134)	7.40 (0.135)	7.36 (0.136)	7.19 (0.139)	7.44 (0.134)	7.44 (0.134)	7.44 (0.134)	7.40 (0.135)
	125	7.36 (0.136)	7.32 (0.137)	7.28 (0.137)	7.12 (0.140)	7.37 (0.136)	7.37 (0.136)	7.36 (0.136)	7.33 (0.136)
	135	7.30 (0.137)	7.25 (0.138)	7.21 (0.139)	7.06 (0.142)	7.31 (0.137)	7.30 (0.137)	7.30 (0.137)	7.26 (0.138)
Extruded Polystyrene, 3/4 in.	85	10.09 (0.099)	10.05 (0.100)	10.02 (0.100)	9.84 (0.102)	10.09 (0.099)	10.09 (0.099)	10.10 (0.099)	10.05 (0.100)
	95	9.98 (0.100)	9.94 (0.101)	9.91 (0.101)	9.73 (0.103)	9.99 (0.100)	9.99 (0.100)	9.99 (0.100)	9.94 (0.101)
	105	9.89 (0.101)	9.85 (0.102)	9.81 (0.102)	9.64 (0.104)	9.89 (0.101)	9.89 (0.101)	9.89 (0.101)	9.85 (0.102)
	115	9.80 (0.102)	9.76 (0.102)	9.73 (0.103)	9.56 (0.105)	9.81 (0.102)	9.81 (0.102)	9.81 (0.102)	9.77 (0.102)
	125	9.73 (0.103)	9.69 (0.103)	9.65 (0.104)	9.49 (0.105)	9.74 (0.103)	9.73 (0.103)	9.73 (0.103)	9.69 (0.103)
	135	9.66 (0.103)	9.62 (0.104)	9.58 (0.104)	9.43 (0.106)	9.67 (0.103)	9.67 (0.103)	9.66 (0.103)	9.63 (0.104)
Polyisocyanurate, 3/4 in.	85	12.90 (0.078)	12.86 (0.078)	12.83 (0.078)	12.65 (0.079)	12.90 (0.077)	12.91 (0.077)	12.91 (0.077)	12.86 (0.078)
	95	12.79 (0.078)	12.76 (0.078)	12.72 (0.079)	12.54 (0.080)	12.80 (0.078)	12.80 (0.078)	12.80 (0.078)	12.75 (0.078)
	105	12.70 (0.079)	12.66 (0.079)	12.62 (0.079)	12.45 (0.080)	12.70 (0.079)	12.70 (0.079)	12.71 (0.079)	12.66 (0.079)
	115	12.61 (0.079)	12.57 (0.080)	12.54 (0.080)	12.37 (0.081)	12.62 (0.079)	12.62 (0.079)	12.62 (0.079)	12.58 (0.080)
	125	12.54 (0.080)	12.50 (0.080)	12.46 (0.080)	12.30 (0.081)	12.55 (0.080)	12.55 (0.080)	12.54 (0.080)	12.51 (0.080)
	135	12.48 (0.080)	12.43 (0.080)	12.39 (0.081)	12.24 (0.082)	12.49 (0.080)	12.48 (0.080)	12.48 (0.080)	12.44 (0.080)
R11 Batt	85	13.56 (0.074)	13.52 (0.074)	13.49 (0.074)	13.31 (0.075)	13.57 (0.074)	13.57 (0.074)	13.57 (0.074)	13.52 (0.074)
	95	13.46 (0.074)	13.42 (0.075)	13.38 (0.075)	13.21 (0.076)	13.46 (0.074)	13.46 (0.074)	13.46 (0.074)	13.42 (0.075)
	105	13.36 (0.075)	13.32 (0.075)	13.29 (0.075)	13.11 (0.076)	13.37 (0.075)	13.37 (0.075)	13.37 (0.075)	13.32 (0.075)
	115	13.28 (0.075)	13.24 (0.076)	13.20 (0.076)	13.03 (0.077)	13.29 (0.075)	13.28 (0.075)	13.28 (0.075)	13.24 (0.076)
	125	13.20 (0.076)	13.16 (0.076)	13.13 (0.076)	12.96 (0.077)	13.21 (0.076)	13.21 (0.076)	13.21 (0.076)	13.17 (0.076)
	135	13.14 (0.076)	13.10 (0.076)	13.06 (0.077)	12.90 (0.078)	13.15 (0.076)	13.14 (0.076)	13.14 (0.076)	13.11 (0.076)
R13 Batt	85	14.56 (0.069)	14.52 (0.069)	14.49 (0.069)	14.31 (0.070)	14.57 (0.069)	14.57 (0.069)	14.57 (0.069)	14.52 (0.069)
	95	14.46 (0.069)	14.42 (0.069)	14.38 (0.070)	14.21 (0.070)	14.46 (0.069)	14.46 (0.069)	14.46 (0.069)	14.42 (0.069)
	105	14.36 (0.070)	14.32 (0.070)	14.29 (0.070)	14.11 (0.071)	14.37 (0.070)	14.37 (0.070)	14.37 (0.070)	14.32 (0.070)
	115	14.28 (0.070)	14.24 (0.070)	14.20 (0.070)	14.03 (0.071)	14.29 (0.070)	14.28 (0.070)	14.28 (0.070)	14.24 (0.070)
	125	14.20 (0.070)	14.16 (0.071)	14.13 (0.071)	13.96 (0.072)	14.21 (0.070)	14.21 (0.070)	14.21 (0.070)	14.17 (0.071)
	135	14.14 (0.071)	14.10 (0.071)	14.06 (0.071)	13.90 (0.072)	14.15 (0.071)	14.14 (0.071)	14.14 (0.071)	14.11 (0.071)
R15 Batt	85	15.46 (0.065)	15.42 (0.065)	15.39 (0.065)	15.21 (0.066)	15.47 (0.065)	15.47 (0.065)	15.47 (0.065)	15.42 (0.065)
	95	15.36 (0.065)	15.32 (0.065)	15.28 (0.065)	15.11 (0.066)	15.36 (0.065)	15.36 (0.065)	15.36 (0.065)	15.32 (0.065)
	105	15.26 (0.066)	15.22 (0.066)	15.19 (0.066)	15.01 (0.067)	15.27 (0.065)	15.27 (0.065)	15.27 (0.065)	15.22 (0.066)
	115	15.18 (0.066)	15.14 (0.066)	15.10 (0.066)	14.93 (0.067)	15.19 (0.066)	15.18 (0.066)	15.18 (0.066)	15.14 (0.066)
	125	15.10 (0.066)	15.06 (0.066)	15.03 (0.067)	14.86 (0.067)	15.11 (0.066)	15.11 (0.066)	15.11 (0.066)	15.07 (0.066)
	135	15.04 (0.066)	15.00 (0.067)	14.96 (0.067)	14.80 (0.068)	15.05 (0.066)	15.04 (0.066)	15.04 (0.066)	15.01 (0.067)
R19 Batt	85	18.36 (0.054)	18.32 (0.055)	18.29 (0.055)	18.11 (0.055)	18.37 (0.054)	18.37 (0.054)	18.37 (0.054)	18.32 (0.055)
	95	18.26 (0.055)	18.22 (0.055)	18.18 (0.055)	18.01 (0.056)	18.26 (0.055)	18.26 (0.055)	18.26 (0.055)	18.22 (0.055)
	105	18.16 (0.055)	18.12 (0.055)	18.09 (0.055)	17.91 (0.056)	18.17 (0.055)	18.17 (0.055)	18.17 (0.055)	18.12 (0.055)
	115	18.08 (0.055)	18.04 (0.055)	18.00 (0.056)	17.83 (0.056)	18.09 (0.055)	18.08 (0.055)	18.08 (0.055)	18.04 (0.055)
	125	18.00 (0.056)	17.96 (0.056)	17.93 (0.056)	17.76 (0.056)	18.01 (0.056)	18.01 (0.056)	18.01 (0.056)	17.97 (0.056)
	135	17.94 (0.056)	17.90 (0.056)	17.86 (0.056)	17.70 (0.056)	17.95 (0.056)	17.94 (0.056)	17.94 (0.056)	17.91 (0.056)
R21 Batt	85	19.66 (0.051)	19.62 (0.051)	19.59 (0.051)	19.41 (0.052)	19.67 (0.051)	19.67 (0.051)	19.67 (0.051)	19.62 (0.051)
	95	19.56 (0.051)	19.52 (0.051)	19.48 (0.051)	19.31 (0.052)	19.56 (0.051)	19.56 (0.051)	19.56 (0.051)	19.52 (0.051)
	105	19.46 (0.051)	19.42 (0.051)	19.39 (0.052)	19.21 (0.052)	19.47 (0.051)	19.47 (0.051)	19.47 (0.051)	19.42 (0.051)
	115	19.38 (0.052)	19.34 (0.052)	19.30 (0.052)	19.13 (0.052)	19.39 (0.052)	19.38 (0.052)	19.38 (0.052)	19.34 (0.052)
	125	19.30 (0.052)	19.26 (0.052)	19.23 (0.052)	19.06 (0.052)	19.31 (0.052)	19.31 (0.052)	19.31 (0.052)	19.27 (0.052)
	135	19.24 (0.052)	19.20 (0.052)	19.16 (0.052)	19.00 (0.053)	19.25 (0.052)	19.24 (0.052)	19.24 (0.052)	19.21 (0.052)

SINGLE WYTHE CONCRETE MASONRY ASSEMBLIES

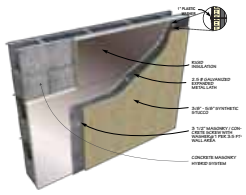
EXTERIOR INSULATION

Assembly 3-8: Continuous exterior insulation and finish system, exposed interior masonry

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Rigid insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.26 (0.108)	9.14 (0.109)	9.03 (0.111)	8.66 (0.115)	9.40 (0.106)	9.32 (0.107)	9.25 (0.108)	8.95 (0.112)
	95	9.17 (0.109)	9.05 (0.111)	8.94 (0.112)	8.58 (0.117)	9.30 (0.108)	9.21 (0.109)	9.14 (0.109)	8.85 (0.113)
	105	9.09 (0.110)	8.97 (0.112)	8.86 (0.113)	8.51 (0.118)	9.20 (0.109)	9.12 (0.110)	9.04 (0.111)	8.76 (0.114)
	115	9.01 (0.111)	8.89 (0.112)	8.79 (0.114)	8.44 (0.118)	9.11 (0.110)	9.03 (0.111)	8.96 (0.112)	8.68 (0.115)
	125	8.95 (0.112)	8.83 (0.113)	8.73 (0.115)	8.39 (0.119)	9.04 (0.111)	8.95 (0.112)	8.88 (0.113)	8.61 (0.116)
	135	8.88 (0.113)	8.77 (0.114)	8.67 (0.115)	8.34 (0.120)	8.97 (0.112)	8.88 (0.113)	8.81 (0.114)	8.55 (0.117)
Expanded polystyrene, 1 1/2 in.	85	8.56 (0.117)	8.44 (0.119)	8.33 (0.120)	7.96 (0.126)	8.70 (0.115)	8.62 (0.116)	8.55 (0.117)	8.25 (0.121)
	95	8.47 (0.118)	8.35 (0.120)	8.24 (0.121)	7.88 (0.127)	8.60 (0.116)	8.51 (0.117)	8.44 (0.118)	8.15 (0.123)
	105	8.39 (0.119)	8.27 (0.121)	8.16 (0.123)	7.81 (0.128)	8.50 (0.118)	8.42 (0.119)	8.34 (0.120)	8.06 (0.124)
	115	8.31 (0.120)	8.19 (0.122)	8.09 (0.124)	7.74 (0.129)	8.41 (0.119)	8.33 (0.120)	8.26 (0.121)	7.98 (0.125)
	125	8.25 (0.121)	8.13 (0.123)	8.03 (0.125)	7.69 (0.130)	8.34 (0.120)	8.25 (0.121)	8.18 (0.122)	7.91 (0.126)
	135	8.18 (0.122)	8.07 (0.124)	7.97 (0.126)	7.64 (0.131)	8.27 (0.121)	8.18 (0.122)	8.11 (0.123)	7.85 (0.127)
Expanded polystyrene, 2 in.	85	10.56 (0.095)	10.44 (0.096)	10.33 (0.097)	9.96 (0.100)	10.70 (0.093)	10.62 (0.094)	10.55 (0.095)	10.25 (0.098)
	95	10.47 (0.096)	10.35 (0.097)	10.24 (0.098)	9.88 (0.101)	10.60 (0.094)	10.51 (0.095)	10.44 (0.096)	10.15 (0.099)
	105	10.39 (0.096)	10.27 (0.097)	10.16 (0.098)	9.81 (0.102)	10.50 (0.095)	10.42 (0.096)	10.34 (0.097)	10.06 (0.099)
	115	10.31 (0.097)	10.19 (0.098)	10.09 (0.099)	9.74 (0.103)	10.41 (0.096)	10.33 (0.097)	10.26 (0.097)	9.98 (0.100)
	125	10.25 (0.098)	10.13 (0.099)	10.03 (0.100)	9.69 (0.103)	10.34 (0.097)	10.25 (0.098)	10.18 (0.098)	9.91 (0.101)
	135	10.18 (0.098)	10.07 (0.099)	9.97 (0.100)	9.64 (0.104)	10.27 (0.097)	10.18 (0.098)	10.11 (0.099)	9.85 (0.102)
Extruded polystyrene, 2 in.	85	12.56 (0.080)	12.44 (0.080)	12.33 (0.081)	11.96 (0.084)	12.70 (0.079)	12.62 (0.079)	12.55 (0.080)	12.25 (0.082)
	95	12.47 (0.080)	12.35 (0.081)	12.24 (0.082)	11.88 (0.084)	12.60 (0.079)	12.51 (0.080)	12.44 (0.080)	12.15 (0.082)
	105	12.39 (0.081)	12.27 (0.082)	12.16 (0.082)	11.81 (0.085)	12.50 (0.080)	12.42 (0.081)	12.34 (0.081)	12.06 (0.083)
	115	12.31 (0.081)	12.19 (0.082)	12.09 (0.083)	11.74 (0.085)	12.41 (0.081)	12.33 (0.081)	12.26 (0.082)	11.98 (0.083)
	125	12.25 (0.082)	12.13 (0.082)	12.03 (0.083)	11.69 (0.086)	12.34 (0.081)	12.25 (0.082)	12.18 (0.082)	11.91 (0.084)
	135	12.18 (0.082)	12.07 (0.083)	11.97 (0.084)	11.64 (0.086)	12.27 (0.082)	12.18 (0.082)	12.11 (0.083)	11.85 (0.084)
Polyisocyanurate, 2 in.	85	16.96 (0.059)	16.84 (0.059)	16.73 (0.060)	16.36 (0.061)	17.10 (0.058)	17.02 (0.059)	16.95 (0.059)	16.65 (0.060)
	95	16.87 (0.059)	16.75 (0.060)	16.64 (0.060)	16.28 (0.061)	17.00 (0.059)	16.91 (0.059)	16.84 (0.059)	16.55 (0.060)
	105	16.79 (0.060)	16.67 (0.060)	16.56 (0.060)	16.21 (0.062)	16.90 (0.059)	16.82 (0.059)	16.74 (0.060)	16.46 (0.061)
	115	16.71 (0.060)	16.59 (0.060)	16.49 (0.061)	16.14 (0.062)	16.81 (0.059)	16.73 (0.060)	16.66 (0.060)	16.38 (0.061)
	125	16.65 (0.060)	16.53 (0.061)	16.43 (0.061)	16.09 (0.062)	16.74 (0.060)	16.65 (0.060)	16.58 (0.060)	16.31 (0.061)
	135	16.58 (0.060)	16.47 (0.061)	16.37 (0.061)	16.04 (0.062)	16.67 (0.060)	16.58 (0.060)	16.51 (0.061)	16.25 (0.062)
Extruded Polystyrene, 2 1/2 in	85	15.06 (0.066)	14.94 (0.067)	14.83 (0.067)	14.46 (0.069)	15.20 (0.066)	15.12 (0.066)	15.05 (0.066)	14.75 (0.068)
	95	14.97 (0.067)	14.85 (0.067)	14.74 (0.068)	14.38 (0.070)	15.10 (0.066)	15.01 (0.067)	14.94 (0.067)	14.65 (0.068)
	105	14.89 (0.067)	14.77 (0.068)	14.66 (0.068)	14.31 (0.070)	15.00 (0.067)	14.92 (0.067)	14.84 (0.067)	14.56 (0.069)
	115	14.81 (0.068)	14.69 (0.068)	14.59 (0.069)	14.24 (0.070)	14.91 (0.067)	14.83 (0.067)	14.76 (0.068)	14.48 (0.069)
	125	14.75 (0.068)	14.63 (0.068)	14.53 (0.069)	14.19 (0.070)	14.84 (0.067)	14.75 (0.068)	14.68 (0.068)	14.41 (0.069)
	135	14.68 (0.068)	14.57 (0.069)	14.47 (0.069)	14.14 (0.071)	14.77 (0.068)	14.68 (0.068)	14.61 (0.068)	14.35 (0.070)
Expanded polystyrene, 3 in.	85	14.56 (0.069)	14.44 (0.069)	14.33 (0.070)	13.96 (0.072)	14.70 (0.068)	14.62 (0.068)	14.55 (0.069)	14.25 (0.070)
	95	14.47 (0.069)	14.35 (0.070)	14.24 (0.070)	13.88 (0.072)	14.60 (0.069)	14.51 (0.069)	14.44 (0.069)	14.15 (0.071)
	105	14.39 (0.070)	14.27 (0.070)	14.16 (0.071)	13.81 (0.072)	14.50 (0.069)	14.42 (0.069)	14.34 (0.070)	14.06 (0.071)
	115	14.31 (0.070)	14.19 (0.070)	14.09 (0.071)	13.74 (0.073)	14.41 (0.069)	14.33 (0.070)	14.26 (0.070)	13.98 (0.072)
	125	14.25 (0.070)	14.13 (0.071)	14.03 (0.071)	13.69 (0.073)	14.34 (0.070)	14.25 (0.070)	14.18 (0.071)	13.91 (0.072)
	135	14.18 (0.070)	14.07 (0.071)	13.97 (0.072)	13.64 (0.073)	14.27 (0.070)	14.18 (0.071)	14.11 (0.071)	13.85 (0.072)
Polyisocyanurate, 3 in.	85	23.76 (0.042)	23.64 (0.042)	23.53 (0.042)	23.16 (0.043)	23.90 (0.042)	23.82 (0.042)	23.75 (0.042)	23.45 (0.043)
	95	23.67 (0.042)	23.55 (0.042)	23.44 (0.043)	23.08 (0.043)	23.80 (0.042)	23.71 (0.042)	23.64 (0.042)	23.35 (0.043)
	105	23.59 (0.042)	23.47 (0.043)	23.36 (0.043)	23.01 (0.043)	23.70 (0.042)	23.62 (0.042)	23.54 (0.042)	23.26 (0.043)
	115	23.51 (0.043)	23.39 (0.043)	23.29 (0.043)	22.94 (0.044)	23.61 (0.042)	23.53 (0.042)	23.46 (0.043)	23.18 (0.043)
	125	23.45 (0.043)	23.33 (0.043)	23.23 (0.043)	22.89 (0.044)	23.54 (0.042)	23.45 (0.043)	23.38 (0.043)	23.11 (0.043)
	135	23.38 (0.043)	23.27 (0.043)	23.17 (0.043)	22.84 (0.044)	23.47 (0.043)	23.38 (0.043)	23.31 (0.043)	23.05 (0.043)

*Assembly details page 66.



Rigid insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Polyisocyanurate, 1 in.	85	9.41 (0.106)	9.37 (0.107)	9.34 (0.107)	9.16 (0.109)	9.42 (0.106)	9.42 (0.106)	9.42 (0.106)	9.37 (0.107)
	95	9.31 (0.107)	9.27 (0.108)	9.23 (0.108)	9.06 (0.110)	9.31 (0.107)	9.31 (0.107)	9.31 (0.107)	9.27 (0.108)
	105	9.21 (0.109)	9.17 (0.109)	9.14 (0.109)	8.96 (0.112)	9.22 (0.108)	9.22 (0.108)	9.22 (0.108)	9.17 (0.109)
	115	9.13 (0.110)	9.09 (0.110)	9.05 (0.110)	8.88 (0.113)	9.14 (0.109)	9.13 (0.109)	9.13 (0.110)	9.09 (0.110)
	125	9.05 (0.110)	9.01 (0.111)	8.98 (0.111)	8.81 (0.113)	9.06 (0.110)	9.06 (0.110)	9.06 (0.110)	9.02 (0.111)
	135	8.99 (0.111)	8.95 (0.112)	8.91 (0.112)	8.75 (0.114)	9.00 (0.111)	8.99 (0.111)	8.99 (0.111)	8.96 (0.112)
Expanded polystyrene, 1 1/2 in.	85	8.71 (0.115)	8.67 (0.115)	8.64 (0.116)	8.46 (0.118)	8.72 (0.115)	8.72 (0.115)	8.72 (0.115)	8.67 (0.115)
	95	8.61 (0.116)	8.57 (0.117)	8.53 (0.117)	8.36 (0.120)	8.61 (0.116)	8.61 (0.116)	8.61 (0.116)	8.57 (0.117)
	105	8.51 (0.117)	8.47 (0.118)	8.44 (0.119)	8.26 (0.121)	8.52 (0.117)	8.52 (0.117)	8.52 (0.117)	8.47 (0.118)
	115	8.43 (0.119)	8.39 (0.119)	8.35 (0.120)	8.18 (0.122)	8.44 (0.119)	8.43 (0.119)	8.43 (0.119)	8.39 (0.119)
	125	8.35 (0.120)	8.31 (0.120)	8.28 (0.121)	8.11 (0.123)	8.36 (0.120)	8.36 (0.120)	8.36 (0.120)	8.32 (0.120)
	135	8.29 (0.121)	8.25 (0.121)	8.21 (0.122)	8.05 (0.124)	8.30 (0.120)	8.29 (0.121)	8.29 (0.121)	8.26 (0.121)
Expanded polystyrene, 2 in.	85	10.71 (0.093)	10.67 (0.094)	10.64 (0.094)	10.46 (0.096)	10.72 (0.093)	10.72 (0.093)	10.72 (0.093)	10.67 (0.094)
	95	10.61 (0.094)	10.57 (0.095)	10.53 (0.095)	10.36 (0.097)	10.61 (0.094)	10.61 (0.094)	10.61 (0.094)	10.57 (0.095)
	105	10.51 (0.095)	10.47 (0.095)	10.44 (0.096)	10.26 (0.097)	10.52 (0.095)	10.52 (0.095)	10.52 (0.095)	10.47 (0.095)
	115	10.43 (0.096)	10.39 (0.096)	10.35 (0.097)	10.18 (0.098)	10.44 (0.096)	10.43 (0.096)	10.43 (0.096)	10.39 (0.096)
	125	10.35 (0.097)	10.31 (0.097)	10.28 (0.097)	10.11 (0.099)	10.36 (0.096)	10.36 (0.097)	10.36 (0.097)	10.32 (0.097)
	135	10.29 (0.097)	10.25 (0.098)	10.21 (0.098)	10.05 (0.099)	10.30 (0.097)	10.29 (0.097)	10.29 (0.097)	10.26 (0.097)
Extruded polystyrene, 2 in.	85	12.71 (0.079)	12.67 (0.079)	12.64 (0.079)	12.46 (0.080)	12.72 (0.079)	12.72 (0.079)	12.72 (0.079)	12.67 (0.079)
	95	12.61 (0.079)	12.57 (0.080)	12.53 (0.080)	12.36 (0.081)	12.61 (0.079)	12.61 (0.079)	12.61 (0.079)	12.57 (0.080)
	105	12.51 (0.080)	12.47 (0.080)	12.44 (0.080)	12.26 (0.082)	12.52 (0.080)	12.52 (0.080)	12.52 (0.080)	12.47 (0.080)
	115	12.43 (0.080)	12.39 (0.081)	12.35 (0.081)	12.18 (0.082)	12.44 (0.080)	12.43 (0.080)	12.43 (0.080)	12.39 (0.081)
	125	12.35 (0.081)	12.31 (0.081)	12.28 (0.081)	12.11 (0.083)	12.36 (0.081)	12.36 (0.081)	12.36 (0.081)	12.32 (0.081)
	135	12.29 (0.081)	12.25 (0.082)	12.21 (0.082)	12.05 (0.083)	12.30 (0.081)	12.29 (0.081)	12.29 (0.081)	12.26 (0.082)
Polyisocyanurate, 2 in.	85	17.11 (0.058)	17.07 (0.059)	17.04 (0.059)	16.86 (0.059)	17.12 (0.058)	17.12 (0.058)	17.12 (0.058)	17.07 (0.059)
	95	17.01 (0.059)	16.97 (0.059)	16.93 (0.059)	16.76 (0.060)	17.01 (0.059)	17.01 (0.059)	17.01 (0.059)	16.97 (0.059)
	105	16.91 (0.059)	16.87 (0.059)	16.84 (0.059)	16.66 (0.060)	16.92 (0.059)	16.92 (0.059)	16.92 (0.059)	16.87 (0.059)
	115	16.83 (0.059)	16.79 (0.060)	16.75 (0.060)	16.58 (0.060)	16.84 (0.059)	16.83 (0.059)	16.83 (0.059)	16.79 (0.060)
	125	16.75 (0.060)	16.71 (0.060)	16.68 (0.060)	16.51 (0.061)	16.76 (0.060)	16.76 (0.060)	16.76 (0.060)	16.72 (0.060)
	135	16.69 (0.060)	16.65 (0.060)	16.61 (0.060)	16.45 (0.061)	16.70 (0.060)	16.69 (0.060)	16.69 (0.060)	16.66 (0.060)
Extruded Polystyrene, 2 1/2 in	85	15.21 (0.066)	15.17 (0.066)	15.14 (0.066)	14.96 (0.067)	15.22 (0.066)	15.22 (0.066)	15.22 (0.066)	15.17 (0.066)
	95	15.11 (0.066)	15.07 (0.066)	15.03 (0.067)	14.86 (0.067)	15.11 (0.066)	15.11 (0.066)	15.11 (0.066)	15.07 (0.066)
	105	15.01 (0.067)	14.97 (0.067)	14.94 (0.067)	14.76 (0.068)	15.02 (0.067)	15.02 (0.067)	15.02 (0.067)	14.97 (0.067)
	115	14.93 (0.067)	14.89 (0.067)	14.85 (0.067)	14.68 (0.068)	14.94 (0.067)	14.93 (0.067)	14.93 (0.067)	14.89 (0.067)
	125	14.85 (0.067)	14.81 (0.068)	14.78 (0.068)	14.61 (0.068)	14.86 (0.067)	14.86 (0.067)	14.86 (0.067)	14.82 (0.067)
	135	14.79 (0.068)	14.75 (0.068)	14.71 (0.068)	14.55 (0.069)	14.80 (0.068)	14.79 (0.068)	14.79 (0.068)	14.76 (0.068)
Expanded polystyrene, 3 in.	85	14.71 (0.068)	14.67 (0.068)	14.64 (0.068)	14.46 (0.069)	14.72 (0.068)	14.72 (0.068)	14.72 (0.068)	14.67 (0.068)
	95	14.61 (0.068)	14.57 (0.069)	14.53 (0.069)	14.36 (0.070)	14.61 (0.068)	14.61 (0.068)	14.61 (0.068)	14.57 (0.069)
	105	14.51 (0.069)	14.47 (0.069)	14.44 (0.069)	14.26 (0.070)	14.52 (0.069)	14.52 (0.069)	14.52 (0.069)	14.47 (0.069)
	115	14.43 (0.069)	14.39 (0.070)	14.35 (0.070)	14.18 (0.070)	14.44 (0.069)	14.43 (0.069)	14.43 (0.069)	14.39 (0.069)
	125	14.35 (0.070)	14.31 (0.070)	14.28 (0.070)	14.11 (0.071)	14.36 (0.070)	14.36 (0.070)	14.36 (0.070)	14.32 (0.070)
	135	14.29 (0.070)	14.25 (0.070)	14.21 (0.070)	14.05 (0.071)	14.30 (0.070)	14.29 (0.070)	14.29 (0.070)	14.26 (0.070)
Polyisocyanurate, 3 in.	85	23.91 (0.042)	23.87 (0.042)	23.84 (0.042)	23.66 (0.042)	23.92 (0.042)	23.92 (0.042)	23.92 (0.042)	23.87 (0.042)
	95	23.81 (0.042)	23.77 (0.042)	23.73 (0.042)	23.56 (0.042)	23.81 (0.042)	23.81 (0.042)	23.81 (0.042)	23.77 (0.042)
	105	23.71 (0.042)	23.67 (0.042)	23.64 (0.042)	23.46 (0.043)	23.72 (0.042)	23.72 (0.042)	23.72 (0.042)	23.67 (0.042)
	115	23.63 (0.042)	23.59 (0.042)	23.55 (0.042)	23.38 (0.043)	23.64 (0.042)	23.63 (0.042)	23.63 (0.042)	23.59 (0.042)
	125	23.55 (0.042)	23.51 (0.043)	23.48 (0.043)	23.31 (0.043)	23.56 (0.042)	23.56 (0.042)	23.56 (0.042)	23.52 (0.043)
	135	23.49 (0.043)	23.45 (0.043)	23.41 (0.043)	23.25 (0.043)	23.50 (0.043)	23.49 (0.043)	23.49 (0.043)	23.46 (0.043)

CONCRETE MASONRY CAVITY ASSEMBLIES

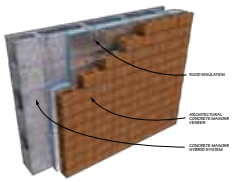
NO INTERIOR FINISHES

Assembly 3-9: Continuous insulation in cavity, 4-in. concrete masonry veneer
(Continued on next page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.27 (0.108)	9.15 (0.109)	9.04 (0.111)	8.67 (0.115)	9.41 (0.106)	9.33 (0.107)	9.26 (0.108)	8.96 (0.112)
	95	9.18 (0.109)	9.06 (0.110)	8.95 (0.112)	8.59 (0.116)	9.31 (0.107)	9.22 (0.108)	9.15 (0.109)	8.86 (0.113)
	105	9.10 (0.110)	8.98 (0.111)	8.87 (0.113)	8.52 (0.117)	9.21 (0.109)	9.13 (0.110)	9.05 (0.110)	8.77 (0.114)
	115	9.02 (0.111)	8.90 (0.112)	8.80 (0.114)	8.45 (0.118)	9.12 (0.110)	9.04 (0.111)	8.97 (0.112)	8.69 (0.115)
	125	8.96 (0.112)	8.84 (0.113)	8.74 (0.114)	8.40 (0.119)	9.05 (0.111)	8.96 (0.112)	8.89 (0.112)	8.62 (0.116)
	135	8.89 (0.112)	8.78 (0.114)	8.68 (0.115)	8.35 (0.120)	8.98 (0.111)	8.89 (0.112)	8.82 (0.113)	8.56 (0.117)
Closed cell spray polyurethane foam, 1 in.	85	11.07 (0.090)	10.95 (0.091)	10.84 (0.092)	10.47 (0.095)	11.21 (0.089)	11.13 (0.090)	11.06 (0.090)	10.76 (0.093)
	95	10.98 (0.091)	10.86 (0.092)	10.75 (0.093)	10.39 (0.096)	11.11 (0.090)	11.02 (0.091)	10.95 (0.091)	10.66 (0.094)
	105	10.90 (0.092)	10.78 (0.093)	10.67 (0.094)	10.32 (0.097)	11.01 (0.091)	10.93 (0.092)	10.85 (0.092)	10.57 (0.095)
	115	10.82 (0.092)	10.70 (0.093)	10.60 (0.094)	10.25 (0.098)	10.92 (0.092)	10.84 (0.092)	10.77 (0.093)	10.49 (0.095)
	125	10.76 (0.093)	10.64 (0.094)	10.54 (0.095)	10.20 (0.098)	10.85 (0.092)	10.76 (0.093)	10.69 (0.094)	10.42 (0.096)
	135	10.69 (0.094)	10.58 (0.095)	10.48 (0.095)	10.15 (0.099)	10.78 (0.093)	10.69 (0.094)	10.62 (0.094)	10.36 (0.097)
Polyisocyanurate, 1 in.	85	12.80 (0.078)	12.68 (0.079)	12.57 (0.080)	12.20 (0.082)	12.94 (0.077)	12.86 (0.078)	12.79 (0.078)	12.49 (0.080)
	95	12.71 (0.079)	12.59 (0.079)	12.48 (0.080)	12.12 (0.083)	12.84 (0.078)	12.75 (0.078)	12.68 (0.079)	12.39 (0.081)
	105	12.63 (0.079)	12.51 (0.080)	12.40 (0.081)	12.05 (0.083)	12.74 (0.078)	12.66 (0.079)	12.58 (0.079)	12.30 (0.081)
	115	12.55 (0.080)	12.43 (0.080)	12.33 (0.081)	11.98 (0.083)	12.65 (0.079)	12.57 (0.080)	12.50 (0.080)	12.22 (0.082)
	125	12.49 (0.080)	12.37 (0.081)	12.27 (0.082)	11.93 (0.084)	12.58 (0.080)	12.49 (0.080)	12.42 (0.081)	12.15 (0.082)
	135	12.42 (0.080)	12.31 (0.081)	12.21 (0.082)	11.88 (0.084)	12.51 (0.080)	12.42 (0.080)	12.35 (0.081)	12.09 (0.083)
Extruded polystyrene, 1 1/2 in.	85	11.77 (0.085)	11.65 (0.086)	11.54 (0.087)	11.17 (0.090)	11.91 (0.084)	11.83 (0.085)	11.76 (0.085)	11.46 (0.087)
	95	11.68 (0.086)	11.56 (0.087)	11.45 (0.087)	11.09 (0.090)	11.81 (0.085)	11.72 (0.085)	11.65 (0.086)	11.36 (0.088)
	105	11.60 (0.086)	11.48 (0.087)	11.37 (0.088)	11.02 (0.091)	11.71 (0.085)	11.63 (0.086)	11.55 (0.087)	11.27 (0.089)
	115	11.52 (0.087)	11.40 (0.088)	11.30 (0.088)	10.95 (0.091)	11.62 (0.086)	11.54 (0.087)	11.47 (0.087)	11.19 (0.089)
	125	11.46 (0.087)	11.34 (0.088)	11.24 (0.089)	10.90 (0.092)	11.55 (0.087)	11.46 (0.087)	11.39 (0.088)	11.12 (0.090)
	135	11.39 (0.088)	11.28 (0.089)	11.18 (0.089)	10.85 (0.092)	11.48 (0.087)	11.39 (0.088)	11.32 (0.088)	11.06 (0.090)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.17 (0.071)	14.05 (0.071)	13.94 (0.072)	13.57 (0.074)	14.31 (0.070)	14.23 (0.070)	14.16 (0.071)	13.86 (0.072)
	95	14.08 (0.071)	13.96 (0.072)	13.85 (0.072)	13.49 (0.074)	14.21 (0.070)	14.12 (0.071)	14.05 (0.071)	13.76 (0.073)
	105	14.00 (0.071)	13.88 (0.072)	13.77 (0.073)	13.42 (0.075)	14.11 (0.071)	14.03 (0.071)	13.95 (0.072)	13.67 (0.073)
	115	13.92 (0.072)	13.80 (0.072)	13.70 (0.073)	13.35 (0.075)	14.02 (0.071)	13.94 (0.072)	13.87 (0.072)	13.59 (0.074)
	125	13.86 (0.072)	13.74 (0.073)	13.64 (0.073)	13.30 (0.075)	13.95 (0.072)	13.86 (0.072)	13.79 (0.073)	13.52 (0.074)
	135	13.79 (0.072)	13.68 (0.073)	13.58 (0.074)	13.25 (0.075)	13.88 (0.072)	13.79 (0.072)	13.72 (0.073)	13.46 (0.074)
Polyisocyanurate, 1 1/2 in.	85	16.60 (0.060)	16.48 (0.061)	16.37 (0.061)	16.00 (0.062)	16.74 (0.060)	16.66 (0.060)	16.59 (0.060)	16.29 (0.061)
	95	16.51 (0.061)	16.39 (0.061)	16.28 (0.061)	15.92 (0.063)	16.64 (0.060)	16.55 (0.060)	16.48 (0.061)	16.19 (0.062)
	105	16.43 (0.061)	16.31 (0.061)	16.20 (0.062)	15.85 (0.063)	16.54 (0.060)	16.46 (0.061)	16.38 (0.061)	16.10 (0.062)
	115	16.35 (0.061)	16.23 (0.062)	16.13 (0.062)	15.78 (0.063)	16.45 (0.061)	16.37 (0.061)	16.30 (0.061)	16.02 (0.062)
	125	16.29 (0.061)	16.17 (0.062)	16.07 (0.062)	15.73 (0.064)	16.38 (0.061)	16.29 (0.061)	16.22 (0.062)	15.95 (0.063)
	135	16.22 (0.062)	16.11 (0.062)	16.01 (0.062)	15.68 (0.064)	16.31 (0.061)	16.22 (0.062)	16.15 (0.062)	15.89 (0.063)
Extruded polystyrene, 2 in.	85	14.27 (0.070)	14.15 (0.071)	14.04 (0.071)	13.67 (0.073)	14.41 (0.069)	14.33 (0.070)	14.26 (0.070)	13.96 (0.072)
	95	14.18 (0.071)	14.06 (0.071)	13.95 (0.072)	13.59 (0.074)	14.31 (0.070)	14.22 (0.070)	14.15 (0.071)	13.86 (0.072)
	105	14.10 (0.071)	13.98 (0.072)	13.87 (0.072)	13.52 (0.074)	14.21 (0.070)	14.13 (0.071)	14.05 (0.071)	13.77 (0.073)
	115	14.02 (0.071)	13.90 (0.072)	13.80 (0.072)	13.45 (0.074)	14.12 (0.071)	14.04 (0.071)	13.97 (0.072)	13.69 (0.073)
	125	13.96 (0.072)	13.84 (0.072)	13.74 (0.073)	13.40 (0.075)	14.05 (0.071)	13.96 (0.072)	13.89 (0.072)	13.62 (0.073)
	135	13.89 (0.072)	13.78 (0.073)	13.68 (0.073)	13.35 (0.075)	13.98 (0.072)	13.89 (0.072)	13.82 (0.072)	13.56 (0.074)
Closed cell spray polyurethane foam, 2 in.	85	17.27 (0.058)	17.15 (0.058)	17.04 (0.059)	16.67 (0.060)	17.41 (0.057)	17.33 (0.058)	17.26 (0.058)	16.96 (0.059)
	95	17.18 (0.058)	17.06 (0.059)	16.95 (0.059)	16.59 (0.060)	17.31 (0.058)	17.22 (0.058)	17.15 (0.058)	16.86 (0.059)
	105	17.10 (0.058)	16.98 (0.059)	16.87 (0.059)	16.52 (0.061)	17.21 (0.058)	17.13 (0.058)	17.05 (0.059)	16.77 (0.060)
	115	17.02 (0.059)	16.90 (0.059)	16.80 (0.060)	16.45 (0.061)	17.12 (0.058)	17.04 (0.059)	16.97 (0.059)	16.69 (0.060)
	125	16.96 (0.059)	16.84 (0.059)	16.74 (0.060)	16.40 (0.061)	17.05 (0.059)	16.96 (0.059)	16.89 (0.059)	16.62 (0.060)
	135	16.89 (0.059)	16.78 (0.060)	16.68 (0.060)	16.35 (0.061)	16.98 (0.059)	16.89 (0.059)	16.82 (0.059)	16.56 (0.060)
Polyisocyanurate, 2 in.	85	20.50 (0.049)	20.38 (0.049)	20.27 (0.049)	19.90 (0.050)	20.64 (0.048)	20.56 (0.049)	20.49 (0.049)	20.19 (0.050)
	95	20.41 (0.049)	20.29 (0.049)	20.18 (0.050)	19.82 (0.050)	20.54 (0.049)	20.45 (0.049)	20.38 (0.049)	20.09 (0.050)
	105	20.33 (0.049)	20.21 (0.049)	20.10 (0.050)	19.75 (0.051)	20.44 (0.049)	20.36 (0.049)	20.28 (0.049)	20.00 (0.050)
	115	20.25 (0.049)	20.13 (0.050)	20.03 (0.050)	19.68 (0.051)	20.35 (0.049)	20.27 (0.049)	20.20 (0.050)	19.92 (0.050)
	125	20.19 (0.050)	20.07 (0.050)	19.97 (0.050)	19.63 (0.051)	20.28 (0.049)	20.19 (0.050)	20.12 (0.050)	19.85 (0.050)
	135	20.12 (0.050)	20.01 (0.050)	19.91 (0.050)	19.58 (0.051)	20.21 (0.049)	20.12 (0.050)	20.05 (0.050)	19.79 (0.051)

*Assembly details page 67.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	9.42 (0.106)	9.38 (0.107)	9.35 (0.107)	9.17 (0.109)	9.43 (0.106)	9.43 (0.106)	9.43 (0.106)	9.38 (0.107)
	95	9.32 (0.107)	9.28 (0.108)	9.24 (0.108)	9.07 (0.110)	9.32 (0.107)	9.32 (0.107)	9.32 (0.107)	9.28 (0.108)
	105	9.22 (0.108)	9.18 (0.109)	9.15 (0.109)	8.97 (0.111)	9.23 (0.108)	9.23 (0.108)	9.23 (0.108)	9.18 (0.109)
	115	9.14 (0.109)	9.10 (0.110)	9.06 (0.110)	8.89 (0.112)	9.15 (0.109)	9.14 (0.109)	9.14 (0.109)	9.10 (0.110)
	125	9.06 (0.110)	9.02 (0.111)	8.99 (0.111)	8.82 (0.113)	9.07 (0.110)	9.07 (0.110)	9.07 (0.110)	9.03 (0.111)
	135	9.00 (0.111)	8.96 (0.112)	8.92 (0.112)	8.76 (0.114)	9.01 (0.111)	9.00 (0.111)	9.00 (0.111)	8.97 (0.112)
Closed cell spray polyurethane foam, 1 in.	85	11.22 (0.089)	11.18 (0.089)	11.15 (0.090)	10.97 (0.091)	11.23 (0.089)	11.23 (0.089)	11.23 (0.089)	11.18 (0.089)
	95	11.12 (0.090)	11.08 (0.090)	11.04 (0.091)	10.87 (0.092)	11.12 (0.090)	11.12 (0.090)	11.12 (0.090)	11.08 (0.090)
	105	11.02 (0.091)	10.98 (0.091)	10.95 (0.091)	10.77 (0.093)	11.03 (0.091)	11.03 (0.091)	11.03 (0.091)	10.98 (0.091)
	115	10.94 (0.091)	10.90 (0.092)	10.86 (0.092)	10.69 (0.094)	10.95 (0.091)	10.94 (0.091)	10.94 (0.091)	10.90 (0.092)
	125	10.86 (0.092)	10.82 (0.092)	10.79 (0.093)	10.62 (0.094)	10.87 (0.092)	10.87 (0.092)	10.87 (0.092)	10.83 (0.092)
	135	10.80 (0.093)	10.76 (0.093)	10.72 (0.093)	10.56 (0.095)	10.81 (0.093)	10.80 (0.093)	10.80 (0.093)	10.77 (0.093)
Polyisocyanurate, 1 in.	85	12.95 (0.077)	12.91 (0.077)	12.88 (0.078)	12.70 (0.079)	12.96 (0.077)	12.96 (0.077)	12.96 (0.077)	12.91 (0.077)
	95	12.85 (0.078)	12.81 (0.078)	12.77 (0.078)	12.60 (0.079)	12.85 (0.078)	12.85 (0.078)	12.85 (0.078)	12.81 (0.078)
	105	12.75 (0.078)	12.71 (0.079)	12.68 (0.079)	12.50 (0.080)	12.76 (0.078)	12.76 (0.078)	12.76 (0.078)	12.71 (0.079)
	115	12.67 (0.079)	12.63 (0.079)	12.59 (0.079)	12.42 (0.080)	12.68 (0.079)	12.67 (0.079)	12.67 (0.079)	12.63 (0.079)
	125	12.59 (0.079)	12.55 (0.080)	12.52 (0.080)	12.35 (0.081)	12.60 (0.079)	12.60 (0.079)	12.60 (0.079)	12.56 (0.080)
	135	12.53 (0.080)	12.49 (0.080)	12.45 (0.080)	12.29 (0.081)	12.54 (0.080)	12.53 (0.080)	12.53 (0.080)	12.50 (0.080)
Extruded polystyrene, 1 1/2 in.	85	11.92 (0.084)	11.88 (0.084)	11.85 (0.084)	11.67 (0.086)	11.93 (0.084)	11.93 (0.084)	11.93 (0.084)	11.88 (0.084)
	95	11.82 (0.085)	11.78 (0.085)	11.74 (0.085)	11.57 (0.086)	11.82 (0.085)	11.82 (0.085)	11.82 (0.085)	11.78 (0.085)
	105	11.72 (0.085)	11.68 (0.086)	11.65 (0.086)	11.47 (0.087)	11.73 (0.085)	11.73 (0.085)	11.73 (0.085)	11.68 (0.086)
	115	11.64 (0.086)	11.60 (0.086)	11.56 (0.086)	11.39 (0.088)	11.65 (0.086)	11.64 (0.086)	11.64 (0.086)	11.60 (0.086)
	125	11.56 (0.086)	11.52 (0.087)	11.49 (0.087)	11.32 (0.088)	11.57 (0.086)	11.57 (0.086)	11.57 (0.086)	11.53 (0.087)
	135	11.50 (0.087)	11.46 (0.087)	11.42 (0.088)	11.26 (0.089)	11.51 (0.087)	11.50 (0.087)	11.50 (0.087)	11.47 (0.087)
Closed cell spray polyurethane foam, 1 1/2 in.	85	14.32 (0.070)	14.28 (0.070)	14.25 (0.070)	14.07 (0.071)	14.33 (0.070)	14.33 (0.070)	14.33 (0.070)	14.28 (0.070)
	95	14.22 (0.070)	14.18 (0.071)	14.14 (0.071)	13.97 (0.072)	14.22 (0.070)	14.22 (0.070)	14.22 (0.070)	14.18 (0.071)
	105	14.12 (0.071)	14.08 (0.071)	14.05 (0.071)	13.87 (0.072)	14.13 (0.071)	14.13 (0.071)	14.13 (0.071)	14.08 (0.071)
	115	14.04 (0.071)	14.00 (0.071)	13.96 (0.072)	13.79 (0.072)	14.05 (0.071)	14.04 (0.071)	14.04 (0.071)	14.00 (0.071)
	125	13.96 (0.072)	13.92 (0.072)	13.89 (0.072)	13.72 (0.073)	13.97 (0.072)	13.97 (0.072)	13.97 (0.072)	13.93 (0.072)
	135	13.90 (0.072)	13.86 (0.072)	13.82 (0.072)	13.66 (0.073)	13.91 (0.072)	13.90 (0.072)	13.90 (0.072)	13.87 (0.072)
Polyisocyanurate, 1 1/2 in.	85	16.75 (0.060)	16.71 (0.060)	16.68 (0.060)	16.50 (0.061)	16.76 (0.060)	16.76 (0.060)	16.76 (0.060)	16.71 (0.060)
	95	16.65 (0.060)	16.61 (0.060)	16.57 (0.060)	16.40 (0.061)	16.65 (0.060)	16.65 (0.060)	16.65 (0.060)	16.61 (0.060)
	105	16.55 (0.060)	16.51 (0.061)	16.48 (0.061)	16.30 (0.061)	16.56 (0.060)	16.56 (0.060)	16.56 (0.060)	16.51 (0.061)
	115	16.47 (0.061)	16.43 (0.061)	16.39 (0.061)	16.22 (0.062)	16.48 (0.061)	16.47 (0.061)	16.47 (0.061)	16.43 (0.061)
	125	16.39 (0.061)	16.35 (0.061)	16.32 (0.061)	16.15 (0.062)	16.40 (0.061)	16.40 (0.061)	16.40 (0.061)	16.36 (0.061)
	135	16.33 (0.061)	16.29 (0.061)	16.25 (0.062)	16.09 (0.062)	16.34 (0.061)	16.33 (0.061)	16.33 (0.061)	16.30 (0.061)
Extruded polystyrene, 2 in.	85	14.42 (0.069)	14.38 (0.070)	14.35 (0.070)	14.17 (0.071)	14.43 (0.069)	14.43 (0.069)	14.43 (0.069)	14.38 (0.070)
	95	14.32 (0.070)	14.28 (0.070)	14.24 (0.070)	14.07 (0.071)	14.32 (0.070)	14.32 (0.070)	14.32 (0.070)	14.28 (0.070)
	105	14.22 (0.070)	14.18 (0.071)	14.15 (0.071)	13.97 (0.072)	14.23 (0.070)	14.23 (0.070)	14.23 (0.070)	14.18 (0.071)
	115	14.14 (0.071)	14.10 (0.071)	14.06 (0.071)	13.89 (0.072)	14.15 (0.071)	14.14 (0.071)	14.14 (0.071)	14.10 (0.071)
	125	14.06 (0.071)	14.02 (0.071)	13.99 (0.072)	13.82 (0.072)	14.07 (0.071)	14.07 (0.071)	14.07 (0.071)	14.03 (0.071)
	135	14.00 (0.071)	13.96 (0.072)	13.92 (0.072)	13.76 (0.073)	14.01 (0.071)	14.00 (0.071)	14.00 (0.071)	13.97 (0.072)
Closed cell spray polyurethane foam, 2 in.	85	17.42 (0.057)	17.38 (0.058)	17.35 (0.058)	17.17 (0.058)	17.43 (0.057)	17.43 (0.057)	17.43 (0.057)	17.38 (0.058)
	95	17.32 (0.058)	17.28 (0.058)	17.24 (0.058)	17.07 (0.059)	17.32 (0.058)	17.32 (0.058)	17.32 (0.058)	17.28 (0.058)
	105	17.22 (0.058)	17.18 (0.058)	17.15 (0.058)	16.97 (0.059)	17.23 (0.058)	17.23 (0.058)	17.23 (0.058)	17.18 (0.058)
	115	17.14 (0.058)	17.10 (0.058)	17.06 (0.059)	16.89 (0.059)	17.15 (0.058)	17.14 (0.058)	17.14 (0.058)	17.10 (0.058)
	125	17.06 (0.059)	17.02 (0.059)	16.99 (0.059)	16.82 (0.059)	17.07 (0.059)	17.07 (0.059)	17.07 (0.059)	17.03 (0.059)
	135	17.00 (0.059)	16.96 (0.059)	16.92 (0.059)	16.76 (0.060)	17.01 (0.059)	17.00 (0.059)	17.00 (0.059)	16.97 (0.059)
Polyisocyanurate, 2 in.	85	20.65 (0.048)	20.61 (0.049)	20.58 (0.049)	20.40 (0.049)	20.66 (0.048)	20.66 (0.048)	20.66 (0.048)	20.61 (0.049)
	95	20.55 (0.049)	20.51 (0.049)	20.47 (0.049)	20.30 (0.049)	20.55 (0.049)	20.55 (0.049)	20.55 (0.049)	20.51 (0.049)
	105	20.45 (0.049)	20.41 (0.049)	20.38 (0.049)	20.20 (0.049)	20.46 (0.049)	20.46 (0.049)	20.46 (0.049)	20.41 (0.049)
	115	20.37 (0.049)	20.33 (0.049)	20.29 (0.049)	20.12 (0.050)	20.38 (0.049)	20.37 (0.049)	20.37 (0.049)	20.33 (0.049)
	125	20.29 (0.049)	20.25 (0.049)	20.22 (0.049)	20.05 (0.050)	20.30 (0.049)	20.30 (0.049)	20.30 (0.049)	20.26 (0.049)
	135	20.23 (0.049)	20.19 (0.050)	20.15 (0.050)	19.99 (0.050)	20.24 (0.049)	20.23 (0.049)	20.23 (0.049)	20.20 (0.050)

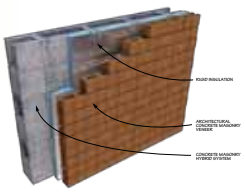
CONCRETE MASONRY CAVITY ASSEMBLIES
NO INTERIOR FINISHES

Assembly 3-9: Continuous insulation in cavity, 4-in. concrete masonry veneer (Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	16.77 (0.060)	16.65 (0.060)	16.54 (0.060)	16.17 (0.062)	16.91 (0.059)	16.83 (0.059)	16.76 (0.060)	16.46 (0.061)
	95	16.68 (0.060)	16.56 (0.060)	16.45 (0.061)	16.09 (0.062)	16.81 (0.060)	16.72 (0.060)	16.65 (0.060)	16.36 (0.061)
	105	16.60 (0.060)	16.48 (0.061)	16.37 (0.061)	16.02 (0.062)	16.71 (0.060)	16.63 (0.060)	16.55 (0.060)	16.27 (0.061)
	115	16.52 (0.061)	16.40 (0.061)	16.30 (0.061)	15.95 (0.063)	16.62 (0.060)	16.54 (0.060)	16.47 (0.061)	16.19 (0.062)
	125	16.46 (0.061)	16.34 (0.061)	16.24 (0.062)	15.90 (0.063)	16.55 (0.060)	16.46 (0.061)	16.39 (0.061)	16.12 (0.062)
	135	16.39 (0.061)	16.28 (0.061)	16.18 (0.062)	15.85 (0.063)	16.48 (0.061)	16.39 (0.061)	16.32 (0.061)	16.06 (0.062)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.27 (0.049)	20.15 (0.050)	20.04 (0.050)	19.67 (0.051)	20.41 (0.049)	20.33 (0.049)	20.26 (0.049)	19.96 (0.050)
	95	20.18 (0.050)	20.06 (0.050)	19.95 (0.050)	19.59 (0.051)	20.31 (0.049)	20.22 (0.049)	20.15 (0.050)	19.86 (0.050)
	105	20.10 (0.050)	19.98 (0.050)	19.87 (0.050)	19.52 (0.051)	20.21 (0.049)	20.13 (0.050)	20.05 (0.050)	19.77 (0.051)
	115	20.02 (0.050)	19.90 (0.050)	19.80 (0.051)	19.45 (0.051)	20.12 (0.050)	20.04 (0.050)	19.97 (0.050)	19.69 (0.051)
	125	19.96 (0.050)	19.84 (0.050)	19.74 (0.051)	19.40 (0.052)	20.05 (0.050)	19.96 (0.050)	19.89 (0.050)	19.62 (0.051)
	135	19.89 (0.050)	19.78 (0.051)	19.68 (0.051)	19.35 (0.052)	19.98 (0.050)	19.89 (0.050)	19.82 (0.050)	19.56 (0.051)
Polyisocyanurate, 2 1/2 in.	85	23.90 (0.042)	23.78 (0.042)	23.67 (0.042)	23.30 (0.043)	24.04 (0.042)	23.96 (0.042)	23.89 (0.042)	23.59 (0.042)
	95	23.81 (0.042)	23.69 (0.042)	23.58 (0.042)	23.22 (0.043)	23.94 (0.042)	23.85 (0.042)	23.78 (0.042)	23.49 (0.043)
	105	23.73 (0.042)	23.61 (0.042)	23.50 (0.043)	23.15 (0.043)	23.84 (0.042)	23.76 (0.042)	23.68 (0.042)	23.40 (0.043)
	115	23.65 (0.042)	23.53 (0.042)	23.43 (0.043)	23.08 (0.043)	23.75 (0.042)	23.67 (0.042)	23.60 (0.042)	23.32 (0.043)
	125	23.59 (0.042)	23.47 (0.043)	23.37 (0.043)	23.03 (0.043)	23.68 (0.042)	23.59 (0.042)	23.52 (0.043)	23.25 (0.043)
	135	23.52 (0.043)	23.41 (0.043)	23.31 (0.043)	22.98 (0.044)	23.61 (0.042)	23.52 (0.043)	23.45 (0.043)	23.19 (0.043)
Extruded polystyrene, 3 in.	85	19.27 (0.052)	19.15 (0.052)	19.04 (0.053)	18.67 (0.054)	19.41 (0.052)	19.33 (0.052)	19.26 (0.052)	18.96 (0.053)
	95	19.18 (0.052)	19.06 (0.052)	18.95 (0.053)	18.59 (0.054)	19.31 (0.052)	19.22 (0.052)	19.15 (0.052)	18.86 (0.053)
	105	19.10 (0.052)	18.98 (0.053)	18.87 (0.053)	18.52 (0.054)	19.21 (0.052)	19.13 (0.052)	19.05 (0.052)	18.77 (0.053)
	115	19.02 (0.053)	18.90 (0.053)	18.80 (0.053)	18.45 (0.054)	19.12 (0.052)	19.04 (0.053)	18.97 (0.053)	18.69 (0.054)
	125	18.96 (0.053)	18.84 (0.053)	18.74 (0.053)	18.40 (0.054)	19.05 (0.053)	18.96 (0.053)	18.89 (0.053)	18.62 (0.054)
	135	18.89 (0.053)	18.78 (0.053)	18.68 (0.054)	18.35 (0.054)	18.98 (0.053)	18.89 (0.053)	18.82 (0.053)	18.56 (0.054)
Closed cell spray polyurethane foam, 3 in.	85	23.27 (0.043)	23.15 (0.043)	23.04 (0.043)	22.67 (0.044)	23.41 (0.043)	23.33 (0.043)	23.26 (0.043)	22.96 (0.044)
	95	23.18 (0.043)	23.06 (0.043)	22.95 (0.044)	22.59 (0.044)	23.31 (0.043)	23.22 (0.043)	23.15 (0.043)	22.86 (0.044)
	105	23.10 (0.043)	22.98 (0.044)	22.87 (0.044)	22.52 (0.044)	23.21 (0.043)	23.13 (0.043)	23.05 (0.043)	22.77 (0.044)
	115	23.02 (0.043)	22.90 (0.044)	22.80 (0.044)	22.45 (0.045)	23.12 (0.043)	23.04 (0.043)	22.97 (0.044)	22.69 (0.044)
	125	22.96 (0.044)	22.84 (0.044)	22.74 (0.044)	22.40 (0.045)	23.05 (0.043)	22.96 (0.044)	22.89 (0.044)	22.62 (0.044)
	135	22.89 (0.044)	22.78 (0.044)	22.68 (0.044)	22.35 (0.045)	22.98 (0.044)	22.89 (0.044)	22.82 (0.044)	22.56 (0.044)
Polyisocyanurate, 3 in.	85	27.30 (0.037)	27.18 (0.037)	27.07 (0.037)	26.70 (0.037)	27.44 (0.036)	27.36 (0.037)	27.29 (0.037)	26.99 (0.037)
	95	27.21 (0.037)	27.09 (0.037)	26.98 (0.037)	26.62 (0.038)	27.34 (0.037)	27.25 (0.037)	27.18 (0.037)	26.89 (0.037)
	105	27.13 (0.037)	27.01 (0.037)	26.90 (0.037)	26.55 (0.038)	27.24 (0.037)	27.16 (0.037)	27.08 (0.037)	26.80 (0.037)
	115	27.05 (0.037)	26.93 (0.037)	26.83 (0.037)	26.48 (0.038)	27.15 (0.037)	27.07 (0.037)	27.00 (0.037)	26.72 (0.037)
	125	26.99 (0.037)	26.87 (0.037)	26.77 (0.037)	26.43 (0.038)	27.08 (0.037)	26.99 (0.037)	26.92 (0.037)	26.65 (0.038)
	135	26.92 (0.037)	26.81 (0.037)	26.71 (0.037)	26.38 (0.038)	27.01 (0.037)	26.92 (0.037)	26.85 (0.037)	26.59 (0.038)
Extruded polystyrene, 3 1/2 in.	85	21.77 (0.046)	21.65 (0.046)	21.54 (0.046)	21.17 (0.047)	21.91 (0.046)	21.83 (0.046)	21.76 (0.046)	21.46 (0.047)
	95	21.68 (0.046)	21.56 (0.046)	21.45 (0.047)	21.09 (0.047)	21.81 (0.046)	21.72 (0.046)	21.65 (0.046)	21.36 (0.047)
	105	21.60 (0.046)	21.48 (0.047)	21.37 (0.047)	21.02 (0.048)	21.71 (0.046)	21.63 (0.046)	21.55 (0.046)	21.27 (0.047)
	115	21.52 (0.046)	21.40 (0.047)	21.30 (0.047)	20.95 (0.048)	21.62 (0.046)	21.54 (0.046)	21.47 (0.047)	21.19 (0.047)
	125	21.46 (0.047)	21.34 (0.047)	21.24 (0.047)	20.90 (0.048)	21.55 (0.046)	21.46 (0.047)	21.39 (0.047)	21.12 (0.047)
	135	21.39 (0.047)	21.28 (0.047)	21.18 (0.047)	20.85 (0.048)	21.48 (0.047)	21.39 (0.047)	21.32 (0.047)	21.06 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.27 (0.038)	26.15 (0.038)	26.04 (0.038)	25.67 (0.039)	26.41 (0.038)	26.33 (0.038)	26.26 (0.038)	25.96 (0.039)
	95	26.18 (0.038)	26.06 (0.038)	25.95 (0.039)	25.59 (0.039)	26.31 (0.038)	26.22 (0.038)	26.15 (0.038)	25.86 (0.039)
	105	26.10 (0.038)	25.98 (0.038)	25.87 (0.039)	25.52 (0.039)	26.21 (0.038)	26.13 (0.038)	26.05 (0.038)	25.77 (0.039)
	115	26.02 (0.038)	25.90 (0.039)	25.80 (0.039)	25.45 (0.039)	26.12 (0.038)	26.04 (0.038)	25.97 (0.039)	25.69 (0.039)
	125	25.96 (0.039)	25.84 (0.039)	25.74 (0.039)	25.40 (0.039)	26.05 (0.038)	25.96 (0.039)	25.89 (0.039)	25.62 (0.039)
	135	25.89 (0.039)	25.78 (0.039)	25.68 (0.039)	25.35 (0.039)	25.98 (0.038)	25.89 (0.039)	25.82 (0.039)	25.56 (0.039)
Polyisocyanurate, 3 1/2 in.	85	30.70 (0.033)	30.58 (0.033)	30.47 (0.033)	30.10 (0.033)	30.84 (0.032)	30.76 (0.033)	30.69 (0.033)	30.39 (0.033)
	95	30.61 (0.033)	30.49 (0.033)	30.38 (0.033)	30.02 (0.033)	30.74 (0.033)	30.65 (0.033)	30.58 (0.033)	30.29 (0.033)
	105	30.53 (0.033)	30.41 (0.033)	30.30 (0.033)	29.95 (0.033)	30.64 (0.033)	30.56 (0.033)	30.48 (0.033)	30.20 (0.033)
	115	30.45 (0.033)	30.33 (0.033)	30.23 (0.033)	29.88 (0.033)	30.55 (0.033)	30.47 (0.033)	30.40 (0.033)	30.12 (0.033)
	125	30.39 (0.033)	30.27 (0.033)	30.17 (0.033)	29.83 (0.034)	30.48 (0.033)	30.39 (0.033)	30.32 (0.033)	30.05 (0.033)
	135	30.32 (0.033)	30.21 (0.033)	30.11 (0.033)	29.78 (0.034)	30.41 (0.033)	30.32 (0.033)	30.25 (0.033)	29.99 (0.033)

*Assembly details page 67.



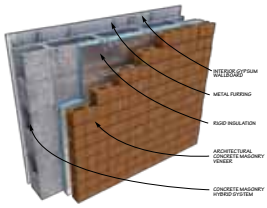
Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	16.92 (0.059)	16.88 (0.059)	16.85 (0.059)	16.67 (0.060)	16.93 (0.059)	16.93 (0.059)	16.93 (0.059)	16.88 (0.059)
	95	16.82 (0.059)	16.78 (0.060)	16.74 (0.060)	16.57 (0.060)	16.82 (0.059)	16.82 (0.059)	16.82 (0.059)	16.78 (0.060)
	105	16.72 (0.060)	16.68 (0.060)	16.65 (0.060)	16.47 (0.061)	16.73 (0.060)	16.73 (0.060)	16.73 (0.060)	16.68 (0.060)
	115	16.64 (0.060)	16.60 (0.060)	16.56 (0.060)	16.39 (0.061)	16.65 (0.060)	16.64 (0.060)	16.64 (0.060)	16.60 (0.060)
	125	16.56 (0.060)	16.52 (0.061)	16.49 (0.061)	16.32 (0.061)	16.57 (0.060)	16.57 (0.060)	16.57 (0.060)	16.53 (0.060)
	135	16.50 (0.061)	16.46 (0.061)	16.42 (0.061)	16.26 (0.061)	16.51 (0.061)	16.50 (0.061)	16.50 (0.061)	16.47 (0.061)
Closed cell spray polyurethane foam, 2 1/2 in.	85	20.42 (0.049)	20.38 (0.049)	20.35 (0.049)	20.17 (0.050)	20.43 (0.049)	20.43 (0.049)	20.43 (0.049)	20.38 (0.049)
	95	20.32 (0.049)	20.28 (0.049)	20.24 (0.049)	20.07 (0.050)	20.32 (0.049)	20.32 (0.049)	20.32 (0.049)	20.28 (0.049)
	105	20.22 (0.049)	20.18 (0.050)	20.15 (0.050)	19.97 (0.050)	20.23 (0.049)	20.23 (0.049)	20.23 (0.049)	20.18 (0.050)
	115	20.14 (0.050)	20.10 (0.050)	20.06 (0.050)	19.89 (0.050)	20.15 (0.050)	20.14 (0.050)	20.14 (0.050)	20.10 (0.050)
	125	20.06 (0.050)	20.02 (0.050)	19.99 (0.050)	19.82 (0.050)	20.07 (0.050)	20.07 (0.050)	20.07 (0.050)	20.03 (0.050)
	135	20.00 (0.050)	19.96 (0.050)	19.92 (0.050)	19.76 (0.051)	20.01 (0.050)	20.00 (0.050)	20.00 (0.050)	19.97 (0.050)
Polyisocyanurate, 2 1/2 in.	85	24.05 (0.042)	24.01 (0.042)	23.98 (0.042)	23.80 (0.042)	24.06 (0.042)	24.06 (0.042)	24.06 (0.042)	24.01 (0.042)
	95	23.95 (0.042)	23.91 (0.042)	23.87 (0.042)	23.70 (0.042)	23.95 (0.042)	23.95 (0.042)	23.95 (0.042)	23.91 (0.042)
	105	23.85 (0.042)	23.81 (0.042)	23.78 (0.042)	23.60 (0.042)	23.86 (0.042)	23.86 (0.042)	23.86 (0.042)	23.81 (0.042)
	115	23.77 (0.042)	23.73 (0.042)	23.69 (0.042)	23.52 (0.043)	23.78 (0.042)	23.77 (0.042)	23.77 (0.042)	23.73 (0.042)
	125	23.69 (0.042)	23.65 (0.042)	23.62 (0.042)	23.45 (0.043)	23.70 (0.042)	23.70 (0.042)	23.70 (0.042)	23.66 (0.042)
	135	23.63 (0.042)	23.59 (0.042)	23.55 (0.042)	23.39 (0.043)	23.64 (0.042)	23.63 (0.042)	23.63 (0.042)	23.60 (0.042)
Extruded polystyrene, 3 in.	85	19.42 (0.051)	19.38 (0.052)	19.35 (0.052)	19.17 (0.052)	19.43 (0.051)	19.43 (0.051)	19.43 (0.051)	19.38 (0.052)
	95	19.32 (0.052)	19.28 (0.052)	19.24 (0.052)	19.07 (0.052)	19.32 (0.052)	19.32 (0.052)	19.32 (0.052)	19.28 (0.052)
	105	19.22 (0.052)	19.18 (0.052)	19.15 (0.052)	18.97 (0.053)	19.23 (0.052)	19.23 (0.052)	19.23 (0.052)	19.18 (0.052)
	115	19.14 (0.052)	19.10 (0.052)	19.06 (0.052)	18.89 (0.053)	19.15 (0.052)	19.14 (0.052)	19.14 (0.052)	19.10 (0.052)
	125	19.06 (0.052)	19.02 (0.053)	18.99 (0.053)	18.82 (0.053)	19.07 (0.052)	19.07 (0.052)	19.07 (0.052)	19.03 (0.053)
	135	19.00 (0.053)	18.96 (0.053)	18.92 (0.053)	18.76 (0.053)	19.01 (0.053)	19.00 (0.053)	19.00 (0.053)	18.97 (0.053)
Closed cell spray polyurethane foam, 3 in.	85	23.42 (0.043)	23.38 (0.043)	23.35 (0.043)	23.17 (0.043)	23.43 (0.043)	23.43 (0.043)	23.43 (0.043)	23.38 (0.043)
	95	23.32 (0.043)	23.28 (0.043)	23.24 (0.043)	23.07 (0.043)	23.32 (0.043)	23.32 (0.043)	23.32 (0.043)	23.28 (0.043)
	105	23.22 (0.043)	23.18 (0.043)	23.15 (0.043)	22.97 (0.044)	23.23 (0.043)	23.23 (0.043)	23.23 (0.043)	23.18 (0.043)
	115	23.14 (0.043)	23.10 (0.043)	23.06 (0.043)	22.89 (0.044)	23.15 (0.043)	23.14 (0.043)	23.14 (0.043)	23.10 (0.043)
	125	23.06 (0.043)	23.02 (0.043)	22.99 (0.044)	22.82 (0.044)	23.07 (0.043)	23.07 (0.043)	23.07 (0.043)	23.03 (0.043)
	135	23.00 (0.043)	22.96 (0.044)	22.92 (0.044)	22.76 (0.044)	23.01 (0.043)	23.00 (0.043)	23.00 (0.043)	22.97 (0.044)
Polyisocyanurate, 3 in.	85	27.45 (0.036)	27.41 (0.036)	27.38 (0.037)	27.20 (0.037)	27.46 (0.036)	27.46 (0.036)	27.46 (0.036)	27.41 (0.036)
	95	27.35 (0.037)	27.31 (0.037)	27.27 (0.037)	27.10 (0.037)	27.35 (0.037)	27.35 (0.037)	27.35 (0.037)	27.31 (0.037)
	105	27.25 (0.037)	27.21 (0.037)	27.18 (0.037)	27.00 (0.037)	27.26 (0.037)	27.26 (0.037)	27.26 (0.037)	27.21 (0.037)
	115	27.17 (0.037)	27.13 (0.037)	27.09 (0.037)	26.92 (0.037)	27.18 (0.037)	27.17 (0.037)	27.17 (0.037)	27.13 (0.037)
	125	27.09 (0.037)	27.05 (0.037)	27.02 (0.037)	26.85 (0.037)	27.10 (0.037)	27.10 (0.037)	27.10 (0.037)	27.06 (0.037)
	135	27.03 (0.037)	26.99 (0.037)	26.95 (0.037)	26.79 (0.037)	27.04 (0.037)	27.03 (0.037)	27.03 (0.037)	27.00 (0.037)
Extruded polystyrene, 3 1/2 in.	85	21.92 (0.046)	21.88 (0.046)	21.85 (0.046)	21.67 (0.046)	21.93 (0.046)	21.93 (0.046)	21.93 (0.046)	21.88 (0.046)
	95	21.82 (0.046)	21.78 (0.046)	21.74 (0.046)	21.57 (0.046)	21.82 (0.046)	21.82 (0.046)	21.82 (0.046)	21.78 (0.046)
	105	21.72 (0.046)	21.68 (0.046)	21.65 (0.046)	21.47 (0.047)	21.73 (0.046)	21.73 (0.046)	21.73 (0.046)	21.68 (0.046)
	115	21.64 (0.046)	21.60 (0.046)	21.56 (0.046)	21.39 (0.047)	21.65 (0.046)	21.64 (0.046)	21.64 (0.046)	21.60 (0.046)
	125	21.56 (0.046)	21.52 (0.046)	21.49 (0.047)	21.32 (0.047)	21.57 (0.046)	21.57 (0.046)	21.57 (0.046)	21.53 (0.046)
	135	21.50 (0.047)	21.46 (0.047)	21.42 (0.047)	21.26 (0.047)	21.51 (0.046)	21.50 (0.047)	21.50 (0.047)	21.47 (0.047)
Closed cell spray polyurethane foam, 3 1/2 in.	85	26.42 (0.038)	26.38 (0.038)	26.35 (0.038)	26.17 (0.038)	26.43 (0.038)	26.43 (0.038)	26.43 (0.038)	26.38 (0.038)
	95	26.32 (0.038)	26.28 (0.038)	26.24 (0.038)	26.07 (0.038)	26.32 (0.038)	26.32 (0.038)	26.32 (0.038)	26.28 (0.038)
	105	26.22 (0.038)	26.18 (0.038)	26.15 (0.038)	25.97 (0.038)	26.23 (0.038)	26.23 (0.038)	26.23 (0.038)	26.18 (0.038)
	115	26.14 (0.038)	26.10 (0.038)	26.06 (0.038)	25.89 (0.039)	26.15 (0.038)	26.14 (0.038)	26.14 (0.038)	26.10 (0.038)
	125	26.06 (0.038)	26.02 (0.038)	25.99 (0.038)	25.82 (0.039)	26.07 (0.038)	26.07 (0.038)	26.07 (0.038)	26.03 (0.038)
	135	26.00 (0.038)	25.96 (0.039)	25.92 (0.039)	25.76 (0.039)	26.01 (0.038)	26.00 (0.038)	26.00 (0.038)	25.97 (0.039)
Polyisocyanurate, 3 1/2 in.	85	30.85 (0.032)	30.81 (0.032)	30.78 (0.032)	30.60 (0.033)	30.86 (0.032)	30.86 (0.032)	30.86 (0.032)	30.81 (0.032)
	95	30.75 (0.033)	30.71 (0.033)	30.67 (0.033)	30.50 (0.033)	30.75 (0.033)	30.75 (0.033)	30.75 (0.033)	30.71 (0.033)
	105	30.65 (0.033)	30.61 (0.033)	30.58 (0.033)	30.40 (0.033)	30.66 (0.033)	30.66 (0.033)	30.66 (0.033)	30.61 (0.033)
	115	30.57 (0.033)	30.53 (0.033)	30.49 (0.033)	30.32 (0.033)	30.58 (0.033)	30.57 (0.033)	30.57 (0.033)	30.53 (0.033)
	125	30.49 (0.033)	30.45 (0.033)	30.42 (0.033)	30.25 (0.033)	30.50 (0.033)	30.50 (0.033)	30.50 (0.033)	30.46 (0.033)
	135	30.43 (0.033)	30.39 (0.033)	30.35 (0.033)	30.19 (0.033)	30.44 (0.033)	30.43 (0.033)	30.43 (0.033)	30.40 (0.033)

Assembly 3-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued on next page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.37 (0.096)	10.25 (0.098)	10.14 (0.099)	9.77 (0.102)	10.51 (0.095)	10.43 (0.096)	10.36 (0.097)	10.06 (0.099)
	95	10.28 (0.097)	10.16 (0.098)	10.05 (0.099)	9.69 (0.103)	10.41 (0.096)	10.32 (0.097)	10.25 (0.098)	9.96 (0.100)
	105	10.20 (0.098)	10.08 (0.099)	9.97 (0.100)	9.62 (0.104)	10.31 (0.097)	10.23 (0.098)	10.15 (0.098)	9.87 (0.101)
	115	10.12 (0.099)	10.00 (0.100)	9.90 (0.101)	9.55 (0.105)	10.22 (0.098)	10.14 (0.099)	10.07 (0.099)	9.79 (0.102)
	125	10.06 (0.099)	9.94 (0.101)	9.84 (0.102)	9.50 (0.105)	10.15 (0.099)	10.06 (0.099)	9.99 (0.100)	9.72 (0.103)
	135	9.99 (0.100)	9.88 (0.101)	9.78 (0.102)	9.45 (0.106)	10.08 (0.099)	9.99 (0.100)	9.92 (0.101)	9.66 (0.104)
Closed cell spray polyurethane foam, 1 in.	85	12.17 (0.082)	12.05 (0.083)	11.94 (0.084)	11.57 (0.086)	12.31 (0.081)	12.23 (0.082)	12.16 (0.082)	11.86 (0.084)
	95	12.08 (0.083)	11.96 (0.084)	11.85 (0.084)	11.49 (0.087)	12.21 (0.082)	12.12 (0.082)	12.05 (0.083)	11.76 (0.085)
	105	12.00 (0.083)	11.88 (0.084)	11.77 (0.085)	11.42 (0.088)	12.11 (0.083)	12.03 (0.083)	11.95 (0.084)	11.67 (0.086)
	115	11.92 (0.084)	11.80 (0.085)	11.70 (0.085)	11.35 (0.088)	12.02 (0.083)	11.94 (0.084)	11.87 (0.084)	11.59 (0.086)
	125	11.86 (0.084)	11.74 (0.085)	11.64 (0.086)	11.30 (0.089)	11.95 (0.084)	11.86 (0.084)	11.79 (0.085)	11.52 (0.087)
	135	11.79 (0.085)	11.68 (0.086)	11.58 (0.086)	11.25 (0.089)	11.88 (0.084)	11.79 (0.085)	11.72 (0.085)	11.46 (0.087)
Polyisocyanurate, 1 in.	85	13.90 (0.072)	13.78 (0.073)	13.67 (0.073)	13.30 (0.075)	14.04 (0.071)	13.96 (0.072)	13.89 (0.072)	13.59 (0.074)
	95	13.81 (0.072)	13.69 (0.073)	13.58 (0.074)	13.22 (0.076)	13.94 (0.072)	13.85 (0.072)	13.78 (0.073)	13.49 (0.074)
	105	13.73 (0.073)	13.61 (0.073)	13.50 (0.074)	13.15 (0.076)	13.84 (0.072)	13.76 (0.073)	13.68 (0.073)	13.40 (0.075)
	115	13.65 (0.073)	13.53 (0.074)	13.43 (0.074)	13.08 (0.076)	13.75 (0.073)	13.67 (0.073)	13.60 (0.074)	13.32 (0.075)
	125	13.59 (0.074)	13.47 (0.074)	13.37 (0.075)	13.03 (0.077)	13.68 (0.073)	13.59 (0.074)	13.52 (0.074)	13.25 (0.075)
	135	13.52 (0.074)	13.41 (0.075)	13.31 (0.075)	12.98 (0.077)	13.61 (0.073)	13.52 (0.074)	13.45 (0.074)	13.19 (0.076)
Extruded polystyrene, 1 1/2 in.	85	12.87 (0.078)	12.75 (0.078)	12.64 (0.079)	12.27 (0.081)	13.01 (0.077)	12.93 (0.077)	12.86 (0.078)	12.56 (0.080)
	95	12.78 (0.078)	12.66 (0.079)	12.55 (0.080)	12.19 (0.082)	12.91 (0.077)	12.82 (0.078)	12.75 (0.078)	12.46 (0.080)
	105	12.70 (0.079)	12.58 (0.080)	12.47 (0.080)	12.12 (0.083)	12.81 (0.078)	12.73 (0.079)	12.65 (0.079)	12.37 (0.081)
	115	12.62 (0.079)	12.50 (0.080)	12.40 (0.081)	12.05 (0.083)	12.72 (0.079)	12.64 (0.079)	12.57 (0.080)	12.29 (0.081)
	125	12.56 (0.080)	12.44 (0.080)	12.34 (0.081)	12.00 (0.083)	12.65 (0.079)	12.56 (0.080)	12.49 (0.080)	12.22 (0.082)
	135	12.49 (0.080)	12.38 (0.081)	12.28 (0.081)	11.95 (0.084)	12.58 (0.080)	12.49 (0.080)	12.42 (0.081)	12.16 (0.082)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.27 (0.065)	15.15 (0.066)	15.04 (0.066)	14.67 (0.068)	15.41 (0.065)	15.33 (0.065)	15.26 (0.066)	14.96 (0.067)
	95	15.18 (0.066)	15.06 (0.066)	14.95 (0.067)	14.59 (0.069)	15.31 (0.065)	15.22 (0.066)	15.15 (0.066)	14.86 (0.067)
	105	15.10 (0.066)	14.98 (0.067)	14.87 (0.067)	14.52 (0.069)	15.21 (0.066)	15.13 (0.066)	15.05 (0.066)	14.77 (0.068)
	115	15.02 (0.067)	14.90 (0.067)	14.80 (0.068)	14.45 (0.069)	15.12 (0.066)	15.04 (0.066)	14.97 (0.067)	14.69 (0.068)
	125	14.96 (0.067)	14.84 (0.067)	14.74 (0.068)	14.40 (0.069)	15.05 (0.066)	14.96 (0.067)	14.89 (0.067)	14.62 (0.068)
	135	14.89 (0.067)	14.78 (0.068)	14.68 (0.068)	14.35 (0.070)	14.98 (0.067)	14.89 (0.067)	14.82 (0.067)	14.56 (0.069)
Polyisocyanurate, 1 1/2 in.	85	17.70 (0.057)	17.58 (0.057)	17.47 (0.057)	17.10 (0.058)	17.84 (0.056)	17.76 (0.056)	17.69 (0.057)	17.39 (0.057)
	95	17.61 (0.057)	17.49 (0.057)	17.38 (0.058)	17.02 (0.059)	17.74 (0.056)	17.65 (0.057)	17.58 (0.057)	17.29 (0.058)
	105	17.53 (0.057)	17.41 (0.057)	17.30 (0.058)	16.95 (0.059)	17.64 (0.057)	17.56 (0.057)	17.48 (0.057)	17.20 (0.058)
	115	17.45 (0.057)	17.33 (0.058)	17.23 (0.058)	16.88 (0.059)	17.55 (0.057)	17.47 (0.057)	17.40 (0.057)	17.12 (0.058)
	125	17.39 (0.058)	17.27 (0.058)	17.17 (0.058)	16.83 (0.059)	17.48 (0.057)	17.39 (0.057)	17.32 (0.058)	17.05 (0.059)
	135	17.32 (0.058)	17.21 (0.058)	17.11 (0.058)	16.78 (0.060)	17.41 (0.057)	17.32 (0.058)	17.25 (0.058)	16.99 (0.059)
Extruded polystyrene, 2 in.	85	15.37 (0.065)	15.25 (0.066)	15.14 (0.066)	14.77 (0.068)	15.51 (0.064)	15.43 (0.065)	15.36 (0.065)	15.06 (0.066)
	95	15.28 (0.065)	15.16 (0.066)	15.05 (0.066)	14.69 (0.068)	15.41 (0.065)	15.32 (0.065)	15.25 (0.066)	14.96 (0.067)
	105	15.20 (0.066)	15.08 (0.066)	14.97 (0.067)	14.62 (0.068)	15.31 (0.065)	15.23 (0.066)	15.15 (0.066)	14.87 (0.067)
	115	15.12 (0.066)	15.00 (0.067)	14.90 (0.067)	14.55 (0.069)	15.22 (0.066)	15.14 (0.066)	15.07 (0.066)	14.79 (0.068)
	125	15.06 (0.066)	14.94 (0.067)	14.84 (0.067)	14.50 (0.069)	15.15 (0.066)	15.06 (0.066)	14.99 (0.067)	14.72 (0.068)
	135	14.99 (0.067)	14.88 (0.067)	14.78 (0.068)	14.45 (0.069)	15.08 (0.066)	14.99 (0.067)	14.92 (0.067)	14.66 (0.068)
Closed cell spray polyurethane foam, 2 in.	85	18.37 (0.054)	18.25 (0.055)	18.14 (0.055)	17.77 (0.056)	18.51 (0.054)	18.43 (0.054)	18.36 (0.054)	18.06 (0.055)
	95	18.28 (0.055)	18.16 (0.055)	18.05 (0.055)	17.69 (0.057)	18.41 (0.054)	18.32 (0.055)	18.25 (0.055)	17.96 (0.056)
	105	18.20 (0.055)	18.08 (0.055)	17.97 (0.056)	17.62 (0.057)	18.31 (0.055)	18.23 (0.055)	18.15 (0.055)	17.87 (0.056)
	115	18.12 (0.055)	18.00 (0.056)	17.90 (0.056)	17.55 (0.057)	18.22 (0.055)	18.14 (0.055)	18.07 (0.055)	17.79 (0.056)
	125	18.06 (0.055)	17.94 (0.056)	17.84 (0.056)	17.50 (0.057)	18.15 (0.055)	18.06 (0.055)	17.99 (0.056)	17.72 (0.056)
	135	17.99 (0.056)	17.88 (0.056)	17.78 (0.056)	17.45 (0.057)	18.08 (0.055)	17.99 (0.056)	17.92 (0.056)	17.66 (0.057)
Polyisocyanurate, 2 in.	85	21.60 (0.046)	21.48 (0.047)	21.37 (0.047)	21.00 (0.048)	21.74 (0.046)	21.66 (0.046)	21.59 (0.046)	21.29 (0.047)
	95	21.51 (0.046)	21.39 (0.047)	21.28 (0.047)	20.92 (0.048)	21.64 (0.046)	21.55 (0.046)	21.48 (0.047)	21.19 (0.047)
	105	21.43 (0.047)	21.31 (0.047)	21.20 (0.047)	20.85 (0.048)	21.54 (0.046)	21.46 (0.047)	21.38 (0.047)	21.10 (0.047)
	115	21.35 (0.047)	21.23 (0.047)	21.13 (0.047)	20.78 (0.048)	21.45 (0.047)	21.37 (0.047)	21.30 (0.047)	21.02 (0.048)
	125	21.29 (0.047)	21.17 (0.047)	21.07 (0.047)	20.73 (0.048)	21.38 (0.047)	21.29 (0.047)	21.22 (0.047)	20.95 (0.048)
	135	21.22 (0.047)	21.11 (0.047)	21.01 (0.048)	20.68 (0.048)	21.31 (0.047)	21.22 (0.047)	21.15 (0.047)	20.89 (0.048)

*Assembly details page 67.



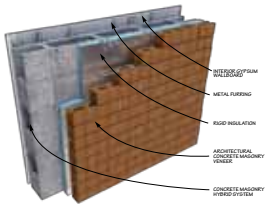
Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 1 in.	85	10.52 (0.095)	10.48 (0.095)	10.45 (0.096)	10.27 (0.097)	10.53 (0.095)	10.53 (0.095)	10.53 (0.095)	10.48 (0.095)
	95	10.42 (0.096)	10.38 (0.096)	10.34 (0.097)	10.17 (0.098)	10.42 (0.096)	10.42 (0.096)	10.42 (0.096)	10.38 (0.096)
	105	10.32 (0.097)	10.28 (0.097)	10.25 (0.098)	10.07 (0.099)	10.33 (0.097)	10.33 (0.097)	10.33 (0.097)	10.28 (0.097)
	115	10.24 (0.098)	10.20 (0.098)	10.16 (0.098)	9.99 (0.100)	10.25 (0.098)	10.24 (0.098)	10.24 (0.098)	10.20 (0.098)
	125	10.16 (0.098)	10.12 (0.099)	10.09 (0.099)	9.92 (0.101)	10.17 (0.098)	10.17 (0.098)	10.17 (0.098)	10.13 (0.099)
	135	10.10 (0.099)	10.06 (0.099)	10.02 (0.100)	9.86 (0.101)	10.11 (0.099)	10.10 (0.099)	10.10 (0.099)	10.07 (0.099)
Closed cell spray polyurethane foam, 1 in.	85	12.32 (0.081)	12.28 (0.081)	12.25 (0.082)	12.07 (0.083)	12.33 (0.081)	12.33 (0.081)	12.33 (0.081)	12.28 (0.081)
	95	12.22 (0.082)	12.18 (0.082)	12.14 (0.082)	11.97 (0.084)	12.22 (0.082)	12.22 (0.082)	12.22 (0.082)	12.18 (0.082)
	105	12.12 (0.083)	12.08 (0.083)	12.05 (0.083)	11.87 (0.084)	12.13 (0.082)	12.13 (0.082)	12.13 (0.082)	12.08 (0.083)
	115	12.04 (0.083)	12.00 (0.083)	11.96 (0.084)	11.79 (0.085)	12.05 (0.083)	12.04 (0.083)	12.04 (0.083)	12.00 (0.083)
	125	11.96 (0.084)	11.92 (0.084)	11.89 (0.084)	11.72 (0.085)	11.97 (0.084)	11.97 (0.084)	11.97 (0.084)	11.93 (0.084)
	135	11.90 (0.084)	11.86 (0.084)	11.82 (0.085)	11.66 (0.086)	11.91 (0.084)	11.90 (0.084)	11.90 (0.084)	11.87 (0.084)
Polyisocyanurate, 1 in.	85	14.05 (0.071)	14.01 (0.071)	13.98 (0.072)	13.80 (0.072)	14.06 (0.071)	14.06 (0.071)	14.06 (0.071)	14.01 (0.071)
	95	13.95 (0.072)	13.91 (0.072)	13.87 (0.072)	13.70 (0.073)	13.95 (0.072)	13.95 (0.072)	13.95 (0.072)	13.91 (0.072)
	105	13.85 (0.072)	13.81 (0.072)	13.78 (0.073)	13.60 (0.074)	13.86 (0.072)	13.86 (0.072)	13.86 (0.072)	13.81 (0.072)
	115	13.77 (0.073)	13.73 (0.073)	13.69 (0.073)	13.52 (0.074)	13.78 (0.073)	13.77 (0.073)	13.77 (0.073)	13.73 (0.073)
	125	13.69 (0.073)	13.65 (0.073)	13.62 (0.073)	13.45 (0.074)	13.70 (0.073)	13.70 (0.073)	13.70 (0.073)	13.66 (0.073)
	135	13.63 (0.073)	13.59 (0.074)	13.55 (0.074)	13.39 (0.075)	13.64 (0.073)	13.63 (0.073)	13.63 (0.073)	13.60 (0.074)
Extruded polystyrene, 1 1/2 in.	85	13.02 (0.077)	12.98 (0.077)	12.95 (0.077)	12.77 (0.078)	13.03 (0.077)	13.03 (0.077)	13.03 (0.077)	12.98 (0.077)
	95	12.92 (0.077)	12.88 (0.078)	12.84 (0.078)	12.67 (0.079)	12.92 (0.077)	12.92 (0.077)	12.92 (0.077)	12.88 (0.078)
	105	12.82 (0.078)	12.78 (0.078)	12.75 (0.078)	12.57 (0.080)	12.83 (0.078)	12.83 (0.078)	12.83 (0.078)	12.78 (0.078)
	115	12.74 (0.079)	12.70 (0.079)	12.66 (0.079)	12.49 (0.080)	12.75 (0.078)	12.74 (0.078)	12.74 (0.078)	12.70 (0.079)
	125	12.66 (0.079)	12.62 (0.079)	12.59 (0.079)	12.42 (0.080)	12.67 (0.079)	12.67 (0.079)	12.67 (0.079)	12.63 (0.079)
	135	12.60 (0.079)	12.56 (0.080)	12.52 (0.080)	12.36 (0.081)	12.61 (0.079)	12.60 (0.079)	12.60 (0.079)	12.57 (0.080)
Closed cell spray polyurethane foam, 1 1/2 in.	85	15.42 (0.065)	15.38 (0.065)	15.35 (0.065)	15.17 (0.066)	15.43 (0.065)	15.43 (0.065)	15.43 (0.065)	15.38 (0.065)
	95	15.32 (0.065)	15.28 (0.065)	15.24 (0.066)	15.07 (0.066)	15.32 (0.065)	15.32 (0.065)	15.32 (0.065)	15.28 (0.065)
	105	15.22 (0.066)	15.18 (0.066)	15.15 (0.066)	14.97 (0.067)	15.23 (0.066)	15.23 (0.066)	15.23 (0.066)	15.18 (0.066)
	115	15.14 (0.066)	15.10 (0.066)	15.06 (0.066)	14.89 (0.067)	15.15 (0.066)	15.14 (0.066)	15.14 (0.066)	15.10 (0.066)
	125	15.06 (0.066)	15.02 (0.067)	14.99 (0.067)	14.82 (0.067)	15.07 (0.066)	15.07 (0.066)	15.07 (0.066)	15.03 (0.067)
	135	15.00 (0.067)	14.96 (0.067)	14.92 (0.067)	14.76 (0.068)	15.01 (0.067)	15.00 (0.067)	15.00 (0.067)	14.97 (0.067)
Polyisocyanurate, 1 1/2 in.	85	17.85 (0.056)	17.81 (0.056)	17.78 (0.056)	17.60 (0.057)	17.86 (0.056)	17.86 (0.056)	17.86 (0.056)	17.81 (0.056)
	95	17.75 (0.056)	17.71 (0.056)	17.67 (0.057)	17.50 (0.057)	17.75 (0.056)	17.75 (0.056)	17.75 (0.056)	17.71 (0.056)
	105	17.65 (0.057)	17.61 (0.057)	17.58 (0.057)	17.40 (0.057)	17.66 (0.057)	17.66 (0.057)	17.66 (0.057)	17.61 (0.057)
	115	17.57 (0.057)	17.53 (0.057)	17.49 (0.057)	17.32 (0.058)	17.58 (0.057)	17.57 (0.057)	17.57 (0.057)	17.53 (0.057)
	125	17.49 (0.057)	17.45 (0.057)	17.42 (0.057)	17.25 (0.058)	17.50 (0.057)	17.50 (0.057)	17.50 (0.057)	17.46 (0.057)
	135	17.43 (0.057)	17.39 (0.058)	17.35 (0.058)	17.19 (0.058)	17.44 (0.057)	17.43 (0.057)	17.43 (0.057)	17.40 (0.057)
Extruded polystyrene, 2 in.	85	15.52 (0.064)	15.48 (0.065)	15.45 (0.065)	15.27 (0.065)	15.53 (0.064)	15.53 (0.064)	15.53 (0.064)	15.48 (0.065)
	95	15.42 (0.065)	15.38 (0.065)	15.34 (0.065)	15.17 (0.066)	15.42 (0.065)	15.42 (0.065)	15.42 (0.065)	15.38 (0.065)
	105	15.32 (0.065)	15.28 (0.065)	15.25 (0.066)	15.07 (0.066)	15.33 (0.065)	15.33 (0.065)	15.33 (0.065)	15.28 (0.065)
	115	15.24 (0.066)	15.20 (0.066)	15.16 (0.066)	14.99 (0.067)	15.25 (0.066)	15.24 (0.066)	15.24 (0.066)	15.20 (0.066)
	125	15.16 (0.066)	15.12 (0.066)	15.09 (0.066)	14.92 (0.067)	15.17 (0.066)	15.17 (0.066)	15.17 (0.066)	15.13 (0.066)
	135	15.10 (0.066)	15.06 (0.066)	15.02 (0.067)	14.86 (0.067)	15.11 (0.066)	15.10 (0.066)	15.10 (0.066)	15.07 (0.066)
Closed cell spray polyurethane foam, 2 in.	85	18.52 (0.054)	18.48 (0.054)	18.45 (0.054)	18.27 (0.055)	18.53 (0.054)	18.53 (0.054)	18.53 (0.054)	18.48 (0.054)
	95	18.42 (0.054)	18.38 (0.054)	18.34 (0.055)	18.17 (0.055)	18.42 (0.054)	18.42 (0.054)	18.42 (0.054)	18.38 (0.054)
	105	18.32 (0.055)	18.28 (0.055)	18.25 (0.055)	18.07 (0.055)	18.33 (0.055)	18.33 (0.055)	18.33 (0.055)	18.28 (0.055)
	115	18.24 (0.055)	18.20 (0.055)	18.16 (0.055)	17.99 (0.056)	18.25 (0.055)	18.24 (0.055)	18.24 (0.055)	18.20 (0.055)
	125	18.16 (0.055)	18.12 (0.055)	18.09 (0.055)	17.92 (0.056)	18.17 (0.055)	18.17 (0.055)	18.17 (0.055)	18.13 (0.055)
	135	18.10 (0.055)	18.06 (0.055)	18.02 (0.056)	17.86 (0.056)	18.11 (0.055)	18.10 (0.055)	18.10 (0.055)	18.07 (0.055)
Polyisocyanurate, 2 in.	85	21.75 (0.046)	21.71 (0.046)	21.68 (0.046)	21.50 (0.047)	21.76 (0.046)	21.76 (0.046)	21.76 (0.046)	21.71 (0.046)
	95	21.65 (0.046)	21.61 (0.046)	21.57 (0.046)	21.40 (0.047)	21.65 (0.046)	21.65 (0.046)	21.65 (0.046)	21.61 (0.046)
	105	21.55 (0.046)	21.51 (0.046)	21.48 (0.047)	21.30 (0.047)	21.56 (0.046)	21.56 (0.046)	21.56 (0.046)	21.51 (0.046)
	115	21.47 (0.047)	21.43 (0.047)	21.39 (0.047)	21.22 (0.047)	21.48 (0.047)	21.47 (0.047)	21.47 (0.047)	21.43 (0.047)
	125	21.39 (0.047)	21.35 (0.047)	21.32 (0.047)	21.15 (0.047)	21.40 (0.047)	21.40 (0.047)	21.40 (0.047)	21.36 (0.047)
	135	21.33 (0.047)	21.29 (0.047)	21.25 (0.047)	21.09 (0.047)	21.34 (0.047)	21.33 (0.047)	21.33 (0.047)	21.30 (0.047)

Assembly 3-10: Continuous insulation in cavity, 4-in. concrete masonry veneer, 1/2 in. gypsum wallboard on furring
(Continued from previous page)

Concrete Masonry Assembly R-Values (hr·ft²·°F/Btu) and U-Factors (Btu/hr·ft²·°F)

Insulation type and thickness:	Density of CMU, PCF	6-in. Concrete Masonry				8-in. Concrete			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	17.87 (0.056)	17.75 (0.056)	17.64 (0.057)	17.27 (0.058)	18.01 (0.056)	17.93 (0.056)	17.86 (0.056)	17.56 (0.057)
	95	17.78 (0.056)	17.66 (0.057)	17.55 (0.057)	17.19 (0.058)	17.91 (0.056)	17.82 (0.056)	17.75 (0.056)	17.46 (0.057)
	105	17.70 (0.057)	17.58 (0.057)	17.47 (0.057)	17.12 (0.058)	17.81 (0.056)	17.73 (0.056)	17.65 (0.057)	17.37 (0.058)
	115	17.62 (0.057)	17.50 (0.057)	17.40 (0.057)	17.05 (0.059)	17.72 (0.056)	17.64 (0.057)	17.57 (0.057)	17.29 (0.058)
	125	17.56 (0.057)	17.44 (0.057)	17.34 (0.058)	17.00 (0.059)	17.65 (0.057)	17.56 (0.057)	17.49 (0.057)	17.22 (0.058)
	135	17.49 (0.057)	17.38 (0.058)	17.28 (0.058)	16.95 (0.059)	17.58 (0.057)	17.49 (0.057)	17.42 (0.057)	17.16 (0.058)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.37 (0.047)	21.25 (0.047)	21.14 (0.047)	20.77 (0.048)	21.51 (0.046)	21.43 (0.047)	21.36 (0.047)	21.06 (0.047)
	95	21.28 (0.047)	21.16 (0.047)	21.05 (0.047)	20.69 (0.048)	21.41 (0.047)	21.32 (0.047)	21.25 (0.047)	20.96 (0.048)
	105	21.20 (0.047)	21.08 (0.047)	20.97 (0.048)	20.62 (0.049)	21.31 (0.047)	21.23 (0.047)	21.15 (0.047)	20.87 (0.048)
	115	21.12 (0.047)	21.00 (0.048)	20.90 (0.048)	20.55 (0.049)	21.22 (0.047)	21.14 (0.047)	21.07 (0.047)	20.79 (0.048)
	125	21.06 (0.047)	20.94 (0.048)	20.84 (0.048)	20.50 (0.049)	21.15 (0.047)	21.06 (0.047)	20.99 (0.048)	20.72 (0.048)
	135	20.99 (0.048)	20.88 (0.048)	20.78 (0.048)	20.45 (0.049)	21.08 (0.047)	20.99 (0.048)	20.92 (0.048)	20.66 (0.048)
Polyisocyanurate, 2 1/2 in.	85	25.00 (0.040)	24.88 (0.040)	24.77 (0.040)	24.40 (0.041)	25.14 (0.040)	25.06 (0.040)	24.99 (0.040)	24.69 (0.040)
	95	24.91 (0.040)	24.79 (0.040)	24.68 (0.041)	24.32 (0.041)	25.04 (0.040)	24.95 (0.040)	24.88 (0.040)	24.59 (0.041)
	105	24.83 (0.040)	24.71 (0.040)	24.60 (0.041)	24.25 (0.041)	24.94 (0.040)	24.86 (0.040)	24.78 (0.040)	24.50 (0.041)
	115	24.75 (0.040)	24.63 (0.041)	24.53 (0.041)	24.18 (0.041)	24.85 (0.040)	24.77 (0.040)	24.70 (0.040)	24.42 (0.041)
	125	24.69 (0.041)	24.57 (0.041)	24.47 (0.041)	24.13 (0.041)	24.78 (0.040)	24.69 (0.040)	24.62 (0.041)	24.35 (0.041)
	135	24.62 (0.041)	24.51 (0.041)	24.41 (0.041)	24.08 (0.042)	24.71 (0.040)	24.62 (0.041)	24.55 (0.041)	24.29 (0.041)
Extruded polystyrene, 3 in.	85	20.37 (0.049)	20.25 (0.049)	20.14 (0.050)	19.77 (0.051)	20.51 (0.049)	20.43 (0.049)	20.36 (0.049)	20.06 (0.050)
	95	20.28 (0.049)	20.16 (0.050)	20.05 (0.050)	19.69 (0.051)	20.41 (0.049)	20.32 (0.049)	20.25 (0.049)	19.96 (0.050)
	105	20.20 (0.050)	20.08 (0.050)	19.97 (0.050)	19.62 (0.051)	20.31 (0.049)	20.23 (0.049)	20.15 (0.050)	19.87 (0.050)
	115	20.12 (0.050)	20.00 (0.050)	19.90 (0.050)	19.55 (0.051)	20.22 (0.049)	20.14 (0.050)	20.07 (0.050)	19.79 (0.051)
	125	20.06 (0.050)	19.94 (0.050)	19.84 (0.050)	19.50 (0.051)	20.15 (0.050)	20.06 (0.050)	19.99 (0.050)	19.72 (0.051)
	135	19.99 (0.050)	19.88 (0.050)	19.78 (0.051)	19.45 (0.051)	20.08 (0.050)	19.99 (0.050)	19.92 (0.050)	19.66 (0.051)
Closed cell spray polyurethane foam, 3 in.	85	24.37 (0.041)	24.25 (0.041)	24.14 (0.041)	23.77 (0.042)	24.51 (0.041)	24.43 (0.041)	24.36 (0.041)	24.06 (0.042)
	95	24.28 (0.041)	24.16 (0.041)	24.05 (0.042)	23.69 (0.042)	24.41 (0.041)	24.32 (0.041)	24.25 (0.041)	23.96 (0.042)
	105	24.20 (0.041)	24.08 (0.042)	23.97 (0.042)	23.62 (0.042)	24.31 (0.041)	24.23 (0.041)	24.15 (0.041)	23.87 (0.042)
	115	24.12 (0.041)	24.00 (0.042)	23.90 (0.042)	23.55 (0.042)	24.22 (0.041)	24.14 (0.041)	24.07 (0.042)	23.79 (0.042)
	125	24.06 (0.042)	23.94 (0.042)	23.84 (0.042)	23.50 (0.043)	24.15 (0.041)	24.06 (0.042)	23.99 (0.042)	23.72 (0.042)
	135	23.99 (0.042)	23.88 (0.042)	23.78 (0.042)	23.45 (0.043)	24.08 (0.042)	23.99 (0.042)	23.92 (0.042)	23.66 (0.042)
Polyisocyanurate, 3 in.	85	28.40 (0.035)	28.28 (0.035)	28.17 (0.035)	27.80 (0.036)	28.54 (0.035)	28.46 (0.035)	28.39 (0.035)	28.09 (0.036)
	95	28.31 (0.035)	28.19 (0.035)	28.08 (0.036)	27.72 (0.036)	28.44 (0.035)	28.35 (0.035)	28.28 (0.035)	27.99 (0.036)
	105	28.23 (0.035)	28.11 (0.036)	28.00 (0.036)	27.65 (0.036)	28.34 (0.035)	28.26 (0.035)	28.18 (0.035)	27.90 (0.036)
	115	28.15 (0.036)	28.03 (0.036)	27.93 (0.036)	27.58 (0.036)	28.25 (0.035)	28.17 (0.035)	28.10 (0.036)	27.82 (0.036)
	125	28.09 (0.036)	27.97 (0.036)	27.87 (0.036)	27.53 (0.036)	28.18 (0.035)	28.09 (0.036)	28.02 (0.036)	27.75 (0.036)
	135	28.02 (0.036)	27.91 (0.036)	27.81 (0.036)	27.48 (0.036)	28.11 (0.036)	28.02 (0.036)	27.95 (0.036)	27.69 (0.036)
Extruded polystyrene, 3 1/2 in.	85	22.87 (0.044)	22.75 (0.044)	22.64 (0.044)	22.27 (0.045)	23.01 (0.043)	22.93 (0.044)	22.86 (0.044)	22.56 (0.044)
	95	22.78 (0.044)	22.66 (0.044)	22.55 (0.044)	22.19 (0.045)	22.91 (0.044)	22.82 (0.044)	22.75 (0.044)	22.46 (0.045)
	105	22.70 (0.044)	22.58 (0.044)	22.47 (0.044)	22.12 (0.045)	22.81 (0.044)	22.73 (0.044)	22.65 (0.044)	22.37 (0.045)
	115	22.62 (0.044)	22.50 (0.044)	22.40 (0.045)	22.05 (0.045)	22.72 (0.044)	22.64 (0.044)	22.57 (0.044)	22.29 (0.045)
	125	22.56 (0.044)	22.44 (0.045)	22.34 (0.045)	22.00 (0.045)	22.65 (0.044)	22.56 (0.044)	22.49 (0.044)	22.22 (0.045)
	135	22.49 (0.044)	22.38 (0.045)	22.28 (0.045)	21.95 (0.046)	22.58 (0.044)	22.49 (0.044)	22.42 (0.045)	22.16 (0.045)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.37 (0.037)	27.25 (0.037)	27.14 (0.037)	26.77 (0.037)	27.51 (0.036)	27.43 (0.036)	27.36 (0.037)	27.06 (0.037)
	95	27.28 (0.037)	27.16 (0.037)	27.05 (0.037)	26.69 (0.037)	27.41 (0.036)	27.32 (0.037)	27.25 (0.037)	26.96 (0.037)
	105	27.20 (0.037)	27.08 (0.037)	26.97 (0.037)	26.62 (0.038)	27.31 (0.037)	27.23 (0.037)	27.15 (0.037)	26.87 (0.037)
	115	27.12 (0.037)	27.00 (0.037)	26.90 (0.037)	26.55 (0.038)	27.22 (0.037)	27.14 (0.037)	27.07 (0.037)	26.79 (0.037)
	125	27.06 (0.037)	26.94 (0.037)	26.84 (0.037)	26.50 (0.038)	27.15 (0.037)	27.06 (0.037)	26.99 (0.037)	26.72 (0.037)
	135	26.99 (0.037)	26.88 (0.037)	26.78 (0.037)	26.45 (0.038)	27.08 (0.037)	26.99 (0.037)	26.92 (0.037)	26.66 (0.038)
Polyisocyanurate, 3 1/2 in.	85	31.80 (0.031)	31.68 (0.032)	31.57 (0.032)	31.20 (0.032)	31.94 (0.031)	31.86 (0.031)	31.79 (0.031)	31.49 (0.032)
	95	31.71 (0.032)	31.59 (0.032)	31.48 (0.032)	31.12 (0.032)	31.84 (0.031)	31.75 (0.031)	31.68 (0.032)	31.39 (0.032)
	105	31.63 (0.032)	31.51 (0.032)	31.40 (0.032)	31.05 (0.032)	31.74 (0.032)	31.66 (0.032)	31.58 (0.032)	31.30 (0.032)
	115	31.55 (0.032)	31.43 (0.032)	31.33 (0.032)	30.98 (0.032)	31.65 (0.032)	31.57 (0.032)	31.50 (0.032)	31.22 (0.032)
	125	31.49 (0.032)	31.37 (0.032)	31.27 (0.032)	30.93 (0.032)	31.58 (0.032)	31.49 (0.032)	31.42 (0.032)	31.15 (0.032)
	135	31.42 (0.032)	31.31 (0.032)	31.21 (0.032)	30.88 (0.032)	31.51 (0.032)	31.42 (0.032)	31.35 (0.032)	31.09 (0.032)

*Assembly details page 67.



Insulation type and thickness:	Density of CMU, PCF	10-in. Concrete Masonry				12-in. Concrete Masonry			
		Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted	Ungrouted	Lightly Reinforced	Heavily Reinforced	Fully Grouted
Extruded polystyrene, 2 1/2 in.	85	17.82 (0.055)	17.98 (0.056)	17.95 (0.056)	17.77 (0.056)	18.03 (0.055)	18.03 (0.055)	18.03 (0.055)	17.98 (0.056)
	95	17.78 (0.056)	17.88 (0.056)	17.84 (0.056)	17.67 (0.057)	17.92 (0.056)	17.92 (0.056)	17.92 (0.056)	17.88 (0.056)
	105	17.82 (0.056)	17.78 (0.056)	17.75 (0.056)	17.57 (0.057)	17.83 (0.056)	17.83 (0.056)	17.83 (0.056)	17.78 (0.056)
	115	17.74 (0.056)	17.70 (0.057)	17.66 (0.057)	17.49 (0.057)	17.75 (0.056)	17.74 (0.056)	17.74 (0.056)	17.70 (0.056)
	125	17.66 (0.057)	17.62 (0.057)	17.59 (0.057)	17.42 (0.057)	17.67 (0.057)	17.67 (0.057)	17.67 (0.057)	17.63 (0.057)
	135	17.60 (0.057)	17.56 (0.057)	17.52 (0.057)	17.36 (0.058)	17.61 (0.057)	17.60 (0.057)	17.60 (0.057)	17.57 (0.057)
Closed cell spray polyurethane foam, 2 1/2 in.	85	21.32 (0.046)	21.48 (0.047)	21.45 (0.047)	21.27 (0.047)	21.53 (0.046)	21.53 (0.046)	21.53 (0.046)	21.48 (0.047)
	95	21.28 (0.047)	21.38 (0.047)	21.34 (0.047)	21.17 (0.047)	21.42 (0.047)	21.42 (0.047)	21.42 (0.047)	21.38 (0.047)
	105	21.32 (0.047)	21.28 (0.047)	21.25 (0.047)	21.07 (0.047)	21.33 (0.047)	21.33 (0.047)	21.33 (0.047)	21.28 (0.047)
	115	21.24 (0.047)	21.20 (0.047)	21.16 (0.047)	20.99 (0.048)	21.25 (0.047)	21.24 (0.047)	21.24 (0.047)	21.20 (0.047)
	125	21.16 (0.047)	21.12 (0.047)	21.09 (0.047)	20.92 (0.048)	21.17 (0.047)	21.17 (0.047)	21.17 (0.047)	21.13 (0.047)
	135	21.10 (0.047)	21.06 (0.047)	21.02 (0.048)	20.86 (0.048)	21.11 (0.047)	21.10 (0.047)	21.10 (0.047)	21.07 (0.047)
Polyisocyanurate, 2 1/2 in.	85	25.09 (0.040)	25.11 (0.040)	25.08 (0.040)	24.90 (0.040)	25.16 (0.040)	25.16 (0.040)	25.16 (0.040)	25.11 (0.040)
	95	25.05 (0.040)	25.01 (0.040)	24.97 (0.040)	24.80 (0.040)	25.05 (0.040)	25.05 (0.040)	25.05 (0.040)	25.01 (0.040)
	105	24.95 (0.040)	24.91 (0.040)	24.88 (0.040)	24.70 (0.040)	24.96 (0.040)	24.96 (0.040)	24.96 (0.040)	24.91 (0.040)
	115	24.87 (0.040)	24.83 (0.040)	24.79 (0.040)	24.62 (0.041)	24.88 (0.040)	24.87 (0.040)	24.87 (0.040)	24.83 (0.040)
	125	24.79 (0.040)	24.75 (0.040)	24.72 (0.040)	24.55 (0.041)	24.80 (0.040)	24.80 (0.040)	24.80 (0.040)	24.76 (0.040)
	135	24.73 (0.040)	24.69 (0.041)	24.65 (0.041)	24.49 (0.041)	24.74 (0.040)	24.73 (0.040)	24.73 (0.040)	24.70 (0.040)
Extruded polystyrene, 3 in.	85	20.32 (0.049)	20.48 (0.049)	20.45 (0.049)	20.27 (0.049)	20.53 (0.049)	20.53 (0.049)	20.53 (0.049)	20.48 (0.049)
	95	20.28 (0.049)	20.38 (0.049)	20.34 (0.049)	20.17 (0.050)	20.42 (0.049)	20.42 (0.049)	20.42 (0.049)	20.38 (0.049)
	105	20.32 (0.049)	20.28 (0.049)	20.25 (0.049)	20.07 (0.050)	20.33 (0.049)	20.33 (0.049)	20.33 (0.049)	20.28 (0.049)
	115	20.24 (0.049)	20.20 (0.050)	20.16 (0.050)	19.99 (0.050)	20.25 (0.049)	20.24 (0.049)	20.24 (0.049)	20.20 (0.050)
	125	20.16 (0.050)	20.12 (0.050)	20.09 (0.050)	19.92 (0.050)	20.17 (0.050)	20.17 (0.050)	20.17 (0.050)	20.13 (0.050)
	135	20.10 (0.050)	20.06 (0.050)	20.02 (0.050)	19.86 (0.050)	20.11 (0.050)	20.10 (0.050)	20.10 (0.050)	20.07 (0.050)
Closed cell spray polyurethane foam, 3 in.	85	24.32 (0.041)	24.48 (0.041)	24.45 (0.041)	24.27 (0.041)	24.53 (0.041)	24.53 (0.041)	24.53 (0.041)	24.48 (0.041)
	95	24.28 (0.041)	24.38 (0.041)	24.34 (0.041)	24.17 (0.041)	24.42 (0.041)	24.42 (0.041)	24.42 (0.041)	24.38 (0.041)
	105	24.32 (0.041)	24.28 (0.041)	24.25 (0.041)	24.07 (0.042)	24.33 (0.041)	24.33 (0.041)	24.33 (0.041)	24.28 (0.041)
	115	24.24 (0.041)	24.20 (0.041)	24.16 (0.041)	23.99 (0.042)	24.25 (0.041)	24.24 (0.041)	24.24 (0.041)	24.20 (0.041)
	125	24.16 (0.041)	24.12 (0.041)	24.09 (0.042)	23.92 (0.042)	24.17 (0.041)	24.17 (0.041)	24.17 (0.041)	24.13 (0.041)
	135	24.10 (0.041)	24.06 (0.042)	24.02 (0.042)	23.86 (0.042)	24.11 (0.041)	24.10 (0.041)	24.10 (0.041)	24.07 (0.042)
Polyisocyanurate, 3 in.	85	28.40 (0.035)	28.51 (0.035)	28.48 (0.035)	28.30 (0.035)	28.56 (0.035)	28.56 (0.035)	28.56 (0.035)	28.51 (0.035)
	95	28.31 (0.035)	28.41 (0.035)	28.37 (0.035)	28.20 (0.035)	28.45 (0.035)	28.45 (0.035)	28.45 (0.035)	28.41 (0.035)
	105	28.35 (0.035)	28.31 (0.035)	28.28 (0.035)	28.10 (0.036)	28.36 (0.035)	28.36 (0.035)	28.36 (0.035)	28.31 (0.035)
	115	28.27 (0.035)	28.23 (0.035)	28.19 (0.035)	28.02 (0.036)	28.28 (0.035)	28.27 (0.035)	28.27 (0.035)	28.23 (0.035)
	125	28.19 (0.035)	28.15 (0.036)	28.12 (0.036)	27.95 (0.036)	28.20 (0.035)	28.20 (0.035)	28.20 (0.035)	28.16 (0.036)
	135	28.13 (0.036)	28.09 (0.036)	28.05 (0.036)	27.89 (0.036)	28.14 (0.036)	28.13 (0.036)	28.13 (0.036)	28.10 (0.036)
Extruded polystyrene, 3 1/2 in.	85	23.02 (0.043)	22.98 (0.044)	22.95 (0.044)	22.77 (0.044)	23.03 (0.043)	23.03 (0.043)	23.03 (0.043)	22.98 (0.044)
	95	22.98 (0.044)	22.88 (0.044)	22.84 (0.044)	22.67 (0.044)	22.92 (0.044)	22.92 (0.044)	22.92 (0.044)	22.88 (0.044)
	105	22.82 (0.044)	22.78 (0.044)	22.75 (0.044)	22.57 (0.044)	22.83 (0.044)	22.83 (0.044)	22.83 (0.044)	22.78 (0.044)
	115	22.74 (0.044)	22.70 (0.044)	22.66 (0.044)	22.49 (0.044)	22.75 (0.044)	22.74 (0.044)	22.74 (0.044)	22.70 (0.044)
	125	22.66 (0.044)	22.62 (0.044)	22.59 (0.044)	22.42 (0.045)	22.67 (0.044)	22.67 (0.044)	22.67 (0.044)	22.63 (0.044)
	135	22.60 (0.044)	22.56 (0.044)	22.52 (0.044)	22.36 (0.045)	22.61 (0.044)	22.60 (0.044)	22.60 (0.044)	22.57 (0.044)
Closed cell spray polyurethane foam, 3 1/2 in.	85	27.32 (0.036)	27.48 (0.036)	27.45 (0.036)	27.27 (0.037)	27.53 (0.036)	27.53 (0.036)	27.53 (0.036)	27.48 (0.036)
	95	27.28 (0.036)	27.38 (0.037)	27.34 (0.037)	27.17 (0.037)	27.42 (0.036)	27.42 (0.036)	27.42 (0.036)	27.38 (0.037)
	105	27.32 (0.037)	27.28 (0.037)	27.25 (0.037)	27.07 (0.037)	27.33 (0.037)	27.33 (0.037)	27.33 (0.037)	27.28 (0.037)
	115	27.24 (0.037)	27.20 (0.037)	27.16 (0.037)	26.99 (0.037)	27.25 (0.037)	27.24 (0.037)	27.24 (0.037)	27.20 (0.037)
	125	27.16 (0.037)	27.12 (0.037)	27.09 (0.037)	26.92 (0.037)	27.17 (0.037)	27.17 (0.037)	27.17 (0.037)	27.13 (0.037)
	135	27.10 (0.037)	27.06 (0.037)	27.02 (0.037)	26.86 (0.037)	27.11 (0.037)	27.10 (0.037)	27.10 (0.037)	27.07 (0.037)
Polyisocyanurate, 3 1/2 in.	85	31.80 (0.031)	31.91 (0.031)	31.88 (0.031)	31.70 (0.032)	31.96 (0.031)	31.96 (0.031)	31.96 (0.031)	31.91 (0.031)
	95	31.71 (0.031)	31.81 (0.031)	31.77 (0.031)	31.60 (0.032)	31.85 (0.031)	31.85 (0.031)	31.85 (0.031)	31.81 (0.031)
	105	31.75 (0.031)	31.71 (0.032)	31.68 (0.032)	31.50 (0.032)	31.76 (0.031)	31.76 (0.031)	31.76 (0.031)	31.71 (0.032)
	115	31.67 (0.032)	31.63 (0.032)	31.59 (0.032)	31.42 (0.032)	31.68 (0.032)	31.67 (0.032)	31.67 (0.032)	31.63 (0.032)
	125	31.59 (0.032)	31.55 (0.032)	31.52 (0.032)	31.35 (0.032)	31.60 (0.032)	31.60 (0.032)	31.60 (0.032)	31.56 (0.032)
	135	31.53 (0.032)	31.49 (0.032)	31.45 (0.032)	31.29 (0.032)	31.54 (0.032)	31.53 (0.032)	31.53 (0.032)	31.50 (0.032)

APPENDIX A—THERMAL DATA USED TO DEVELOP TABLES[A]

Material:	Thermal Resistivity (hr·ft²·°F/Btu·in)
Cellular polyisocyanurate, gas-impermeable facer	6.7 - 7.2[B]
Closed-cell spray polyurethane foamed insulation (SPF)	6.3 - 6.8[C]
Expanded polystyrene	4.0
Extruded polystyrene (XPS)	5.0
Polyurethane foamed-in-place[E]	5.9
Wood	1.0
Concrete:	
85 pcf	0.30
95 pcf	0.25
105 pcf	0.20
115 pcf	0.17
125 pcf	0.14
135 pcf	0.11
Grout	0.10
Mortar	0.10

Material:	R-Value (hr·ft²·°F/Btu)
1/2 in. gypsum wallboard	0.45
Surface air films:	
inside	0.68
outside	0.17
Air spaces:	
3/4 - 1 in. non-reflective	0.97
3/4 - 1 in. reflective	2.8
Synthetic stucco	0.20
4 x 8 x 16 in. hollow concrete masonry veneer (135 pcf)	0.94[D]
4 in. solid concrete masonry veneer (135 pcf)	0.41[D]
4 in. clay brick exterior wythe	0.44

[A] Thermal resistivity data may vary from one insulation manufacturer to another. Users of this catalog should verify the thermal properties of the specific insulation product they are using with the insulation manufacturer.

[B] The R-value of polyisocyanurate insulation does not vary linearly with thickness. R-values by thickness are 1 in. = R6.7; 1.5 in. = R10.5; 2 in. = R14.4; 2.5 in. = R17.8; 3 in. = R21.2; 3.5 in. = R24.6.

[C] The R-value of SPF insulation does not vary linearly with thickness. R-values by thickness are 1 in. = R6.8; 2 in. = R13; 3 in. = R19; 3.5 in. = R22.

[D] Applies to both full- and half-height units.

[E] This R-value applies only to polyurethane foamed-in-place insulation. Other available types, such as aminoplast foamed-in-place, will have a different R-value. Aminoplast foamed-in-place insulation has an average R-value of approximately 4.6/inch.

APPENDIX B—METRIC CONVERSIONS

Inch-Pound To Metric Conversions

Quantity	to convert from these inch-pound units. . .	to these metric units. . .	multiply the inch-pound units by:
Length	mile (mi)	kilometer (km)	1.609344
	foot (ft)	meter (m)	0.3048
	foot (ft)	millimeter (mm)	304.8
	inch (in.)	millimeter (mm)	25.4
Area	square yard (yd^2)	square meter (m^2)	0.83612736
	square foot (ft^2)	square meter (m^2)	0.09290304
	square inch ($in.^2$)	square millimeter (mm^2)	645.16
Volume	cubic yard (yd^3)	cubic meter (m^3)	0.764555
	cubic foot (ft^3)	cubic meter (m^3)	0.0283168
	cubic inch ($in.^3$)	cubic millimeter (mm^3)	16,367.064
Mass	pound (lb)	kilogram (kg)	0.453592
	kip (k)	metric ton (t)	0.453592
Mass density	pounds/cubic foot (lb/ft^3 or pcf)	kilogram/cubic meter (kg/m^3)	16.0185
Force	pound (lb)	newton (N)	4.44822
	kip (k)	kilonewton (kN)	4.44822
Force per unit length	pound/foot (lb/ft or plf)	newton/meter (N/m)	14.5939
	kip/foot (k/ft)	kilonewton/meter (kN/m)	14.5939
Force per unit area	pound/square inch ($lb/in.^2$ or psi)	megapascal (MPa)	0.00689476
	kip/square inch ($k/in.^2$ or ksi)	megapascal (MPa)	6.89476
	pound/square foot (lb/ft^2 or psf)	pascal (Pa)	47.8803
Bending moment	foot-pound (ft-lb)	newton · meter (N· m)	1.35582
	foot-kip (ft-k)	kilonewton · meter (kN· m)	1.35582
	inch-pound per foot (in.-lb/ft)	newton · meter per meter (N·m/m)	0.370686
Thermal resistance (R-Value)	square foot-hour-degree Fahrenheit/British thermal unit (ft^2-h-^oF/Btu)	square meter · degree Kelvin/Watt ($m^2 \cdot K/W$)	0.176
Thermal conductance (U-Factor)	British thermal unit/square foot-hour-degree Fahrenheit (Btu/h-ft^2-^oF)	Watt/square meter · degree Kelvin ($W/m^2 \cdot K$)	5.678
Temperature	degrees Fahrenheit (^oF)	degrees Celsius (^oC)	$^oC = (^oF - 32)/1.8$
	degrees Fahrenheit (^oF)	degrees Kelvin (K)	$K = (^oF + 459.67)/1.8$

APPENDIX C—SAMPLE CALCULATIONS

Sample calculation assumptions: Unit length = 15.625 in, Unit Width = 7.625 in, Unit Height = 7.625 in, Mortar Joint Thickness = 0.375 in, Thickness of Web = 1 in, Number of Webs = 3

ASSEMBLY 1-1 – 8" x 8" x 16" 105 lb/ft³ CMU

$$t_{face\ shell} = 1\frac{1}{4}\ in$$

$$t_W = Unit\ Width - 2 \times t_{face\ shell} = 7.625 - 2 \times 1\frac{1}{4} = 5.125\ in$$

$$r_{mortar} = 0.1$$

$$r_{conc} = \frac{1}{e^{0.02 \times density} \times 0.6} = \frac{1}{e^{0.02 \times 105} \times 0.6} = 0.204$$

$$r_{grout} = \frac{1}{e^{0.02 \times density} \times 0.6} = \frac{1}{e^{0.02 \times 140} \times 0.6} = 0.101$$

$$R_{air} = 0.97$$

$$r_{polyurethane} = 5.91$$

$$R_{outside\ air\ film} = 0.17$$

$$R_{inside\ air\ film} = 0.68$$

$$Area_{webs} = \frac{Number\ of\ Webs\ \times Unit\ Height \times\ Thickness\ of\ Web}{(Unit\ length + Mortar\ Joint\ Thickness) \times (Unit\ Height + Mortar\ Joint\ Thickness)}$$

$$= \frac{3 \times 7.625 \times 1}{(15.625 + 0.375) \times (7.625 + 0.375)} = \frac{22.875}{128} = 0.179\%$$

$$Area_{core} = 1 - Area_{webs} = 1 - 0.179 = 0.821\%$$

$$Area_{face} = \frac{Unit\ length \times Unit\ height}{(Unit\ length + Mortar\ Joint) \times (Unit\ height + Mortar\ Joint)}$$

$$= \frac{15.625 \times 7.625}{(15.625 + 0.375) \times (7.625 + 0.375)} = \frac{119.14}{128} = 0.931\%$$

$$Area_{mortar} = 1 - Area_{face} = 1 - 0.931 = 0.069\%$$

$$R_{face} = r_{conc} \times 2 \times t_{face\ shell} = 0.204 \times 2 \times 1.25 = 0.51$$

$$R_{mortar} = r_{mortar} \times 2 \times t_{face\ shell} = 0.1 \times 2 \times 1.25 = 0.25$$

$$R_{web} = r_{conc} \times t_w = 0.204 \times 5.125 = 1.0455$$

$$R_{core} = r_{grout} \times t_w = 0.101 \times 5.125 = 0.518$$

$$R = R_{inside\ air\ film} + R_{CMU} + R_{outside\ film} = R_{inside\ air\ film} + \frac{R_{face} \times R_{mortar}}{Area_{face} \times R_{mortar} + Area_{mortar} \times R_{Face}}$$

$$+ \frac{R_{web} \times R_{core}}{Area_{core} \times R_{web} + Area_{web} \times R_{core}} + R_{outside\ film}$$

$$= 0.68 + \frac{0.51 \times 0.25}{0.931 \times 0.25 + 0.069 \times 0.51} + \frac{1.0455 \times 0.518}{0.821 \times 1.0455 + 0.179 \times 0.518} + 0.17$$

$$= 0.68 + \frac{0.1275}{0.2328 + 0.035} + \frac{0.542}{0.858 + 0.0927} + 0.17 = 0.68 + 1.04 + 0.17 = 1.90$$

ASSEMBLY 1-2 – wall with furring and ½ gypsum

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{inside} = 0.68\ [Assembly\ 1]$$

$$R_{outside} = 0.17\ [Asembly\ 1]$$

$$R_{furring} = 1.1\ [ASHRAE\ 90.1 - 07]$$

$$R_{total} = R_{inside} + R_{CMU} + R_{furring} + R_{outside} = 0.68 + 1.04 + 1.1 + 0.17 = 2.99$$

ASSEMBLY 1-3 – wall with metal furring (1" Spray Polyurethane Foam (SPF) insulation between) and ½ gypsum + 1" continuous SPF insulation

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{insulation} = (1) \times (6.8) = 6.8$$

$R_{insulation}$ (Includes furring and gypsum drywall) Thickness of SPF Insulation between furring	R-Value (Per ASHRAE 90.1-07)
1 in.	3.9
2 in.	5.1
3 in.	5.7
3 1/2 in.	5.9

$$R_{total} = R_{inside} + R_{CMU} + R_{insulation} + R_{outside} = 0.68 + 1.04 + (6.8 + 3.9) + 0.17 = 12.60$$

ASSEMBLY 1-4 – wall with continuous 1" extruded polystyrene insulation and metal furring and ½ gypsum

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{furring} = 1.1\ [Assembly\ 2]$$

$$R_{insulation} = (1\ in.) \times (5) = 5$$

$$R_{total} = R_{Inside} + R_{CMU} + R_{insulation} + R_{furring} + R_{outside} = 0.68 + 1.04 + 5.0 + 1.1 + 0.17 = 7.99$$

ASSEMBLY 1-5 – wall with continuous 2" HD Polyisocyanurate insulation

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{total} = R_{inside} + R_{CMU} + R_{insulation} + R_{outside} = 0.68 + 14.4 + 1.04 + 0.17 = 16.3$$

ASSEMBLY 1-6 – wall with metal furring (R13 BATT insulation between) and ½ gypsum

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

Insulation Type	R-Value (Per ASHRAE 90.1-07)
R11 batt	6.6
R13 batt	7.2
R15 batt	7.8
R19 batt	8.6
R21 batt	9

$$R_{total} = R_{inside} + R_{CMU} + R_{insulation} + R_{gypsum} + R_{outside} = 0.68 + 1.04 + +7.2 + 0.45 + 0.17 = 9.54$$

ASSEMBLY 1-7 – wall with wood furring at 24" (with 1.5" polyisocyanurate between) and ½ gypsum

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

Insulation Type and Thickness	R-Value	
Extruded Polystyrene, 3/4 in.	4.0	Per parallel path calculation
Polyisocyanurate, 3/4 in.	5.2	
Extruded Polystyrene, 1 1/2 in.	7.6	
Polyisocyanurate, 1 1/2 in.	10.4	
R11 batt	10.6	Per ASHRAE 90.1-07
R13 batt	11.6	
R15 batt	12.5	
R19 batt	15.4	
R21 batt	16.7	

$$R_{total} = R_{inside} + R_{insulation} + R_{CMU} + R_{gypsum} + R_{outside} = 0.68 + 10.4 + 1.04 + 0.45 + 0.17 = 12.74$$

ASSEMBLY 1-8 – continuous Insulation + Finish System, exposed exterior masonry [2.5" extruded polystyrene insulation]

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{total} = R_{inside} + R_{CMU} + R_{insulation} + R_{outside} = 0.68 + 12.7 + 1.04 + 0.17 = 14.59$$

ASSEMBLY 1-9 – wall with continuous 1.5" Closed Cell Spray Polyurethane Foam (SPF) insulation + 4 inch CMU veneer

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{\text{cavity}} = 0.97$$

$$R_{cmu\ veneer} = 0.94$$

$$R_{total} = R_{inside} + R_{CMU} + R_{\text{insulation}} + R_{\text{ cavity}} + R_{CMU\ veneer} + R_{outside} = 0.68 + 1.04 + 7.5 + 0.97 + 0.94 + 0.17 = 11.3$$

ASSEMBLY 1-10 – wall with continuous 1.5" Closed Cell Spray Polyurethane Foam (SPF) insulation + 4 inch CMU veneer & 1/2 inch gypsum on furring

$$R_{CMU} = 1.04\ [Assembly\ 1\ example]$$

$$R_{cmu\ veneer} = 0.\ 94$$

$$R_{total} = R_{inside} + R_{furring} + R_{CMU} + R_{\text{insulation}} + R_{\text{ cavity}} + R_{CMU\ veneer} + +R_{outside} = 0.68 + 1.1 + 1.04 + 7.5 + 0.97 + 0.94 + 0.17 = 12.4$$

APPENDIX D – SUMMARY DISCUSSION OF ALTERNATIVE WEB OPTIONS

Contained within this Thermal Catalog are calculated thermal properties for various types of concrete masonry assemblies, as well as various configurations of concrete masonry units. The inclusion of several different types of CMU configurations is a result of recent changes to ASTM C90 (ref. 4) and the associated requirements for web thickness and configuration reflected in ASTM C90 prior to 2011. The version of ASTM C90 published after 2011 has a minimum web thickness of 0.75 inches, and a separate requirement for normalized web area, or the amount of web (in square inches) per square foot of wall surface.

These web requirements, which are significantly different than versions of ASTM C90 published before 2011, provide the opportunity for a large variety of unit configurations, and also tailoring of specific configurations to specific applications. While the possibilities are nearly endless, there are considerations to using/specifying alternative unit configurations.

- Energy Efficiency – One of the primary benefits of units with reduced-size or less webs than traditional units is the reduction in thermal bridging that occurs due to webs. Especially in single-wythe assemblies, the R-value of the assembly can be increased as the number and size of webs is reduced.
- Constructability – units with only one or two webs can be used to accommodate wall configurations with large amounts of reinforcement and congestion. These open end units can be placed easier around reinforcement than close-end units. One must be careful, however, in situations of partial grouting. A one-web unit (typically called "H-block") cannot be partially grouted – as there are not enough webs to confine the grout. Therefore, the one-web unit is likely not a viable option at grouted cells for partially grouted wall assemblies. One-web units can be used for the ungrouted cells between the reinforced cells however.
- Availability – because the change to ASTM C90 is a significant departure from historical configurations, certain configurations may not be available in local markets. Before designing and specifying a non-traditional configuration, local producers should be consulted for availability of desired configurations.
- Secondary Properties – other CMU assembly properties, such as fire resistance or sound transmission class (STC), may be affected based on alternative web configurations. STC, for example, is determined by calculation based on the weight of the wall assembly. If an alternative web unit is substituted for a traditional unit, the reduction in material may lower the wall weight, and in turn reduce the STC rating. When additional properties for the wall (outside of the scope of ASTM C90) are required, the designer should consider the unit configuration that will meet all the needs of the application.

APPENDIX E—REFERENCES

1. International Energy Conservation Code. International Code Council, 2009 and 2012.

2. Energy Standard for Buildings Except Low-Rise Residential Buildings, ANSI/ASHRAE/IESNA 90.1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., and 2007 and 2010.

3. R-Values and U-Factors of Single Wythe Concrete Masonry Walls, TEK 6-2C. National Concrete Masonry Association, 2012.

4. Standard Specification for Loadbearing Concrete Masonry Units, ASTM C90, ASTM International, 2011a and 2011b.

5. ASHRAE Handbook, Fundamentals. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2009.

6. Guide to Thermal Properties of Concrete and Masonry Systems. ACI 122R-02. American Concrete Institute, 2002.

7. R-Values of Multi-Wythe Concrete Masonry Walls, TEK 6-1C. National Concrete Masonry Association, 2012.

8. Specification for Masonry Structures, TMS 602/ACI 530.1/ASCE 6. Reported by the Masonry Standards Joint Committee, 2011.

9. International Building Code. International Code Council, 2009 and 2012.

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