


 **Spec-Thermal®**  
PRE-INSULATED MASONRY SYSTEM



# Thermal Properties Guide

2023 Edition

 **CONCRETE  
PRODUCTS  
GROUP**  
INNOVATIVE CONCRETE  
MASONRY SYSTEMS

# Spec-Thermal® Energy-Efficient Masonry



Energy Code  
Compliant  
Masonry Systems




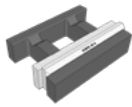

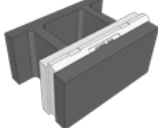

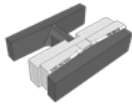

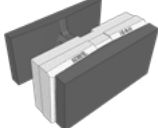
**Spec-Thermal®**  
PRE-INSULATED MASONRY SYSTEM

**Spec-Thermal Pre-Insulated Masonry Walls** provide Energy Code compliance with double exposed masonry surfaces. The Hi-R and Hi-R H systems comply with ASTM C 90 "Standard Specification for Load Bearing Concrete Masonry Units" and exceed ASTM C90's requirement that the concrete web be a minimum of  $\frac{3}{4}$ " thick for a minimum area of 6.5 square inches per square foot of wall area. The load bearing structural elements of the wall and the insulation are built into the masonry.



# Spec-Thermal® Product Family

Spec-Thermal Pre-Insulated Masonry Walls feature Korfil® Hi-R® and HI-R-H pre-insulated concrete masonry units from Concrete Block Insulating Systems, Inc. These wall systems require minimal coordination of trades since the wall finishes, load bearing structural elements, and the insulation are all built into the masonry itself. The product line includes HI-R® and HI-R-H™ pre-insulated masonry units in full and half heights.

Product	Shape	Unit Design	Energy Efficiency	Typical Fire Rating*	Finishes
 HI-R® Half High		4"x16" face (nominal) 2 cross webs 2.5" insulation insert 12" width only Suitable for fully or partially grouted walls.	Allows single wythe or multi-wythe construction in most climate zones.	Fully Grouted: 12-4-16 4-Hour Fire Rating  Partially Grouted: Varies based on unit width and density.	Smooth or blasted finish; Many color options Blended Colors: Spec-Brik Hi-R for brick appearance.
 HI-R®		8"x16" face (nominal) 2 cross webs 2.5" insulation insert 8***, 10, or 12" widths Suitable for fully or partially grouted walls.	Allows single wythe or multi-wythe construction in most climate zones.	Fully Grouted: 12-8-16 4-Hour Fire Rating.  Partially Grouted: Varies based on unit width and density.	Multiple finishes: Ground face, split face, smooth, blasted; Many color options Blended Colors: Spec-Brik HI-R-H Jumbo for brick colors.
 HI-R-H™ Half High		4"x16" face (nominal) 1 cross web 4" insulation insert 12" width only Suitable for fully grouted walls.	Best performing option.	Fully Grouted: 12-4-16 4-Hour Fire Rating.	Smooth or blasted finish; Many color options Blended Colors: Spec-Brik HI-R-H for brick appearance.
 HI-R-H™		8"x16" face (nominal) 1 cross web 3.0", 3.5" or 4" EPS insulation insert 12" unit width** Suitable for fully grouted walls.	Best performing option.	Fully Grouted: 12-8-16 4-Hour Fire Rating.	Multiple finishes: Ground face, split face, smooth, blasted Many color options Blended Colors: Spec-Brik HI-R-H Jumbo for brick colors.

\* Will vary based on unit density and other factors. For unit specific fire rating information, check with your manufacturer.

\*\* 10" unit width is available on a regional basis only. Please check before specifying

\*\*\* 8" units have a small groutable area and may be difficult to grout

## Applications for Hi-R and HI-R-H walls

Water Treatment Facilities  
 Schools  
 Athletic Facilities  
 Concession Stands  
 Grocery Stores  
 Multi-Residential Buildings  
 Detention Facilities  
 Manufacturing Facilities/Warehouses

Automotive Service Centers  
 Parking Structures  
 Indoor Swimming Pool Facilities  
 Single Family Housing  
 Cold Storage Facilities  
 Auditoriums and Music Venues  
 Film Production Stages  
 Public Safety Buildings (Police and Fire)

# HI-R®

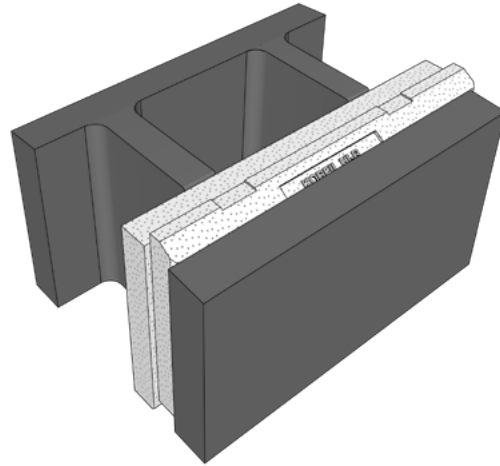
HI-R® is a two web, pre-insulated masonry unit that is suitable for partially or fully grouted walls.

## Primary uses

- Single wythe walls for conditioned spaces in Climate Zones 1–5.
- Single wythe walls for conditioned spaces with furring/wallboard and/or interior or exterior insulation.

## Additional Uses

- Single wythe walls for unconditioned or semi-conditioned spaces in all climate zones.
- Multi-wythe wall construction.
- Diaphragm wall, pier or pilaster construction



## Features

### Suitable for either full or partial grout construction

- Great for regions where partially grouted walls are preferred.
- Fire resistance: depends on unit width, density and whether partially or fully grouted.
- May be constructed as a fully grouted wall to increase fire resistance.

### Construction Efficiency

- Utilities (plumbing and electrical) readily fit in unit cores and horizontal voids.
- Single trade can install interior finish, exterior coverage, structure, fire resistance, weather protection, and insulation in one step.
- Reduced web height Hi-R bond beam units are available.
- Offered in 8", 10" and 12" unit widths.

### Thermal Performance (see comparison chart)

- Two part 2.5" EPS offset and interlocking insulation inserts.
- Interlocking Insulation inserts covers all mortar joints.
- Two web design offers reduced thermal bridging when compared to traditional CMU.
- Thermal mass is exposed to the interior, conditioned space for optimal performance.

### Aesthetics:

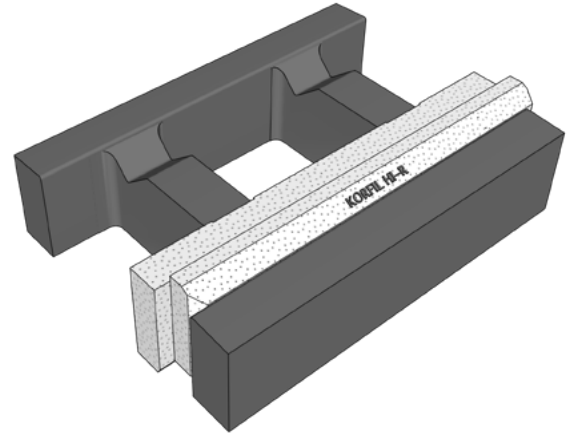
- Scale: 8"x16" face dimension.
- Offered with full range of masonry textures and colors.
- Spec-Brik Jumbo HI-R – with Spec-Brik Blended Colors.





# HI-R® Half High SPEC-BRIK® HI-R®

HI-R® Half High is a two web pre-insulated masonry unit that is suitable for partially or fully grouted walls offered with 4" x 16" face dimensions. When made with Spec-Brik colors, the product is called Spec-Brik HI-R.



## Primary uses

- Single wythe walls for conditioned spaces in Climate Zones 1–5.
- Single wythe walls for conditioned spaces with furring/wallboard and/or interior or exterior insulation.

## Features

### Suitable for either full or partial grout construction

- Great for regions where partially grouted walls are preferred.
- Fire resistance: depends on unit width, density and whether partially or fully grouted.
- May be constructed as a fully grouted wall to increase fire resistance.

### Construction Efficiency

- Utilities (plumbing and electrical) readily fit in unit cores and horizontal voids.
- Single trade can install interior finish, exterior coverage, structure, fire resistance, weather protection, and insulation in one step.
- Offered in 12" unit width.

### Thermal Performance (see comparison chart)

- Two part offset interlocking 2.5" EPS insulation inserts.
- Interlocking insulation covers all mortar joints.
- Two web design offers reduced thermal bridging when compared to traditional CMU.
- Thermal mass is exposed to the interior, conditioned space for optimal thermal performance.

### Aesthetics:

- Scale: 4"x16" face dimension.
- Offered with full range of masonry colors and smooth texture.
- Available in Spec-Brik Blended Colors (see color chart).

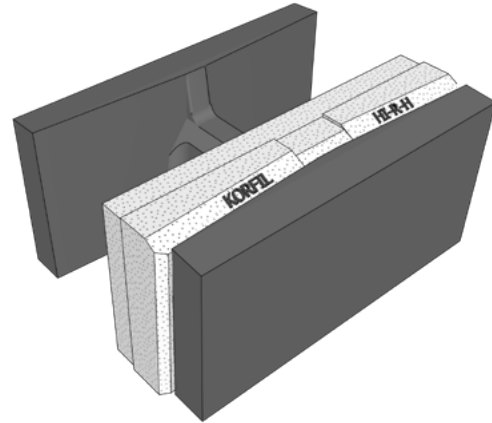


# HI-R-H™

HI-R-H is a single web pre-insulated masonry unit that is suitable for fully grouted walls.

## Primary uses

- Double exposed single wythe masonry walls for all Climate Zones.
- Single wythe walls for conditioned spaces in all Climate Zones with furring/wallboard and/or interior or exterior insulation.
- Load-bearing walls above and/or below grade.



## Features

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### Fully Grouted Wall System

- Barrier wall performance resists moisture penetration with use of integral water repellent in block and mortar and/or post-applied sealant.
- Flashing only required at top of wall and opening sills.
- Fire resistance: Four hour fire rating is typical.
- No additional air barrier or vapor retarder is required with fully grouted masonry walls.
- Great choice for structures designed to be resilient against natural hazards.
- Great choice for demanding applications requiring extensive reinforcement.

### Construction Efficiency

- Shape eases placement even with tight reinforcement spacing.
- No modification to stretcher unit required for bond beam construction.
- Utilities (plumbing and electrical) readily fit in unit cores and horizontal voids.
- Single trade can install interior finish, exterior coverage, structure, fire resistance, weather protection, and insulation in one step.
- Unit Width: 12", 10" (10" regional only – please check with your representative).
- Usually the most cost-effective option for pre-insulated masonry.

### Thermal Performance (see comparison chart)

- Two-part interlocking EPS insulation insert with lapped joints for projects available in 3", 3.5" and 4" thicknesses.
- Interlocking Insulation covers all mortar joints.
- Single partial height web for reduced thermal bridging.
- Thermal mass exposed to the interior, conditioned space for optimal thermal performance.

### Aesthetics:

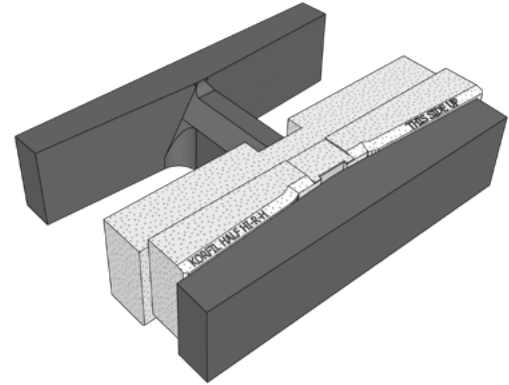
- Scale: 8"x16" face dimension.
- Offered with full range of masonry textures and colors.
- Spec-Brik Jumbo HI-R-H when made with Spec-Brik Blended Colors.





# HI-R-H™ Half High SPEC-BRIK HI-R-H™

HI-R-H Half High is a single web pre-insulated masonry unit that is suitable for fully grouted walls with a 4" x 16" unit face dimension. When made with Spec-Brik colors, the product is called Spec-Brik HI-R-H.



## Primary uses

- Pre-insulated walls where brick aesthetics are desired.
- Single wythe walls for conditioned spaces in all Climate Zones.
- Load-bearing walls above and/or below grade.

## Features

### Double exposed masonry with brick aesthetics

#### Thermal Performance (see comparison chart)

- Two-part 4" EPS offset interlocking insulation insert - thickest insert currently available.
- Interlocking insulation covers all mortar joints.
- Insert uses higher density EPS to enhance thermal performance.
- Single partial height web for reduced thermal bridging.
- Thermal mass exposed to the interior, conditioned space for optimal thermal performance.

### Fully Grouted Wall System

- Barrier wall performance resists moisture penetration issues with use of integral water repellent in block and mortar and/or post-applied sealant.
- Flashing only required at opening sills and top of wall.
- Fire resistance: Four hour fire rating is typical.
- No additional air barrier or vapor retarder is required with fully grouted masonry walls.
- Great choice for structures designed to be resilient against natural hazards.
- Ideal for walls requiring extensive reinforcement.

### Construction Efficiency

- Shape eases placement even with tight reinforcement spacing.
- No modification to stretcher unit required for bond beam construction.
- Utilities (plumbing and electrical) readily fit in unit cores and horizontal voids.
- Single trade can install interior finish, exterior coverage, structure, fire resistance, weather protection, and insulation in one step.
- Unit Dimensions: 12×4×16 nominal.

### Aesthetics:

- Scale: 4"×16" face dimension.
- Offered in full range of masonry colors and smooth texture.
- Available with Spec-Brik Blended Colors (see color chart).

# Which System is Best for my Project?

This will depend on several factors: (1) What level of thermal performance is required for the wall system by Energy Code or otherwise? (2) Is the project going to be fully or partially grouted? and (3) What type of interior finish and exterior covering is optimal for your project?

## Thermal Performance Considerations

All of the Spec-Thermal products offer significant increases in thermal performance compared to conventional concrete masonry units, even with foamed-in-place insulation. Pre-insulated masonry is best evaluated using the U-Factor, approach, which measures the thermal resistivity of the entire wall assembly. The products are listed in order of ascending thermal performance capability. Wall design should also take into account insulation detailing of corners, jams and other features.

R-Values and U-Factors for HI-R and HI-R-H Masonry Units (Stretcher units only/regionally available densities vary)					
Product (grouted cells)	Density (pounds per cubic foot)				
	95	105	115	125	135
HI-R Two Webs, 2.5 inch insert 8-8-16*	U-0.10 R-10.00	U-0.110 R-9.07	U-0.122 R-8.18	U-0.136 R-7.36	U-0.152 R-6.59
HI-R Two Webs, 2.5 inch insert 10-8-16	U-0.085 R-11.82	U-0.092 R-10.82	U-0.10 R-9.85	U-0.11 R-8.94	U-0.124 R-8.08
HI-R and HI-R Half High Two Webs, 2.5 inch insert 12-8-16/12-4-16	U-0.079 R-12.58	U-0.087 R-11.56	U-0.095 R-10.57	U-0.104 R-9.62	U-0.115 R-8.72
HI-R-H One Web, 3.0 Inch Insert 12-8-16	U-0.066 R-15.08	U-0.072 R-13.84	U-0.079 R-12.70	U-0.087 R-11.55	U-0.096 R-10.39
HI-R-H One Web, 3.5 inch insert 10-8-16**	U-0.066 R-15.11	U-0.073 R-13.70	U-0.080 R-12.57	U-0.088 R-11.37	U-0.098 R-10.17
HI-R-H One Web, 3.5 inch insert 12-8-16	U-0.061 R-16.32	U-0.067 R-14.98	U-0.073 R-13.74	U-0.080 R-12.50	U-0.089 R-11.25
HI-R-H One Web, 4 inch insert 12-8-16	U-0.057 R-17.56	U-0.062 R-16.12	U-0.068 R-14.78	U-0.074 R-13.45	U-0.083 R-12.11
HI-R-H Half High One Web, 4 inch insert 12-4-16	U-0.056 R-17.87	U-0.061 R-16.40	U-0.066 R-15.04	U-0.073 R-13.69	U-0.081 R-12.32

\* 8-8-16 HI-R typically is not specified currently. The groutable space is very restricted.

\*\* See Individual Product Tables for full density range

\*\*\* Check with your local CPG representative; 10" version has regional availability only.

As an example, the 2021 IECC prescriptive requirements for mass walls for commercial buildings require that the U-Factor for mass walls not exceed the following values per climate zone (applicable Code for your project will be based on the requirements of the Authority Having Jurisdiction):

Climate Zone	1	2	3	4	5	6	7	8
U-Factor	U-0.151	U-0.151	U-0.123	U-0.104	U-0.090	U-0.080	U-0.071	U-0.037
U-Factor (Group R)	U-0.151	U-0.123	U-0.104	U-0.090	U-0.080	U-0.071	U-0.071	U-0.037



## Fully or Partially Grouted Construction?

With the Spec-Thermal family of products, full or partial grouted walls are both readily constructed. The HI-R products are suitable for both partially grouted and fully grouted walls. The HI-R-H products are suitable only for fully grouted construction, but are optimized to make grouting as efficient as possible since they use a partial height single web per unit, a design which allows grout to flow readily throughout the wall cores by minimizing obstructions.

Here are some considerations regarding the choice between full and partial grouting:

Full Grout	Partial Grout
<b>Construction:</b> Simpler construction process - all cores are grouted and no flashing/weepers at empty cores is required.	<b>Construction:</b> Requires less grout material and associated labor costs. As reinforcement spacing increases, the cost savings for partial grout become more significant, though additional costs are required for flashing/weepers and an air barrier.
<b>Air barrier:</b> Solid grouted walls are deemed by Code to comply with air barrier requirements so no additional air barrier is required.	<b>Air barrier:</b> Additional air barrier is required.
<b>Thermal:</b> Greater mass from a solid grouted wall is exposed to the conditioned interior of the building, optimizing thermal mass benefits of masonry.	<b>Thermal:</b> UngROUTED portions of the wall will have slightly higher R-Value than grouted portions. The overall U-Factor for the assembly is the weighted average of grouted and ungrouted areas.
<b>Moisture Penetration Resistance:</b> Multiple barriers (post-applied sealant on exterior surface; integral water repellent in block and mortar; and solid grouted cores).	<b>Moisture Penetration Resistance:</b> Barriers and interior drainage (post-applied sealant on exterior surface; integral water repellent in block and mortar; and flashing and weepers system to facilitate drainage from the cores of the walls to the exterior).
<b>Fire Resistance*:</b> Fire Rating for solid grouted walls with 12" units will typically exceed 4 Hours.	<b>Fire Resistance*:</b> Varies by unit width and density.

\* check with manufacturer for unit specific fire rating information.

Even in regions where partially grouted construction is the norm, the designer should consider the advantages of solid grouting; ask your CPG representative for assistance in estimating the cost impacts of choosing full or partial grout – often, the net cost difference is not significant.

## What type of architectural finish do you want?

The Spec-Thermal Family of products allows the construction of double exposed masonry walls with attractive and durable interior and exterior surfaces at considerable savings when compared to veneer construction, where both a veneer and a structural backup wall must be built. With Spec-Thermal products, a single unit provides the interior and exterior architectural finish, the load-bearing structure, and the insulation needed to meet energy requirements.

Some additional aesthetic considerations:

(1) **Density.** Using lower density CMU will improve thermal performance, however, it will sometimes limit color/texture selections. Check with your manufacturer to confirm available densities and colors. You may find that HI-R-H CMU, because of their superior performance, will facilitate using higher density CMU and allow more color and texture choices.

(2) **Brick Aesthetics.** All HI-R and HI-R-H products are available in Spec-Brik colors. Using these color blends with the half high HI-R or HI-R-H products allows designers the freedom to create the aesthetics of a brick veneer wall while using cost-effective single wythe masonry. As thermal performance requirements increase, the HI-R-H style block may be the best choice to get a finish that most closely resembles clay brick.

## Spec-Brik® HI-R® and HI-R-H Colors

SPEC-BRIK is available in 12 Standard Colors (custom colors are also available)  
Check [concreteproductsgroup.com](http://concreteproductsgroup.com) for downloadable  
Masonry Designer Rendering Software



The colors above are digital renderings of blended Spec-Brik colors. Due to the limitations of the printing process and the importance of viewing masonry materials under realistic site lighting conditions, we strongly recommend viewing a sample board before making color selections and using a job site sample panel as the basis for acceptance of the final work.



(3) **Other Finishes.** A variety of masonry finishes and colors are available. Generally, the following textures are available by product, but please check with your local manufacturer to confirm local color and texture availability.

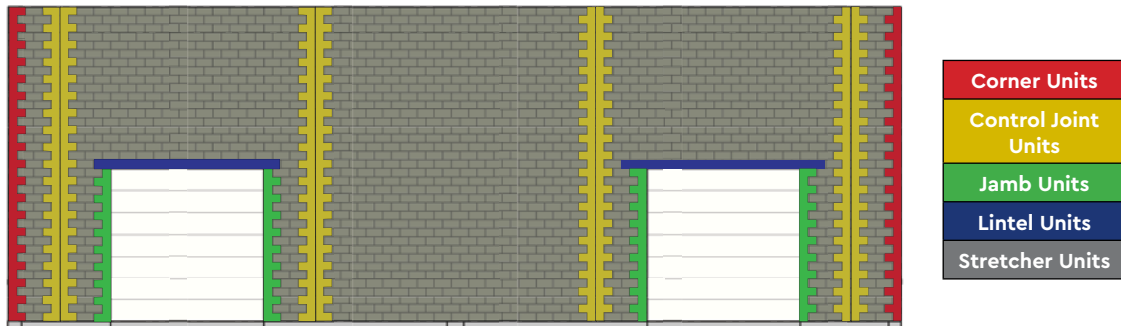
Product	Textures	Colors
<b>HI-R</b> 8-8-16	Smooth, splitface, ground, blasted	Manufacturer's color range; Spec-Brik blends
<b>HI-R</b> 10-8-16	Smooth, splitface, ground, blasted	Manufacturer's color range; Spec-Brik blends
<b>HI-R</b> 12-8-16	Smooth, splitface, ground, blasted	Manufacturer's color range; Spec-Brik blends
<b>HI-R Half High/Spec-Brik HI-R</b> 12-8-16/12-4-16	Smooth, blasted	Manufacturer's color range; Spec-Brik blends
<b>HI-R-H</b> 10-8-16*/12-8-16	Smooth, splitface, ground, blasted	Manufacturer's color range; Spec-Brik blends
<b>HI-R-H Half High/Spec-Brik HI-R-H</b> 12-4-16	Smooth, blasted	Manufacturer's color range; Spec-Brik blends

\* 10-8-16 HI-R-H is available only regionally; check availability before specifying.

## Wall Detailing and Thermal Calculations

The primary method for evaluating Energy Code compliance for pre-insulated walls is to use the U-Factor approach. Many designers are accustomed to using the R-Value Prescriptive Tables in ASHRAE or Code, and assume that continuous insulation is required when designing with masonry. That is not the case! Pre-insulated masonry walls are typically evaluated as mass walls using the U-Factor approach, either through use of the prescriptive tables in ASHRAE or Code, or by using COMcheck where that software is accepted by the Authority Having Jurisdiction. The U-Factor approach takes into account the thermal performance of the entire wall assembly, not just the insulation, and does not require use of continuous insulation provided the assembly is below the applicable U-Factor limit.

To calculate the U-Factor for a wall built with HI-R or HI-R-H concrete masonry units, the design details of the wall as a whole must be considered. While most of the wall will consist of stretcher units, the thermal values for the units used to construct jambs, control joints, corners and lintels all influence the wall's performance. The U-Factor of the complete wall is an area weighted average of the U-Factors of all wall components, as shown in the worksheet below.



Sample Wall Elevation Showing Location of Unit Types

Worksheet for Calculating Wall U-Factor			
	U-Factor – Main wall	X	Wall Area – Main wall (sq. ft.)
+	U-Factor – Jamb	X	Wall Area – Jambs (sq. ft.)
+	U-Factor – Control Joint	X	Wall Area – Control Joints (sq. ft.)
+	U-Factor – Corner	X	Wall Area – Corners (sq. ft.)
+	U-Factor – Lintel	X	Wall Area – Lintels (sq. ft.)
=	Sum of U-Factors x Wall Areas ("SUM")		
	Average U-Factor for complete wall = SUM/Total Wall Area		



## Using COMcheck to Demonstrate Energy Code Compliance for Pre-Insulated Wall Systems

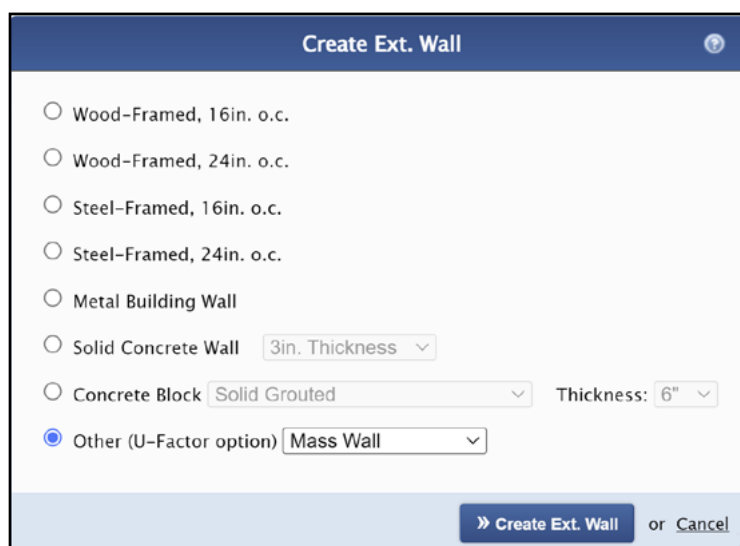
COMcheck is available from: <https://energycode.pnl.gov/COMcheckWeb/>. Demonstrating that concrete masonry wall systems, including pre-insulated systems, comply with the applicable Energy Code in jurisdictions where COMcheck is accepted is uncomplicated provided you use the correct approach. Counter-intuitively, using the obvious menu choice in COMcheck – “Concrete Block”, leads you to the most conservative values and may cause the COMcheck run to fail when it may have passed if the correct approach was used.

Once you have opened the “Envelope” tab in COMcheck and you click on the “Ext. Wall” button, the “Create Ext. Wall” dialog box appears. Therein are two options you can use to test your single wythe concrete masonry design: “Concrete Block” and “Other (U-Factor Option)”. Here are the considerations that apply to the choice between the two options:

1. **“Concrete Block”** This drop down option is not recommended for pre-insulated single wythe CMU walls.

The “Concrete Block” section of COMcheck assumes the insulation is absent from the grouted cores and this greatly penalizes your design. Removing the insulation is not typical of systems like HI-R/HI-R-H or Korfil Icon. These systems have been designed and fully tested structurally for the insert to remain in the cores of the block. For these systems, both the vertical and horizontal reinforcement may be placed and grouted without removing insulation.

2. **“Other U-Factor Option”** When the “Other U-Factor Option” is selected in COMcheck, the user need not rely on the generic thermal values COMcheck provides and can instead enter the exact U-Factor and Heat Capacity values for the specific insulated block system under consideration. The biggest benefit in using this section is that for systems that have been designed and tested with the insulation remaining in the grouted cores, the true performance characteristics of the wall system can be used.



The screenshot shows the "Create Ext. Wall" dialog box. It has a title bar with the text "Create Ext. Wall" and a help icon. The main area contains a list of radio button options: "Wood-Framed, 16in. o.c.", "Wood-Framed, 24in. o.c.", "Steel-Framed, 16in. o.c.", "Steel-Framed, 24in. o.c.", "Metal Building Wall", "Solid Concrete Wall" (with a "3in. Thickness" dropdown), "Concrete Block" (with a "Solid Grouted" dropdown and a "Thickness: 6" dropdown), and "Other (U-Factor option)" (which is selected, with a "Mass Wall" dropdown). At the bottom right, there are two buttons: "» Create Ext. Wall" and "or Cancel".

For Best Results, Choose “Other (U-Factor Option)”/“Mass-Wall”

To evaluate wall assemblies in COMcheck, you will need the following information:

- Governing version of Code for the Authority Having Jurisdiction for your project.
- Wall Assembly Dimensions (Gross Area) – from plans.
- Net Masonry Wall assembly U-Factor – These values are found in the tables for each product. These tables are found starting at page 19 (12×8×16 HI-R-H), page 28 (12×4×16 HI-R-H Half High), page 37 (12×8×16 HI-R), page 45 (12×4×16 HI-R-Half High), page 53 (10×8×16 HI-R), and page 60 (10×8×16 HI-R-H). Remember to account for control joint and fenestration perimeter losses/increases as well as increases from additional materials. The thermal tables include typical related wall components.
- Wall Heat Capacity – refer to the tables referenced above for each product you are considering.

Once you have this information, you can analyze Energy Code compliance for a pre-insulated concrete masonry wall system. A short set of navigation instructions is on the next page. CPG offers an AIA accredited webinar on the topic of how to use COMcheck with pre-insulated masonry along with many related courses.

[Request to Schedule a Webinar](#)

# Basic Navigation in COMcheck-Web

Step One: Choose Applicable Code on the "Project" Page.

The screenshot shows the 'Project' page of the COMcheck-Web application. The 'Code/Location' dropdown menu is open, displaying a list of codes under 'International Codes' and 'Local Codes'. The '2015 IECC' code is selected. The 'Building Envelope Area Types' tab is active, showing a table with one row: 'Office' with an area of 6734 ft² and a W/R² of 0.82.

Building Area	Area Description	Space Conditioning	Area	W/R²
Office		Nonresidential	6734 ft²	0.82

Step Two: Enter Wall Assembly Data on the "Envelope" Page.

The screenshot shows the 'Envelope' page of the COMcheck-Web application. The 'Ext. Wall' assembly data table is displayed. Red boxes highlight specific fields, and red text annotations provide instructions for data entry.

Component	Assembly	Orientation	Building Area Type	Fenestration Details	Construction Details	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	Heat Capacity	UA
1 Roof	Insulation Entirely Above Deck		1 - Office ( Nonresidential			6734 ft²		30	0.012		215
2 Ext. Wall 1	Other Mass Wall	North	1 - Office ( Nonresidential			1975 ft²			0.071	16.75	140
3 Ext. Wall 2	Other Mass Wall	South	1 - Office ( Nonresidential			1975 ft²			0.071	16.75	140
4 Ext. Wall 3	Other Mass Wall	East	1 - Office ( Nonresidential			733 ft²			0.071	16.75	52
5 Ext. Wall	Other Mass Wall	West	1 - Office ( Nonresidential			733 ft²			0.071	16.75	52

Choose "Other (U-Factor Option)"/Mass Wall)

Enter wall orientation

Enter wall gross area

Enter U-Factor

Enter heat capacity

Results: In this case, the wall assembly exceeds Code requirements.

The screenshot shows the results bar of the COMcheck-Web application. The 'Envelope Passes' status is indicated by a green checkmark and a '+8%' margin. The 'Interior Lighting TBD' and 'Exterior Lighting TBD' statuses are indicated by grey boxes with '--'.

Envelope Passes +8%

Interior Lighting TBD --

Exterior Lighting TBD --

## Other Thermal Calculation Considerations

**Thermal Data:** The following data tables are based on thermal data certified by the manufacturer of the Korfil HI-R and HI-R H inserts, Concrete Block Insulating Systems, Inc. Values are based on conventional 3/8" mortar joint construction and either ungrouted and/or grouted cells as indicated on the chart. The thermal values shown below have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables.

**Please check what block densities are available from the local manufacturer before specification.** This is particularly true for lighter weight densities. Also check that the aesthetic finish you would like to specify is available for block with a given density as aesthetic options may be more limited or different for lighter weight density selections.

**Product Availability:** Please note that certain product options listed in the tables may have limited availability in certain regions.

These include the:

- HI-R-H Sash/Jamb Unit (12×8×16 and 12×8×8 half unit are the only available unit dimensions).
- HI-R-H Half High Sash/Jamb Unit (12×4×16 and 12×4×8 half unit are the only available unit dimensions).
- HI-R/HI-R-H Closed Bottom Lintel unit (12×8×16 are the only available unit dimensions).
- 10×8×16 HI-R-H unit.

**Please confirm availability of these products in your project's region prior to specifying them.**

## Other Available Resources:

Concrete Products Group has prepared an extensive detailing manual for the Spec-Thermal product family that includes construction details for all four products including all of the wall components shown here. The Detailing Manual is available at this link:

[Spec-Thermal Detailing Manual](#)



# Wall Systems and Components

There are two basic types of Spec-Thermal® wall systems: HI-R (double web, partially or fully grouted with 2.5" insulation inserts) and HI-R-H (single web, fully grouted, with 3", 3.5" or 4" insulation inserts). Each type is available in full (8" nominal) or half (4" nominal) heights. The half high versions of HI-R and HI-R-H are available only with 2.5" (HI-R) or 4" (HI-R-H) insulation inserts. The first step in determining the thermal performance of a proposed wall is to choose which wall system will be used for the walls. See preceding section for product selection considerations.

After making this selection, the designer should then determine, based on local availability and other considerations, how to detail the corners, openings and control joints in the wall. The tables below show the options for each wall system. No special units are typically required for HI-R H bond beams. HI-R bond beams often require a knock out or cut down web. HI-R / HI-R H solid bottom lintel CMU are available in some regions to bridge openings. Check with your local manufacturer.

The thermal data in this manual is organized by product line. For example, If you are interested in building a HI-R-H Wall, all of the information on related components is in that section.

Wall System: 12×8×16 HI-R-H		Page 19
Main wall units (field of wall)	12×8×16 HI-R-H with choice of insulation	
Control Joints	HI-R-H Sash/Jamb Unit or CMU Sash Unit	
Jambs	HI-R-H Sash/Jamb Unit or CMU Jamb Unit	
Corners	L-Shaped CMU fitting with EPS Insulation	
Lintels	12×8×16 HI-R-H units or HI-R-H/HI-R Closed Bottom Lintel	

Wall System: 12×4×16 HI-R-H Half High		Page 28
Main wall units (field of wall)	12×4×16 HI-R-H Half High	
Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash Unit	
Jambs	HI-R-H Half High Sash/Jamb Unit or CMU Jamb Unit	
Corners	L-Shaped CMU fitting with 4" EPS Insulation	
Lintels	HI-R-H or HI-R-H Half High Unit or HI-R/HI-R-H Closed Bottom Lintel	

Wall System: 12×8×16 HI-R		Page 37
Main wall units (field of wall)	12×8×16 HI-R	
Control Joints	CMU Sash Unit or Michigan Style Control Joint	
Jambs	CMU Jamb Unit	
Corners	L-Shaped CMU fitting with EPS Insulation	
Lintels	HI-R unit or HI-R/HI-R-H Closed Bottom Lintel	

## Wall System and Components, ctd.

Wall System: 12×4×16 HI-R		Page 45
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	HI-R/HI-R Half High or HI-R/HI-R-H Closed Bottom Lintel

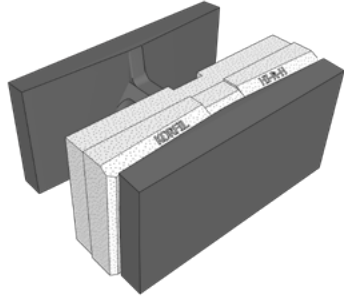
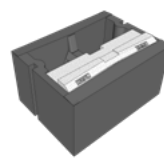
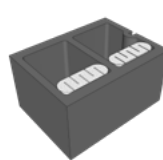
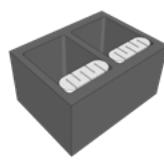
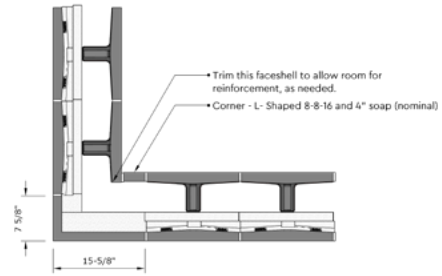
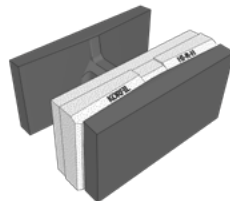
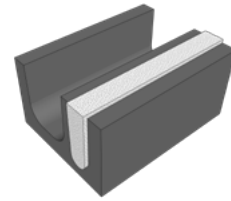
Wall System: 10×8×16 HI-R		Page 53
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	10×8×16 HI-R units

### Limited Regional Availability:

Wall System: 10×8×16 HI-R-H		Page 60
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash Unit
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	10×8×16 HI-R-H units

## Wall System: 12×8×16 HI-R-H

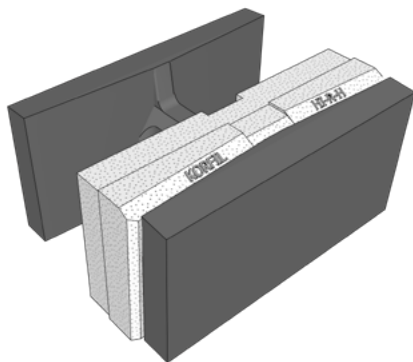
### Summary of System Component Options:

	<p>Main wall units: HI-R-H 12×8×16 Stretcher Unit Choose insulation thickness</p> <p>Bond beams: HI-R-H 12×8×16 Stretcher Unit</p>			
	<p>Control Joints: HI-R-H Sash/Jamb Unit* or CMU Sash Unit (Icon® Insulation)</p>			
	<p>Jambs: HI-R-H Sash/Jamb Unit* or CMU Jamb Unit (Icon® Insulation)</p>	HI-R-H Sash/Jamb Unit	CMU Sash Unit with Icon® Inserts	CMU Jamb Unit with Icon® Inserts
	<p>Corners: L-Shaped CMU fitting with EPS Insulation</p>			
	<p>Lintels: HI-R-H units or HI-R/HI-R-H Closed Bottom Lintel*</p>			
		HI-R-H Unit	HI-R/HI-R-H Closed Bottom Lintel Unit	

\* Availability may be limited in some regions. Please confirm local availability before specifying.

	Wall System: 12×8×16 HI-R-H	Main Wall Unit
	Main wall units (field of wall)	12×8×16 HI-R-H with choice of insulation
	Control Joints	HI-R-H Sash/Jamb Unit or CMU Sash Unit
	Jambs	HI-R-H Sash/Jamb Unit or CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	12×8×16 HI-R-H units or HI-R/HI-R-H Closed Bottom Lintel

**Main wall unit: 12×8×16 HI-R-H with full grout, used for straight portions of the wall**



HI-R-H Unit – Shown with 4" Insulation



HI-R-H Units with Rebar Positioners – Prior to Grout

12×8×16 HI-R-H Unit with 3" Insulation Insert – Full Grout													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0614	0.0638	0.0663	0.0691	0.0723	0.0751	0.0787	0.0826	0.0866	0.0912	0.0962	0.1017	0.1078
R-Value	16.28	15.67	15.08	14.46	13.84	13.28	12.70	12.11	11.55	10.96	10.39	9.84	9.28
Heat Capacity	19.92	20.40	20.89	21.37	21.86	22.34	22.83	23.31	23.83	24.28	24.77	25.25	25.73
<sup>1</sup> From CBIS/Korfil®: "HI-R-H Density 3_0 Grouted_Ungrouted. 10/20/22 PWGRYCEL TOTAL INSULATION INSERT THICKNESS IS 3.0" <sup>2</sup> Interpolations based upon Regression Analyses of CBIS/Korfil®: "HI-R-H Density 3_0 Grouted_Ungrouted. 10/20/22 PWGRYCEL TOTAL INSULATION INSERT THICKNESS IS 3.0" <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil® "HI-R-H Density 3_0 Grouted_Ungrouted. 10/20/22 PWGRYCEL TOTAL INSULATION INSERT THICKNESS IS 3.0"													

12×8×16 HI-R-H Unit with 3.5" Insulation Insert – Full Grout													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0568	0.0590	0.0613	0.0639	0.0668	0.0696	0.0728	0.0763	0.0800	0.0843	0.0889	0.0939	0.0995
R-Value	17.62	16.96	16.32	15.65	14.98	14.37	13.74	13.11	12.50	11.87	11.25	10.65	10.05
Heat Capacity	19.45	19.79	20.10	20.46	20.80	21.13	21.50	21.80	22.10	22.47	22.80	23.14	23.47
<sup>1</sup> From CBIS / Korfil®: "#405 HI-R-H Regular Unit-DLN Stamped" and "HI R AND HI R H GROUTED AND UNGROUTED JULY 2015". <sup>2</sup> Interpolations based upon Regression Analyses of CBIS / Korfil®: "#405 HI-R-H Regular Unit-DLN Stamped" and "HI R AND HI R H GROUTED AND UNGROUTED JULY 2015". <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil® "#405 HI-R-H Regular Unit-DLN Stamped".													

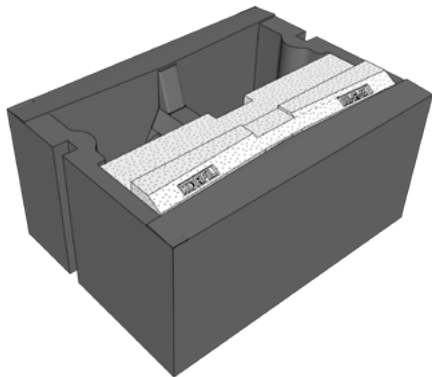
12×8×16 HI-R-H Unit with 4" Insulation Insert – Full Grout													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0527	0.0548	0.0569	0.0594	0.0620	0.0647	0.0677	0.0709	0.0743	0.0783	0.0826	0.0872	0.0924
R-Value	18.96	18.25	17.56	16.84	16.12	15.46	14.78	14.10	13.45	12.77	12.11	11.47	10.82
Heat Capacity	11.86	12.56	13.26	13.96	14.65	15.35	16.05	16.75	17.44	18.14	18.84	19.54	20.23
<sup>1</sup> From CBIS/Korfil® "HI-R-H Grouted Masonry Unit; REVISED 4-19-2019 PW GRAYCEL; B' INSULATION INSERT THICKNESS HAS 0.591 ADDED" <sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS/Korfil® "HI-R-H Grouted Masonry Unit; REVISED 4-19-2019 PW GRAYCEL; B' INSULATION INSERT THICKNESS HAS 0.591 ADDED" <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil® "HI-R-H Grouted Masonry Unit; REVISED 4-19-2019 PW GRAYCEL; B' INSULATION INSERT THICKNESS HAS 0.591 ADDED"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



Wall System: 12×8×16 HI-R-H		Control Joints: Option 1
	Main wall units (field of wall)	12×8×16 HI-R-H
	Control Joints	Option 1: HI-R-H Sash/Jamb Unit
	Jambs	HI-R-H Sash/Jamb Unit or CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	12×8×16 HI-R-H units or HI-R Lintel

**Control Joints: 12×8×16 and 12×8×8 HI-R-H Sash/Jamb unit, used at control joints**  
**PLEASE CHECK WITH LOCAL MANUFACTURER TO ASSURE LOCAL AVAILABILITY**



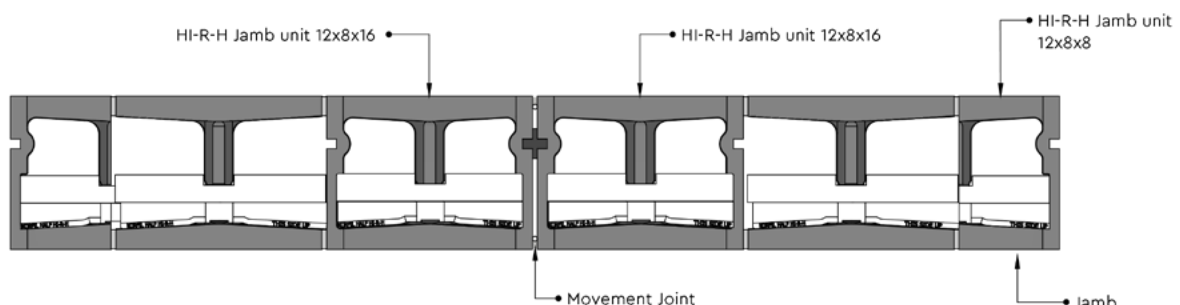
HI-R-H Sash/Jamb Unit 12×8×16



Control joint using HI-R-H Sash/Jamb Unit

12×8×16 and 12×8×8 HI-R-H Sash/Jamb Unit with 4" Insulation Insert													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0695	0.0727	0.0762	0.0800	0.0842	0.0890	0.0943	0.0997	0.1058	0.1124	0.1199	0.1307	0.1420
R-Value	14.39	13.76	13.13	12.50	11.87	11.24	10.61	10.03	9.45	8.895	8.34	7.65	7.04
Heat Capacity	11.97	12.67	13.38	14.08	14.78	15.49	16.19	16.90	17.60	18.30	19.01	19.71	20.42
<sup>1</sup> From CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit, Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..." <sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit, Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..." <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit, Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..." 													

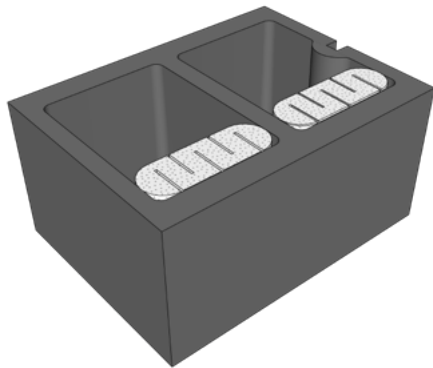
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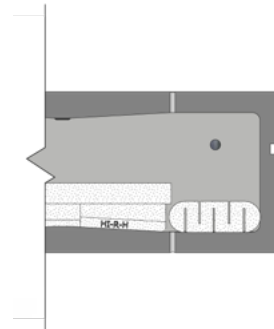
Plan View of Control Joint and Jambs (grout not shown)

Wall System: 12×8×16 HI-R-H		Control Joints: Option 2
	Main wall units (field of wall)	12×8×16 HI-R-H
	Control Joints	Option 2: CMU Sash Unit
	Jambs	HI-R-H Sash/Jamb Unit or CMU Jamb Unit
	Corners	CMU L-Shaped Corner Fitting
	Lintels	12×8×16 HI-R-H units or HI-R Lintel

### Control Joints: 12×8×16 and 12×8×8 CMU Sash, used at control joints



CMU Sash unit with Icon® inserts

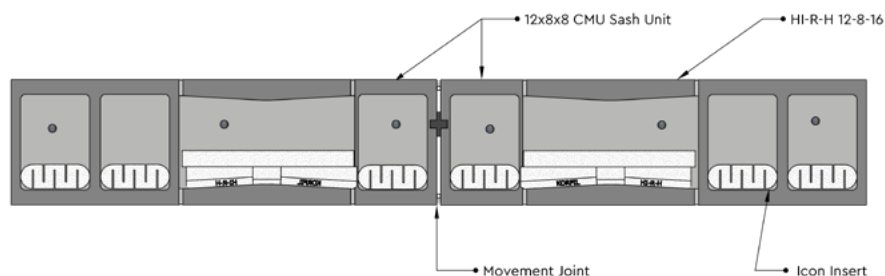


CMU 12×8×8 Sash Unit

12×8×16 and 12×8×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	18.45	18.94	19.42	19.91	20.39	20.88	21.37	21.85	22.34	22.82	23.31	23.79	24.28
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×8×16 and 12×8×8 CMU Sash Unit with double Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	15.73	16.22	16.71	17.19	17.68	18.16	18.65	19.13	19.62	20.10	20.59	21.07	21.56
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

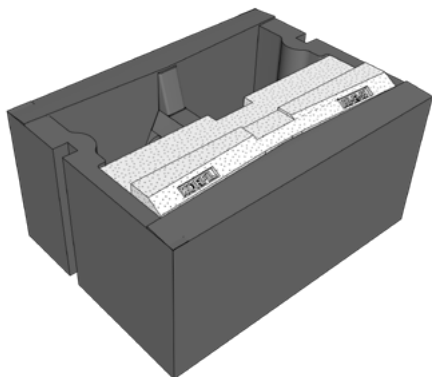
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Plan View of Control Joint and Jambs

Wall System: 12×8×16 HI-R-H		Jambs: Option 1
	Main wall units (field of wall)	12×8×16 HI-R-H
	Control Joints	HI-R-H Sash/Jamb Unit or CMU Sash with Icon®
	Jambs	Option 1: HI-R-H Sash/Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	12×8×16 HI-R-H units or HI-R Lintel

**Jambs: 12×8×16 and 12×8×8 HI-R-H Sash/Jamb Unit, used at openings**  
**PLEASE CHECK WITH LOCAL MANUFACTURER TO ASSURE LOCAL AVAILABILITY**



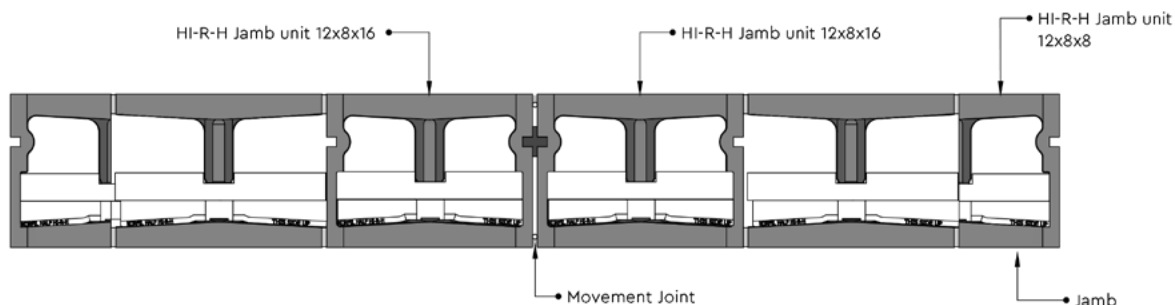
HI-R-H Jamb Unit 12×8×16



Finished Door Jamb using HI-R-H Sash/Jamb Unit

12×8×16 and 12×8×8 HI-R-H Sash/Jamb Unit with 4" Insulation Insert													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0695	0.0727	0.0762	0.0800	0.0842	0.0890	0.0943	0.0997	0.1058	0.1124	0.1199	0.1307	0.1420
R-Value	14.39	13.76	13.13	12.50	11.87	11.24	10.61	10.03	9.45	8.895	8.34	7.65	7.04
Heat Capacity	11.97	12.67	13.38	14.08	14.78	15.49	16.19	16.90	17.60	18.30	19.01	19.71	20.42
<sup>1</sup> From CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit. Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..." <sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit. Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..." <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#406 -B HI-R-H Jamb Unit. Revised 8-29-2019 PW GRAYCEL 'B' INSULATION INSERT THICKNESS HAS 0.561 [INCHES] ADDED (2.061 ["] total)..."													

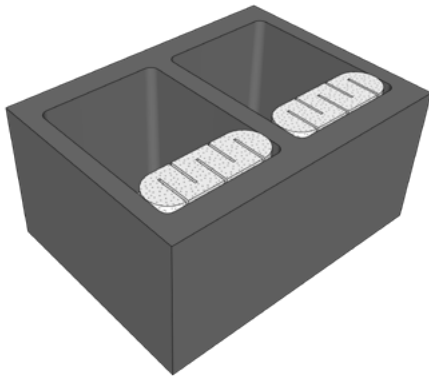
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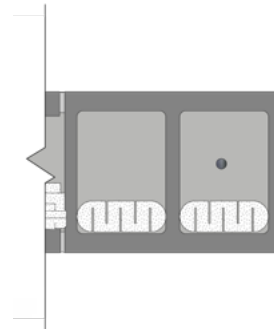
Plan View of Control Joint and Jambs (grout not shown)

Wall System: 12×8×16 HI-R-H		Jambs: Option 2
	Main wall units (field of wall)	12×8×16 HI-R-H
	Control Joints	HI-R-H Sash/Jamb Unit or CMU Sash with Icon®
	Jambs	Option 2: CMU Jamb Unit
	Corners	CMU L-Shaped Corner Fitting
	Lintels	12×8×16 HI-R-H units or HI-R Lintel

### Jambs: 12×8×16 and 12×8×8 CMU Jamb, used at openings



CMU Jamb unit with Icon® inserts

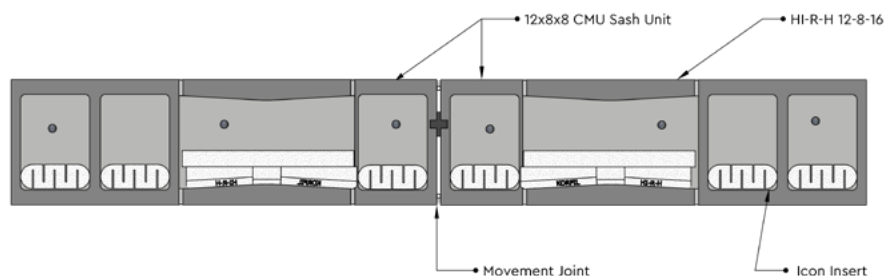


CMU 12×8×16 Jamb Unit

12×8×16 and 12×8×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	18.45	18.94	19.42	19.91	20.39	20.88	21.37	21.85	22.34	22.82	23.31	23.79	24.28
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×8×16 and 12×8×8 CMU Sash Unit with double Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	15.73	16.22	16.71	17.19	17.68	18.16	18.65	19.13	19.62	20.10	20.59	21.07	21.56
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

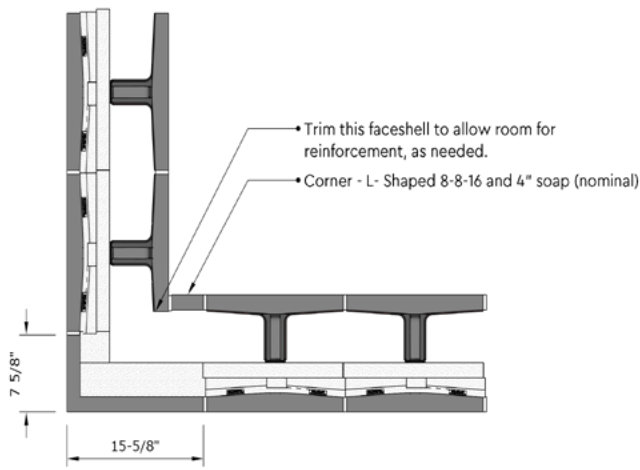


Plan View of Control Joint and Jambs



Wall System: 12×8×16 HI-R-H		Corner
Main wall units (field of wall)		12×8×16 HI-R-H
Control Joints		HI-R-H Sash/Jamb Unit or CMU Sash with Icon®
Jambs		HI-R-H Sash/Jamb Unit or CMU Jamb with Icon®
Corners		L-Shaped CMU fitting with EPS Insulation
Lintels		12×8×16 HI-R-H units or HI-R Lintel

### Corners: 12×8×16 L-Shaped CMU fitting with 4" EPS Insulation

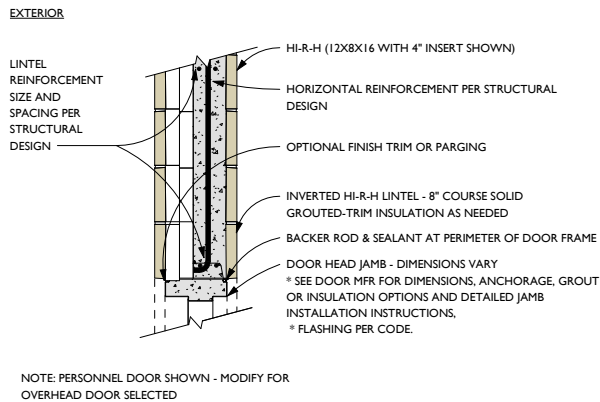


Corner with L-shaped fitting cut from CMU and soap. The face shell of the HI-R-H unit to the right can be cut as needed to accommodate horizontal reinforcement

The thermal values for this corner detail can be assumed to be the same as those for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.

Wall System: 12×8×16 HI-R-H		Lintel: Option 1
	Main wall units (field of wall)	12×8×16 HI-R-H with 4" Insulation
	Control Joints	HI-R-H Sash/Jamb Unit or CMU Sash with Icon®
	Jambs	HI-R-H Sash/Jamb Unit or CMU Jamb with Icon®
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	Option 1: 12×8×16 HI-R-H units

## Lintel Formed from HI-R-H Units

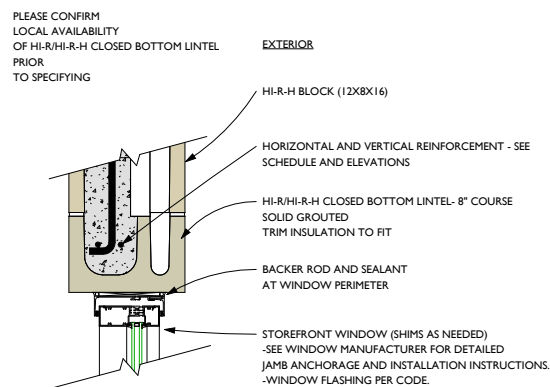


HI-R-H Unit reinforced as a lintel shown prior to grouting

Thermal values will be those for the HI-R-H unit that is used to construct the lintel. Choose the values from the applicable table for that HI-R-H unit (including choosing the same insulation thickness)

Wall System: 12×8×16 HI-R-H		Lintel: Option 2
	Main wall units (field of wall)	12×8×16 HI-R-H
	Control Joints	HI-R-H Jamb Unit or CMU Sash Unit
	Jambs	HI-R-H Jamb Unit or CMU Jamb Unit
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	Option 2: 12×8×16 HI-R/HI-R-H Closed Bottom Lintel

# HI-R/HI-R-H Insulated Solid Bottom Lintel – PLEASE CHECK LOCAL AVAILABILITY



HI-R/HI-R-H Closed Bottom Lintel Unit



HI-R/HI-R-H Closed Bottom Lintel  
Pre-fabricated installation

Lintel – 12×8×16 – HI-R/HI-R-H Closed Bottom Lintel Unit -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.1311	0.1400	0.1490	0.1596	0.1698	0.1817	0.1949	0.2079	0.2227	0.2385	0.2558	0.2768	0.2997
<b>R-Value</b>	7.63	7.14	6.71	6.27	5.89	5.50	5.13	4.82	4.49	4.19	3.91	3.61	3.34
<b>Heat Capacity</b>	14.00	14.82	15.65	16.47	17.29	18.12	18.94	19.76	20.59	21.41	22.24	23.06	23.88
<sup>1</sup> From CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "Lintel-Insulated-Grouted"													

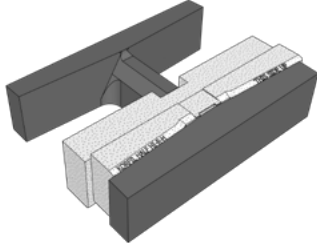
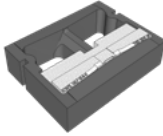
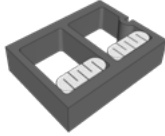
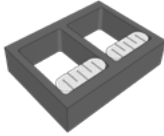
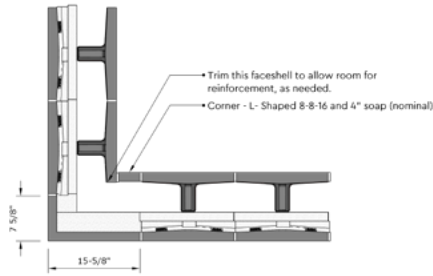
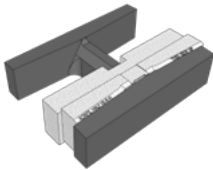
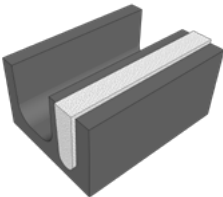
The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



Traditional masonry lintel installation using a form (this lintel is not insulated)

## Wall System: 12×4×16 HI-R-H Half High

### Summary of System Component Options:

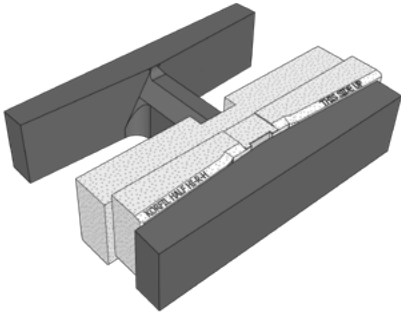
	<p><b>Main wall units:</b> HI-R-H 12×4×16 Stretcher Unit Insulation is 4" thick</p> <p><b>Bond beams:</b> HI-R-H 12×4×16 Stretcher Unit</p>			
	<p><b>Control Joints:</b> HI-R-H Half High Sash/Jamb Unit* or Half High CMU Sash</p>	 <p>HI-R-H Half High Sash/Jamb Unit</p>	 <p>Half High CMU Sash Unit with Icon® Inserts</p>	 <p>Half High CMU Jamb Unit with Icon® Inserts</p>
	<p><b>Jambs:</b> HI-R-H Half High Sash/Jamb Unit* or Half High CMU Jamb</p>			
	<p><b>Corners:</b> L-Shaped CMU fitting with EPS Insulation</p>			
	<p><b>Lintels:</b> HI-R-H Half High units or HI-R/HI-R-H Closed Bottom Lintel*</p>	 <p>HI-R-H Half High Unit</p>	 <p>HI-R/HI-R-H Closed Bottom Lintel</p>	

\* Availability may be limited in some regions. Please confirm local availability before specifying.



Wall System:12×4×16 HI-R-H Half High		Main Wall Units
	Main wall units (field of wall)	12×4×16 HI-R-H Half High
	Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash
	Jambs	HI-R-H Half High Sash/Jamb Unit or CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	12×4×16 HI-R-H units or 12×8×16 HI-R Lintel

Main wall unit: 12×4×16 HI-R-H Half High, used for straight portions of the wall



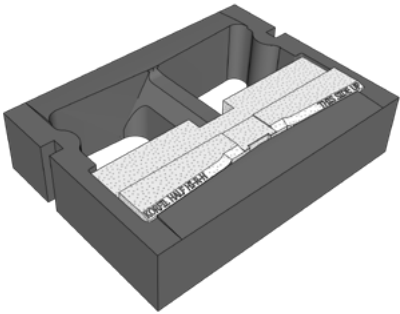
12×4×16 HI-R-H Half High Unit with 4" Insulation Insert													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0518	0.0539	0.0560	0.0584	0.0610	0.0636	0.0665	0.0697	0.0730	0.0769	0.0812	0.0858	0.0910
R-Value	19.29	18.57	17.87	17.13	16.40	15.73	15.04	14.36	13.69	13.00	12.32	11.65	10.98
Heat Capacity	10.37	10.98	11.59	12.2	12.81	13.42	14.03	14.64	15.25	15.86	16.47	17.08	17.69
<sup>1</sup> From CBIS / Korfil® Website, Technical Library: "416 - HI-R-H Spec-Brik-DLN Stamp" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil® Website, Technical Library: "416 - HI-R-H Spec-Brik-DLN Stamp" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS / Korfil® Website, Technical Library: "416 - HI-R-H Spec-Brik-DLN Stamp"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



Wall System:12×4×16 HI-R-H Half High		Control Joints: Option 1
	Main wall units (field of wall)	12×4×16 HI-R-H Half High
	Control Joints	Option 1: HI-R-H Half High Sash/Jamb Unit
	Jambs	HI-R-H Half High Sash/Jamb Unit or CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	12×4×16 HI-R-H units or 12×8×16 HI-R Lintel

Control Joints: 12×4×16 and 12×4×8 HI-R-H Sash/Jamb Unit, used at control joints



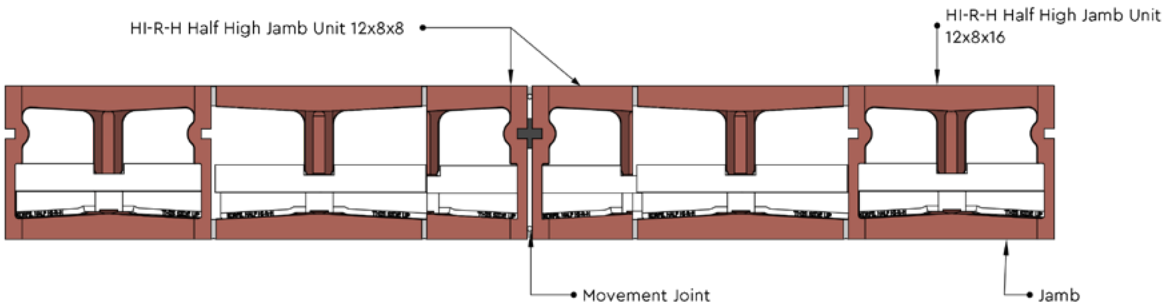
HI-R-H Half High Sash/Jamb Unit 12×4×16



Control Joint using HI-R-H Half High Sash/Jamb Unit

12×4×16 HI-R-H Jamb/Joint Unit with 4" Insulation Insert													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0615	0.0643	0.0672	0.0706	0.0741	0.0781	0.0826	0.0871	0.0925	0.0981	0.1044	0.1119	0.1201
R-Value	16.26	15.56	14.87	14.16	13.50	12.80	12.11	11.48	10.81	10.19	9.58	8.94	8.32
Heat Capacity	11.04	11.68	12.33	12.98	13.63	14.28	14.93	15.58	16.23	16.87	17.53	18.17	18.82
1. From CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED". 2. Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED". 3. Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED".													

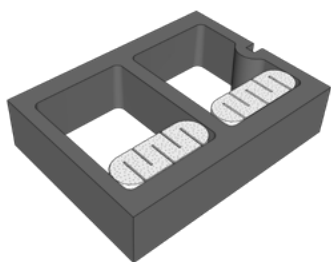
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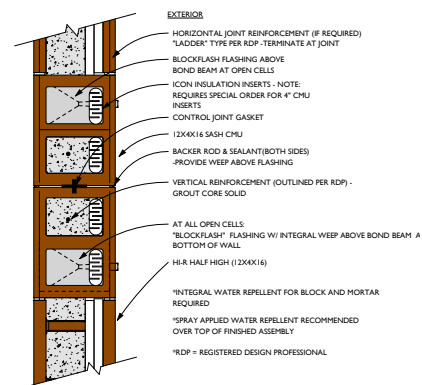
Plan View of Control Joint and Jambs (grout not shown)

	Wall System:12×4×16 HI-R-H Half High	Control Joints: Option 2
	Main wall units (field of wall)	12×4×16 HI-R-H Half High
	Control Joints	Option 2: CMU Sash
	Jamb	HI-R-H Half High Sash/Jamb Unit or CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	12×4×16 HI-R-H units or 12×8×16 HI-R Lintel

## Control Joints : 12×4×16 and 12×4×8 CMU Sash



CMU Sash Unit With Icon® Inserts



Control Joint using CMU Sash Unit

12×4×16 and 12×4×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	17.32	17.80	18.28	18.76	19.24	19.71	20.19	20.67	21.15	21.63	22.11	22.59	23.06
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×4×16 and 12×4×8 CMU Sash Unit with double Icon® Insulation Insert -Grouted													
Density (pcf)	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	14.36	15.12	15.60	16.08	16.56	17.04	17.51	17.99	18.47	18.95	19.43	19.91	20.38
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

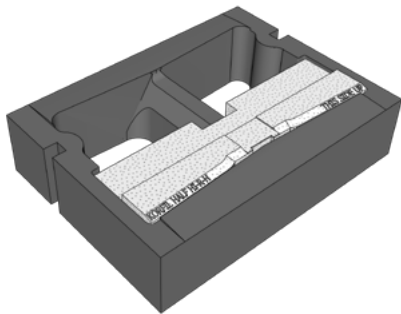
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Note: Icon® Inserts are manufactured to fit full high (nominal 8") CMU and must be cut to fit half high units. This requires a special order or field cutting.



Wall System: 12x4x16 HI-R-H Half High		Jambs: Option 1
	Main wall units (field of wall)	12x4x16 HI-R-H Half High
	Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash
	Jambs	Option 1: HI-R-H Half High Sash/Jamb Unit
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	12x4x16 HI-R-H units or 12x8x16 HI-R Lintel

Jambs: 12x4x16 and 12x4x8 HI-R-H Sash/Jamb, used at control joints and openings



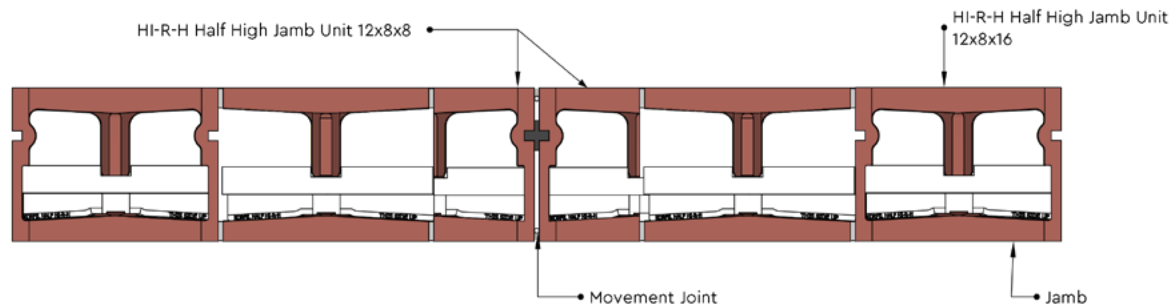
HI-R-H Half High Sash/Jamb Unit 12x4x16



Jambs being constructed using HI-R-H Half High Sash/Jamb Unit

12x4x16 AND 12x4x8 HI-R-H Half High Sash/Jamb Unit with 4" Insulation Insert													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0615	0.0643	0.0672	0.0706	0.0741	0.0781	0.0826	0.0871	0.0925	0.0981	0.1044	0.1119	0.1201
R-Value	16.26	15.56	14.87	14.16	13.50	12.80	12.11	11.48	10.81	10.19	9.58	8.94	8.32
Heat Capacity	11.04	11.68	12.33	12.98	13.63	14.28	14.93	15.58	16.23	16.87	17.53	18.17	18.82
<sup>1</sup> From CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED". <sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED". <sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "HI-R-H Spec-Brik Jamb Unit. HI-R-H HALF HIGH SPEC-BRIK UTILITY JAMB BLOCK. Revised 4-19-2019 PW GRYCEL B' INSULATION INSERT THICKNESS HAS 0.591 ADDED".													

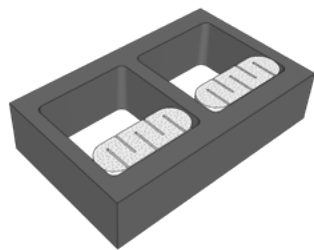
The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



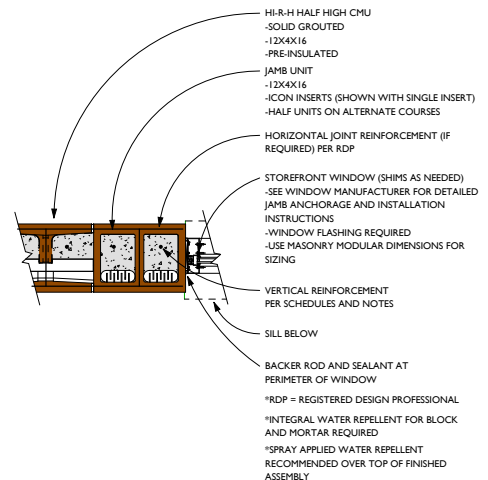
Plan View of Control Joint and Jambs (grout not shown)

Wall System: 12×4×16 HI-R-H Half High		Jamb: Option 2
Main wall units (field of wall)	12×4×16 HI-R-H Half High	
Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash	
Jamb	Option 2: CMU Jamb	
Corners	L-Shaped CMU fitting with 4" EPS Insulation	
Lintels	12×4×16 HI-R-H units or 12×8×16 HI-R Lintel	

## Jamb : 12×4×16 and 12×4×8 CMU Jamb



CMU Jamb Unit With Icon® Inserts



Jamb using CMU Jamb Unit

12×4×16 and 12×4×8 CMU Jamb Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	17.32	17.80	18.28	18.76	19.24	19.71	20.19	20.67	21.15	21.63	22.11	22.59	23.06
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×4×16 and 12×4×8 CMU Jamb Unit with double Icon® Insulation Insert -Grouted													
Density (pcf)	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	14.36	15.12	15.60	16.08	16.56	17.04	17.51	17.99	18.47	18.95	19.43	19.91	20.38
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

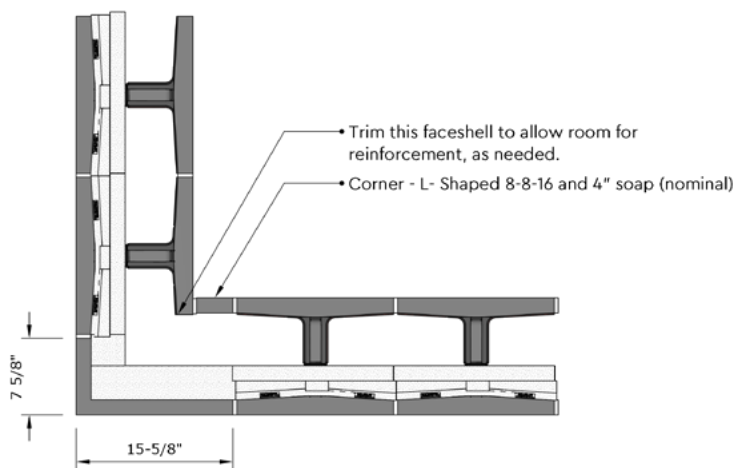
The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

Note: Icon® Inserts are manufactured to fit full high (nominal 8") CMU and must be cut to fit half high units. This requires a special order or field cutting.

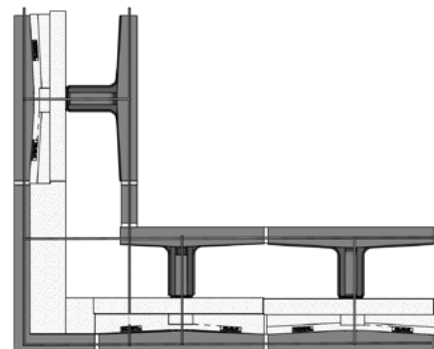


	Wall System:12×4×16 HI-R-H Half High	Corner
	Main wall units (field of wall)	12×4×16 HI-R-H Half High
	Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash
	Jambs	HI-R-H Half High Sash/Jamb Unit or CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	12×4×16 HI-R-H units or HI-R/HI-R-H Closed Bot- tom Lintel

### Corners: 12×4×16 L-Shaped CMU fitting with EPS Insulation



The L-shaped fitting and the soap are cut from a 8×8×16 CMU unit

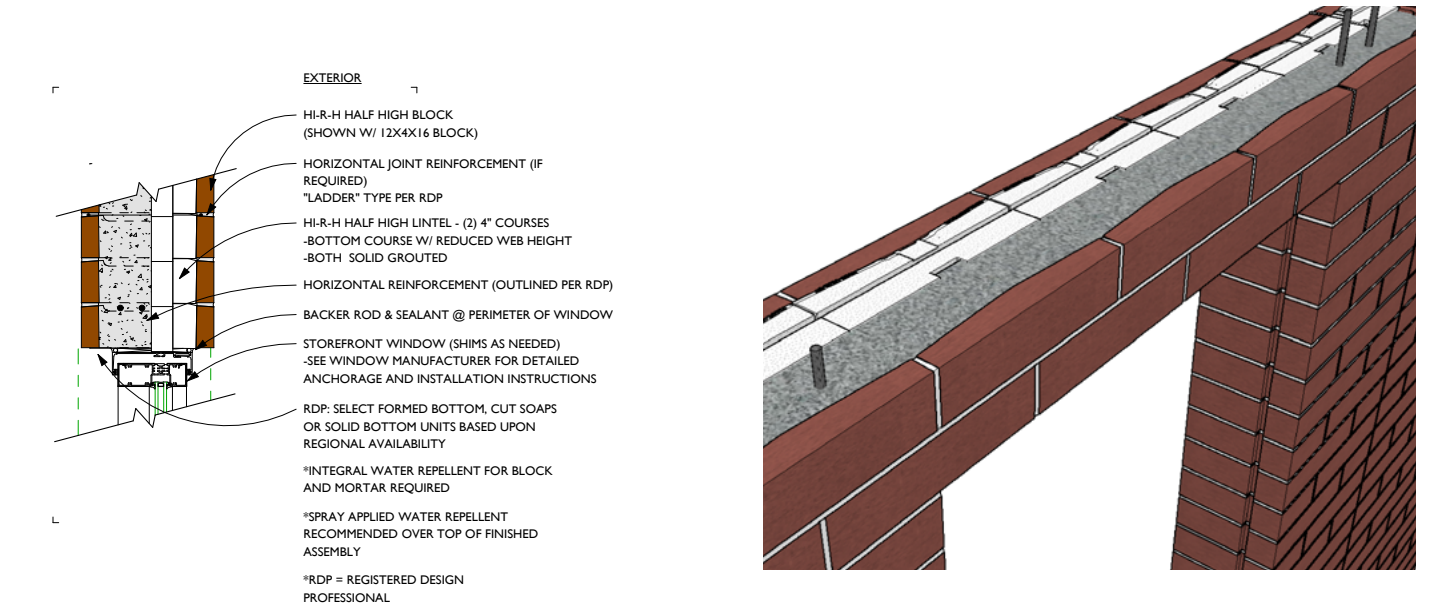


Alternate course unit orientation (also note horizontal joint reinforcement)

The thermal values for this corner detail can be assumed to be the same or better than those for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.

	Wall System:12×4×16 HI-R-H Half High	Lintel – Option 1
	Main wall units (field of wall)	12×4×16 HI-R-H Half High
	Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash
	Jamb	HI-R-H Half High Sash/Jamb Unit or CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	Option 1: 12×4×16 HI-R-H unit

### Lintel Formed from HI-R-H Half High Units



Lintel being constructed with reinforced HI-R-H Half High Units

Thermal values for this detail will be the same as those for the HI-R-H Half High unit that is used to construct the lintel. Choose the values from the applicable table for that unit.

Wall System:12×4×16 HI-R-H Half High		Lintel: Option 2
Main wall units (field of wall)	12×4×16 HI-R-H Half High	
Control Joints	HI-R-H Half High Sash/Jamb Unit or CMU Sash	
Jambs	HI-R-H Half High Sash/Jamb Unit or CMU Jamb	
Corners	L-Shaped CMU fitting with 4" EPS Insulation	
Lintels	Option 2: HI-R/HI-R-H Closed Bottom Lintel	

HI-R Insulated Solid Bottom Lintel – PLEASE CHECK LOCAL AVAILABILITY

PLEASE CONFIRM LOCAL AVAILABILITY OF HI-R/HI-R-H CLOSED BOTTOM LINTEL PRIOR TO SPECIFYING

EXTERIOR

HI-R-H HALF HIGH BLOCK (12X4X16)

HORIZONTAL AND VERTICAL REINFORCEMENT - SEE SCHEDULE AND ELEVATIONS

SPECIALIZED HI-R/HI-R-H CLOSED BOTTOM LINTEL- 8" COURSE SOLID GROUTED TRIM INSULATION TO FIT

BACKER ROD AND SEALANT AT WINDOW PERIMETER

STOREFRONT WINDOW (SHIMS AS NEEDED)  
-SEE WINDOW MANUFACTURER FOR DETAILED JAMB ANCHORAGE AND INSTALLATION INSTRUCTIONS.  
-WINDOW FLASHING PER CODE.

\*RDP = REGISTERED DESIGN PROFESSIONAL

\*INTEGRAL WATER REPELLENT FOR BLOCK AND MORTAR REQUIRED

\*SPRAY APPLIED WATER REPELLENT RECOMMENDED OVER TOP OF FINISHED ASSEMBLY

HI-R Lintel Unit (shown with HI-R-H Half High Units)

HI-R/HI-R-H Closed Bottom Lintel – Pre-fabricated installation

12×8×16 – HI-R/HI-R-H Closed Bottom Lintel Unit -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1311	0.1400	0.1490	0.1596	0.1698	0.1817	0.1949	0.2079	0.2227	0.2385	0.2558	0.2768	0.2997
R-Value	7.63	7.14	6.71	6.27	5.89	5.50	5.13	4.82	4.49	4.19	3.91	3.61	3.34
Heat Capacity	14.00	14.82	15.65	16.47	17.29	18.12	18.94	19.76	20.59	21.41	22.24	23.06	23.88
<sup>1</sup> . From CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>2</sup> . Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>3</sup> . Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "Lintel-Insulated-Grouted"													

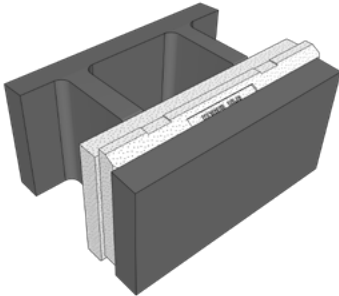
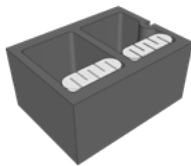
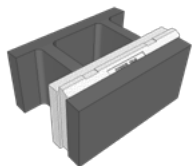
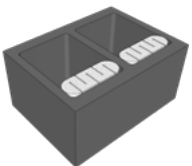
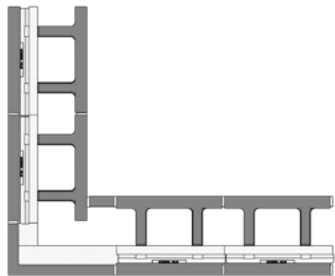
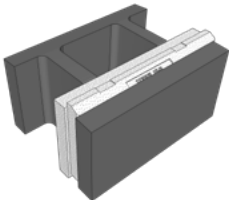
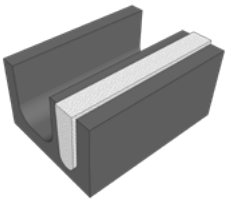
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Traditional masonry lintel installation using a form (this lintel is not insulated)

## Wall System: 12×8×16 HI-R

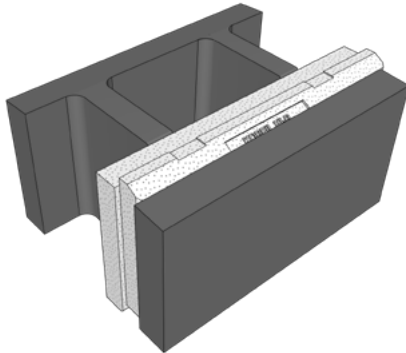
### Summary of System Component Options:

	<p>Main wall units: HI-R 12×8×16 Stretcher Unit</p> <p>Bond beams: HI-R 12×8×16 with reduced web height or HI-R KOBB unit</p>			
	<p>Control Joints: CMU Sash or HI-R Michigan Style Control Joint</p>			
	<p>Jambs: CMU Jamb</p>	CMU Sash with Icon® Inserts	HI-R for Michigan Style Control Joint	CMU Jamb with Icon® Inserts
	<p>Corners: L-Shaped CMU fitting with EPS Insulation</p>			
	<p>Lintels: HI-R units or HI-R/HI-R-H Closed Bottom Lintel*</p>			
		HI-R Unit	HI-R/HI-R-H Closed Bottom Lintel	

\* Availability may be limited in some regions. Please confirm local availability before specifying.

Wall System: 12×8×16 HI-R		Main wall units
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	CMU Sash unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	HI-R units or HI-R/HI-R-H Closed Bottom Lintel

**Main wall unit: 12×8×16 HI-R, used for straight portions of the wall**



HI-R Unit (shown in 12×8×16)



Partially Grouted HI-R Wall

12×8×16 HI-R Unit with 2.5" Insulation Insert – Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0734	0.0763	0.0795	0.0829	0.0865	0.0904	0.0946	0.0990	0.1040	0.1091	0.1147	0.1210	0.1278
R-Value	13.63	13.10	12.58	12.06	11.56	11.06	10.57	10.10	9.62	9.17	8.72	8.27	7.83
Heat Capacity	19.45	19.79	20.10	20.46	20.80	21.13	21.50	21.80	22.10	22.47	22.80	23.14	23.47

<sup>1</sup> From CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (FULLY GROUTED)".  
<sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (FULLY GROUTED)".  
<sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (FULLY GROUTED)".

12×8×16 HI-R Unit with 2.5" Insulation Insert – UngROUTED													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0712	0.0740	0.0770	0.0802	0.0835	0.0872	0.0911	0.0952	0.0997	0.1043	0.1094	0.1151	0.1212
R-Value	14.04	13.51	12.99	12.47	11.97	11.47	10.98	10.51	10.03	9.58	9.14	8.69	8.25
Heat Capacity	6.33	6.68	7.03	7.38	7.70	8.08	8.47	8.79	9.15	9.49	9.82	10.19	10.54

<sup>1</sup> From CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (UNGROUTED)".  
<sup>2</sup> Interpolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (UNGROUTED)".  
<sup>3</sup> Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped, HI-R MASONRY UNITS\* (UNGROUTED)".

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## Determining U-Factor for Partially Grouted Walls

For partially grouted walls, the thermal properties of the wall will need to take into account the weighted average of the thermal values for the portions of the wall that are ungrouted vs. grouted. The method for calculating the U-Factor for a partially grouted wall is set out in NCMA TEK 6-2C R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS (Available for download at: [http://ncma-br.org/e-tek\\_chapter-nbs.asp?id=6.](http://ncma-br.org/e-tek_chapter-nbs.asp?id=6.))

**Table 3—UngROUTED Area : Grouted Area For Partially Grouted Walls<sup>A</sup>**

Vertical grout spacing, in. (mm)

	no vert. grout	48 (1,219)	40 (1,016)	32 (813)	24 (610)	16 (406)
no horiz. grout	100:0	83:17	80:20	75:25	67:33	50:50
48 (1,219)	83:17	69:31	67:33	63:37	56:44	42:58
40 (1,016)	80:20	67:33	64:36	60:40	53:47	40:60
32 (813)	75:25	63:37	60:40	56:44	50:50	37:63
24 (610)	67:33	56:44	53:47	50:50	44:56	33:67
16 (406)	50:50	42:58	40:60	37:63	33:67	25:75

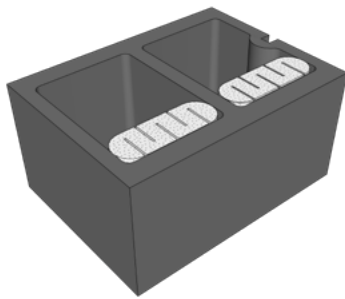
<sup>A</sup> Expressed as a percentage. Example: a wall grouted at 32-in. (813-mm) on center vertically, with no horizontal grout, has approximately 75% of the wall ungrouted, and 25% grouted.

Table 3—UngROUTED Area : Grouted Area For Partially Grouted Walls  
TEK 06-2C – R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS  
(NCMA TEK NOTE- NCMA.ORG)

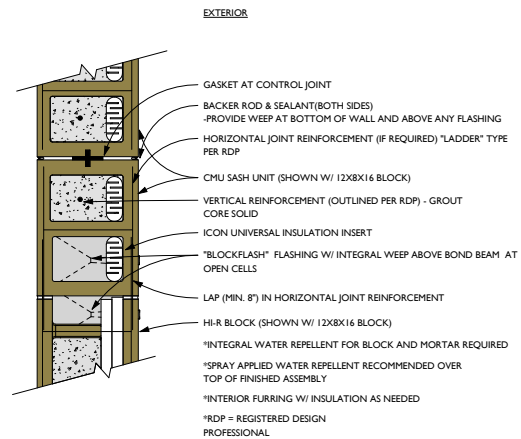


Wall System: 12×8×16 HI-R		Control Joints – Option 1
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	Option 1: CMU Sash Unit with Icon® Inserts
	Jambs	CMU Jamb Unit
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×8×16 HI-R units or HI-R/HI-R-H Closed Bottom Lintel

## Control Joints: 12×8×16 and 12×8×8 CMU Sash Unit



CMU Sash With Icon® Inserts



Control Joint with CMU Sash Unit

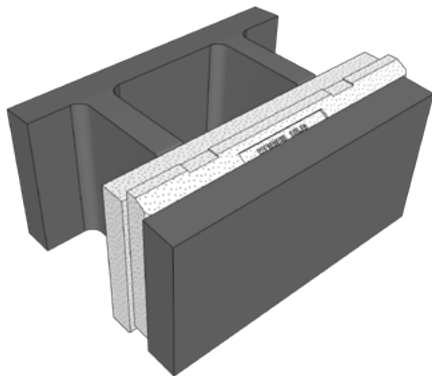
12×8×16 and 12×8×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	18.45	18.94	19.42	19.91	20.39	20.88	21.37	21.85	22.34	22.82	23.31	23.79	24.28
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×8×16 and 12×8×8 CMU Sash Unit with double Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	15.73	16.22	16.71	17.19	17.68	18.16	18.65	19.13	19.62	20.10	20.59	21.07	21.56
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

Wall System: 12×8×16 HI-R		Control Joints – Option 2
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	Option 2: HI-R Michigan Style Control Joint
	Jambs	CMU Jamb with Icon® Inserts
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×8×16 HI-R units or HI-R/HI-R-H Closed Bottom Lintel

**Michigan Style HI-R Control Joint** – this method allows the control joint to have the same thermal performance as the main wall.

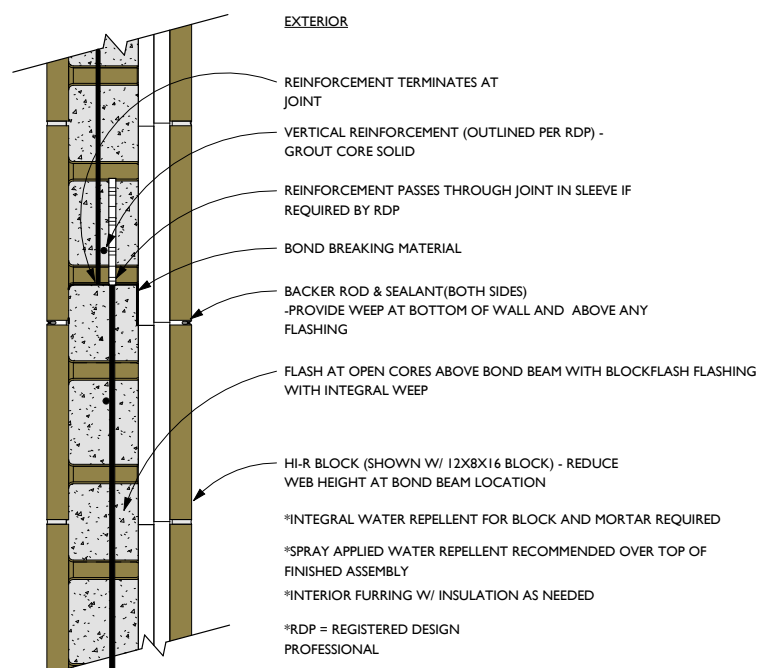


Control joint is built from HI-R Units



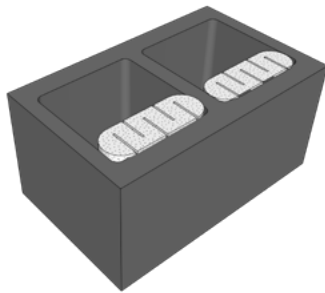
Bond break at control joint

This detail is suitable for control joints with HI-R or HI-R Half High only. Thermal values will be the same as those for the unit that is used to construct the control joint. Choose the values from the applicable table.

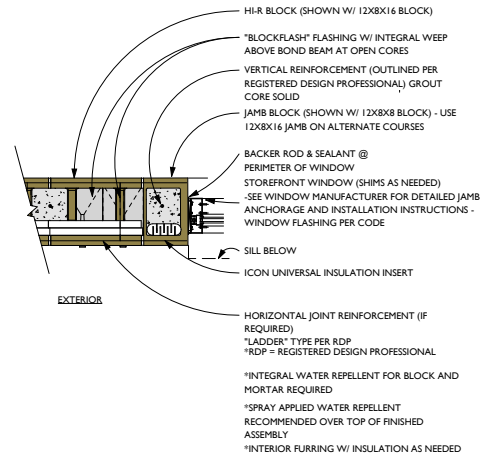


Wall System: 12×8×16 HI-R		Jambs
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	CMU Sash unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×8×16 HI-R units or HI-R/HI-R-H Closed Bottom Lintel

## Jambs: 12×8×16 and 12×8×8 CMU Jamb Unit



CMU Jamb with Icon® Inserts



Window Jamb with CMU Jamb Unit

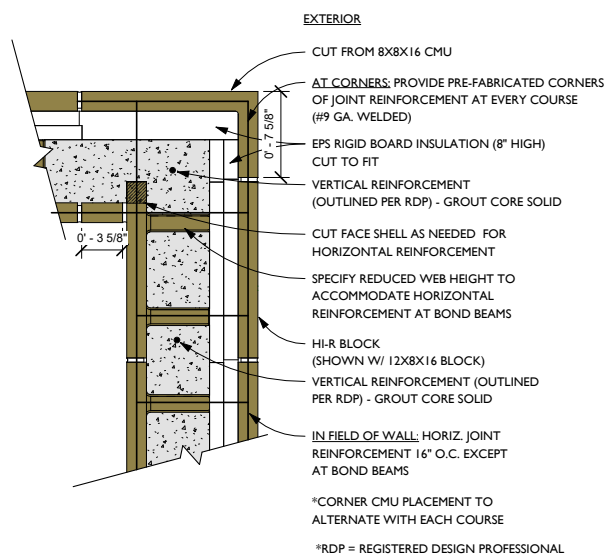
12×8×16 and 12×8×8 CMU Jamb Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
<b>R-Value</b>	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
<b>Heat Capacity</b>	18.45	18.94	19.42	19.91	20.39	20.88	21.37	21.85	22.34	22.82	23.31	23.79	24.28
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

12×8×16 and 12×8×8 CMU Jamb Unit with double Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
<b>R-Value</b>	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
<b>Heat Capacity</b>	15.73	16.22	16.71	17.19	17.68	18.16	18.65	19.13	19.62	20.10	20.59	21.07	21.56
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

	Wall System: 12×8×16 HI-R	Corner
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	12×8×16 HI-R-H units or HI-R/HI-R-H Closed Bottom Lintel

### Corners: 12×8×16 L-Shaped CMU fitting with EPS Insulation

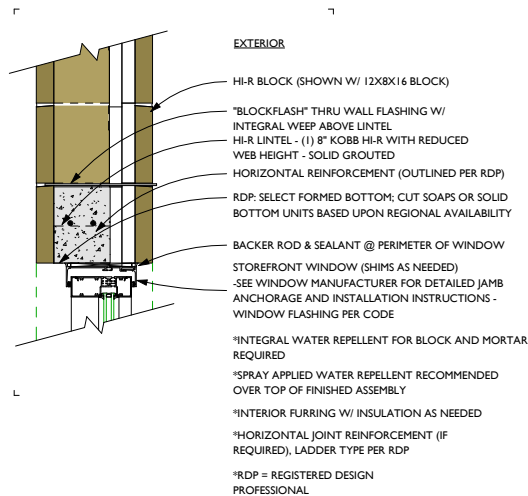


Corner with L-shaped fitting cut from CMU and soap. The HI-R-H unit to right's face shell can be cut as needed. This detail can be used with both HI-R and HI-R-H units

The thermal values for this corner detail can be assumed to be the same as for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.

	Wall System: 12×8×16 HI-R	Lintels – Option 1
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	Option 1: 12×8×16 HI-R units

## Lintel Formed from HI-R Units



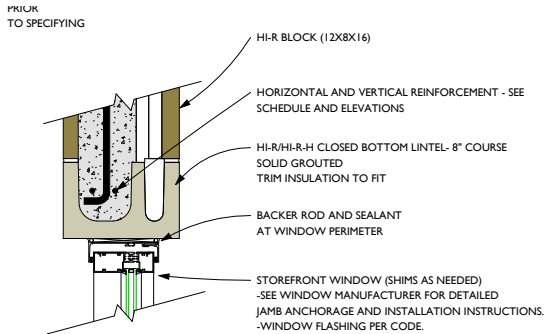
HI-R reinforced as lintel after grout has cured and wood forms have been removed

Thermal values will be the same as those for the HI-R unit that is used to construct this detail. Choose the values from the applicable table for that HI-R unit.



	Wall System: 12×8×16 HI-R	Lintels – Option 2
	Main wall units (field of wall)	12×8×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	Option 2: 12×8×16 HI-R/HI-R-H Closed Bottom Lintel

HI-R/HI-R-H Closed Bottom Lintel – PLEASE CHECK LOCAL AVAILABILITY



HI-R/HI-R-H Closed Bottom Lintel Unit

HI-R/HI-R-H Closed Bottom Lintel – Pre-fabricated installation

Lintel -12×8×16 -HI-R/HI-R-H Closed Bottom Lintel Unit -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1311	0.1400	0.1490	0.1596	0.1698	0.1817	0.1949	0.2079	0.2227	0.2385	0.2558	0.2768	0.2997
R-Value	7.63	7.14	6.71	6.27	5.89	5.50	5.13	4.82	4.49	4.19	3.91	3.61	3.34
Heat Capacity	14.00	14.82	15.65	16.47	17.29	18.12	18.94	19.76	20.59	21.41	22.24	23.06	23.88
1. From CBIS / Korfil®: "Lintel-Insulated-Grouted" 2. Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "Lintel-Insulated-Grouted" 3. Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "Lintel-Insulated-Grouted"													

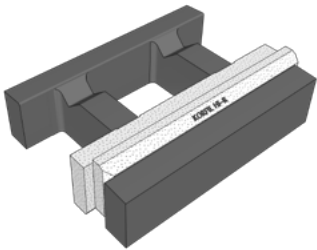
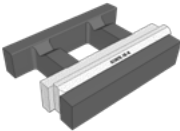
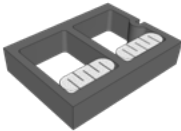
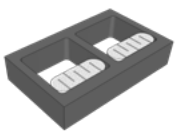
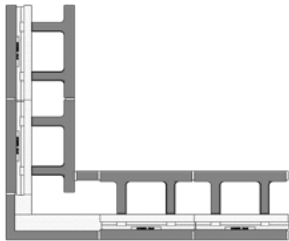
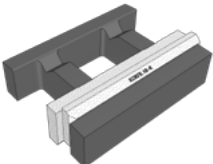
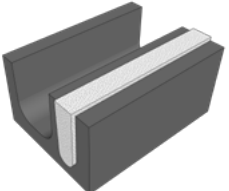
The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



Traditional masonry lintel installation using a form (this lintel is not insulated)

# Wall System: 12×4×16 HI-R Half High

## Summary of System Component Options:

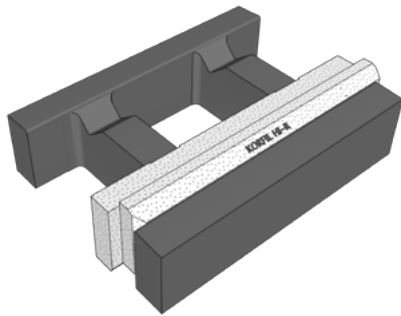
	<p><b>Main wall units:</b> HI-R Half High 12×4×16 Stretcher Unit</p> <p><b>Bond beams:</b> HI-R Half High 12×4×16 unit KOBB</p>			
	<p><b>Control Joints:</b> HI-R Michigan Style Control Joint or CMU Sash Unit</p>	 <p>HI-R Half High Unit (used for Michigan style control joint)</p>	 <p>CMU Half High Sash Unit</p>	 <p>CMU Half High Jamb Unit</p>
	<p><b>Jambs:</b> CMU Jamb Unit**</p>			
	<p><b>Corners:</b> L-Shaped CMU fitting with EPS Insulation</p>			
	<p><b>Lintels:</b> HI-R Half High units or HI-R 12×8×16 Insulated Lintel*</p>	 <p>HI-R Half High Unit</p>	 <p>HI-R/HI-R-H Closed Bottom Lintel</p>	

\* Availability may be limited in some regions. Please confirm local availability before specifying.

\*\* Icon inserts are made for 8" high CMU – half high size requires special order or field cut.

Wall System: 12×4×16 HI-R Half High		Main Wall Unit
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash or HI-R Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	L-Shaped CMU fitting
	Lintels	12×4×16 HI-R units or HI-R Lintel

### Main wall unit: 12×4×16 HI-R Half High, used for straight portions of the wall



12×4×16 HI-R Half High Unit



HI-R Half High Wall Under Construction

12×4×16 HI-R Unit with 2.5" Insulation Insert – Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0734	0.0763	0.0795	0.0829	0.0865	0.0904	0.0946	0.0990	0.1040	0.1091	0.1147	0.1210	0.1278
R-Value	14.18	13.63	12.58	12.06	11.56	11.06	10.57	10.10	9.62	9.17	8.72	8.27	7.83
Heat Capacity	19.45	19.79	20.10	20.46	20.80	21.13	21.50	21.80	22.10	22.47	22.80	23.14	23.47

1. From CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (FULLY GROUTED)."

2. Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (FULLY GROUTED)."

3. Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (FULLY GROUTED)."

12×4×16 HI-R Unit with 2.5" Insulation Insert – UngROUTed													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0712	0.0740	0.0770	0.0801	0.0835	0.0872	0.0911	0.0952	0.0997	0.1044	0.1094	0.1148	0.1205
R-Value	14.04	13.51	12.99	12.48	11.97	11.47	10.98	10.50	10.03	9.58	9.14	8.71	8.30
Heat Capacity	6.51	6.89	7.27	7.66	8.04	8.42	8.90	9.19	9.57	9.95	10.34	10.72	11.10

1. From CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (UNGROUTED)."

2. Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (UNGROUTED)."

3. Extrapolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "#323 Half HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. 1/2 HIGH HI-R MASONRY UNITS\* (UNGROUTED)."

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

### Determining U-Factor for Partially Grouted Walls

For partially grouted walls, the thermal properties of the wall will need to take into account the weighted average of the thermal values for the portions of the wall that are ungrouted vs. grouted. The method for calculating the U-Factor for a partially grouted wall is set out in NCMA TEK 6-2C R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS (Available for download at: [http://ncma-br.org/e-tek\\_chapter-nbs.asp?id=6.](http://ncma-br.org/e-tek_chapter-nbs.asp?id=6.))

**Table 3—UngROUTed Area : Grouted Area For Partially Grouted Walls<sup>A</sup>**

Vertical grout spacing, in. (mm)

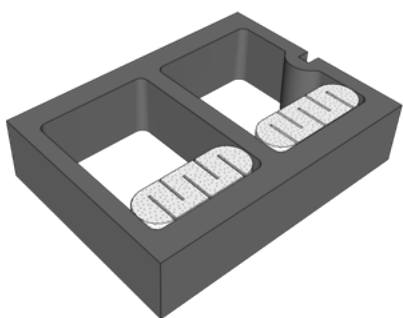
	no vert. grout	48 (1,219)	40 (1,016)	32 (813)	24 (610)	16 (406)
no horiz. grout	100:0	83:17	80:20	75:25	67:33	50:50
48 (1,219)	83:17	69:31	67:33	63:37	56:44	42:58
40 (1,016)	80:20	67:33	64:36	60:40	53:47	40:60
32 (813)	75:25	63:37	60:40	56:44	50:50	37:63
24 (610)	67:33	56:44	53:47	50:50	44:56	33:67
16 (406)	50:50	42:58	40:60	37:63	33:67	25:75

<sup>A</sup> Expressed as a percentage. Example: a wall grouted at 32-in. (813-mm) on center vertically, with no horizontal grout, has approximately 75% of the wall ungrouted, and 25% grouted.

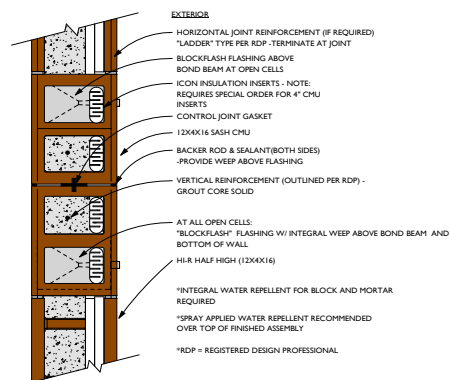
Table 3—UngROUTed Area : Grouted Area For Partially Grouted Walls  
TEK 06-2C – R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS  
(NCMA TEK NOTE- NCMA.ORG)

Wall System: 12×4×16 HI-R Half High		Control Joints: Option 1
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	Option 1: CMU Sash Unit with Icon® Inserts
	Jambs	CMU Jamb
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×4×16 HI-R units or HI-R/HI-R-H Closed Bottom Lintel

## Control Joints: 12×4×16 and 12×4×8 CMU Sash



CMU Half High Sash Unit with Icon® Inserts\*  
(\*special order item)



Control Joint using CMU Sash Unit

12×4×16 and 12×4×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	17.32	17.80	18.28	18.76	19.24	19.71	20.19	20.67	21.15	21.63	22.11	22.59	23.06
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

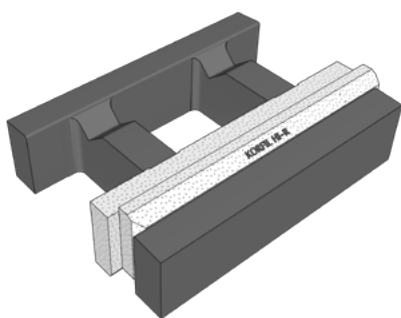
12×4×16 and 12×4×8 CMU Sash Unit with double Icon® Insulation Insert -Grouted													
Density (pcf)	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	14.36	15.12	15.60	16.08	16.56	17.04	17.51	17.99	18.47	18.95	19.43	19.91	20.38
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

**Note:** Icon® Inserts are manufactured to fit full high (nominal 8") CMU and must be cut to fit half high units. This requires a special order or field cutting.

Wall System: 12×4×16 HI-R Half High		Control Joints: Option 2
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	Option 2: HI-R Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×4×16 HI-R units or HI-R Lintel

**Michigan Style HI-R Control Joint** – this method allows the control joint to have the same thermal performance as the main wall.

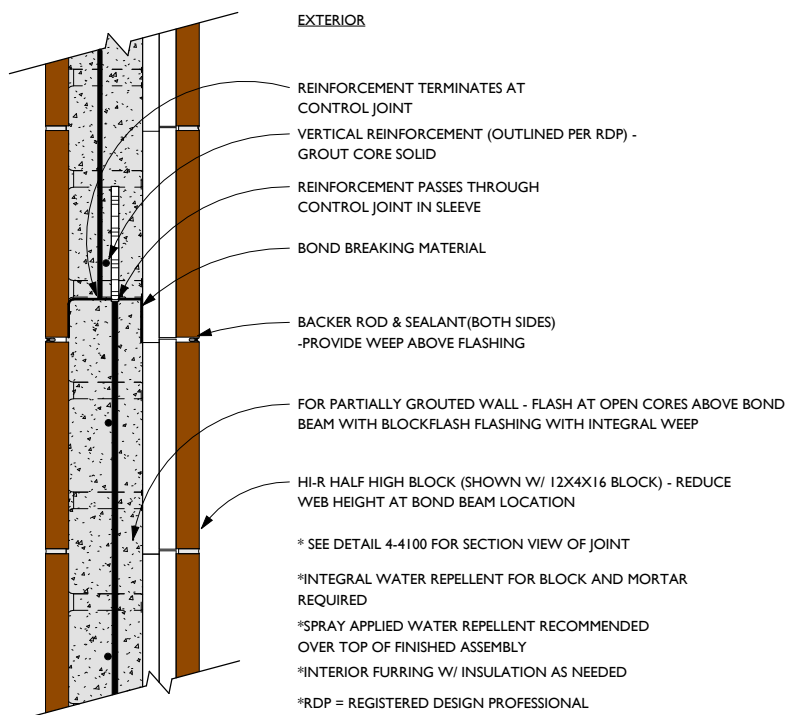


Control joint is built from HI-R Units



Bond break at control joint

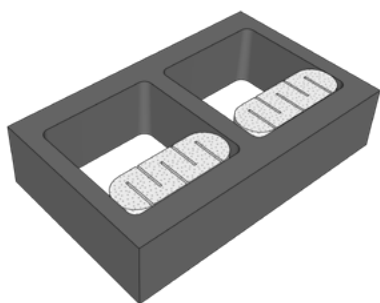
This detail is suitable for control joints with HI-R or HI-R Half High only. Thermal values will be the same as those for the unit that is used to construct the control joint. Choose the values from the applicable table.



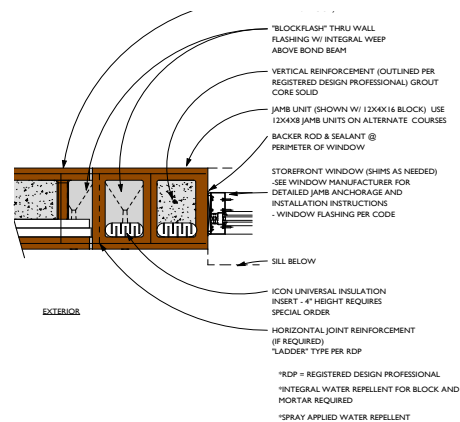


	Wall System: 12×4×16 HI-R Half High	Jambs
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash or HI-R Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	12×4×16 HI-R units or HI-R/HI-R-H Closed Bot- tom Lintel

## Jambs: 12×4×16 and 12×4×8 CMU Jamb



CMU Half High Jamb Unit with Icon® Inserts\*  
(\*special order item)



Window Jamb – CMU Jamb Unit with Icon® Inserts

12×4×16 and 12×4×8 CMU Jamb Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1137	0.1193	0.1255	0.1321	0.1393	0.1472	0.1558	0.1649	0.1748	0.1858	0.1976	0.2106	0.2247
R-Value	8.79	8.38	7.97	7.57	7.18	6.79	6.42	6.06	5.72	5.38	5.06	4.75	4.45
Heat Capacity	17.32	17.80	18.28	18.76	19.24	19.71	20.19	20.67	21.15	21.63	22.11	22.59	23.06
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

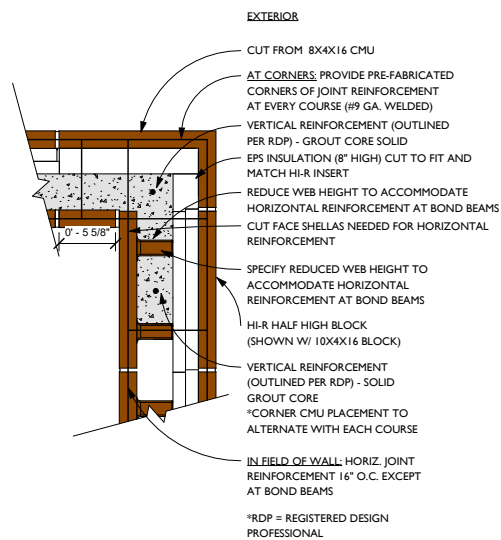
12×4×16 and 12×4×8 CMU Jamb Unit with double Icon® Insulation Insert -Grouted													
Density (pcf)	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0898	0.0954	0.1017	0.1085	0.1159	0.1241	0.1330	0.1424	0.1527	0.1639	0.1761	0.1894	0.2042
R-Value	11.14	10.48	9.83	9.21	8.63	8.06	7.52	7.02	6.55	6.10	5.68	5.28	4.90
Heat Capacity	14.36	15.12	15.60	16.08	16.56	17.04	17.51	17.99	18.47	18.95	19.43	19.91	20.38
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220, pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 2, 2ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 12×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

**Note: Icon® Inserts are manufactured to fit full high (nominal 8") CMU and must be cut to fit half high units. This requires a special order or field cutting.**

	Wall System: 12×4×16 HI-R Half High	Corner
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	12×4×16 HI-R-H units or HI-R Insulated Lintel

### Corners: 12×4×16 L-Shaped CMU fitting

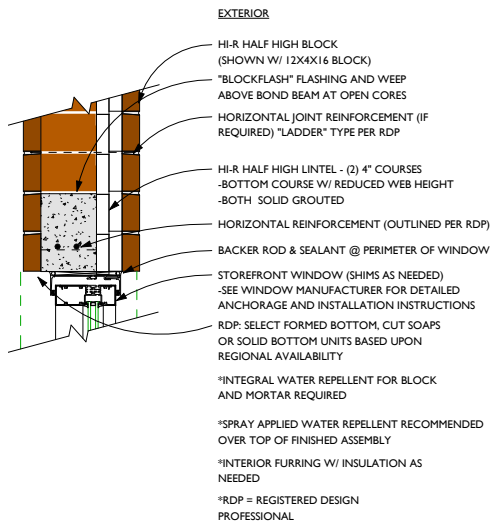


Corner with L-shaped fitting cut from CMU and soap. The HI-R-H unit to right's face shell can be cut as needed. This detail can be used with both HI-R and HI-R-H units as well as the Half High versions of each

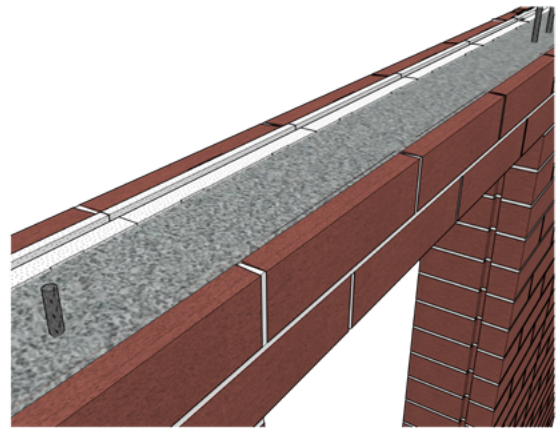
The thermal values for this corner detail can be assumed to be the same as for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.

	Wall System: 12×4×16 HI-R Half High	Lintels
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash or Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	Option 1: 12×4×16 HI-R units

## Lintel Formed from HI-R Half High Units



HI-R Half High Units reinforced to form a lintel



HI-R Half High Units grouted and reinforced to form a lintel

Thermal values will be those for the HI-R Half High unit that is used to construct this detail. Choose the values from the applicable table for that unit.

Wall System: 12×4×16 HI-R Half High		Lintels – Option 2
	Main wall units (field of wall)	12×4×16 HI-R
	Control Joints	CMU Sash or Michigan Style Control Joint
	Jambs	CMU Jamb
	Corners	L-Shaped CMU fitting
	Lintels	Option 2: HI-R/HI-R-H Closed Bottom Lintel

HI-R Insulated Solid Bottom Lintel – PLEASE CHECK LOCAL AVAILABILITY

PLEASE CONFIRM LOCAL AVAILABILITY OF HI-R/HI-R-H CLOSED BOTTOM LINTEL PRIOR TO SPECIFYING

Lintel with HI-R/HI-R-H Closed Bottom Lintel Unit

HI-R/HI-R-H Closed Bottom Lintel – Pre-fabricated installation

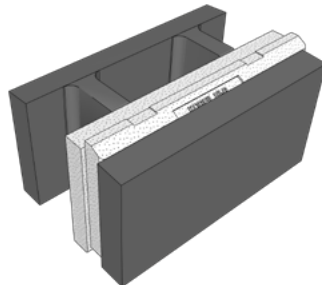
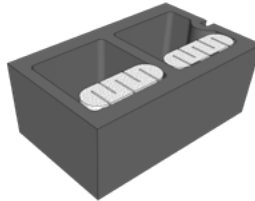
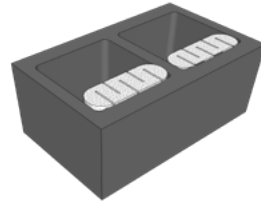
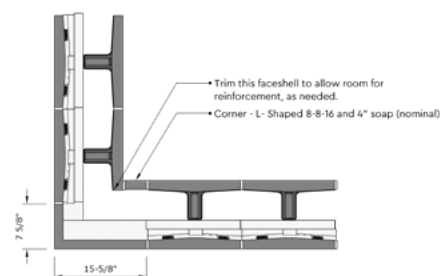
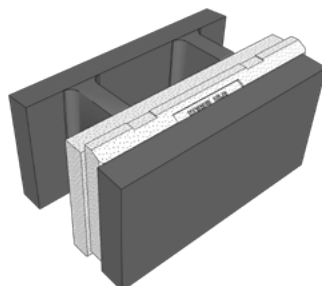
Lintel -12×8×16 -HI-R/HI-R-H Closed Bottom Lintel Unit -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1311	0.1400	0.1490	0.1596	0.1698	0.1817	0.1949	0.2079	0.2227	0.2385	0.2558	0.2768	0.2997
R-Value	7.63	7.14	6.71	6.27	5.89	5.50	5.13	4.82	4.49	4.19	3.91	3.61	3.34
Heat Capacity	14.00	14.82	15.65	16.47	17.29	18.12	18.94	19.76	20.59	21.41	22.24	23.06	23.88
<sup>1</sup> . From CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>2</sup> . Interpolations based upon polynomial quadratic regression analyses of CBIS / Korfil®: "Lintel-Insulated-Grouted" <sup>3</sup> . Extrapolations based upon polynomial quadratic regression analyses of CBIS/Korfil®: "Lintel-Insulated-Grouted"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

Traditional masonry lintel installation using a form (this lintel is not insulated)

## Wall System: 10×8×16 HI-R

### Summary of System Component Options:

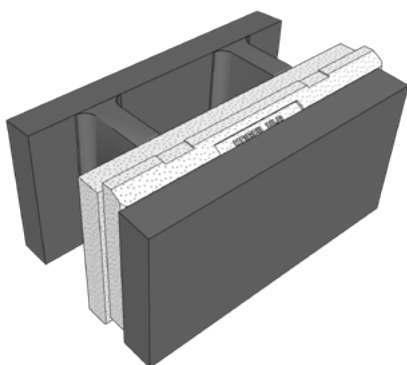
	<p>Main wall units: HI-R 10×8×16 Stretcher Unit* Choose insulation thickness</p> <p>Bond beams: HI-R 10×8×16 with reduced web height or HI-R KOBB</p>		
	<p>Control Joints: CMU Sash</p>		
	<p>Jambs: CMU Jamb</p>	CMU Sash with Icon® inserts	CMU Jamb with Icon® inserts
	<p>Corners: L-Shaped CMU fitting with EPS Insulation</p>		
	<p>Lintels: HI-R units</p>		

\* Availability may be limited in some regions. Please confirm local availability before specifying.



	Wall System: 10×8×16 HI-R	Main Wall Unit
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	CMU Sash Unit or HI-R Michigan Style Jamb
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	10×8×16 HI-R units

**Main wall unit: 10×8×16 HI-R, used for straight portions of the wall**



HI-R Unit (shown in 10×8×16)



Partially Grouted HI-R Wall (shown with 12×8×16 unit)

10×8×16 HI-R Unit with 2.5" Insulation Insert – Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0778	0.0811	0.0846	0.0884	0.0924	0.0968	0.1015	0.1065	0.1119	0.1176	0.1238	0.1303	0.1374
R-Value	12.85	12.33	11.82	11.32	10.82	10.33	9.85	9.39	8.94	8.50	8.08	7.67	7.28
Heat Capacity	15.22	15.50	15.80	16.06	16.30	16.62	16.90	17.18	17.50	17.74	18.00	18.30	18.58

<sup>1</sup> From CBIS / Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. HI-R MASONRY UNITS (FULLY GROUTED)."  
<sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. HI-R MASONRY UNITS (FULLY GROUTED)."  
<sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped. HI-R MASONRY UNITS (FULLY GROUTED)."

10×8×16 HI-R Unit with 2.5" Insulation Insert – UngROUTed													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.0746	0.0776	0.0808	0.0842	0.0879	0.0918	0.0960	0.1005	0.1053	0.1103	0.1157	0.1216	0.1278
R-Value	13.41	12.89	12.38	11.88	11.38	10.89	10.42	9.95	9.50	9.06	8.64	8.23	7.83
Heat Capacity	5.68	6.00	6.32	6.64	6.99	7.28	7.57	7.93	8.24	8.57	8.91	9.21	9.54

<sup>1</sup> From CBIS / Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped 10-in NO GROUT"  
<sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped 10-in NO GROUT"  
<sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "#322 HI-R R value-Heat Cap-Equiv Thk-DLN Stamped 10-in NO GROUT"

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

## Determining U-Factor for Partially Grouted Walls

For partially grouted walls, the thermal properties of the wall will need to take into account the weighted average of the thermal values for the portions of the wall that are ungrouted vs. grouted. The method for calculating the U-Factor for a partially grouted wall is set out in NCMA TEK 6-2C R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS (Available for download at: [http://ncma-br.org/e-tek\\_chapter-nbs.asp?id=6.](http://ncma-br.org/e-tek_chapter-nbs.asp?id=6.))

**Table 3—UngROUTed Area : Grouted Area  
For Partially Grouted Walls<sup>a</sup>**

Vertical grout spacing, in. (mm)

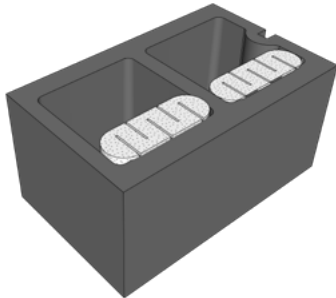
	no vert. grout	48 (1,219)	40 (1,016)	32 (813)	24 (610)	16 (406)
no horiz. grout	100:0	83:17	80:20	75:25	67:33	50:50
48 (1,219)	83:17	69:31	67:33	63:37	56:44	42:58
40 (1,016)	80:20	67:33	64:36	60:40	53:47	40:60
32 (813)	75:25	63:37	60:40	56:44	50:50	37:63
24 (610)	67:33	56:44	53:47	50:50	44:56	33:67
16 (406)	50:50	42:58	40:60	37:63	33:67	25:75

<sup>a</sup> Expressed as a percentage. Example: a wall grouted at 32-in. (813-mm) on center vertically, with no horizontal grout, has approximately 75% of the wall ungrouted, and 25% grouted.

TEK 06-02C – R-VALUES AND U-FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS (NCMA TEK NOTE- NCMA.ORG)

Wall System: 10×8×16 HI-R		Control Joints: Option 1
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	Option 1: CMU Sash
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R units

**Joints: 10×8×16 and 10×8×8 CMU Sash, used at control joints**



CMU Sash Unit With Icon Inserts



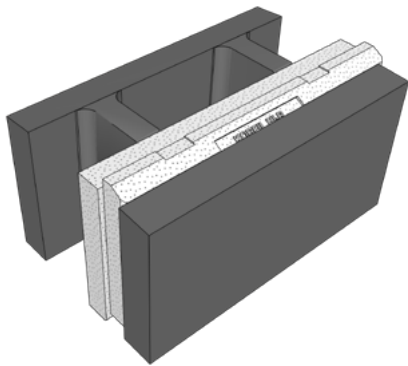
Control Joint built with CMU Sash Unit with Icon Inserts

10×8×16 and 10×8×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.1262	0.1329	0.1403	0.1482	0.1567	0.1661	0.1764	0.1871	0.1988	0.2118	0.2257	0.2409	0.2576
<b>R-Value</b>	7.92	7.52	7.13	6.75	6.38	6.02	5.67	5.34	5.03	4.72	4.43	4.15	3.88
<b>Heat Capacity</b>	16.33	16.71	17.10	17.49	17.87	18.26	18.65	19.03	19.42	19.80	20.19	20.58	20.96
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

Wall System: 10×8×16 HI-R		Control Joints- Option 2
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	HI-R Michigan Style Control Joint
	Jambs	CMU Jamb with Icon® Inserts
	Corners	CMU L-Shaped Fitting with EPS Insulation
	Lintels	10×8×16 HI-R units

**Michigan Style HI-R Control Joint** – this method allows the control joint to have the same thermal performance as the main wall.

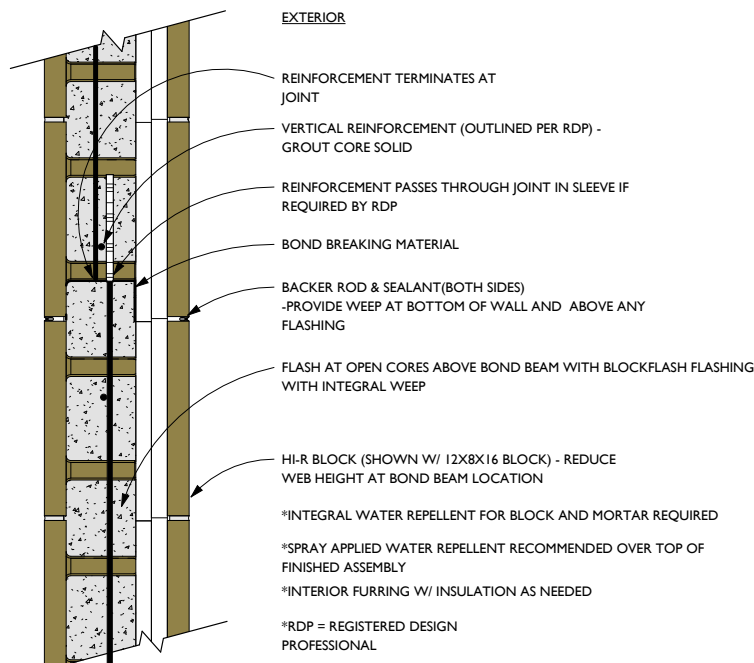


Control Joint is built from 10×8×16 HI-R Units



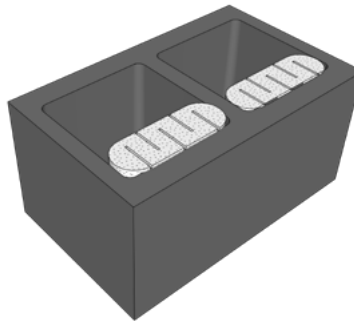
Bond break at Control Joint

This detail is suitable for control joints with HI-R and HI-R Half High only. Thermal values will be the same as those for the HI-R unit that is used to construct the control joint. Choose the values from the applicable table for that HI-R unit



	Wall System: 10×8×16 HI-R	Jambs
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	CMU Sash Unit or HI-R Michigan Style Jamb
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R units

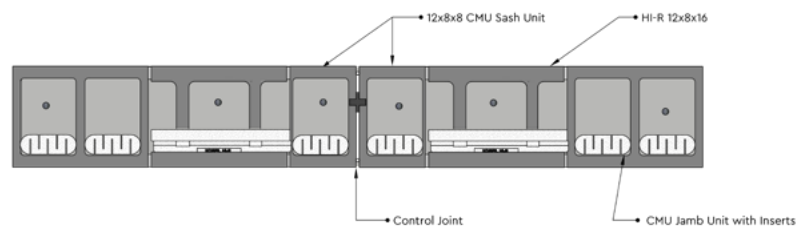
**Jambs: 10×8×16 and 10×8×8 CMU Jamb, used at openings**



CMU Jamb Unit With Icon Inserts

10×8×16 and 10×8×8 CMU Jamb Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
U-Factor	0.1262	0.1329	0.1403	0.1482	0.1567	0.1661	0.1764	0.1871	0.1988	0.2118	0.2257	0.2409	0.2576
R-Value	7.92	7.52	7.13	6.75	6.38	6.02	5.67	5.34	5.03	4.72	4.43	4.15	3.88
Heat Capacity	16.33	16.71	17.10	17.49	17.87	18.26	18.65	19.03	19.42	19.80	20.19	20.58	20.96
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16"													

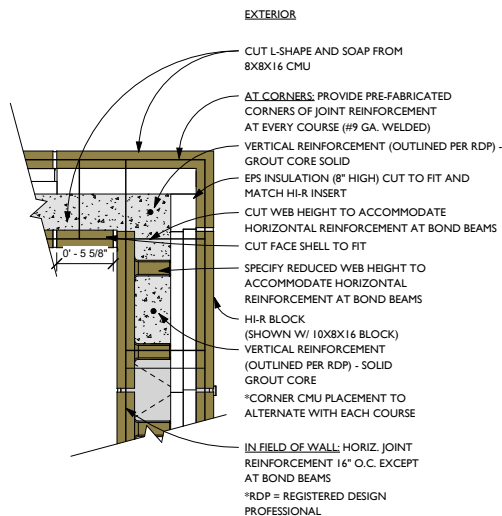
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Plan View of Alternate Courses with Control Joint and Jambs

	Wall System: 10×8×16 HI-R	Corner
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	CMU Sash Unit or Michigan Style Control Joint
	Jambs	CMU Jamb Unit
	Corners	L-Shaped CMU fitting with Insulation
	Lintels	10×8×16 HI-R-H units

## Corners: 10×8×16 L-Shaped CMU fitting with EPS Insulation



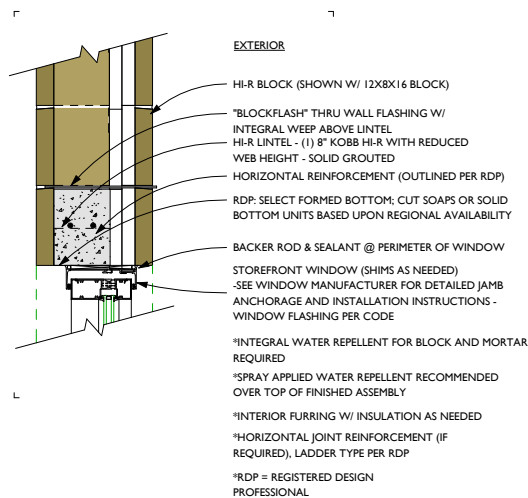
Corner with L-shaped fitting cut from CMU and soap. The HI-R-H unit to right's face shell can be cut as needed. This detail can be used with both HI-R and HI-R-H units as well as the Half High versions of each

The thermal values for this corner detail can be assumed to be the same as for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.



	Wall System: 10×8×16 HI-R	Lintel
	Main wall units (field of wall)	10×8×16 HI-R
	Control Joints	CMU Sash Unit or HI-R Michigan Style Jamb
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R units

## Lintel Formed from 10×8×16 HI-R Units

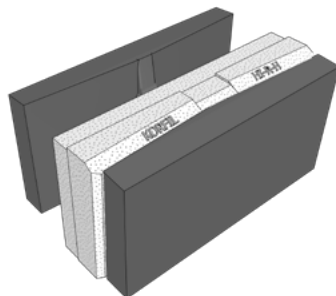
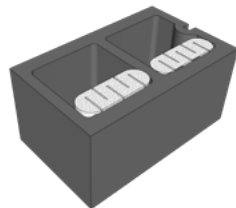
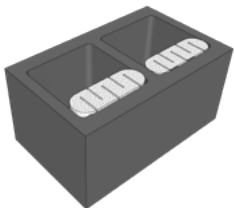
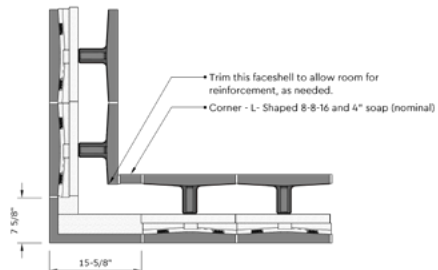
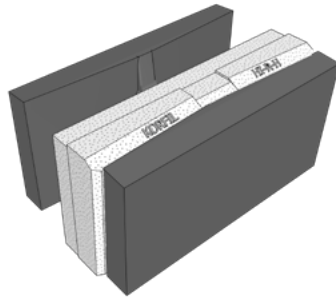


HI-R unit reinforced as lintel after grout has cured and wood forms have been removed

Thermal values will be the same as those for the HI-R unit that is used to construct this detail. Choose the values from the applicable table for that HI-R unit.

## Wall System: 10×8×16 HI-R-H

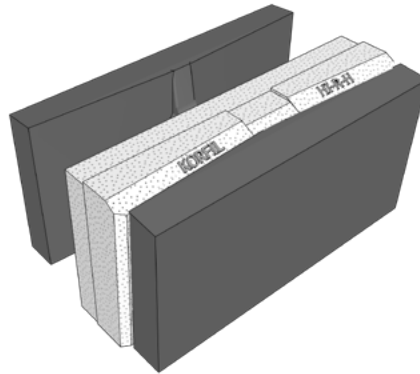
### Summary of System Component Options:

	<p>Main wall units: HI-R-H 10×8×16 Stretcher Unit* 3.5" insulation only</p> <p>Bond beams: HI-R-H 10×8×16 Stretcher Unit*</p>		
	<p>Control Joints: CMU Sash</p>		
	<p>Jambs: CMU Jamb</p>	<p>CMU Sash with Icon® inserts</p>	<p>CMU Jamb with Icon® inserts</p>
	<p>Corners: L-Shaped CMU fitting with EPS Insulation</p>		
	<p>Lintels: HI-R-H units</p>		

\* Availability may be limited in some regions. Please confirm local availability before specifying.

	Wall System: 10×8×16 HI-R-H	Main Wall Unit
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash with Icon® Insulation Inserts
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R-H units

**Main wall unit: 10×8×16 HI-R-H with full grout, used for straight portions of the wall**  
**This unit is not available in most regions – please verify availability before specifying.**

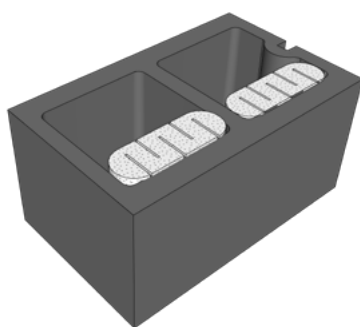


10×8×16 HI-R-H Unit

10×8×16 HI-R-H Unit with 3.5" Insulation Insert – Full Grout													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.0609	0.0636	0.0662	0.0694	0.0730	0.0760	0.0796	0.0837	0.0880	0.0929	0.0983	0.1043	0.1111
<b>R-Value</b>	16.41	15.73	15.11	14.40	13.70	13.15	12.57	11.95	11.37	10.77	10.17	9.59	9.00
<b>Heat Capacity</b>	15.22	15.50	15.80	16.06	16.30	16.62	16.90	17.18	17.50	17.74	18.00	18.30	18.58
<sup>1</sup> From CBIS/Korfil® "#405 HI-R-H Regular Unit-DLN Stamped. HI-R-H MASONRY UNITS* (FULLY GROUTED)." <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS/Korfil® "#405 HI-R-H Regular Unit-DLN Stamped. HI-R-H MASONRY UNITS* (FULLY GROUTED)." <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil® "#405 HI-R-H Regular Unit-DLN Stamped. HI-R-H MASONRY UNITS* (FULLY GROUTED)." 													

Wall System: 10×8×16 HI-R-H		Control Joints
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash with Icon® Insulation Inserts
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R-H units

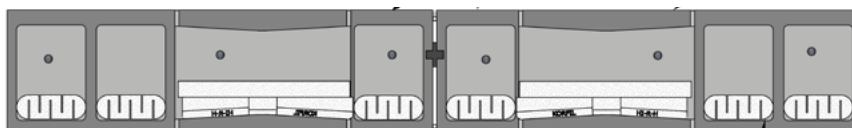
**Control Joints: 10×8×16 and 10×8×8 CMU Sash, used at control joints**



CMU Sash Unit With Icon Inserts

10×8×16 and 10×8×8 CMU Sash Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.1262	0.1329	0.1403	0.1482	0.1567	0.1661	0.1764	0.1871	0.1988	0.2118	0.2257	0.2409	0.2576
<b>R-Value</b>	7.92	7.52	7.13	6.75	6.38	6.02	5.67	5.34	5.03	4.72	4.43	4.15	3.88
<b>Heat Capacity</b>	16.33	16.71	17.10	17.49	17.87	18.26	18.65	19.03	19.42	19.80	20.19	20.58	20.96
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16"													

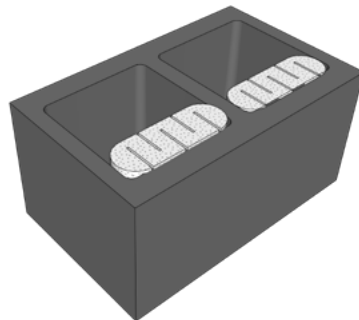
The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.



Plan View of Control Joint and Jambs

Wall System: 10×8×16 HI-R-H		Jambs
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash with Icon® Insulation Inserts
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	CMU L-Shaped Corner Fitting
	Lintels	10×8×16 HI-R-H units

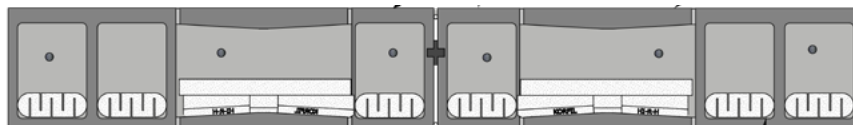
**Jambs: 10×8×16 and 10×8×8 CMU Jamb, used at openings**



CMU Jamb Unit With Icon Inserts

10×8×16 and 10×8×8 CMU Jamb Unit with single Icon® Insulation Insert -Grouted													
Density (pcf) <sup>1</sup>	85	90 <sup>2</sup>	95	100 <sup>2</sup>	105	110 <sup>2</sup>	115	120 <sup>2</sup>	125	130 <sup>2</sup>	135	140 <sup>3</sup>	145 <sup>3</sup>
<b>U-Factor</b>	0.1281	0.1328	0.1403	0.1481	0.1567	0.1658	0.1764	0.1873	0.1988	0.2110	0.2257	0.2392	0.2551
<b>R-Value</b>	7.81	7.53	7.13	6.75	6.38	6.03	5.67	5.34	5.03	4.74	4.43	4.18	3.92
<b>Heat Capacity</b>	16.33	16.71	17.10	17.49	17.87	18.26	18.65	19.03	19.42	19.80	20.19	20.58	20.96
<sup>1</sup> From CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>2</sup> Interpolations based upon polynomial cubic regression analyses of CBIS / Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16" <sup>3</sup> Extrapolations based upon polynomial cubic regression analyses of CBIS/Korfil®: "CBIS-KORFIL #220 pg 1, 1ea ICON/Grout Space Fully Grouted; Derivatives of Dave Nickerson's No 221 U-Shaped-ICON Research Document 10×8×16"													

The thermal values above have been taken from the CBIS-Korfil® Technical Library and other CBIS-Korfil® references. Concrete masonry producers manufacture CMU having a wide variety of densities based on the aggregates available in their region. Standard calculation methods have been used to illustrate the thermal values of densities not listed in the CBIS-Korfil® tables. Please check with the CPG member in your region for the densities they have available.

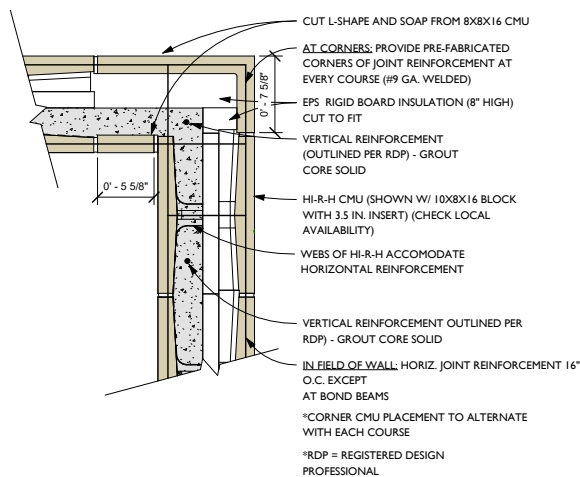


Plan View of Control Joint and Jambs



	Wall System: 10×8×16 HI-R-H	Corner
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash with Icon® Insulation Inserts
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	L-Shaped CMU fitting with EPS Insulation
	Lintels	10×8×16 HI-R-H unit

## Corners: 10×8×16 L-Shaped CMU fitting with EPS Insulation



For 10×8×16 HI-R-H, the soap size will be 5-5/8"

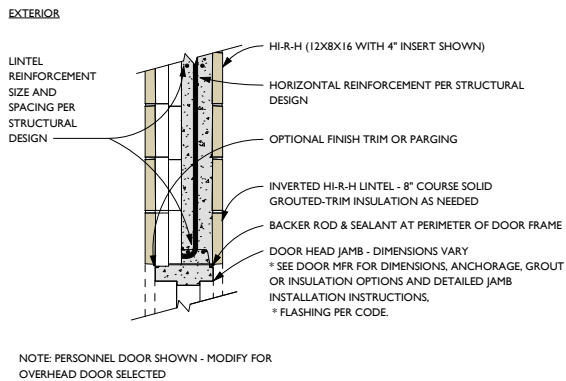


Corner with L-shaped fitting cut from CMU and soap. The HI-R-H unit to right's face shell can be cut as needed. This detail can be used with both HI-R and HI-R-H units as well as the Half High versions of each

The thermal values for this corner detail can be assumed to be the same as those for the main wall units provided that the insulation thickness is equivalent or greater than that of the insulation inserts in the main wall units.

	Wall System: 10×8×16 HI-R-H	Lintel
	Main wall units (field of wall)	10×8×16 HI-R-H
	Control Joints	CMU Sash with Icon® Insulation Inserts
	Jambs	CMU Jamb with Icon® Insulation Inserts
	Corners	L-Shaped CMU fitting with 4" EPS Insulation
	Lintels	10×8×16 HI-R-H units

## Lintel Formed from HI-R-H Units



HI-R-H Lintel – Shown with 12×8×16 units



HI-R-H units reinforced as a lintel before placement of succeeding courses

Thermal values will be those for the HI-R-H unit that is used to construct the lintel. Choose the values from the applicable table for that HI-R-H unit (including choosing the same insulation thickness)

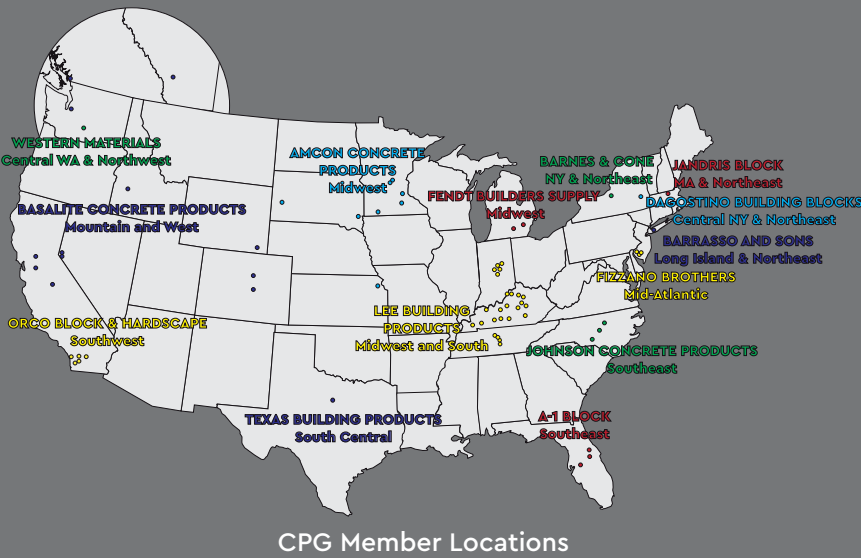
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