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**Analysis of the  
2003 International Energy  
Conservation Code  
( IECC )  
and its Effect on  
Commercial Masonry  
Construction in New England**

**Prepared by the New England Concrete Masonry Association**

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## **INTRODUCTION**

This publication is designed to acquaint the reader with the 2003 International Energy Conservation Code (IECC). This particular Code is the standard used by the majority of states in the development of their local Code requirements for the construction of energy efficient buildings.

The intent is to show how masonry construction can work with this Code. The only portion of the Code that will be addressed is the Building Envelope construction requirements for new commercial buildings. It will not touch on the numerous other portions of the Code, namely, mechanical systems, service water heating, and electrical power & lighting requirements.

The Code itself has been designed for use primarily by individuals with a familiarity with the various Energy Codes that have been adopted since the early 1970's when the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) developed the ASHRAE 90 Standard. This publication is not intended to over-simplify the Code, but merely to acquaint the reader with the key elements as they are related to masonry construction. The ultimate goal of this publication is to show that the new IECC does not prevent the use of masonry construction, particularly single wythe masonry walls.

## **DISCUSSION**

The IECC has been prepared and is a model that the majority of states use in preparation of their building code requirements. It is important to note that the New England states allow the use of the COMcheck computer program developed to work in conjunction with the IECC Code to show compliance with the Code. This will be discussed in detail in the body of this report.

There are three methods for demonstrating energy building compliance, namely:

- the Prescriptive Method
- the Building Performance Method
- the Whole Building Performance Analysis

Of the three, the simplest to use is the Prescriptive Method. This is also the most restrictive as far as masonry construction is concerned.

Exhibit "A" of this publication is an energy analysis using the Prescriptive Method. In addition to integral core insulation, a need to completely cover interior walls using insulation material with an R-value of 5 would be required for the sample building we selected. The remarks in Exhibit "A" will provide additional detailing.

Exhibit "B" of this publication is an energy analysis using the IECC 2003 Building Performance Method. The sample building is identical to the location and size of the building detailed in Exhibit "A". The Building Performance Method allows the use of the COMcheck computer program. The results of this program are shown in the remarks listed in Exhibit "B".

The third method that IECC allows is the Whole Building Performance Analysis, which is in the writer's opinion, the most difficult of all the three methods allowed. It takes the analysis for a full year of the building's operation, taking into account all building energy uses and detailed analysis using a government software program. This method does allow extensive design flexibility but is a very time-consuming approach.

## **CONCLUSIONS**

As shown in Exhibits "A" and "B", the trade-off of the System Performance Method is the best approach designers should consider in designing commercial buildings with masonry. The example clearly shows it is possible to design single wythe masonry structures without adding additional insulation to the interior surfaces of masonry walls.

The COMcheck-EZ program was developed by the Department of Energy and is an effective way to show that trade-offs can be made between various Building Envelope parameters to show compliance for commercial construction. There is also a computer program to show how residential construction can show IECC compliance. The program is known as REScheck. Both of the computer programs are available on-line and the site is listed in the "Reference" Section of this report.

## **REFERENCES**

**\*National Concrete Masonry Association** - Technical Bulletin 6-2A Dated 1996 entitled "R-Values for Single Wythe Concrete Masonry Walls"

**\*National Concrete Masonry Association** - Technical Bulletin 6-12B Dated 2004 entitled, "International Energy Conservation Code and Concrete Masonry"

**Department of Defense Websites:** [www.energycodes.gov/comcheck](http://www.energycodes.gov/comcheck) and [www.energycodes.gov/rescheck](http://www.energycodes.gov/rescheck)

These websites will allow the reader to download the current versions of both the COMcheck and REScheck programs.

\*Both of these publications are available from the New England Concrete Masonry

Association website at: [www.necma.com](http://www.necma.com)

## **EXHIBIT "A"**

### **ENERGY ANALYSIS USING IECC 2003 PRESCRIPTIVE METHOD**

Sample Building: Manufacturing

Location: Worcester, Massachusetts

Size: 250 ft. x 100 ft. -- 25,000 sq. ft.

Total Wall Area: 14,000 sq. ft.

Total Glass Window and Glass Door Area: 1,400 sq. ft. (10% of gross wall area)

Total Roof Area: 25,000 sq. ft.

Slab on Grade

No Skylights

Heated and Cooled

#### **ASSUME:**

Concrete block walls 12' x 8' x 16' -- 135 lb. density

Windows and Doors – No projections above

Windows or Doors – Solar heat gain coefficient

(SHGC) is 0.5 and U-Factor is 0.6.

Roof is flat metal joist, continuous insulation, R-20

Slab insulation: R-8

## **EXHIBIT "A"**

### **ENERGY ANALYSIS USING IECC 2003 PRESCRIPTIVE METHOD**

#### **REMARKS:**

Table 802.2(31), [see Page 3 of 4 of this Exhibit], must be used since the building lies within Climate Zone 14A [see Page 4 of 4 of this Exhibit]

Both of these pages are directly from the IECC standard.

The Table shows in addition to the integral insulation within the block, a continuous R-value of 5 would be required. One could also wood frame or metal frame the inside walls but they would have to add an R-11 between framing. In addition, the insulation on the inside walls would be required to have sufficient covering to meet Fire Code requirements.

**TABLE 802.2(31)**  
**BUILDING ENVELOPE REQUIREMENTS<sup>a</sup> through <sup>e</sup> - CLIMATE ZONE 14a**

WINDOW AND GLAZED DOOR AREA 10 PERCENT OR LESS OF ABOVE-GRADE WALL AREA				
ELEMENT	CONDITION/VALUE			
Skylights ( <i>U</i> -factor)	0.8			
Slab or below-grade wall ( <i>R</i> -value)	R-0			
Windows and glass doors	SHGC		<i>U</i> -factor	
	PF < 0.25	Any	0.7	
	0.25 ≤ PF < 0.50	Any	0.7	
	PF ≥ 0.50	Any	0.7	
Roof assemblies ( <i>R</i> -value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-19	R-17	
	Metal joist/truss	R-25	R-18	
	Concrete slab or deck	NA	R-17	
	Metal purlin with thermal block	R-30	R-18	
Metal purlin without thermal block	X	R-18		
Floors over outdoor air or unconditioned space ( <i>R</i> -value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-25	R-18	
	Metal joist/truss	R-25	R-19	
	Concrete slab or deck	NA	R-19	
Above-grade walls ( <i>R</i> -value)	No framing		Metal framing	Wood framing
	Framed			
	<i>R</i> -value cavity	NA	R-13	R-11
	<i>R</i> -value continuous	NA	R-3	R-0
	CMU, ≥ 8 inches, with integral insulation			
	<i>R</i> -value cavity	NA	R-11	R-11
	<i>R</i> -value continuous	R-5	R-0	R-0
	Other masonry walls			
<i>R</i> -value cavity	NA	R-11	R-11	
<i>R</i> -value continuous	R-5	R-0	R-0	
WINDOW AND GLAZED DOOR AREA GREATER THAN 10 PERCENT BUT NOT GREATER THAN 25 PERCENT OF ABOVE-GRADE WALL AREA				
ELEMENT	CONDITION/VALUE			
Skylights ( <i>U</i> -factor)	0.8			
Slab or below-grade wall ( <i>R</i> -value)	R-8			
Windows and glass doors	SHGC		<i>U</i> -factor	
	PF < 0.25	0.5	0.6	
	0.25 ≤ PF < 0.50	0.6	0.6	
	PF ≥ 0.50	0.7	0.6	
Roof assemblies ( <i>R</i> -value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-25	R-19	
	Metal joist/truss	R-25	R-20	
	Concrete slab or deck	NA	R-19	
	Metal purlin with thermal block	R-30	R-20	
Metal purlin without thermal block	X	R-20		
Floors over outdoor air or unconditioned space ( <i>R</i> -value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-25	R-18	
	Metal joist/truss	R-25	R-19	
	Concrete slab or deck	NA	R-19	
Above-grade walls ( <i>R</i> -value)	No framing		Metal framing	Wood framing
	Framed			
	<i>R</i> -value cavity	NA	R-13	R-11
	<i>R</i> -value continuous	NA	R-3	R-0
	CMU, ≥ 8 inches, with integral insulation			
	<i>R</i> -value cavity	NA	R-11	R-11
	<i>R</i> -value continuous	R-5	R-0	R-0
	Other masonry walls			
<i>R</i> -value cavity	NA	R-11	R-11	
<i>R</i> -value continuous	R-5	R-0	R-0	

(continued)

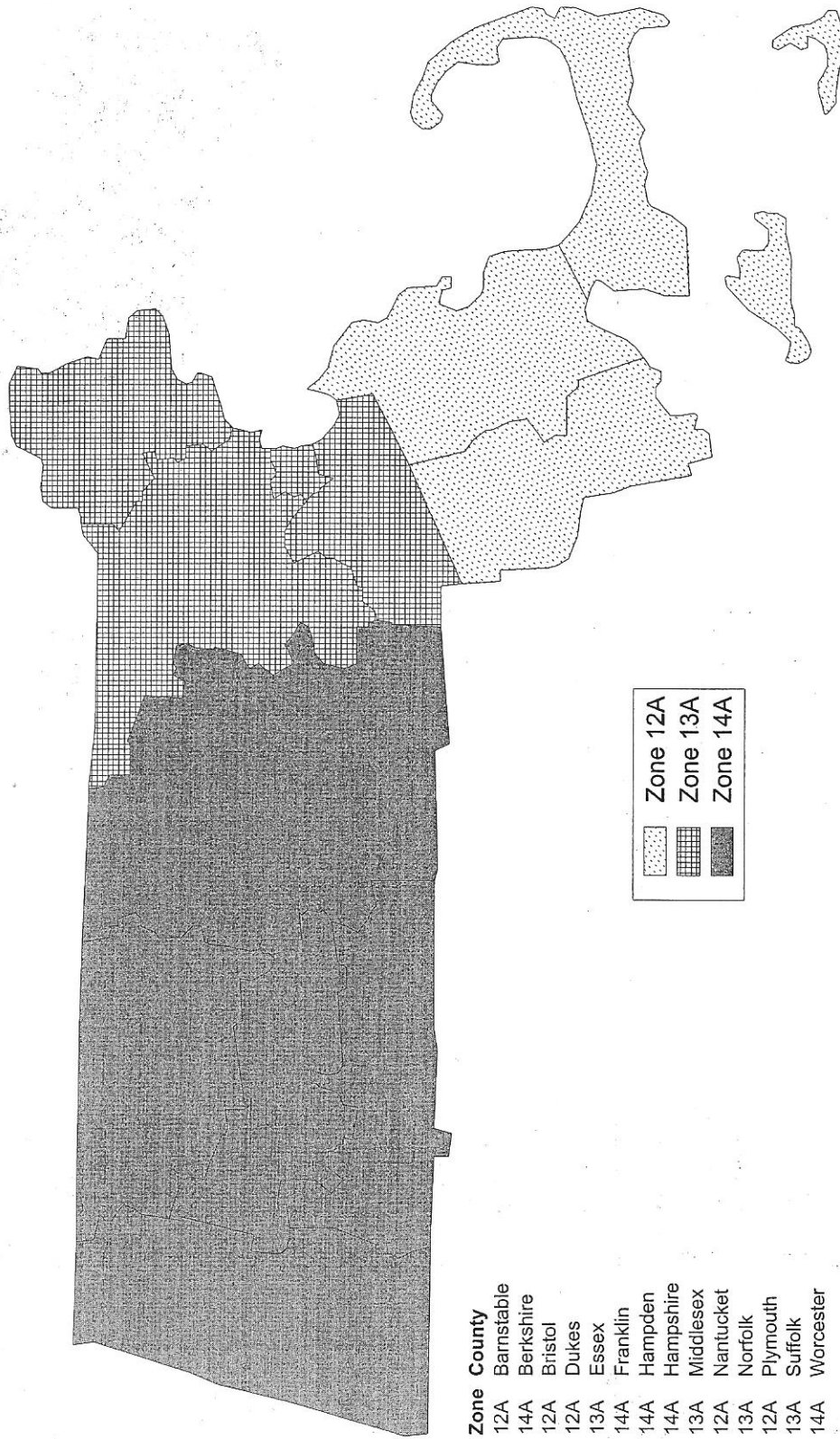


FIGURE 902.1(22)  
MASSACHUSETTS

## **EXHIBIT "B"**

### **ENERGY ANALYSIS USING IECC 2003 BUILDING PERFORMANCE METHOD**

**(Sample Building same as on Exhibit "A")**

This method allows the use of the COMcheck computer program.

Sample Building: Manufacturing

Location: Worcester, Massachusetts

Size: 250 ft. x 100 ft. -- 25,000 sq. ft.

Total Wall Area: 14,000 sq. ft.

Total Glass Window and Glass Door Area: 1,400 sq. ft.

Total Roof Area: 25,000 sq. ft.

Slab on Grade

No Skylights

Heated and Cooled

#### **ASSUME:**

Concrete block walls 12' x 8' x 16' -- 135 lb. density

Windows and Doors -- No projections above

Windows or Doors -- Solar heat gain coefficient

(SHGC) is 0.5 and U-Factor is 0.6.

Roof is flat metal joist, continuous insulation, R-20

Slab insulation: R-8

## **EXHIBIT "B"**

### **ENERGY ANALYSIS USING IECC 2003 BUILDING PERFORMANCE METHOD**

#### **REMARKS:**

COMcheck has been run not only for Worcester, Massachusetts (Exhibit "A", Pages 3 and 4), but for the sample building , assuming it was built in the following areas and states:

Storrs, Connecticut	(Pages 5 and 6)
York Harbor, Maine	(Pages 7 and 8)
Keene, New Hampshire	(Pages 9 and 10)
Providence, Rhode Island	(Pages 11 and 12)
Brattleboro, Vermont	(Pages 13 and 14)

The sample building passed in all New England states, using single wythe construction, without the need for additional insulation on the interior walls.

Each of the locations selected fall into Climatic Zones that are shown in the individual State Maps which are part of the IECC publication. The map for Massachusetts shown on Page 4 of Exhibit "A" is an example of a state map broken down into separate Climatic Zones.

\_\_\_\_\_  
Permit Number

\_\_\_\_\_  
Checked By/Date

## Envelope Compliance Certificate Massachusetts Commercial Code

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryMA.cck

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): Worcester, Massachusetts  
Climate Zone: 14a  
Heating Degree Days (base 65 degrees F): 6894  
Cooling Degree Days (base 65 degrees F): 507  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Manufacturing	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | Air Leakage, Component Certification, and Vapor Retarder Requirements

- [ ] | 1. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.  
[ ] | 2. Windows, doors, and skylights certified as meeting leakage requirements.  
[ ] | 3. Component R-values & U-factors labeled as certified.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Metal Roof with Thermal Blocks	25000	0.0	20.0	0.048	0.054
Exterior Wall: Other, HC 13.3	14000	---	---	0.200	0.079
Comments: 12" CMU@135 lb/cu.ft. density with Korfil Insulating Inserts					
Total Windows: Metal Frame:Double Pane					
Clear, SHGC 0.50	1272	---	---	0.600	0.547
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.547
Floor: Slab-On-Grade:Unheated, Depth 4 ft.(b)	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

(b) Certain building use types require continuous under-slab insulation (see Massachusetts Code Section 1304.2.7 and 1304.2.8).

**Envelope PASSES:** Design 12% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the Massachusetts Commercial Code requirements in COM *check-EZ* Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name                      Signature                      Date

Permit Number

Checked By/Date

## Envelope Compliance Certificate 2003 IECC

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryCT.cck

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): Storrs, Connecticut  
Climate Zone: 14a  
Heating Degree Days (base 65 degrees F): 6481  
Cooling Degree Days (base 65 degrees F): 377  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Storage, Industrial and Commercial	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | Air Leakage, Component Certification, and Vapor Retarder Requirements

- [ ] | 1. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
- [ ] | 2. Windows, doors, and skylights certified as meeting leakage requirements.
- [ ] | 3. Component R-values & U-factors labeled as certified.
- [ ] | 4. Stair, elevator shaft vents, and other dampers integral to the building envelope are equipped with motorized dampers.
- [ ] | 5. Cargo doors and loading dock doors are weather sealed.
- [ ] | 6. Recessed lighting fixtures are: (i) Type IC rated and sealed or gasketed; or (ii) installed inside an appropriate air-tight assembly with a 0.5 inch clearance from combustibile materials and with 3 inches clearance from insulation material.
- [ ] | 7 Building entrance doors have a vestibule and equipped with closing devices.
  - | Exceptions:
  - | Building entrances with revolving doors.
  - | Doors that open directly from a space less than 3000 sq. ft. in area.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Metal Roof with Thermal Blocks	25000	0.0	20.0	0.048	0.057
Exterior Wall: Other, HC 13.3 Comments: 12" CMU@135 lb/cu.ft. density with Korfil Insulating Inserts	14000	---	---	0.200	0.083
Total Windows: Metal Frame:Double Pane Clear, SHGC 0.50	1272	---	---	0.600	0.565
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.565
Floor: Slab-On-Grade:Unheated	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

**Envelope PASSES:** Design 6% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the 2003 IECC requirements in COM *check-EZ* Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Permit Number

Checked By/Date

## Envelope Compliance Certificate Standard 90.1-2001

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryME.cck

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): York Harbor, Maine  
Heating Degree Days (base 65 degrees F): 6973  
Cooling Degree Days (base 50 degrees F): 2116  
Building type for envelope requirements: Non-Residential  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Manufacturing Facility	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | Insulation

- [ ] | 1. Open-blown or poured loose-fill insulation has not been used in attic roof spaces with ceiling slope greater than 3 in 12.
- [ ] | 2. Wherever vents occur, they are baffled to deflect incoming air above the insulation.
- [ ] | 3. Recessed lights, equipment and ducts are not affecting insulation thickness.
- [ ] | 4. No roof insulation is installed on a suspended ceiling with removable ceiling panels.
- [ ] | 5. All exterior insulation is covered with protective material.
- [ ] | 6. Cargo and loading dock doors are equipped with weather seals.

#### | Fenestration and Doors

- [ ] | 7. Windows and skylights are labeled and certified by the manufacturer for U-factor and SHGC.
- [ ] | 8. Fixed windows and skylights unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.
- [ ] | 9. Other unlabeled vertical fenestration, operable and fixed, that are unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.  
| No credit has been given for metal frames with thermal breaks,  
| low-emissivity coatings, gas fillings, or insulating spacers.

**Air Leakage and Component Certification**

- [ ] | 10. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
  - [ ] | 11. Windows, doors, and skylights certified as meeting leakage requirements.
  - [ ] | 12. Component R-values & U-factors labeled as certified.
  - [ ] | 13 Building entrance doors have a vestibule and equipped with closing devices.
- Exceptions:
- | Buildings less than four stories above grade, building entrances with revolving doors.
  - | Doors that open directly from a space less than 3000 sq. ft. in area.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Insulation Entirely Above Deck	25000	0.0	25.0	0.039	0.063
Exterior Wall: Other, HC 10.9	14000	---	---	0.170	0.089
Comments: 12" CMU@125 lb/cu.ft. density with Korfil Insulating Inserts					
Total Windows: Metal Frame:Double Pane					
Clear, Fixed, SHGC 0.50	1272	---	---	0.600	0.570
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.570
Floor: Slab-On-Grade:Unheated	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

**Envelope PASSES:** Design 1% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the Standard 90.1-2001 requirements in COMcheck-EZ Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name                      Signature                      Date

Permit Number

Checked By/Date

## Envelope Compliance Certificate Standard 90.1-1999

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryNH.ckk

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): Keene, New Hampshire  
Heating Degree Days (base 65 degrees F): 6948  
Cooling Degree Days (base 50 degrees F): 2398  
Building type for envelope requirements: Non-Residential  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Manufacturing Facility	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | Insulation

- [ ] | 1. Open-blown or poured loose-fill insulation has not been used in attic roof spaces with ceiling slope greater than 3 in 12.
- [ ] | 2. Wherever vents occur, they are baffled to deflect incoming air above the insulation.
- [ ] | 3. Recessed lights, equipment and ducts are not affecting insulation thickness.
- [ ] | 4. No roof insulation is installed on a suspended ceiling with removable ceiling panels.
- [ ] | 5. All exterior insulation is covered with protective material.
- [ ] | 6. Cargo and loading dock doors are equipped with weather seals.

#### | Fenestration and Doors

- [ ] | 7. Windows and skylights are labeled and certified by the manufacturer for U-factor and SHGC.
- [ ] | 8. Fixed windows and skylights unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.
- [ ] | 9. Other unlabeled vertical fenestration, operable and fixed, that are unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.  
| No credit has been given for metal frames with thermal breaks,  
| low-emissivity coatings, gas fillings, or insulating spacers.

| **Air Leakage and Component Certification**

- [ ] | 10. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
- [ ] | 11. Windows, doors, and skylights certified as meeting leakage requirements.
- [ ] | 12. Component R-values & U-factors labeled as certified.
- [ ] | 13 Building entrance doors have a vestibule and equipped with closing devices.
  - | Exceptions:
  - | Buildings less than four stories above grade, building entrances with revolving doors.
  - | Doors that open directly from a space less than 3000 sq. ft. in area.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Insulation Entirely Above Deck	25000	0.0	25.0	0.039	0.063
Exterior Wall: Other, HC 10.9	14000	---	---	0.170	0.089
Comments: 12" CMU@125 lb/cu.ft. density with Korfil Insulating Inserts					
Total Windows: Metal Frame:Double Pane					
Clear, Fixed, SHGC 0.50	1272	---	---	0.600	0.570
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.570
Floor: Slab-On-Grade:Unheated	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

**Envelope PASSES:** Design 1% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the Standard 90.1-1999 requirements in COMcheck-EZ Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name                      Signature                      Date

Permit Number

Checked By/Date

## Envelope Compliance Certificate 2003 IECC

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryRI.cck

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): Providence, Rhode Island  
Climate Zone: 14a  
Heating Degree Days (base 65 degrees F): 5884  
Cooling Degree Days (base 65 degrees F): 606  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Storage, Industrial and Commercial	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | **Air Leakage, Component Certification, and Vapor Retarder Requirements**

- [ ] | 1. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
- [ ] | 2. Windows, doors, and skylights certified as meeting leakage requirements.
- [ ] | 3. Component R-values & U-factors labeled as certified.
- [ ] | 4. Stair, elevator shaft vents, and other dampers integral to the building envelope are equipped with motorized dampers.
- [ ] | 5. Cargo doors and loading dock doors are weather sealed.
- [ ] | 6. Recessed lighting fixtures are: (i) Type IC rated and sealed or gasketed; or (ii) installed inside an appropriate air-tight assembly with a 0.5 inch clearance from combustible materials and with 3 inches clearance from insulation material.
- [ ] | 7. Building entrance doors have a vestibule and equipped with closing devices.
  - | Exceptions:
  - | Building entrances with revolving doors.
  - | Doors that open directly from a space less than 3000 sq. ft. in area.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Metal Roof with Thermal Blocks	25000	0.0	20.0	0.048	0.059
Exterior Wall: Other, HC 13.3	14000	---	---	0.200	0.089
Comments: 12" CMU@135 lb/cu.ft. density with Korfil Insulating Inserts					
Total Windows: Metal Frame:Double Pane					
Clear, SHGC 0.50	1272	---	---	0.600	0.592
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.592
Floor: Slab-On-Grade:Unheated	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

**Envelope PASSES:** Design 12% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the 2003 IECC requirements in COM *check-EZ* Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name                      Signature                      Date

Permit Number

Checked By/Date

## Envelope Compliance Certificate Standard 90.1-1999

COMcheckEZ Software Version 3.0 Release 1

Data filename: D:\Check\COMcheck-EZ 3.0 R1\New England MasonryVT.cck

### Section 1: Project Information

Project Name: Manufacturing Plant  
Reference-Exhibit A  
Designer/Contractor: Sample Calculations  
Document Author: Concrete Block Insulating Systems

### Section 2: General Information

Building Location (for weather data): Brattleboro, Vermont  
Heating Degree Days (base 65 degrees F): 7253  
Cooling Degree Days (base 50 degrees F): 2314  
Building type for envelope requirements: Non-Residential  
Project Type: New Construction  
Window / Wall Ratio: 0.10

<u>Building Type</u>	<u>Floor Area</u>
Manufacturing Facility	25000

### Section 3: Requirements Checklist

Bldg. |  
Dept. |  
Use |

#### | Insulation

- [ ] | 1. Open-blown or poured loose-fill insulation has not been used in attic roof spaces with ceiling slope greater than 3 in 12.
- [ ] | 2. Wherever vents occur, they are baffled to deflect incoming air above the insulation.
- [ ] | 3. Recessed lights, equipment and ducts are not affecting insulation thickness.
- [ ] | 4. No roof insulation is installed on a suspended ceiling with removable ceiling panels.
- [ ] | 5. All exterior insulation is covered with protective material.
- [ ] | 6. Cargo and loading dock doors are equipped with weather seals.

#### | Fenestration and Doors

- [ ] | 7. Windows and skylights are labeled and certified by the manufacturer for U-factor and SHGC.
- [ ] | 8. Fixed windows and skylights unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.
- [ ] | 9. Other unlabeled vertical fenestration, operable and fixed, that are unlabeled by the manufacturer have been site labeled using the default U-factor and SHGC.  
| No credit has been given for metal frames with thermal breaks,  
| low-emissivity coatings, gas fillings, or insulating spacers.

**Air Leakage and Component Certification**

- [ ] | 10. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
  - [ ] | 11. Windows, doors, and skylights certified as meeting leakage requirements.
  - [ ] | 12. Component R-values & U-factors labeled as certified.
  - [ ] | 13 Building entrance doors have a vestibule and equipped with closing devices.
- Exceptions:
- | Buildings less than four stories above grade, building entrances with revolving doors.
  - | Doors that open directly from a space less than 3000 sq. ft. in area.

**Climate-Specific Requirements**

<u>Component Name/Description</u>	<u>Gross Area</u>	<u>Cavity R-Value</u>	<u>Cont. R-Value</u>	<u>Proposed U-Factor</u>	<u>Budget U-Factor</u>
Roof: Insulation Entirely Above Deck	25000	0.0	25.0	0.039	0.063
Exterior Wall: Other, HC 13.3	14000	---	---	0.170	0.089
Comments: 12" CMU@125 lb/cu.ft. density with Korfil Insulating Inserts					
Total Windows: Metal Frame:Double Pane					
Clear, Fixed, SHGC 0.50	1272	---	---	0.600	0.570
Total Doors: Glass, Clear, SHGC 0.50	128	---	---	0.600	0.570
Floor: Slab-On-Grade:Unheated	700	---	8.0	---	---

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

**Envelope PASSES:** Design 1% better than code

**Section 4: Compliance Statement**

The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the Standard 90.1-1999 requirements in COMcheck-EZ Version 3.0 Release 1 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Principal Envelope Designer-Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date