

9.36

# Energy Efficiency

City of Richmond Acceptable Details





### Background:

As per Ministerial Order M111 effective December 19, 2014, the 2012 BC Building Code was amended to include new energy efficiency requirements in Section 9.36.

### Implementation:

This package has been created to illustrate details that are in compliance with Section 9.36. These details have been released for information purposes only, and it is up to each individual owner, designer, or contractor to develop details showing compliance to the BC Building Code for their projects.

Applications must show the required levels of insulation in addition to all relevant building envelope information. Construction details, other than energy components, have been omitted in this package, as methods will vary from project to project.

Within this package, the phrase "From Table" has been used to reference BC Building Code Section 9.36, Table A-9.36.2.4.(1)D - *Thermal Resistance Values of Common Building Materials*. Where RSI values for components are not known, manufacturer data for that component should be provided.

### Resources:

Below are various resources that have been compiled to inform owners, designers, and contractors of the requirements of Section 9.36.

- All Building Permits must comply with the information as provided in the City of Richmond bulletin Permits-54, which can be found here:

[http://www.richmond.ca/\\_shared/assets/permits5440254.pdf](http://www.richmond.ca/_shared/assets/permits5440254.pdf)

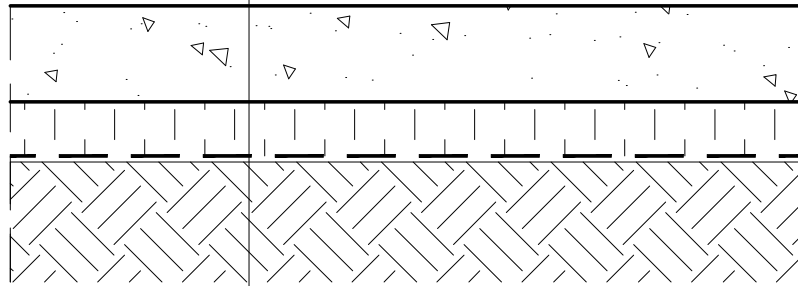
- The British Columbia Homeowner Protection Office (HPO) has created an Illustrated Guide to the Energy Efficiency requirements of Section 9.36. The guide linked below is applicable to Climate Zone 4, which includes the City of Richmond:

[http://www.hpo.bc.ca/sites/www.hpo.bc.ca/files/download/guide/Section\\_9.36\\_zone\\_4\\_web\\_%20%28April%202015%29.pdf](http://www.hpo.bc.ca/sites/www.hpo.bc.ca/files/download/guide/Section_9.36_zone_4_web_%20%28April%202015%29.pdf)

- The BC Office of Housing and Construction Standards has provided Section 9.36 as a PDF which can be found here:

[http://bccodes.ca/BCBC\\_9%2036%20EnergyEfficiency.pdf](http://bccodes.ca/BCBC_9%2036%20EnergyEfficiency.pdf)

Should you have any questions, comments or suggestions concerning this bulletin please contact either the Supervisor, Permits Section at 604-276-4278 or Supervisor, Building Inspections at 604-276-4354.



100mm CONCRETE SLAB  
 63.5mm TYPE 2/3/4 XPS INSULATION  
 VAPOUR BARRIER

## HEATED FLOORS: 2.32 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
INTERIOR AIR FILM	0.16 (FROM TABLE)	0.16
100MM CONCRETE SLAB	100mm x 0.0004 RSI/mm	0.04
63.5MM TYPE 2/3/4 XPS INSULATION	63.5mm x 0.0336 RSI/mm	2.1336
<b>TOTAL RSI: 2.33</b>		

MEETS REQUIREMENTS FOR UNHEATED FLOORS ABOVE FROST LINE



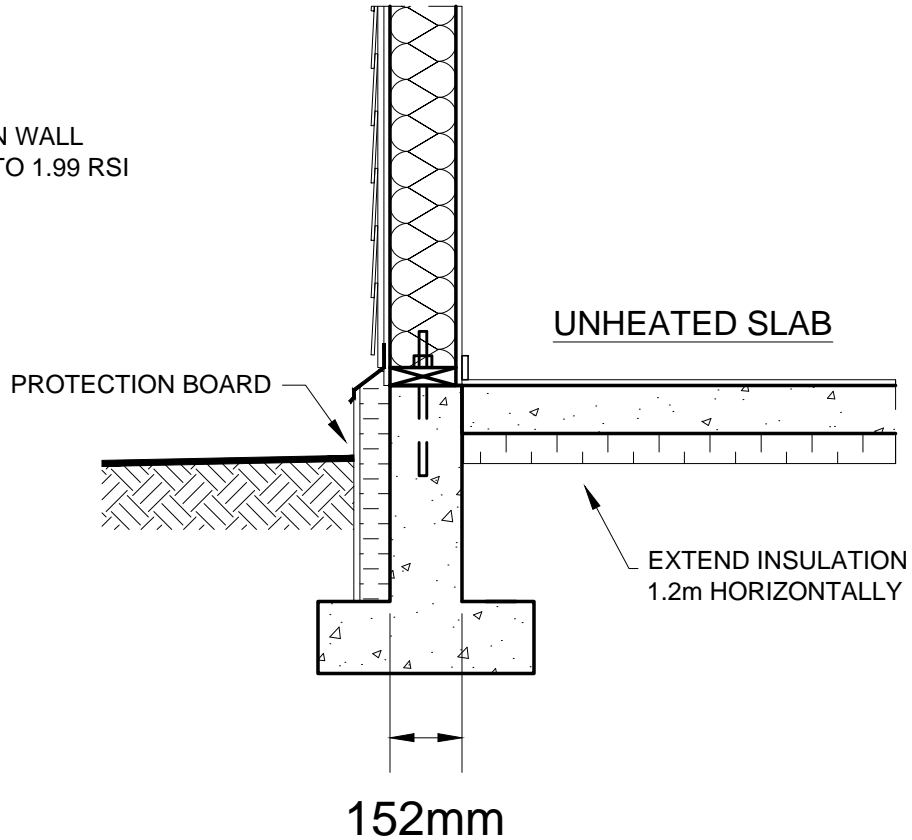
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### Heated Floor Slab (2.32 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

Dr. No.: 1  
 Sheet No.: A1  
 Scale: 1:8  
 Date: 2015/06/05

**NOTE:**  
 FOUNDATION WALL  
 INSULATED TO 1.99 RSI



## FOUNDATION WALL: 1.99 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
152mm CONCRETE FOUNDATION WALL	152mm x 0.0004 RSI/mm	0.0608
63.5mm TYPE 2/3/4 XPS INSULATION	63.5mm x 0.0336 RSI/mm	2.1336
<b>TOTAL RSI: 2.19</b>		

NO AIR FILMS ARE INCLUDED IN CALCULATION



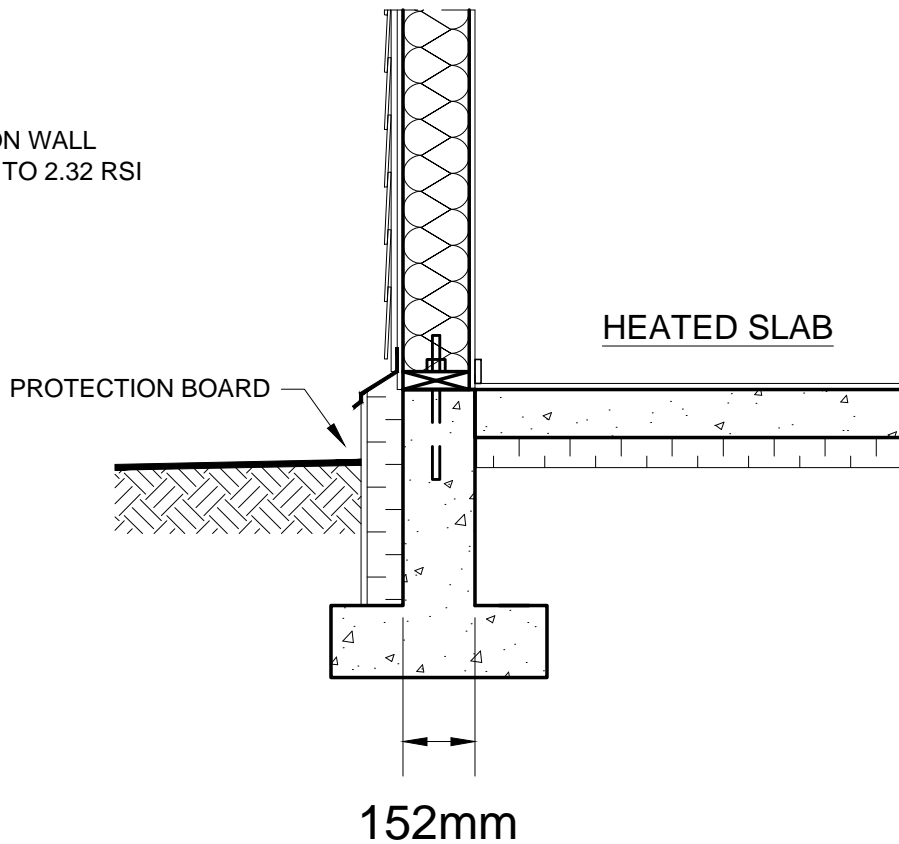
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Foundation Wall - Exterior Insulation  
 Unheated Slab (1.99 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

Dr. No.: 1  
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 Scale: 1:16  
 Date: 2015/06/05

NOTE:  
FOUNDATION WALL  
INSULATED TO 2.32 RSI



## FOUNDATION WALL: 2.32 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
152mm CONCRETE FOUNDATION WALL	152mm x 0.0004 RSI/mm	0.0608
76mm TYPE 2/3/4 XPS INSULATION	76mm x 0.0336 RSI/mm	2.56
<b>TOTAL RSI: 2.62</b>		

NO AIR FILMS ARE INCLUDED IN CALCULATION



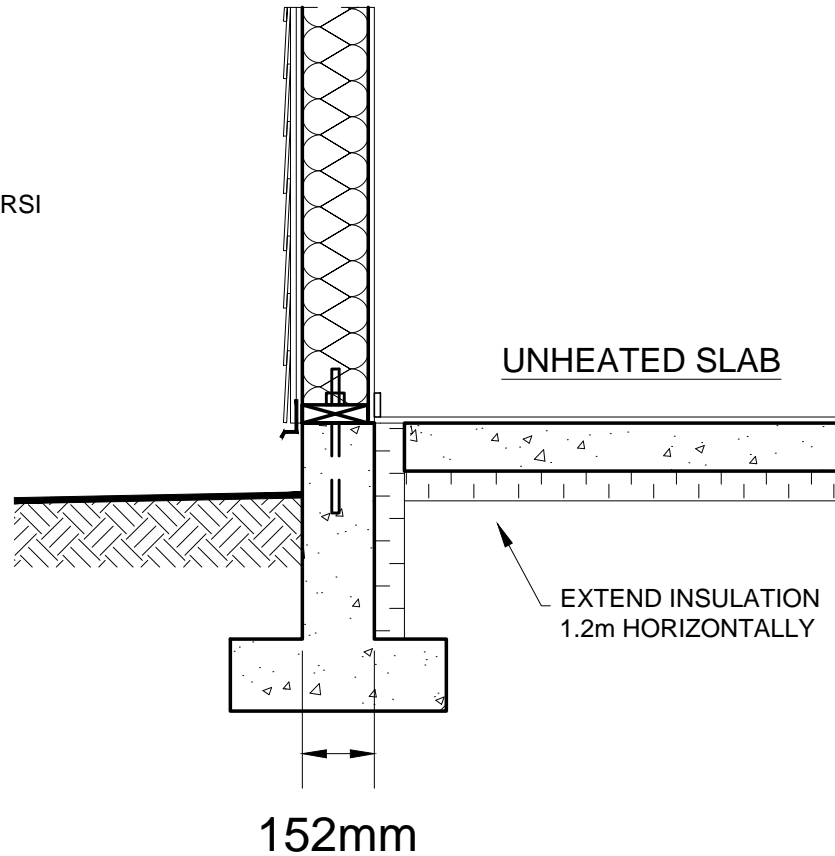
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Foundation Wall - Exterior Insulation  
Heated Slab (2.32 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

Dr. No.: 1  
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Scale: 1:16  
Date: 2015/06/05

NOTE:  
 FOUNDATION WALL  
 INSULATED TO 1.99 RSI



## FOUNDATION WALL: 1.99 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
152mm CONCRETE FOUNDATION WALL	152mm x 0.0004 RSI/mm	0.0608
63.5mm TYPE 2/3/4 XPS INSULATION	63.5mm x 0.0336 RSI/mm	2.1336
<b>TOTAL RSI: 2.19</b>		

NO AIR FILMS ARE INCLUDED IN CALCULATION



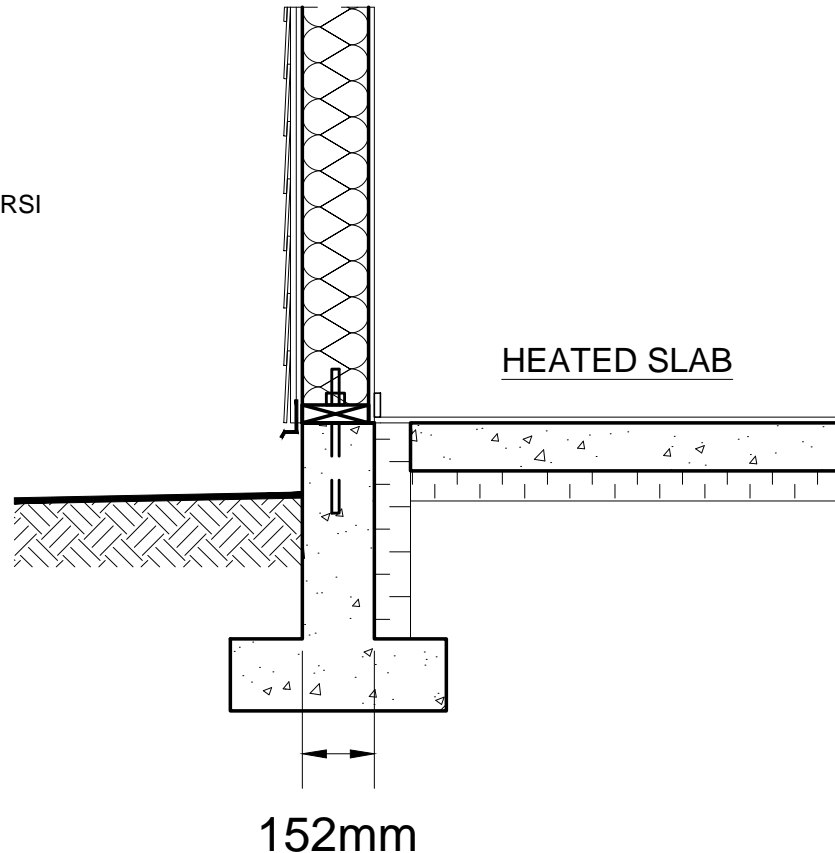
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Foundation Wall - Interior Insulation  
 Unheated Slab (1.99 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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 Scale: 1:16  
 Date: 2015/06/05

NOTE:  
FOUNDATION WALL  
INSULATED TO 2.32 RSI



## FOUNDATION WALL: 2.32 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
152mm CONCRETE FOUNDATION WALL	$152\text{mm} \times 0.0004 \text{ RSI/mm}$	0.0608
76mm TYPE 2/3/4 XPS INSULATION	$76\text{mm} \times 0.0336 \text{ RSI/mm}$	2.56
<b>TOTAL RSI: 2.62</b>		

NO AIR FILMS ARE INCLUDED IN CALCULATION

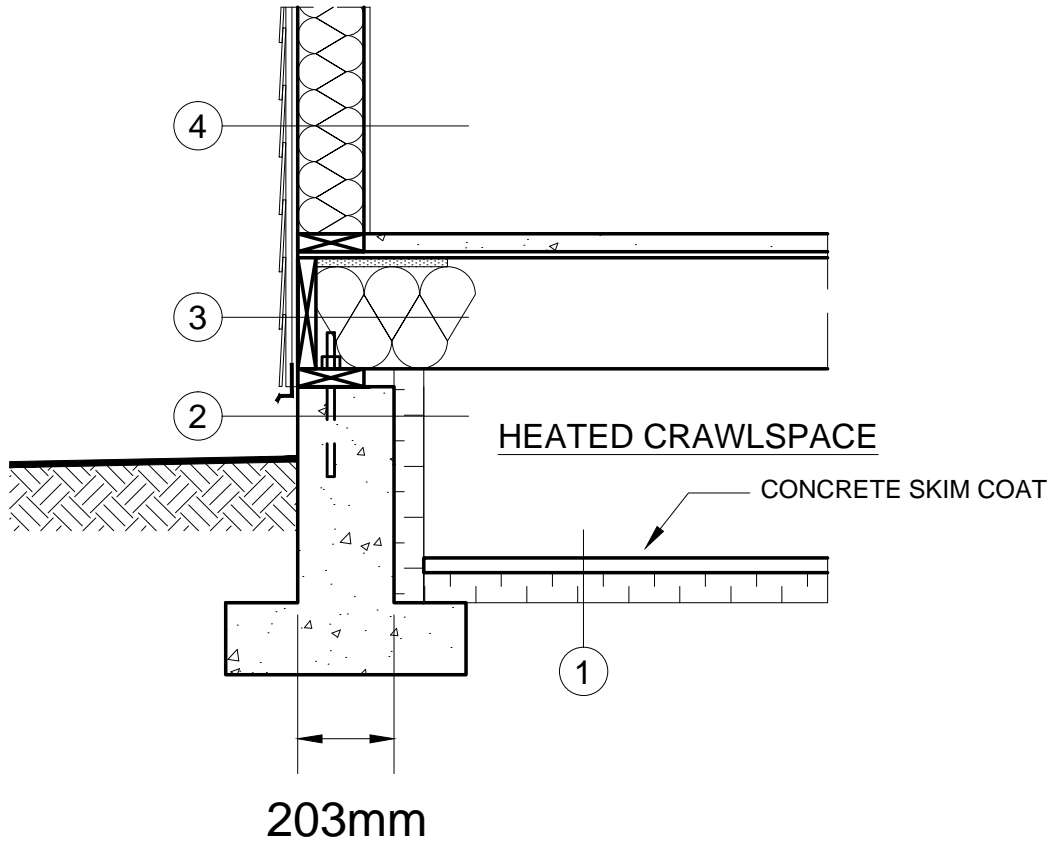


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**Foundation Wall - Interior Insulation  
Heated Slab (2.32 RSI Required)**

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A5  
Scale: 1:16  
Date: 2015/06/05



## MINIMUM REQUIRED RSI:

①	UNHEATED FLOOR ABOVE FROST	MIN: 1.96 RSI
②	FOUNDATION WALL	MIN: 1.99 RSI
③	FOUNDATION WALL	MIN: 1.99 RSI
④	EXTERIOR WALL	MIN: 2.78 RSI



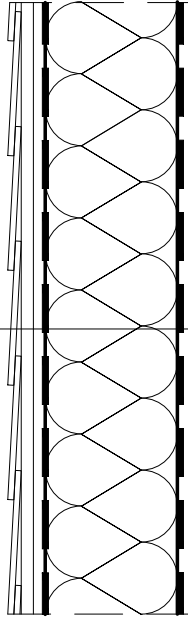
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## Heated Crawl Space (RSI Varies - See Drawing)

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Sheet No.: A6  
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12.7mm GYPSUM WALL BOARD  
 VAPOUR BARRIER  
 140mm STUDS WITH BATT INSULATION  
 12.5mm PLYWOOD SHEATHING  
 AIR/MOISTURE BARRIER  
 9.5mm STRAPPING  
 CLADDING MATERIAL

## EXTERIOR WALLS: 2.78 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
140mm STUDS @ 406mm O/C WITH R-19 BATT (R-20 COMPRESSED)	$100 / ((\frac{23\%}{1.19}) + (\frac{77\%}{3.34}))$	2.36
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
CLADDING MATERIAL	AS INDICATED BY DESIGNER	-
9.5mm STRAPPING	0.15 (FROM TABLE)	0.15
12.5mm PLYWOOD SHEATHING	0.109 (FROM TABLE)	0.109
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.12 (FROM TABLE)	0.12
<b>EFFECTIVE RSI (BEFORE CLADDING): 2.85</b>		

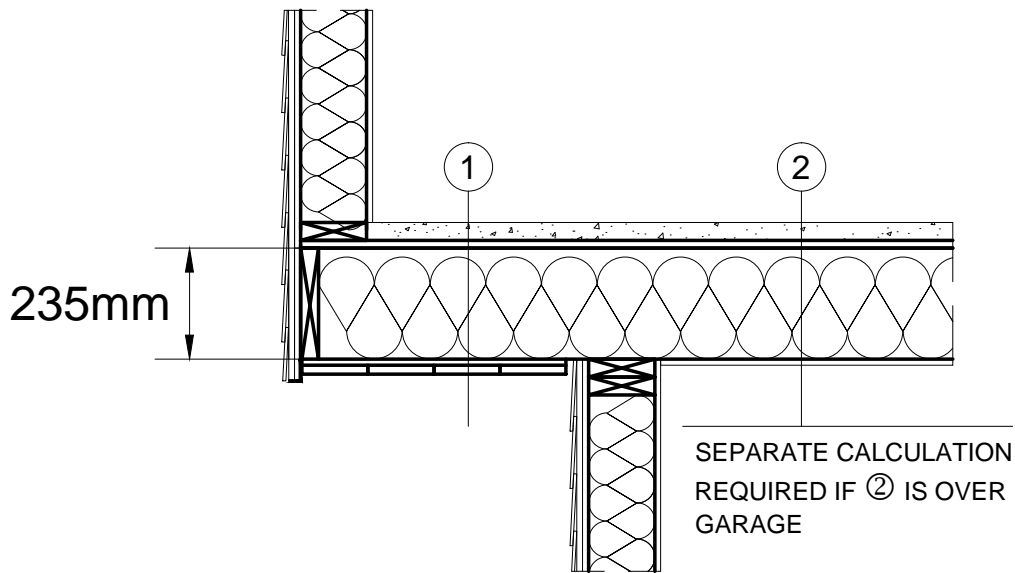


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### Exterior Wall (2.78 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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 Sheet No.: A7  
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 Date: 2015/06/05



## ① FLOORS OVER UNHEATED: 4.67 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
235mm JOIST @ 406mm O/C WITH R-28 BATT INSULATION	$100 / ((\frac{13\%}{1.9975}) + (\frac{87\%}{4.93}))$	4.14
<b>ADDITIONAL COMPONENTS</b>		
INTERIOR AIR FILM	0.16 (FROM TABLE)	0.16
38mm CONCRETE TOPPING	38 x 0.0004 RSI/mm	0.0152
15.5mm PLYWOOD SHEATHING	0.135 (FROM TABLE)	0.135
13mm STRAPPING	0.16 (FROM TABLE)	0.16
12.7mm WOOD SOFFIT	12.7mm x 0.0077 RSI/mm	0.09779
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
<b>TOTAL RSI: 4.74</b>		

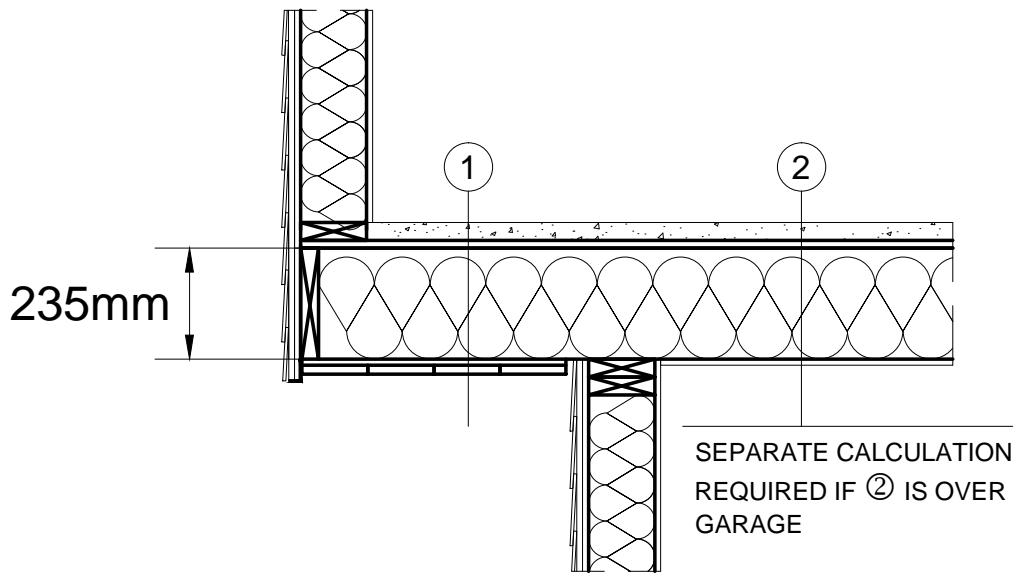


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Floors Over Unheated Spaces  
235mm Joists @ 406mm O/C With  
R-28 Batt (4.67 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A8  
Scale: 1:16  
Date: 2015/06/05



## ① FLOORS OVER UNHEATED: 4.67 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
235mm JOIST @ 610mm O/C WITH R-28 BATT INSULATION	$100 / ((\frac{10\%}{1.9975}) + (\frac{90\%}{4.93}))$	4.299
<b>ADDITIONAL COMPONENTS</b>		
INTERIOR AIR FILM	0.16 (FROM TABLE)	0.16
38mm CONCRETE TOPPING	$38 \times 0.0004$ RSI/mm	0.0152
15.5mm PLYWOOD SHEATHING	0.135 (FROM TABLE)	0.135
12.7mm WOOD SOFFIT	$12.7\text{mm} \times 0.0077$ RSI/mm	0.09779
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
<b>TOTAL RSI: 4.74</b>		

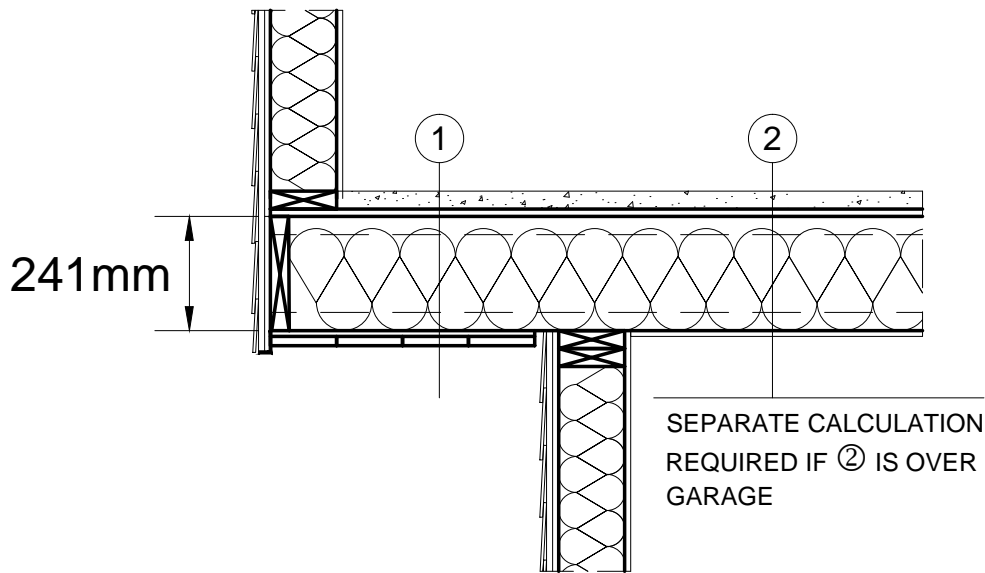


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Floors Over Unheated Spaces  
235mm Joists @ 610mm O/C With  
R-28 Batt (4.67 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A9  
Scale: 1:16  
Date: 2015/06/05



## ① FLOORS OVER UNHEATED: 4.67 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
241mm TJI JOIST @ 406mm O/C WITH R-28 BATT INSULATION	$100 / ((\frac{9\%}{2.0485}) + (\frac{91\%}{4.93}))$	4.376
<b>ADDITIONAL COMPONENTS</b>		
INTERIOR AIR FILM	0.16 (FROM TABLE)	0.16
38mm CONCRETE TOPPING	38 x 0.0004 RSI/mm	0.0152
15.5mm PLYWOOD SHEATHING	0.135 (FROM TABLE)	0.135
12.7mm WOOD SOFFIT	12.7mm x 0.0077 RSI/mm	0.09779
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
<b>TOTAL RSI: 4.81</b>		

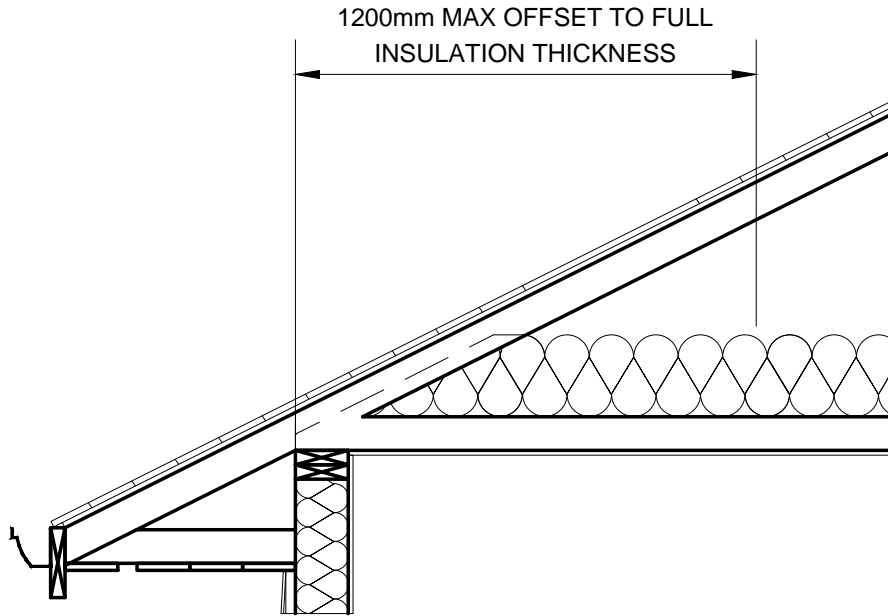


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Floors Over Unheated Spaces  
241mm Joists @ 406mm O/C With  
R-28 Batt (4.67 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A10  
Scale: 1:16  
Date: 2015/06/05



## CEILINGS BELOW ATTIC: 6.91 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
89mm TRUSS @ 610mm O/C WITH R-12 BATT INSULATION	$100 / ((\frac{11\%}{0.7565}) + (\frac{89\%}{2.11}))$	1.763
CONTINUOUS LAYER OF R-28 BATT INSULATION ABOVE CHORDS	4.93 (FROM TABLE)	4.93
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.11 (FROM TABLE)	0.11
<b>TOTAL RSI: 6.91</b>		

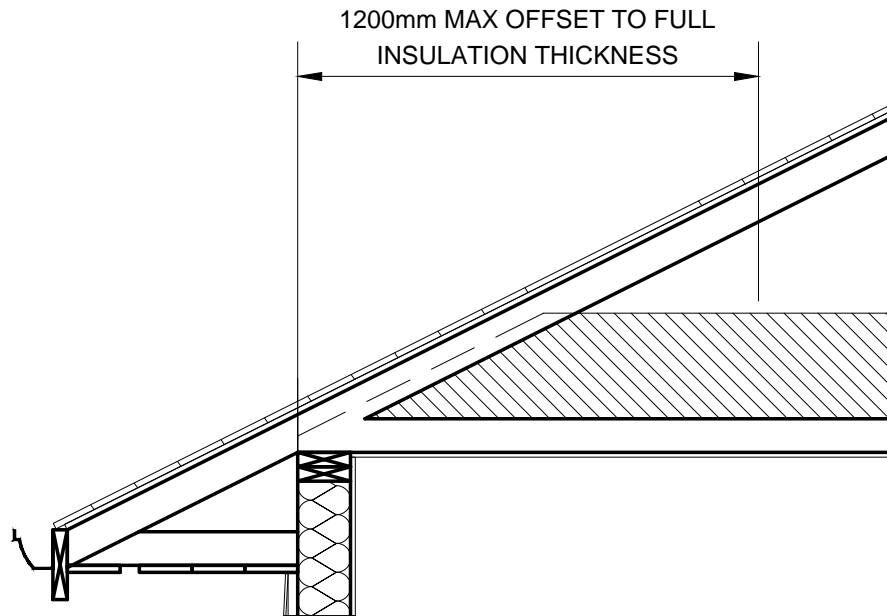


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### Ceilings Below Attics Typical 89mm Trusses With R-40 Batt Insulation (6.91 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A11  
Scale: 1:20  
Date: 2015/06/05



## CEILINGS BELOW ATTIC: 6.91 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
89mm TRUSS @ 610mm O/C WITH GLASS-FIBRE LOOSE-FILL INSULATION	$100 / ((\frac{11\%}{0.7565}) + (\frac{89\%}{1.66875}))$	1.473
CONTINUOUS LAYER OF INSULATION ABOVE CHORDS	279mm x 0.01875 RSI/mm	5.231
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.11 (FROM TABLE)	0.11
<b>TOTAL RSI: 6.92</b>		

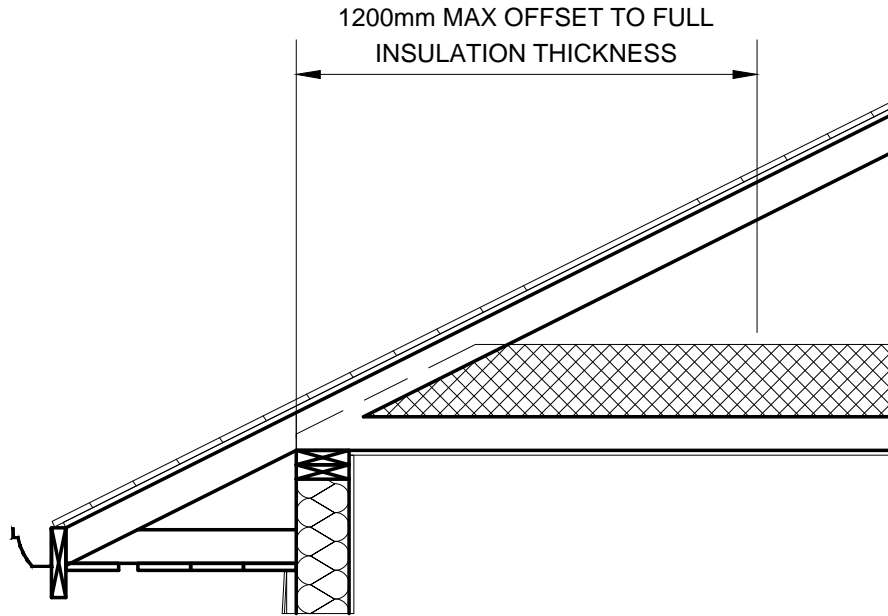


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### Ceilings Below Attic Typical 89mm Trusses W/Glass-Fibre Loose-Fill (6.91 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

Dr. No.: 1  
Sheet No.: A12  
Scale: 1:20  
Date: 2015/06/05



## CEILINGS BELOW ATTIC: 6.91 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
89mm TRUSS @ 610mm O/C WITH CELLULOSE LOOSE-FILL INSULATION	$100 / ((\frac{11\%}{0.7565}) + (\frac{89\%}{2.225}))$	1.833
CONTINUOUS LAYER OF INSULATION ABOVE CHORDS	195mm x 0.025 RSI/mm	4.875
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.11 (FROM TABLE)	0.11
<b>TOTAL RSI: 6.93</b>		

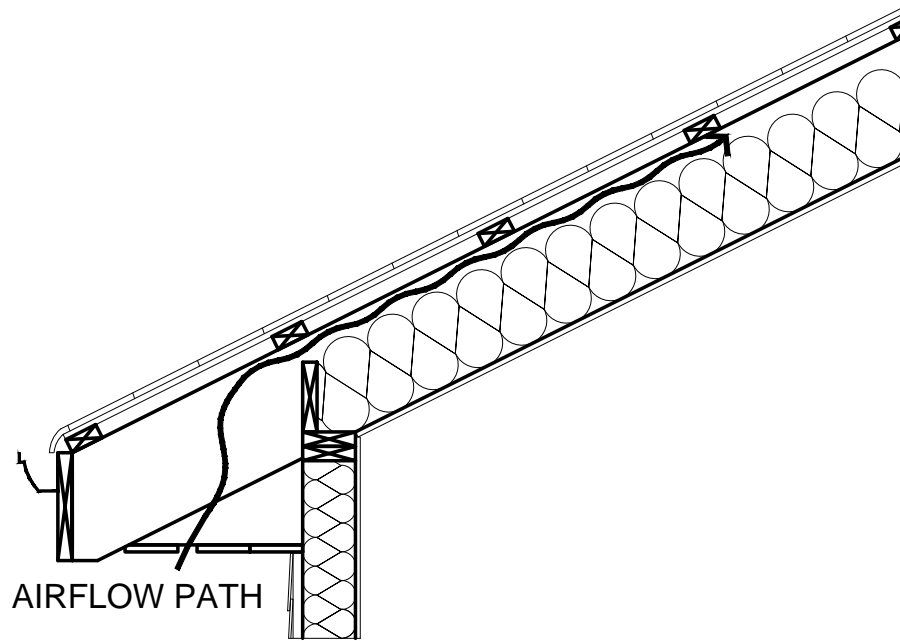


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### Ceilings Below Attic Typical 89mm Trusses W/Cellulose Loose-Fill (6.91 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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## CATHEDRAL/FLAT ROOF: 4.67 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
285mm RAFTER @ 406mm O/C WITH R-31 BATT INSULATION	$100 / ((\frac{13\%}{2.422}) + (\frac{87\%}{5.46}))$	4.694
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.11 (FROM TABLE)	0.11
<b>TOTAL RSI: 4.91</b>		



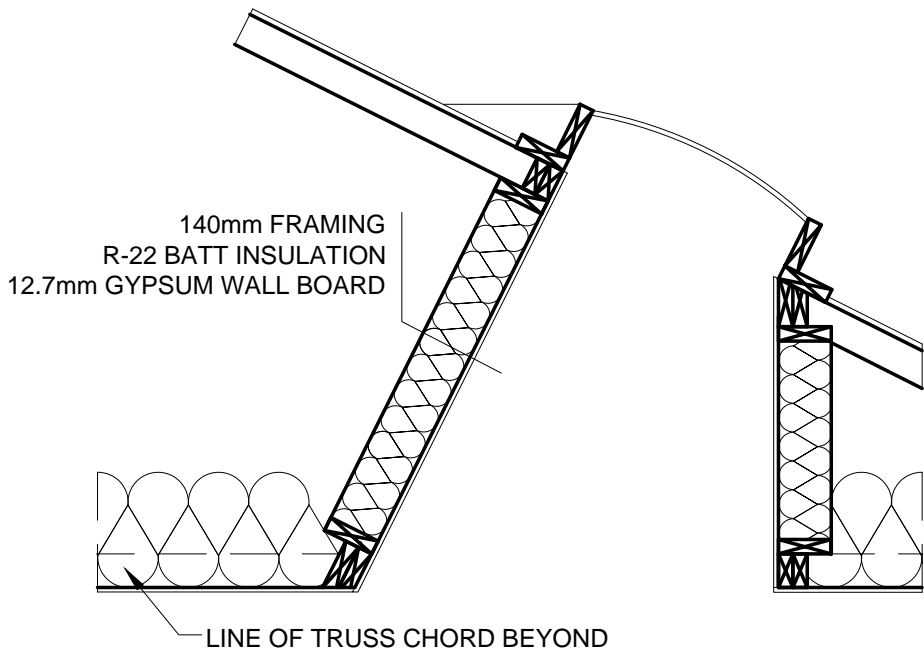
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Cathedral/Flat Roof  
285mm Rafter @ 406mm O/C With  
R-31 Batt (4.67 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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Sheet No.: A14  
Scale: 1:20  
Date: 2015/06/05





## SKYLIGHT SHAFT: 2.78 RSI

COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
140mm WALL @ 610mm O/C WITH R-22 BATT INSULATION	$100 / ((\frac{20\%}{1.19}) + (\frac{80\%}{3.87}))$	2.668
<b>ADDITIONAL COMPONENTS</b>		
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
12.7mm GYPSUM WALL BOARD	12.7mm x 0.0061 RSI/mm	0.07747
INTERIOR AIR FILM	0.12 (FROM TABLE)	0.12
<b>TOTAL RSI: 2.90</b>		

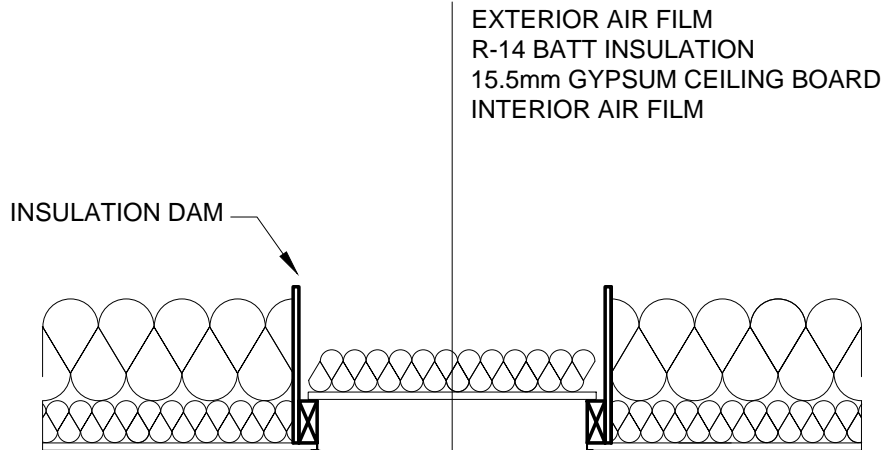


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### Skylight Shaft Detail (2.78 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

Dr. No.: 1  
Sheet No.: A15  
Scale: 1:20  
Date: 2015/06/05



WEATHERSTRIP AND GAS SEAL ACCESS HATCH

ATTIC ACCESS HATCH: 2.60 RSI		
COMPONENT	RSI CALCULATION	RSI FOR COMPONENT
EXTERIOR AIR FILM	0.03 (FROM TABLE)	0.03
R-14 BATT INSULATION	2.46 (FROM TABLE)	2.46
15.5mm GYPSUM CEILING BOARD	15.5mm X 0.0061RSI/mm	0.09455
INTERIOR AIR FILM	0.11 (FROM TABLE)	0.11
<b>TOTAL RSI: 2.69</b>		



Attic Access Hatch  
(2.60 RSI Required)

DETAIL COMPLIANT TO BCBC 2012 SECTION 9.36 - ENERGY EFFICIENCY

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 Sheet No.: A16  
 Scale: 1:16  
 Date: 2015/06/05



# City of Richmond

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