

# ROXUL REPORT:

## Fastener Guidelines



# Fastener Guidelines

## DESIGN BASIS

### 1. MECHANICAL ATTACHMENT

For permanent attachment, ROXUL stone wool (mineral wool) insulation should be mechanically attached or pressure held by supporting members.

### 2. ADHESIVES

Adhesives and adhesive applied stick-pins should NOT be used for permanent attachment of ROXUL stone wool insulation. Adhesives, and adhesive based systems can be used for temporary attachment, but mechanical attachment (or supporting members) must be used for permanent attachment.

### 3. EXPOSED INSULATION

ROXUL stone wool insulation is not intended to be left exposed to the elements. Cladding should be installed after insulation attachment. If the insulation is to be left exposed, or installation takes place in bad weather, the insulation should be permanently mechanically attached and covered with a breathable protective layer (such as tarp). Designers can increase number of fasteners to meet specific conditions and design requirements (including wind-driven rain-loads).

### 4. DESIGN LOADS

Fastening connections should be designed to withstand all the combined applied loads, including (but not limited to) Dead-Load and Wind-Loads. Where applicable, consideration should also be given to Seismic- Load, Live-Load and Wind-Driven Rain-Load (Not covered in this guide).

### 5. DEAD LOAD

Fastening connections should be designed to withstand all the combined applied dead loads, including (but not limited to) the insulation, fasteners and any other supported members or cladding.

### 6. WIND LOAD (LIVE LOAD)

Fastening connections should be designed to withstand horizontal loads imposed by wind pressures. Wind loads often govern lateral load scenarios

### 7. FASTENER SELECTION

Fasteners should be: a) appropriate type for the substrate; b) capable of withstanding applied pull-out and shear-loads ; c) numerous enough and of large enough cross-section to prevent tear-through of the insulation under expected conditions; d) suitable for use outside if being used in exterior applications.

### 8. ENGINEERED DESIGN

The design of fastened connections is a task normally completed, or reviewed, by a structural engineer. The primary purpose of this fastener guide is to provide suggestions for attachment design of ROXUL stone wool insulation attachment to various structures and buildings.

### 9. LIMITATION

ROXUL stone wool insulation boards are suitable for mechanical attachment using a number of fasteners and fastening systems. Mechanically attached fastening systems are subject to various loads including dead load, wind load and seismic load; all of which vary with location and over time. **WARNING:** Failure to include safety factors or adequately design for applied loads can result in failure of mechanical attachment. The determination of the specific design requirements and safety factors regarding a fastener system is the sole responsibility of the installer and/or end user. ROXUL Inc assumes no responsibility whatsoever for any failure of insulation attachment or related fastening systems.

# Plain Insulation

## 1. APPLICATIONS

- ☐ Exposed Exterior Insulation
- ☐ Basements (Inside / Outside)
- ☐ Parking Garages
- ☐ Acoustic Panels

## 2. EXPOSED INSULATION

ROXUL stone wool insulation is not intended to be left exposed to the elements. Cladding should ideally be installed immediately after insulation attachment. If the insulation is to be left exposed, or installation takes place in bad weather, ROXUL recommends a minimum of 5 mechanically attached insulation fasteners per board.

## 3. TYPE OF FASTENERS

- ☐ Screw & Washer
- ☐ Insulation Fastener
- ☐ Plastic Cap Nails
- ☐ Impaling Pins

## 4. NUMBER OF FASTENERS

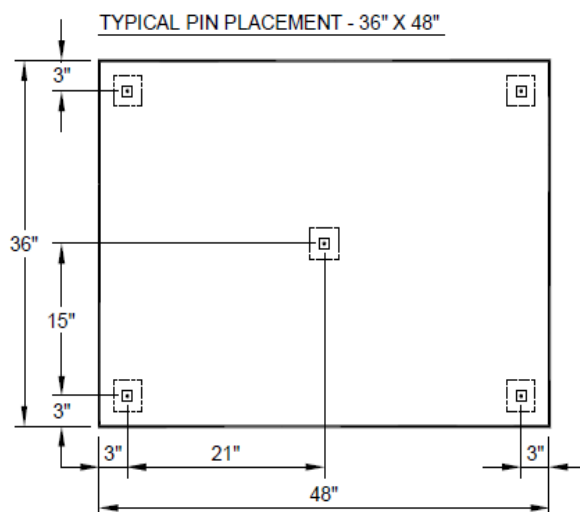
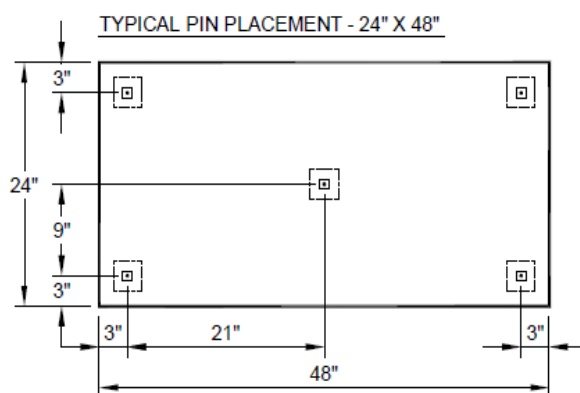
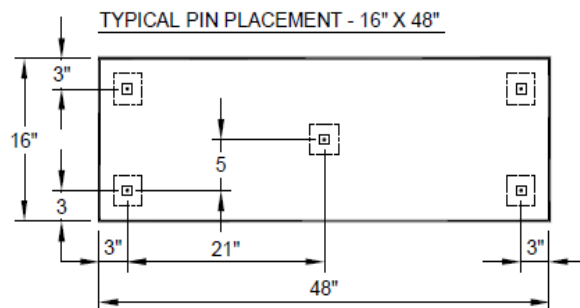
ROXUL recommends a minimum of 5 mechanically attached insulation fasteners per board. Designers can increase number of fasteners to meet specific conditions and design requirements (including wind-driven rain-loads).

## 5. EMBEDDED DEPTH OF FASTENER

Embedded depth required to resist fastener pull-out will vary with both substrate material and the fastener type. ROXUL recommends a minimum 1" embedded depth, designers may vary this amount.

## 6. PROPRIETARY FASTENERS

Some proprietary Insulation Fasteners can provide adequate support with fewer than 5 fasteners per board and less than 1" embedded depth. Individual fastener manufacturers should be consulted for details.



# Strapping

## 1. GENERAL

Strapping, attached to the building structure, will act like giant clamps to hold insulation in place. ROXUL insulation boards will be permanently mechanically supported by the strapping attachment if the attachment is designed to withstand live loads and total applied dead loads. Insulation boards can be temporarily held in place prior to strapping unless the insulation is to be left exposed without strapping or installation takes place in bad weather; in which case guidelines for Plain Insulation attachment in the previous section should be followed

## 2. DESIGN

- ❑ ROXUL recommends installing strapping vertically to provide a drained cavity; drained metal hat-channels can be installed horizontally.
- ❑ Strapping attachment should be designed to withstand wind loads and total applied dead loads (Insulation + Fasteners + Strapping + Cladding)
- ❑ ROXUL recommends a maximum system dead load area weight of 12 psf for wood frame construction and 5 psf for metal frame construction.



## 3. FASTENERS

- ❑ Fasteners should be: a) appropriate type for the substrate; b) capable of withstanding applied pull-out and shear loads.
- ❑ Required length, number, spacing and embedded depth of fasteners will depend on the type of fastener, the applied loads, the substrate and the thickness of the insulation, strapping and any sheathing.
- ❑ Anti-unwinding fasteners (or alternative precautions) should be used for metal frame construction.
- ❑ Fasteners should be embedded 1.5" in wood studs and concrete, and extend at least 3 full threads past the inside face of steel studs.
- ❑ Designers can vary the type, number and embedded depth of fasteners to meet specific requirements.

## 4. STRAPPING TYPE

Metal or treated wood strapping can be used. ROXUL recommends using 2x3 or 2x4 dimensional lumber (laid on the flat), or metal hat-channels.

## 5. INSTALLATION TIPS

- ❑ Use Experienced Installers or a laser-level with inexperienced installers
- ❑ Use 2x3 or 2x4 lumber instead of thinner strapping
- ❑ Use double-thread screws for wood strapping
- ❑ Recommended for maximum insulation thickness  $\leq 3"$

## 6. REFERENCES

- ❑ *NTA Engineering Evaluation Report TRU110910-21* can be used to design strapping attachment for wood-frame and concrete with TRUFAST SIP and TRUFAST Tru-Grip fasteners.
- ❑ *ROXUL Continuous Exterior Insulation – Deflection Report*
- ❑ *IMETCO IntelliScreen* system is recommended for cladding installation using horizontally installed drained metal hat channels



# Masonry Ties

## 1. GENERAL

Wedges / clips installed over masonry ties can be used to attach ROXUL insulation boards. Non-proprietary or proprietary masonry ties can be used.

## 2. DESIGN

Spacing and design of the masonry tie pattern should follow accepted practice and be adequate to support wind and dead loads.

Where permissible by codes and design, the spacing of ties should be made to be 16" or 24" in at least one orientation (vertical or horizontal) to allow easy installation of ROXUL insulation boards with little or no cutting of the insulation.

## 3. INSULATION ATTACHMENT

Wedges or clips over masonry ties can be used to hold the insulation in place at board edges. Additional fasteners can be used in the middle of boards if needed.

The average number of masonry tie wedges and / or fasteners holding a single piece of insulation should be a minimum of 5.

Designers can increase the number of fasteners or wedges to meet specific conditions and design requirements.

## 4. FASTENERS

ROXUL recommends wedges or clips designed for the particular type of masonry tie being used.

If additional fasteners are required in the middle of boards these can be:

- ☐ Plastic cap nails
- ☐ Screws & washers
- ☐ Insulation Fasteners
- ☐ Impaling Pins

## 5. STPE – ADHESIVE WRB

Some STPE based WRB (Weather Resistive Barrier) compounds have adhesive properties prior to curing and can be used to attach ROXUL stone wool insulation to the wall **when used in combination** with brick ties and wedges around board edges.

Follow manufacturers direction when using an STPE based WRB as an adhesive for ROXUL insulation.

# Clips & Girts

## 1. GENERAL

Proprietary clips / brackets or non-proprietary stand-offs designed to support vertically installed z-girts or L-channels can be used. Insulation is not required to provide any structural support with this type of system.

## 2. THERMAL BRIDGING & Z-GIRTS

ROXUL does NOT recommend using z-girts through the full thickness of insulation. Clips, brackets or stand-offs should be used to minimize thermal bridging.

## 3. DESIGN

Z-girts and fastening system should be designed to support wind loads and total applied dead loads independently of the insulation.

If clips & girts do NOT provide structural support to the insulation it should be fastened per directions for *Plain Insulation*.

If clips & girts provide structural support to the insulation then designers can reduce the required number of fasteners appropriately.

## 4. CASCADIA CLIPS & OTHER PROPRIETARY SYSTEMS

Follow manufacturers recommendations

## 5. FASTENERS

- ☐ Fasteners should be appropriate type for the substrate
- ☐ Use the manufacturers recommended fasteners when using proprietary clips & brackets
- ☐ Anti-unwinding fasteners (or alternative precautions) should be used for metal frame construction and metal-to-metal fastening of clips & girts.

Fasteners for attaching insulation

- ☐ Impaling Pins
- ☐ Screws & Washers
- ☐ Plastic Cap Nails
- ☐ Insulation Fasteners

# Fastener - Examples



## Fastener & Washer

Recommended for use with all types of ROXUL stone wool insulation boards  
Fastener should be appropriate type for the substrate



## Plastic Cap Nails

Recommended for temporarily holding insulation and fastening insulation to wood and wood based substrates



## Clip & Z-Girt

e.g. CASCADIA CLIPS  
Recommended for thick exterior insulation (over 3")  
Follow manufacturers recommendations for use



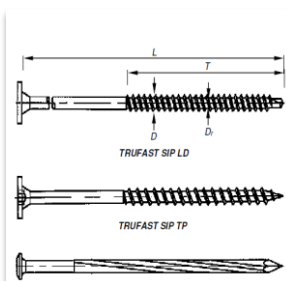
## Metal Fasteners

Recommended for use with metal frame construction.  
Anti-unwinding fasteners (or other precautions) should be used with metal frame construction



## Insulation Fasteners

e.g. RAMSET INSULFAST  
Recommended for fastening insulation to concrete, masonry block and exterior gypsum sheathing



## Regular

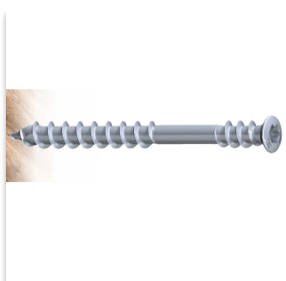
Wood Screws  
Concrete Screws  
Concrete Nails

Must be right type for the substrate and suitable for outside use if not being used inside.



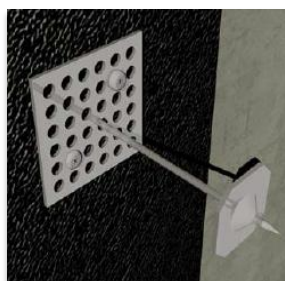
## Brick-Tie & Wedge

Wedges or clips used with masonry ties can be used to attach ROXUL CAVITYROCK DD and MD insulation



## Dual-Thread Fasteners

e.g. Heco-Topix  
Recommended for use with wood strapping to reduce risk of compression deflection



## Impaling Pin

Mechanically attached or bonded to structure.  
Recommended for use with all types of ROXUL stone wool insulation boards.  
Adhesive "stick" pins should be avoided



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