



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, however for permanent attachment ROXUL recommends mechanical attachment (or supporting members).

3.EXPOSED INSULATION

ROXUL stone wool insulation products should be protected using best practices, at all times during construction to minimize exposure, physical damage and contamination. Within normal building practices it is common for ROXUL stone wool insulation products to be exposed to the elements prior to the final closing of a wall.

ROXUL stone wool insulation is water resistant and vapor permeable. In the event of exposure to moisture the insulation, when thoroughly dried, will retain all of the performance properties claimed – provided there is no additional physical damage.

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 by a design professional 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 typically completed by a design professional. 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 and shall not supersede that of a design professional.

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 based on location and 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
- Concrete Masonry Unit (CMU)

2. TYPE OF FASTENERS

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

3. NUMBER OF FASTENERS

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

4. EMBEDDED DEPTH OF FASTENER

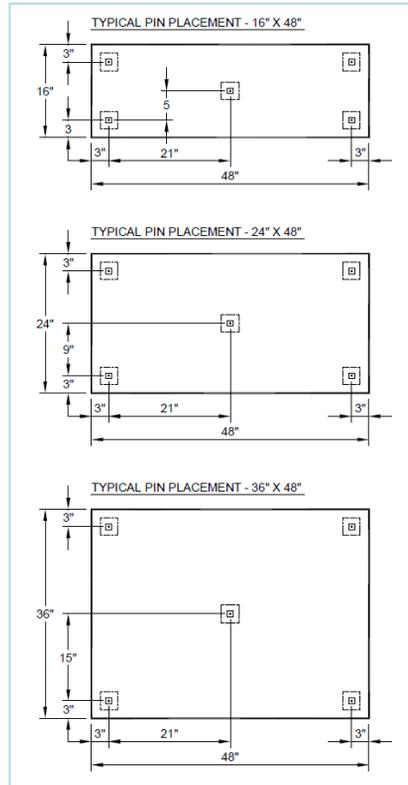
Embedded depth required to resist fastener pull-out will vary with both substrate material and the fastener type. ROXUL recommends a minimum 1.5" embedded depth, designers may vary this amount.

5. PROPRIETARY FASTENERS

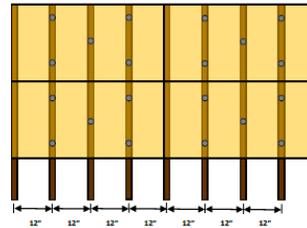
Some proprietary Insulation Fasteners can provide adequate support with fewer than 5 fasteners per board and less than 1" embedded depth. The recommendations of the individual fastener manufacturers should be followed to obtain the desired performance

6. Washer Size

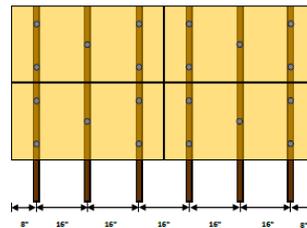
Recommended washer size is 50mm which should be used when installing ROXUL onto impaling pins or with a screw.



Scenario 1: 12 Inch on Center

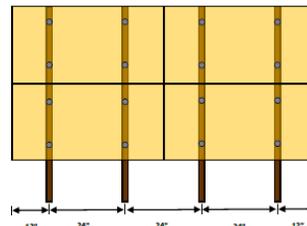


Scenario 2: 16 Inch on Center



For 16" on center off set boards by 8" off studs.

Scenario 3: 24 Inch on Center



For 24" on center off set boards by 12" off studs.

Strapping

1. GENERAL

Strapping, fastened in to the building structure, will act like giant clamps to hold insulation in place. ROXUL rigid stone wool 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.

During installation, minimal fasteners can be used to temporarily hold the product in place until the strapping is applied provided undesirable conditions are not expected in that time frame.

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).
- ❑ Current research suggest limiting installed cladding load to 10 lb/fastener (relative to fasteners attaching furring to the structure) over COMFORTBOARD IS up to 4 inches thick.
- ❑ ROXUL COMFORTBOARD IS is used for wood framed construction.
- ❑ ROXUL COMFORTBOARD CIS is used for Steel Framed 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.
- ❑ Embedded fastener depth will vary based on framing medium. As a general rule: 1.5" deep in wood studs and concrete, 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 1x4, 2x3 or 2x4 dimensional lumber (laid on the flat), or metal hat-channels.

5. INSTALLATION TIPS

- ❑ Use Experienced Installers or a lazer-level with inexperienced installers.
- ❑ Use 1x4, 2x3 or 2x4 lumber instead of thinner strapping.
- ❑ Use double-thread screws for wood strapping.
- ❑ Recommended for maximum insulation thickness $\leq 4"$ – for insulation thicknesses greater than 3" additional support may be required. Consult a design professional in these cases.

6. REFERENCES

- ❑ *NTA Engineering Evaluation Report TRU110910-21*
- ❑ *Building America Case Study : Cladding Attachment Over Mineral Fiber Insulation Board*

Masonry Ties

1. GENERAL

Wedges / clips installed over masonry ties can be used to attach ROXUL semi-rigid stone wool insulation boards. Non-proprietary or proprietary masonry ties can be used as the ROXUL semi-rigid stone wool insulation will conform around the ties and the inner wythe.

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.
- CAVITYROCK MD/DD recommended for masonry tie applications.

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. Design professionals 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



Clips & Girts

1. GENERAL

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

2. DESIGN

- ❑ Z-girts and fastening system should be designed to support wind loads and total applied dead loads of cladding independently of the insulation.
- ❑ Adjust the number of pins or screws in insulation retention system appropriately based on level of support provided by clip and girt system.

3. THERMALLY BROKEN CLIP & GIRT SYSTEMS

Whether using a T-Clip, TAC clip, Cascadia clip, etc. to achieve a thermally broken system always follow the manufacturers installation instructions.

4. 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.

Common Insulation Retention Systems

- ❑ 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.



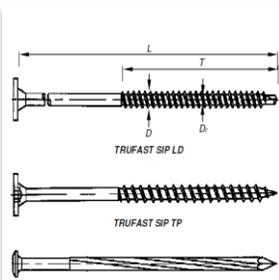
Metal Fasteners

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 through gypsum sheathing (steel stud).



Regular

Wood Screws
Concrete Screws
Concrete Nails

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



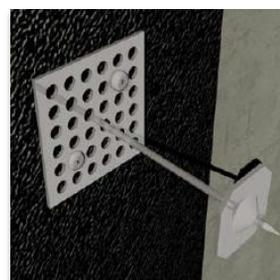
Brick-Tie & Wedge

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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