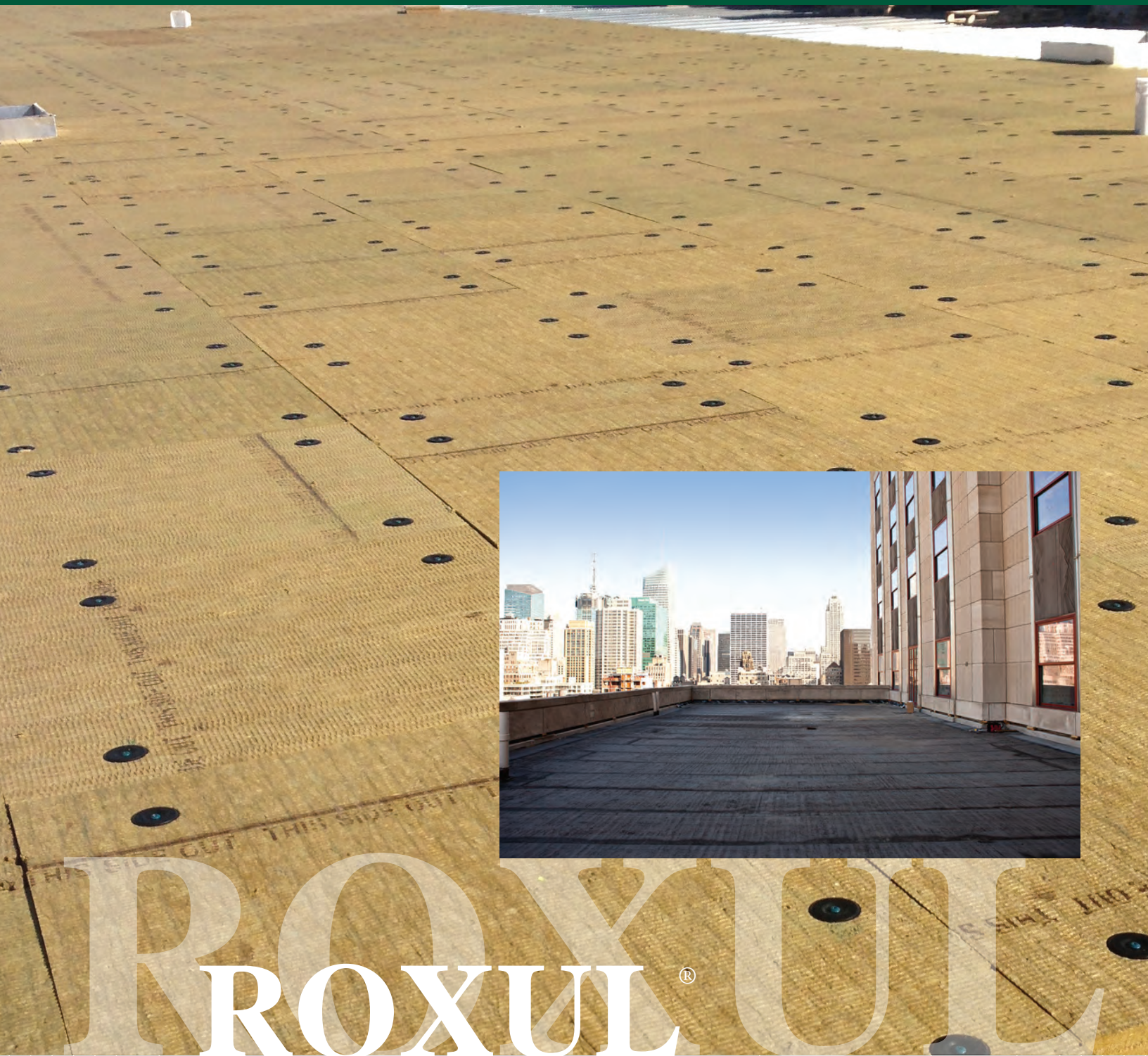


Tremco Roofing and Building Maintenance



PROXUL[®]

**Understanding Climate Requirements
That Drive Performance**

TREMCO
ROOFING & BUILDING MAINTENANCE

Tremco Roofing and Building Maintenance

ROXUL®

High Performance Roofing Insulation Products

- ✓ No R-value loss over time
- ✓ Non-combustible
- ✓ Impact resistant
- ✓ Water repellent
- ✓ Sound absorbent
- ✓ Environmentally sustainable
- ✓ Made from Stone
- ✓ Vapor permeable
- ✓ No off-gassing
- ✓ Resistant to rot, mold, fungi and chemicals

TOPROCK® DD

Fire Resistant Roofing Insulation

ROXUL® TOPROCK® DD has exclusive stone dual density properties that feature a higher-density top layer, providing strong point load resistance and effective load distribution to minimize puncture damage to the membrane – particularly during installation.

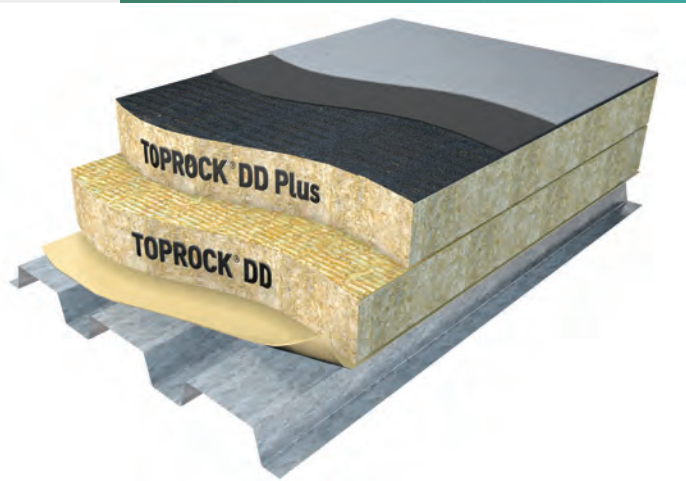
- Insulation and coverboard in one
- Suitable for new building, re-roofing and re-cover applications
- Also used in tapered systems
- Available thicknesses: 2", 2.5", 3", 3.5"
- R-value of 3.8 per inch as tested at 75°F per ASTM standard

MONOBOARD®

The Ultimate Insulating Coverboard

ROXUL® MONOBOARD® is a rigid, mono-density roof coverboard with a uniform density that can provide tremendous versatility, and is designed for use as a coverboard and re-coverboard.

- Higher density: 12.5 lb/ft³ (200 kg/m³)
- Suitable for new building, re-roofing, and re-cover applications
- Also used in tapered systems and fabrications
- Standard thickness: 1.04" / R4 as tested at 75°F per ASTM standard



TOPROCK® DD Plus and MONOBOARD® Plus are available with an impregnated surface layer of bitumen. This pre-applied coating makes the products compatible with both torch and mop applied membranes; it also simplifies the application process, saving time as well as material and labor costs on-site.

*In which climate zone are you designing roof assemblies?
Think about climate driven R-values for improved performance.*

Climate Driven R-Value (CDRV)

Declared R-Values – Industry Standard

All insulation manufacturers follow the R-value rule that requires all types of insulation to be tested in accordance with one of the standard industry test methods defined by the American Society of Testing and Materials (ASTM).

The rule requires that R-value tests be conducted at a mean temperature of 23.9°C (75°F) and a temperature differential of 27.8°C (50°F). This means that insulation is usually tested with the cold side at 10°C (50°F) and the warm side at 37.8°C (100°F).

Roofs are subjected to a significant range of temperatures – not only seasonally, but daily as well. Of course, those temperature ranges will vary depending on how and where the roofs are built, as factors such as the climate and the membrane color affect the heating and cooling of the roof. What does this mean?

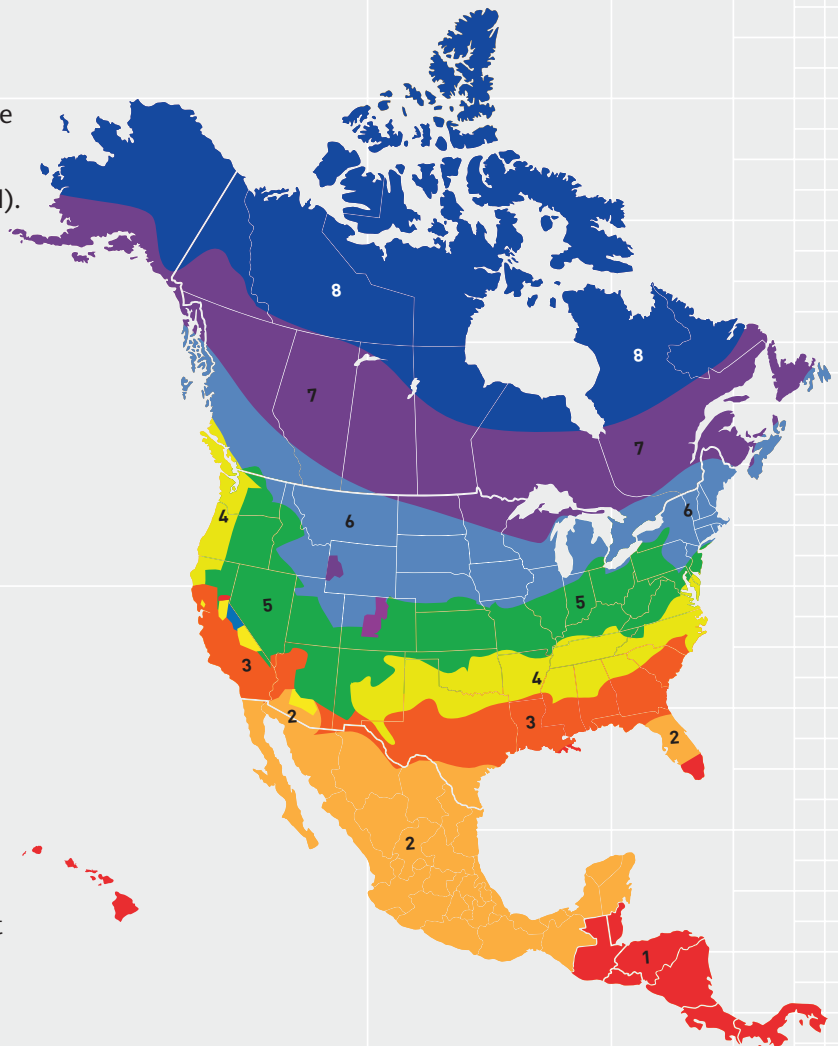
Climate Driven R-Value – Real World Performance Consideration

Climate driven R-value serves to recognize that some insulation materials exhibit different thermal performance as temperatures change (i.e., the apparent R-value increases as the temperature decreases), and some materials exhibit a loss of thermal performance as temperatures decrease (i.e., the apparent R-value decreases as the temperature decreases).

ROXUL® stone wool insulation is an example of an insulation that performs better than manufacturer declared R-value in colder temperatures, while polyisocyanurate (polyiso or ISO) insulation R-values have been shown to decrease. In warm temperatures, all insulations exhibit drops in performance, to varying degrees.

The “NRCA” conducted a research study after noticing a drop in thermal performance in polyiso roof boards over varying temperatures. Their original results are displayed here for your reference.

In recent years, “BSC” and “RDH” have also conducted their own studies into the effects of climate and temperature on R-value performance.



The concept of **climate driven R-value focuses strictly on climate or temperature when predicting R-values Real World Performance Consideration.**

That is to say other factors such as aging, off-gassing, dimensional stability and thermal bridging can further reduce the expected performance of your design.

Learn more about the studies conducted, visit these websites:

NRCA: www.nrca.net “Comparing Polyiso R-values”

Building Science Corporation:

www.buildingscience.com “BSC-502”

RDH Building Science: www.rdh.com

“Conventional Roofing Study”

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Beyond Climate Driven R-Value Performance

Other factors that negatively impact thermal performance are:

Blowing Agents

Blowing agents may condense (changing from a gas to a liquid) in cold climates, causing the R-value to decrease. Unlike foam plastic insulation materials that use blowing agents, ROXUL® stone wool insulation does not.

Dimensional Stability

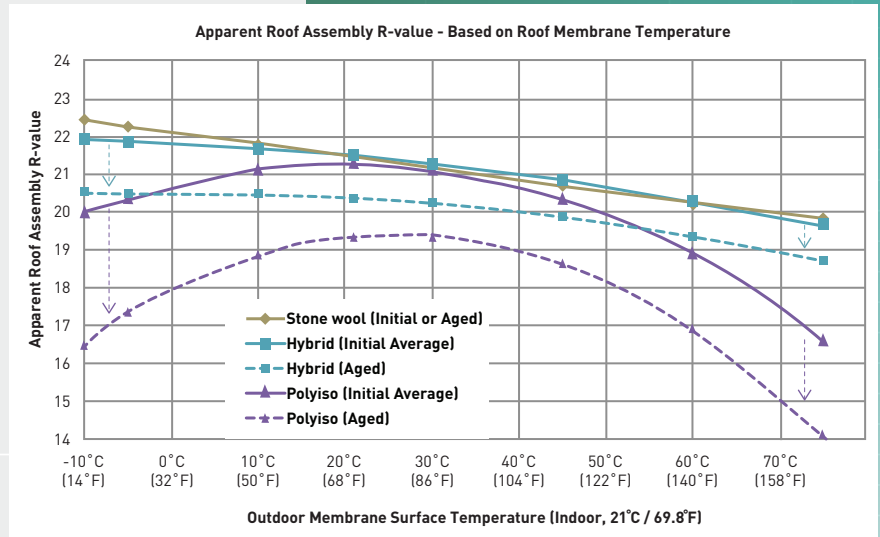
Polyiso roof boards, per ASTM 1289 standard, can lose up to 2% of their size and be within standards, increasing gaps in the insulation layer.

Thermal Bridging

Heat transfer will increase when conducted through attachment systems. The type and quantity of fastener will influence the rate of heat transfer and therefore influence thermal performance of the system.

Aging

The graph above, excerpted from RDH Building Engineering, shows the effects that the aging of the Polyiso roof board has on its thermal performance over varying surface temperatures.¹



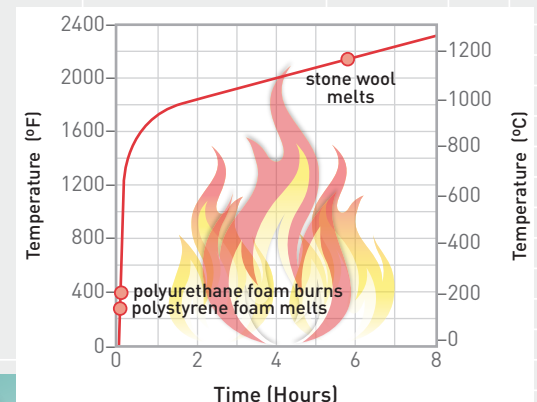
Fire Resistant Insulation To Prevent Flame Spread & Toxic Smoke Development



ROXUL® TOPROCK® DD stone wool insulation has a melting point that exceeds the temperatures of most commercial fires.

ROXUL® TOPROCK® DD stone wool roofing insulation is non-combustible and will not develop toxic smoke or promote flame spread, even when directly exposed to fire.

Therefore it will not add fuel to an existing fire, as foam plastics tend to do, making it ideal for use in high occupancy buildings.



Stone wool provides passive fire protection – a strong complement to active systems such as sprinklers. This is important while a building is operational and just as important in the construction and maintenance stages.

Moisture Management Properties Better Than Other Insulations



ROXUL® TOPROCK® DD insulation has superior drying potential, minimizing the risk of condensation buildup – effectively managing stresses on the membrane from changes in temperature. Built-up moisture can cause the formation of blisters and ridging, which can lead to leaks and premature failure of the roofing membrane.

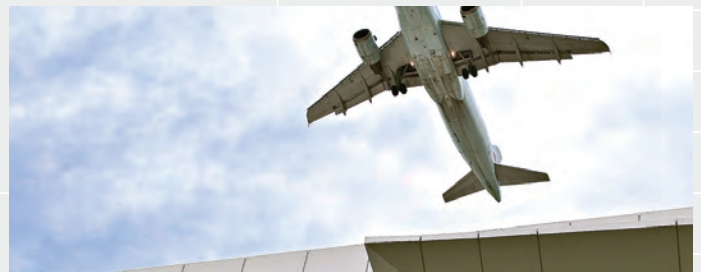


TOPROCK® DD and MONOBOARD® are water repellent yet vapor permeable and will not promote rot, corrosion, mold or bacterial growth.

Minimizing Noise With Superior Sound Absorption



ROXUL® TOPROCK® DD stone wool insulation products demonstrate superior sound absorption characteristics. The unique non-directional structure is denser than traditional insulations. This effectively reduces airflow and sound transmissions for excellent noise reduction. These denser structures, coupled with tight, seamless joints, create effective barriers to noise and contribute to a much quieter work environment.



Although Ridgewood High School has served the Chicago suburb of Norridge for over six decades, changing flight plans at O'Hare International Airport created a major noise issue. The solution - ROXUL Tapered System with ROXUL TOPROCK® DD Plus.

ROXUL TOPROCK® DD Plus stone wool insulation demonstrates superior sound reduction characteristics as its non-directional fiber orientation helps to trap and dissipate sound waves.



Dimensionally Stable:



ROXUL® Holds Up Year After Year

ROXUL stone wool retains its physical characteristics over time. Unlike foam insulation materials, both TOPROCK® DD and MONOBOARD® have minimal contraction or expansion due to fluctuating temperatures, nor are they adversely affected by the presence of moisture – two critical factors that can compromise a building's roofing system.

The exceptional stability of ROXUL stone wool eliminates stresses on the roofing membrane, and extends the overall service life of the roof.

- *Stone wool is thermally stable and maintains its R-value over time*
- *Low thermal expansion/contraction due to temperature variance*
- *No shrinkage due to off-gassing*
- *No warping or curling over time*
- *Life-cycle costing becomes more definitive*

Dimensional Stability

Material Type	Co-Efficient of Linear Expansion	Actual Expansion at Temperature Difference of 50°C on a 10 m Section	Actual Expansion at Temperature Difference of 50°F on a 50 ft Section
Stone Wool	10-6 m/m°C	mm	inch
Stone Wool	11	5.5	1/4
Concrete	12	6	1/4
Steel	12	6	1/4
Expanded Polystyrene	63	32	11/8
Extruded Polystyrene	63	32	11/8
Polyurethane	40-70	20-35	3/4 - 11/4
Polyisocyanurate	40-70	20-35	3/4 - 11/4

Environmentally Sustainable

ROXUL® stone wool production process uses some of the most advanced technology available. The last decade has seen a new generation of ROXUL manufacturing advancements designed to lower its environmental footprint. These endeavours have included:

- the capture and recycling of rainwater;
- reduction in energy consumption;
- recycling of raw materials back into the production process;
- the use of natural lighting in ROXUL® facilities; and
- repurposing water used during the manufacturing process.

ROXUL® is proud that these steps have minimized its impact on the environment and surrounding community resources. But ROXUL's green programs don't stop there.

ROXUL® insulation is created using naturally occurring inorganic raw materials, and reuses waste from other manufacturers as well as from ROXUL's own plants. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. Therefore, ROXUL® products do not off-gas over time.

This feature alone makes a substantial contribution to a cleaner environment.

To remain efficient and environmentally friendly, each ROXUL® plant uses a varying combination of new and recycled content. For example, as a direct result of producing less manufacturing waste during the production process, ROXUL® is able to use up to 40 percent recycled content. ROXUL's continuing effort to improve its overall efficiencies further solidifies the commitment to environmental stewardship within ROXUL®.



Tremco Roofing and Building Maintenance

To learn more about how we can help you solve your roofing and building envelope challenges, or other facility issues you're facing, contact your local Tremco Roofing and Building Maintenance sales representative. You can also visit www.tremcoroofing.com or call us toll-free at 800.852.6013.



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