

## MAX NO. 9001

**SUBJECT: MOISTURE AND R-VALUE PERFORMANCE UNDER EXTREME ENVIRONMENTAL CONDITIONS:**

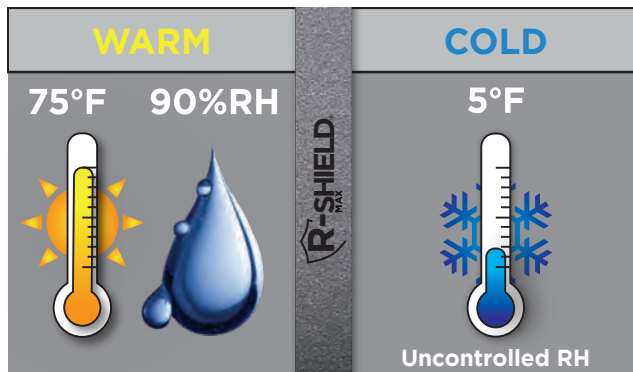
**DATE: JULY 2018 (REVISED JANUARY 2019)**

R-Shield® MAX is well known for its embedded graphite particles that reflect heat radiation like a mirror to increase R-value. This innovative rigid foam insulation is also known for its excellent moisture performance. Its exceptional breathability and permeability help reduce the risk of mold, rot, and structural damage associated with moisture condensation and long-term water retention.

In order to confirm the thermal, moisture, and structural properties of R-Shield MAX under environmental extremes, Intertek Testing Services was commissioned to conduct rigorous ASTM C1512 testing. ASTM C1512 is a standard test method for characterizing the effect of extreme temperature variations and exposure to moisture on the thermal performance of the insulation products. Testing was conducted on R-Shield MAX 100, 130, 150, and 250.

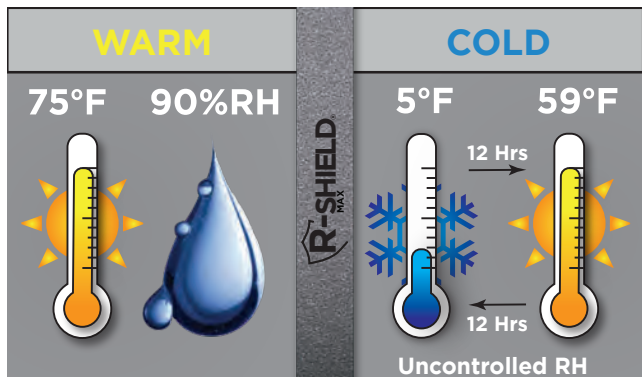
### ASTM C1512 Preconditioning

In the first stage of the ASTM C1512 test, the R-Shield MAX samples were subjected to conditioning in a test chamber for 28 days to artificially increase moisture content due to vapor diffusion associated with constant thermal gradient. The specimens divide two environments. The warm side is at 75°F and 90% relative humidity and the cold side is a constant 5°F with uncontrolled ambient humidity. The intention of the extreme temperature and humidity gradient between the warm and cold side is to artificially accumulate moisture by vapor diffusion into the test specimens.



### ASTM C1512 Cycling Stage

After 28 days of preconditioning, the samples were removed and weighed, and then returned to the test chamber to undergo another 20 days of testing comprised of alternating 12-hour cycles. In this cycling stage, the warm side was still at 75°F and 90% relative humidity, but the cold side was cycled every 12 hours from 5°F to 59°F for 40 cycles. This rigorous testing regime is designed to determine the moisture management properties of the insulation under common field exposure conditions. The cycling stage is where the drying potential of the insulation under common field exposure conditions is measured.



### ASTM C1512 Results


At the end of the testing all of the R-Shield MAX samples were weighed, dried, and moisture content was measured. The samples were subjected to compressive strength (ASTM D1621) and R-value (ASTM C518) testing to measure the effects of the extreme environmental exposure on the material's physical properties.

R-Shield MAX held its R-value, didn't retain moisture, and maintained its physical properties after undergoing severe environmental testing.

**Conclusions**

The series of tests conducted by Intertek was designed to see how R-Shield MAX insulation responded to extreme environmental conditions in terms of thermal performance, moisture performance, and compressive strength. After the rigorous ASTM C1512 testing was complete, R-Shield MAX proved itself in a number of key areas:

- R-Shield MAX doesn't retain moisture, drying quickly after cycling from low to high humidity.
- R-Shield MAX held its R-value after undergoing 48 days of extreme environmental testing that involved both a constant thermal gradient and cycling between large temperature and humidity variations.
- R-Shield MAX holds its properties after exposure to extreme environmental cycling, further confirming and quantifying what building professionals have observed in the field

ASTM C1512 ENVIRONMENTAL CYCLING RESULTS		
	Moisture Retained After Cycling (%)	R-value Retention After Cycling (%)
<b>100</b>	< 0.05	100
<b>130</b>	< 0.05	100
<b>150</b>	< 0.05	100
<b>250</b>	< 0.05	100