Technical Bulletin

Issued: 02/12/2010
Re: Technical Bulletin – Steel & Ice Ball Impacting of PVC & TPO with ROCKWOOL Stone Wool

---

In a recent Laboratory study, thermoplastic single-ply membranes supported by ROCKWOOL mineral wool insulation were tested in accordance with FM 4470, and UL 2218, and ice balls in accordance with FM 4473. The conclusion of this independent Laboratory study is that, PVC and TPO thermoplastic single-ply membranes supported by ROCKWOOL mineral wool insulation are not damaged by impacts with steel balls in accordance with FM 4470 (Class 1-SH) and UL 2218 (Class 4), and ice balls in accordance with FM 4473 (Class 4).

DISCUSSION

FM 4470 - Steel balls were dropped against roofing assemblies in accordance with FM (Factory Mutual) Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies, Class Number 4470, October 2008.

Roof systems included PVC and TPO membrane over ROCKWOOL MONOBOARD® and TOPROCK® DD. Steel balls 1-3/4" diameter and weighing 0.79 lbs were dropped 17' 9-1/2" to develop 14 ft-lb kinetic energy, Class 1-SH (Severe Hail Damage Test), against 10 target locations. The thermoplastic membranes were found to be intact after impacts by the 1-3/4" steel balls.

FM 4473 - Ice balls were propelled against roofing assemblies in accordance with FM Specification Test Standard for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls, Class Number 4473, July 2005. Roof systems included PVC and TPO membranes over ROCKWOOL MONOBOARD® and TOPROCK® DD.

The roof assemblies were impacted by 2" diameter molded ice spheres, target weight 0.1385 lb, propelled at free-fall speeds of the same size hail, 111.6 ft/sec (76.1 mph), to develop 26.8 ft-lb kinetic energy, Class 4. Projectiles were launched perpendicularly against the assembly with double impacts at two target locations within ½" of one another. The thermoplastic membranes were found to be intact after impacts by the 2" ice balls.

UL 2218 - Steel balls were dropped against roofing assemblies in accordance with UL (Underwriters Laboratory) Standard for Safety for Impact Resistance of Prepared Roof Covering Materials, UL 2218, First Edition, May 31, 1996, and revisions dated January 25, 2002. Roof systems include PVC and TPO membranes over MONOBOARD® and TOPROCK® DD.

Steel balls 2” in diameter and weighing 1.15 lb were dropped 20’ against six target locations. Double impacts were made at each target location within ½” of one another. The thermoplastic membranes were found to be intact after impacts by the 2” steel balls.

OBSERVATIONS

Impacts were made against PVC and TPO single-ply membranes over ROCKWOOL mineral wool insulation with steel balls in accordance with FM 4470 and UL 2218, and ice balls in accordance with FM 4473. Top and bottom surfaces of the PVC and TPO membranes were scrutinized at impacted locations with the unaided eye, tactilely, and back lighted by high intensity light. There were no punctures or fractures in the membranes caused by the impacts.