



ACCESSORY PRODUCTS

THE IMPORTANCE OF COVER BOARDS FOR ROOF DURABILITY

TECHNICAL BULLETIN

221213SCANE



(Supersedes -)



INTRODUCTION

The durability of roof assemblies depends on various factors, for example, proper design of the assembly by the design authority, the selection of quality products, careful installation by the contractor and, of course, diligent preventive maintenance by the owner.

In North America, the use of cover boards in roofing systems has long been considered by the contractor community, roofing associations, and industry professionals, including researchers from the National Research Council of Canada (NRC), as being an essential element of quality design in order to increase the durability of assemblies.

Here is an excerpt from an article published in 2018 in Professional Roofing (NRCA):

"The North American roofing community has long recognized the benefits of including a cover board to increase a roof assembly's durability. In the past, the main purpose of cover boards was to protect against weather elements and minimal foot traffic [...]"

"Rooftops now are used as platforms for add-ons, such as photovoltaic or vegetative roof systems, which result in increased foot traffic, loads, and stresses on roof systems. In addition to the increased physical burdens, there are more frequent extreme weather events, including hailstorms and heavy winds, that can result in debris and other items coming into contact with roof systems."

(Ref.: ASSESSING COVER BOARDS by DOMINIQUE LEFEBVRE NRC and BAS A. BASKARAN, PH.D., P.ENG., NRC, AUGUST 2018)

Since the late 1970s, the National Roofing Contractors Association (NRCA) has notably adopted recommendations accordingly, considering the use of cover boards in multilayer systems as being the best practice. In March 2000, the association extended its recommendation to all types of roof waterproofing membranes.

This position is also endorsed by the Canadian Roofing Contractors Association (CRCA) as stated in their Technical Bulletin, Volume 50. Most Canadian provincial associations also promote or even require this practice in roof design as part of their warranty program.

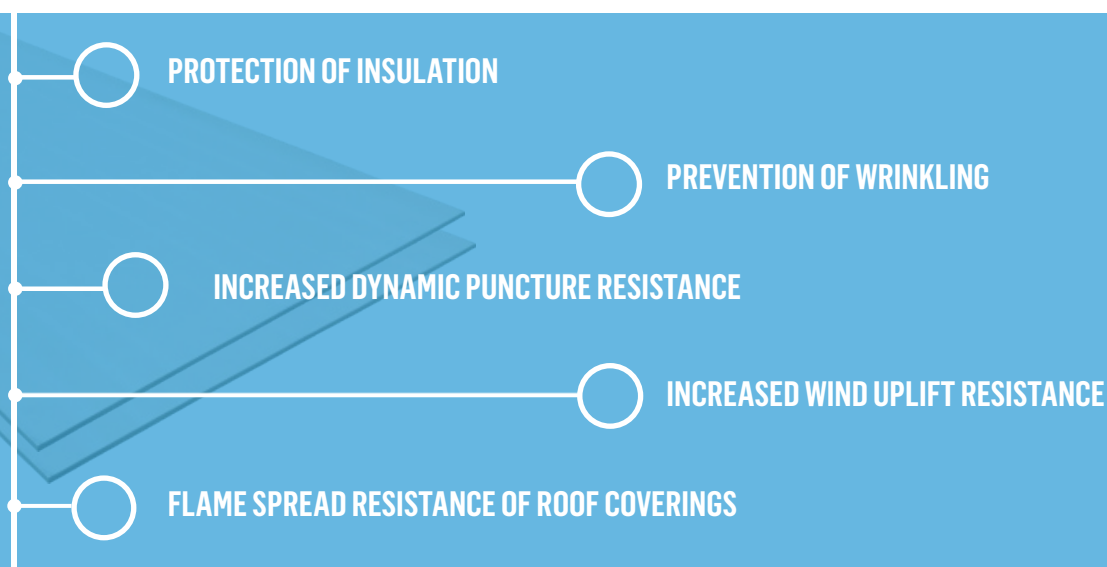
The same is true for all major serious manufacturers. Membrane, insulation and cover-board manufacturers who are involved in the community of contractors and professional associations recommend cover boards when waterproofing membranes are to be fully adhered. Exceptions apply to mechanically fastened or partially adhered membranes. However, even in these special cases, some of the benefits of cover boards remain.

BENEFITS OF COVER BOARDS

Different types of boards can be selected according to their specific features, their compatibility with the waterproofing membranes, and the budget of the project manager. The benefits of the boards vary depending on the components used to manufacture them.

Several board types are available on the market, such as asphalt, wood fibre, perlite, high-density polyisocyanurate, gypsum, and concrete. Some have common characteristics such as high-dimensional stability, while others offer specific advantages.

The main benefits of cover boards will be addressed in more detail in this technical bulletin.



PROTECTION OF INSULATION

The rigidity of the boards protects the insulation from traffic-related loads during the work, but also after the installation of the membranes. The use of roofs as living spaces is increasingly common, particularly in urban areas. Whether it is simply for preventive maintenance, for the installation of a vegetated system or to access a plaza deck, the presence of a cover board minimizes the impact of repetitive traffic on the waterproofing system. This will help prevent the sagging of insulation and the delamination of membranes.

PREVENTION OF WRINKLING

The dimensions of all materials, whichever they are, vary according to the temperature. This is the linear expansion coefficient. Insulation panels are no exception to this rule. They contract in the cold and expand in hot weather. The same is true for the various waterproofing membranes which have their own dimensional stability. The differences between the linear expansion coefficients of insulation and membranes are insignificant and generally do not cause wrinkling, only some simple aesthetic inconveniences, if any.

More serious cases of wrinkling that can lead to the premature wear of the membranes as well as the loss of waterproofing are caused by the poor dimensional stability of certain materials used in roofing assemblies. For example, polystyrene insulation has a service temperature that is limited to 75 °C (167 °F). When exposed to higher temperatures, this material is subject to severe changes in dimensions, and these deformations are permanent.

The use of cover boards with greater dimensional stability than that of the insulating material and membranes restricts these movements and prevents wrinkling. The impact of the cooling and heating cycles of insulating materials and their dimensional stability on the performance of conventional roofing systems was the subject of a study published in 2017 carried out by the firm RDH and presented at the 15th Canadian Conference on Building Science and Technology.

Among the findings and conclusions of the study, it is mentioned that this study has "[...] reinforced general construction knowledge that having a dimensionally stable substrate in a conventional roof system is important to the performance and durability of SBS roof membranes as well as to the overall performance of a roof system [...]"

(Ref.: IMPACT OF HEATING AND COOLING OF EXPANDED POLYSTYRENE AND STONE WOOL INSULATION ON CONVENTIONAL ROOF PERFORMANCE by Jun Tatara, Dipl. T., Lorne Ricketts, MASC, P.Eng, 2017, 15th Canadian Conference on Building Science and Technology)

INCREASED DYNAMIC PUNCTURE RESISTANCE

Waterproofing membranes have a puncture resistance that varies according to the technologies used in their design. SBS-modified bitumen membranes are recognized for their robustness, superior to that of other types of waterproofing materials. Falling objects and traffic on the membranes can sometimes perforate the waterproofing membrane, which leads to water infiltration.

Whether the impact is due to falling branches, tools, ice, or even hail, the use of rigid cover boards plays an important role in maintaining the waterproofing of the roof.

FM Global's FM 4470 method for evaluating roofing assemblies for wind uplift resistance also requires, among other characteristics, the evaluation of hail resistance. The classification is divided into three categories, which are as follows:

- Moderate Hail (MH)
- Severe Hail (SH)
- Very Severe Hail (VSH).

In order to obtain superior resistance to hail, rigid cover boards must be installed under the membranes. The use of gypsum or concrete boards provides superior resistance to all types of membranes, which is not the case with soft boards, such as wood fibres, perlite or rock wool.

INCREASED WIND UPLIFT RESISTANCE

Roofing assemblies offered by manufacturers on the Canadian market must be evaluated for wind uplift resistance according to CSA A123.21 Standard test method for the dynamic wind uplift resistance of membrane-roofing systems. The mutual insurance company FM Global requires that the roofs of buildings they insure be tested according to FM 4470 Standard.

The use of rigid cover boards can improve wind uplift resistance results, whether with the CSA or FM test protocol.

The reason is that the rigidity of the boards installed on the insulation contributes to distributing the negative loads coming from gusts of wind over a large surface. This rigidity also reduces the deflection of the assembly and the fatigue effect exerted on the mechanical fasteners and beads of adhesive which hold the components in place. This also helps to prevent the delamination of facers and the core of the insulating materials.

FLAME SPREAD RESISTANCE OF ROOF COVERINGS

Roofing systems must also be evaluated for fire resistance, including flame spread over roofing membranes according to CAN/ULC-S107, Standard Methods of Fire Tests of Roof Coverings. The systems are rated A, B or C (A being the highest strength and C being the minimum required).

Depending on the type of membrane used (modified bitumen, PVC, TPO, EPDM, PMMA, etc.), certain assemblies require cover boards with good fire resistance in order to achieve Class A.

In the case of roof designs incorporating highly combustible insulation, such as expanded polystyrene (EPS), the use of insulation panels with high fire resistance is mandatory in order to meet the minimum requirements of the standard.

CONCLUSION

The benefits of adding quality cover boards go far beyond that of a simple substrate offering an ideal surface for the installation of membranes. The increased stability and rigidity provide many benefits that ensure better resiliency and extend the life of roofing systems. In contrast, the absence of cover boards significantly increases the risk of premature problems that can lead to costly maintenance fees for the owner or even the need for medium-term reroofing.

The additional costs generated by the use of cover boards are, all in all, negligible considering its benefits. Owners should consider cover boards as a profitable investment that allows them to properly protect all the components of their buildings and ensure their durability.

