



## Moisture Contamination of Polyisocyanurate Insulation

Reports have been received of moisture contamination, or signs of moisture contamination of polyisocyanurate insulation on some construction job sites. The reports concern surface staining of polyisocyanurate insulation, which has been interpreted by some as evidence that the material has become wet, and should be replaced. The problem appears to be limited to rigid glass-faced polyisocyanurate roof insulations. This bulletin is intended to explain the probable cause of this phenomenon, and offer guidance to roofing professionals when it occurs.

Roofing materials can be exposed to moisture contamination from the time of manufacture until the time they are installed as part of the roof. The most obvious source of contamination is exposure to rain, snow and ice during transport, or while stored outside. It must be remembered that roofing materials are often shipped over great distances, from plant to final destination, and pass through a great number of hands. It is critical, therefore, that the materials be properly protected from the elements throughout the entire supply chain.

All roofing product manufacturers and roofing associations explicitly recommend proper handling and storage of roofing materials. *Technical Bulletin #109, Storage and Handling Recommendations for Polyiso Roof Insulation*, published by the Polyisocyanurate Insulation manufacturers Association (PIMA), provides recommendations for the storage and handling of polyisocyanurate roof insulation.

It is not recommended that polyisocyanurate insulation be stored for more than two weeks on the job site. For longer storage requirements, a dry and well ventilated warehouse should be used. These recommendations should be followed for storage at manufacturers' facilities, distributors' yards and job sites. Exposure to moisture can occur anywhere along the supply chain. Unfortunately, contractors are usually blamed for moisture contamination of insulation and other roofing materials even though they are the last in a succession of many that handle the product.

Many roofing materials, including polyiso are factory wrapped in plastic covers or bags. This packaging serves a variety of purposes. The packaging facilitates bundling and palletizing of the material, making its handling and transport more efficient. It also provides short-term protection from the weather and mechanical damage. However, the wrapping should not be relied on as long-term protection from the elements.

Rain and snow are not the only sources of contamination. Materials can be wetted significantly by water vapour. The source of water vapour can be from conditioned spaces below the roof or the surrounding ambient air. Hygroscopic materials, such as organic felts, can absorb enough quantities of moisture to adversely affect their performance properties if stored in humid environments and unprotected. Most rigid roof insulation, including polyiso, will remain relatively dry, even when exposed to significant amounts of water vapour.

A concern may arise, however, if water vapour in ambient air contacts a surface of insulation, which is below the dew point temperature and condenses as liquid water. With organic faced insulation, due to the absorptive characteristics of the facer, the moisture may be unobservable. These small amounts of moisture will typically not be of concern as the facer dries out under conditions conducive to drying. However, problems may occur if the boards have not dried adequately. Surface moisture can cause foaming of asphalt in hot applied b.u.r., or compromise adhesion in adhesive applied membrane systems. In the case of inorganic, glass-faced boards, the condensate will not be absorbed by the facer but will, instead, bead on the board surface. Under conditions conducive to drying, this surface moisture, will, as in the case of organic faced boards, evaporate. In some instances, vestiges of the surface wetting will be manifested in the form of minor discoloration and staining of the board surface. This has been misinterpreted by some roof observers of evidence of more severe wetting of the insulation and become grounds for rejection of the material.

CRCA believes when staining is encountered, visual observation cannot always be relied on to determine the “wetness” of the insulation and its suitability for use. Determining the level of moisture contamination of materials, and its impact on performance may require careful analysis by a qualified individual. For a more detailed discussion on determining moisture in materials, see CRCA Technical Bulletin Volume 47, *Methods for Determining Moisture in Roofing Materials—Measurement and Limitations*.

Evidence suggests that long-term storage of polyiso insulation in its factory wrapping, whether in the suppliers’ yards or on the job site contributes to surface condensation on the boards. Because the wrapping material is vapour impermeable, moist ambient air under the shroud cannot dissipate under drying conditions and will condense. When the surface temperature of the shroud falls below the dew point temperature, and by gravity, the liquid water will be deposited on the boards. For this reason, all manufacturers recommend that, when stored outside, the factory insulation wrapping be slit, or removed, and the insulation be covered with breathable tarpaulins or other suitable waterproof coverings. When stored on site, it should be placed on raised pallets or platforms as specified by the insulation manufacturer.

CRCA's National Technical Committee recommends that polyisocyanurate insulation and other roofing materials be inspected at the job site upon arrival. If moisture contamination is evident it should be duly noted in writing. The determination of the appropriate course of action should be made only after the extent and consequences of the moisture contamination has been established. Polyisocyanurate insulation, similar to other roofing materials, requires a working knowledge of proper storage, handling and application to ensure a quality well constructed and performing roofing system.

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