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# Shattering of Aged Unreinforced PVC Roof Membranes

September, 1990

## Joint Document



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This document is based upon information developed through a survey<sup>1</sup> conducted by the National Roofing Contractors Association (NRCA) in an attempt to clarify the incidence of shattering of unreinforced polyvinyl chloride (PVC) roof membranes. In an effort to educate professional roofing contractors, building owners, architects, engineers, roof consultants, sales representatives, material distributors and suppliers, and others with the latest available information on the subject, NRCA and the Single Ply Roofing Institute (SPRI) have developed this joint document, which includes the following sections:

1. Description of the Shattering Phenomenon
2. Membrane Identification
3. Early Warning Signs
4. Cold Weather Precautions

Building owners with an unreinforced PVC membrane roof should determine the manufacturer of the membrane. The manufacturer should then be consulted for specific information regarding maintenance and modifications. If the manufacturer is no longer in business, a professional roofing contractor or qualified individual **knowledgeable about the installation and maintenance of PVC roof membranes should be contacted.**

**Note: There is no evidence that shattering occurs in reinforced or fiber supported PVC membranes** (see definition in Section 2). Reinforced or fiber supported membranes are the type of PVC membranes that are now commonly installed.

If the roof membrane is under a manufacturer's warranty, the building owner should consult the manufacturer for specific information.

**Note: The building owner should be aware of warranty terms and conditions in order to prevent voiding the warranty inadvertently.** For example, a warranty may indicate that repairs, alterations, or additions performed without prior approval of the manufacturer will cause the warranty to become null and void.

The following information reflects current knowledge as of September, 1990.

### 1. Description of the shattering phenomenon

"Shattering" is characterized by a generalized non-linear fragmentation of the membrane. Each fragment may be a few square feet or a few hundred square feet in total area. Typically, when a shatter occurs, it extends throughout the entire roof area, from one edge or perimeter to the other, and is judged to be nonrepairable. This condition is contrasted with cracking and splitting, which are defined as:

- **Cracking:** Localized, nonlinear repairable separation of the membrane, with branches.
- **Splitting:** A single, linear, repairable separation of the membrane.

Cracking and splitting are not addressed in this document.

Shattering may occur suddenly and prior to the onset of noticeable preconditions that warn of the potential for shattering.

Based on the data obtained through the survey, shattering appears to:

- Be related to aged **unreinforced** membranes, the majority of which were ballasted (see Section 2).
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- Occur most frequently in cold weather.
- Be unrelated to membrane thickness.
- Have a median roof age of 8½ years, with a range of 4 to 13 years.

Information gathered to date indicates that only a relatively small number of unreinforced PVC roofs have experienced shattering.

## 2. Membrane identification

It is important for the building owner to know whether an unreinforced PVC membrane is on the roof, so that proper precautions and maintenance procedures may be followed.

**Note:** Unreinforced PVC roof membranes are defined as those containing no internal fabrics or supporting fibers.

If the owner does not have historical records that identify the type of membrane, a professional roofing contractor or qualified individual knowledgeable about the installation and maintenance of PVC roof membranes should be contacted to identify the membrane.

**Note:** Professional roofing contractors and qualified individuals should consult with the manufacturer of the membrane for specific recommendations and guidance regarding membrane identification, maintenance, repair, new penetrations, or reroofing. If the manufacturer is no longer available, the contractor should consult with another PVC manufacturer.

**Investigations should not be performed in cold weather (see section 4).**

## 3. Early warning signs

Shattering may occur without warning. However, early warning signs may sometimes be present.

**Note: The early warning signs discussed below do not necessarily indicate the roof will shatter.** It is also important to note that at this time, no reliable method exists to predict whether any one given roof may or may not shatter.

- **Embrittlement:** "Embrittlement" describes a condition wherein the membrane has lost flexibility.
- **Displaced Wood Nailers, Base Flashings or Metal Flashings:** Wood nailers, base flashings or metal flashings that have pulled away from their initial position may be indicative of high membrane stress or building movement. A membrane under high stress may appear to be visibly taut.

**PVC roofs, like all roof systems, should be inspected twice a year.** At the time of these normal inspections, the presence of the warning signs noted above should be determined. Inspections should occur in the spring and fall, **when the ambient temperature falls within the guidelines listed in Section 4.**

Inspections should be performed by the membrane manufacturer, a professional roofing contractor or by a qualified individual knowledgeable about the installation and maintenance of PVC roof membranes. As a result of the inspection, small splits (if found) should be repaired and precautions taken where items are identified which could puncture or fall onto the roof (e.g., tree limbs), since these items could initiate shattering.

## 4. Maintenance and cold weather precautions

According to the survey data, shattering occurs most frequently in cold weather. **When the roof membrane is identified as an unreinforced PVC, rooftop traffic should be avoided when the ambient temperature is below approximately +50 degrees F.\***

**If any roof traffic is required (e.g., for membrane investigation or inspection, or service of HVAC or other equipment) at temperatures lower than noted above, on unreinforced PVC membranes, there is a risk of initiating shattering.**

**If the building owner elects to have any roofing work (reroofing, repair, maintenance) or any other type of work done at temperatures lower than noted above, the building owner is assuming some risk that this activity may initiate shattering.**

**Note:** Because there is no evidence that **reinforced or fiber supported** PVC membranes are subject to shattering, cold weather restrictions on rooftop traffic are **similar to other membrane systems.**

For recommendations regarding reroofing, maintenance, repair, new penetrations or modifications, contact the manufacturer, a professional roofing contractor or a qualified individual knowledgeable about the installation and maintenance of PVC roof membranes.

### References:

1. Survey Results, Shattering of Unreinforced PVC, July 26, 1990, NRCA.

**Note:** The survey data have not been verified by third party visual inspection.

**Disclaimer:** SPRI disclaims any responsibility on behalf of itself, its members, and its agents for any damage to roofing as a result of inspections or for any other cause. SPRI does not make any recommendations on the usage of industry members' products.

\* SPRI recommends that the individual manufacturer of the product be consulted for a specific recommendation regarding minimum temperature.