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To All Members of the Roofing Metal Heating Associates (RMHA), Area Roofing Contractors, Roofing Material Distributors, or Manufacturer Representatives of Roofing Materials:

The RMHA is launching a program to forward electronic issues of the Trade News, longer written articles that cannot be published in the Trade News, and Pictures of roofing system installations via email.

The RMHA hopes the information helps roofing industry professionals learn about the roofing industry and how other roofing professionals approach installations. Furthermore, we invite you to share this information with others within the roofing industry who may find the information useful.

There are no charges to receive the information, and you don't have to be a member; however, whether you are a roofing contractor, material distributor, or a manufacturer's representative, we hope you may consider membership in the future.

We also hope that area Roofing Contractors, Distributors, or Company Representatives will submit photos of roofing system installations to share with others within the roofing industry.

If you are interested in receiving the Picture Reports, contact me via email or call my cell phone

Regards,
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General Information

The winter of 2025-26 set record low temperatures. In many areas of the country, nighttime temperatures fell below 0 °F, and daytime temperatures were well below average.

With such cold temperatures over an extended period of time, a condensation wall problem was reported to be causing water to drip from the interior walls into a living space. Pictures were sent, and I was asked to offer some thoughts on why the condensation problem exists and recommend possible solutions to stop it.

The pictures showed an interior living space wall within a rounded metal building that has been covered with exposed closed-cell spray-applied polyurethane foam (PUF). There was no description of how the metal building wall was constructed or of the foam's thickness, but at numerous locations, underlying screws had backed out, broken through the surface of the foam, and condensation was now occurring on the heads of each fastener, with the condensate dripping into the living space.

Note: Each small circle in the picture above are screws that have backed out through the PUF, with condensate water dripping from each fastener head. Other locations are not shown in this picture.

After reviewing the pictures, several recommendations were made to help stop the formation of condensation on the fastener heads:

- Retighten the screws back in place so they are no longer protruding through the foam. Add new replacement fasteners if the existing ones cannot be retightened. However, an investigation is first necessary before removing the existing fasteners to determine what they are attached to and whether the fasteners can be removed without detaching the interior or exterior metal skins under the foam insulation.

- After the fasteners are retightened or replaced, clean the surfaces, and install new spray-applied closed-cell foam insulation or sealant over the holes left in the foam.

- Contact a PUF spray installer for further information on making permanent repairs or replacement of the foam insulation. The investigation may find that a thicker layer of foam with a higher R -value is necessary to stop future wall condensation. However, if a delamination problem with the existing foam adhesion to the metal panels or substrate problems are discovered beneath the foam, e.g., rusting of the underlying metal, the existing PUF may have to be removed and replaced.

After the conversation about making repairs, there was a discussion about why the fasteners backed out and protruded through the foam, and how condensation was forming on their surface.

1) While it is unknown if the fasteners had progressively backed out through the foam over several years, the problem was not noticed until condensation suddenly occurred during this year's record-setting cold weather. However, with extreme outdoor cold and a heated interior living space, the exterior and interior surfaces of the metal wall panels were likely experiencing significant temperature differentials, resulting in expansion and contraction forces in the metal panels. The force of this movement could cause the attachment screws to back out. So, this year's extreme cold weather may have caused the metal panel attachment fasteners to noticeably back out through the foam.

2) All buildings contain moisture in the air, which is known as humidity. Common commercial buildings have humidity levels of 35% to 45%, and common residential buildings from 45% to 55%.

Dew point is the temperature at which the surface of a material in contact with a certain humidity level will turn into a liquid condensate. Both temperature and humidity are variables that are always changing, and so is the dew point temperature on a material's surface.

Unknown from just reviewing pictures is the humidity level or the temperature within the interior living space.

To stop condensation, either the moisture in the air (humidity) must be removed, the interior temperature raised to keep the condensation surface above the dew point, or a combination of both.

Several initial thoughts were discussed to immediately and simply lower the interior humidity level, as the installation of a mechanical dehumidification ventilation system is not a realistic solution to solve an immediate problem:

- Slightly open the windows by an (+-) 1/8". The interior humidity (moisture) will be drawn outward, as the high interior moisture pressure (humidity) will escape outward into the lower cold air moisture pressure. High-pressure gases or vapors will flow to areas of lower pressure as the pressures try to equalize.

- Open bathroom doors, and if there are power exhaust fans, turn them on and let them run. While the fan is exhausting air, it is also removing moisture (humidity) from within the house

While either could be considered, they may not be acceptable in extremely cold weather due to the loss of conditioned interior heated air, but they can be tried initially as a simple solution.

- A more costly solution would be to buy one or several single-room dehumidifiers. However, as the water (humidity) is drawn out of the air, the water collection container(s) will have to be emptied as necessary, so it doesn't overflow onto the floor. If a drainage tube is added instead of emptying collection pans, it would have to be extended into an interior drain. The drainage tube should not be extended to the outside, as the water in the tube will probably freeze, and the ice-filled drainage tube will clog, causing the interior collection container to overflow.

A more permanent solution to remove excessive interior building moisture (humidity) is to have a mechanical contractor install a dehumidifying system. If the house has a forced-air heating system with ductwork already in place, a dehumidifier unit may be added to the air-handling unit; otherwise, ductwork would have to be added.

But where, or how, does "excessive" moisture enter a residential building, which causes a high enough humidity buildup within the air to increase the chances of condensation formation within walls or an attic space?

Several possible sources can be investigated:

1) A humidifier was installed as part of a home's forced-air heating system.
This equipment adds moisture to heated air and may offer several benefits, including reducing respiratory infections (sore throats), dry skin, and improving overall breathing comfort. Furthermore, the higher the air's humidity, the warmer you feel. This allows a homeowner to turn the thermostat down a few degrees and still feel warm, saving heating energy and lowering utility costs.

However, according to one published article written by a mechanical contractor, "…adding moisture to interior heated air with a humidistat may be one of the worst decisions a building owner can ever make". The extra moisture in the air could be the source of condensation within walls and attic spaces during cold weather, and the source of mold and mildew growth. Whatever the possible benefits of adding moisture (humidity) to interior heated air may be offset by the damage caused by condensation formation within the walls or attic space.

If you are investigating a source of condensation within a wall or attic space, and the home has a forced air heating system, check to see if the system has a humidifier added to it. If so, talk to the homeowner about lowering the setting or even turning it off for several days to see if the humidity level drops enough to stop condensation formation on walls, windows, or attic spaces

Note: Before shutting off a humidistat, have a mechanical contractor inspect the system to make sure it is working properly or needs replacement.

2) Another source of excessive moisture within a home may be surprising – the basement or a sealed and unvented crawl space under a house.

In older homes, the absence of waterproofing on exterior basement walls or a vapor barrier beneath a floor slab can allow ground moisture to enter the basement. The humidity level in the basement air is now higher than in the upper levels of the house. This higher humidity level will naturally rise into the upper portions of the house, where humidity is lower. Some articles report that up to (+-) 50% of the humidity (moisture) in the air of a home's upper living floors comes from the basement or a sealed crawl space under a house. This is especially true if a building is in an area with a high-water table.

Solving a high-humidity basement or crawl space problem requires a year-round solution by installing a permanent dehumidifying system. A mechanical contractor or a professional basement waterproofing contractor can be contacted for more information.

On a different subject, unrelated to wall condensation but immediately noticeable in the pictures, was the non-fire-protected, exposed yellow-orange closed-cell spray foam.

Because exposed spray applied PUF foam systems are flammable, building codes generally require exposed applications, such as in attic spaces, living spaces, etc., to be covered with some form of fire protection, such as a building code defined: ignition barrier, a 15-30 minute thermal barrier, or even hourly fire rated materials, depending on the foam application and its location within a commercial or residential building.

From the picture, the PUF is unprotected. The building owner should further investigate with the local building code inspector to determine whether the application meets building code requirements. If some form of ignition or fire protection is required, one of the simplest solutions may be to apply an intumescent coating, commonly called a "fire paint". This material is available in different colors and is specifically formulated to protect the underlying foam by charring when exposed to heat; however, further investigation of building codes is needed to determine exactly what is required to cover an exposed PUF wall surface in a living space.