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Preventing Job Site Storage Corrosion of Prepainted Building Panels

Introduction

Prepainted building panels have been successfully used for many years. In general, properly installed building panels under normal service conditions have excellent corrosion resistance; however, prepainted building panels are subject to premature corrosion failures prior to installation if they are not handled and stored properly. Excessive storage periods or improper storage conditions can often result in water intrusion into panel bundles. Exposure of bundled panels to wet conditions or high humidity can lead to premature failure of the coating system which may result in paint blistering and substrate corrosion.

This document is intended to provide guidance for the prevention of storage corrosion of prepainted building panels and accessory items.

Environmental and Service Conditions

Proper storage of prepainted building panels that protects them from any form of moisture is critical to protect them from premature corrosion. Storage in conditions where water or water vapor is available along the sides of a panel bundle may lead to penetration between the panels by capillary action. If proper precautions are not taken during transport, water may already be present between the panels upon delivery at the job site. Ambient humidity and temperature cycles will also promote water intrusion into stored panel bundles through condensation. Finally, rain and snow are other potential sources of water that can cause storage corrosion of prepainted panels.

Besides water, two other important factors that contribute to the corrosion of stored prepainted panels are temperature and exposure time. Corrosion will accelerate with increased temperature. Given enough time in uncontrolled temperature, panel bundles will eventually become wet and storage corrosion may occur.

Storage corrosion can be prevented by

- Reducing site storage time
- Decreasing water contact
- Moderating temperature extremes.

Special case factors not considered here are the presence of aggressive chemicals soluble in water, such as sulfur and chlorine compounds, that might be present in polluted atmospheres, road salt contaminants, or marine environments. It is reasonable to assume that these chemical solutions would also infiltrate a stack of building panels and accelerate storage corrosion.

Prepainted Panel Properties

The environmental conditions and the specific type of prepainted material influence storage corrosion. Specifically, the metal substrate, pretreatment, paint system, and panel geometry can all contribute to the durability of the prepainted panel in both the storage and service environments.

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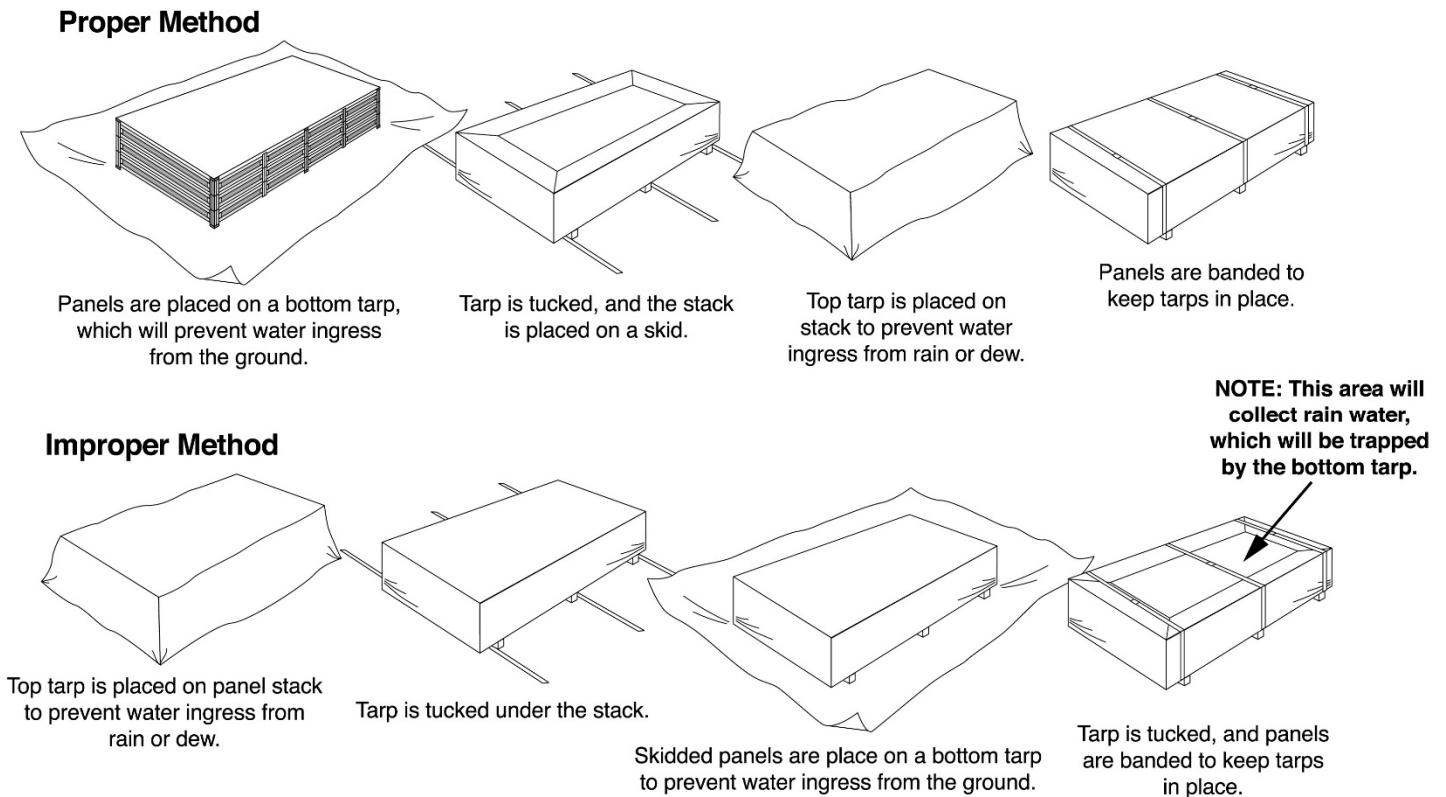
This Tool Kit is part of a series of educational aids developed by the members of the National Coil Coating Association. NCCA is a trade association of coil coaters and suppliers of raw materials and equipment used in the coil coating process. The association concentrates its efforts on providing educational resources and assisting its members in providing superior products and services to their customers. NCCA Tool Kits are informational tools and should not be used as substitutes for instructions from individual manufacturers. Always consult with individual manufacturers for specific instructions regarding their products and equipment.

Storage corrosion resistance of prepainted sheet products is an exceptionally difficult effect to study in the laboratory and subsequently correlate with actual storage performance, although, there are several test methods that have been utilized by the building products industry that are useful in attempting to understand the phenomenon. (See appendix.)

Panel Packaging

To minimize job site storage corrosion, panel bundles must be wrapped with a water-repellant paper and possibly have cover (waster) sheets and end caps. Proper paper wrapping requires that the top sheet laps over the bottom sheet to shed water (Figure 1). The paper wrapping should have no folds or laps that could collect and hold water in, or on, the panel bundle.

Figure 1: Protecting Panels on the Jobsite: Proper and Improper Wrapping Methods



Receiving

Panel bundles must always be carefully inspected when received at the job site. The bundles must be paper wrapped as described above (Figure 1). The bundles must be examined for mechanical damage, rips and tears in the packaging and the presence of water. Rips and tears in the paper wrapping must be repaired using water-resistant tape.

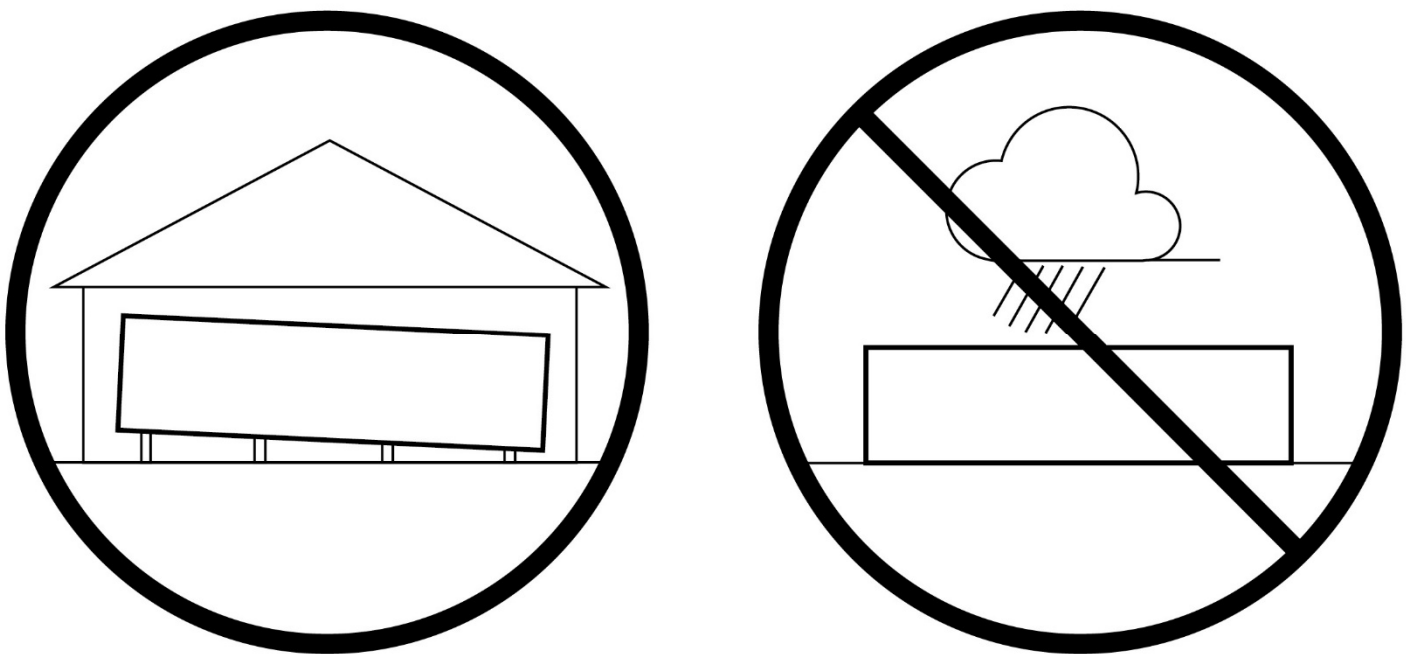
If water is present in the panel bundle, the panels must be separated and wiped dry with a clean, soft cloth and stacked with a space between each panel, so that air circulation can complete the drying process. The panels must also be inspected for paint blistering and corrosion. If wet and corroded panels are observed during the receipt inspection, these conditions must be noted on the delivery receipt and reported promptly to the panel supplier.

Panel bundles must not be stored with plastic wrapping. If the bundles are received with plastic wrap, the wrapping must be removed to prevent water from being trapped in the bundles. Although applying paper wrapping is preferred, it is usually not possible at the job site. Whether the panel bundles are properly paper wrapped or not, the bundles must be stored as described below.

Job Site Storage

Prolonged storage will always increase the likelihood of storage corrosion; therefore, the best prevention is to minimize the storage time. Proper storage limits the collection of water from rain, snow, and condensation on the panel surfaces. Under-roof storage is always preferred, as opposed to outdoor storage (Figure 2):

Figure 2: Jobsite Storage: Under-Roof Storage is the Best Solution



If panel bundles must be stored outdoors, several precautions must be taken to prevent storage corrosion. The panel bundles should be stored in a level area away from other construction activities to minimize the number of bundle movements required at the job site. If the bundles are to be stored on the ground, a plastic ground cover must be put down under the bundle to minimize condensation of water from the ground onto the panels. The bundles must then be raised off the plastic ground cover to avoid contact with water puddles, and to allow for air circulation around the bundle to promote drying of the panels (Figure 3). Wet, uncured, or pretreated lumber must not come in contact with the panel bundles. The panels must be stored on an angle to promote drainage of water off the bundle. Sufficient support along the length of the panels must be provided to avoid excessive bowing, which may result in low spots that could hold water. (See Figure 3.)

The bundle must be completely covered with a loose-fitting waterproof tarp to protect the bundle during rain or snow events and allow for air circulation and drying of condensed water (Figures 3 and 4). A loose-fitting tarp also shadows the bundle from direct sunlight and should act to moderate high temperature extremes.

Figure 3: Proper Storage and Tarp Covering

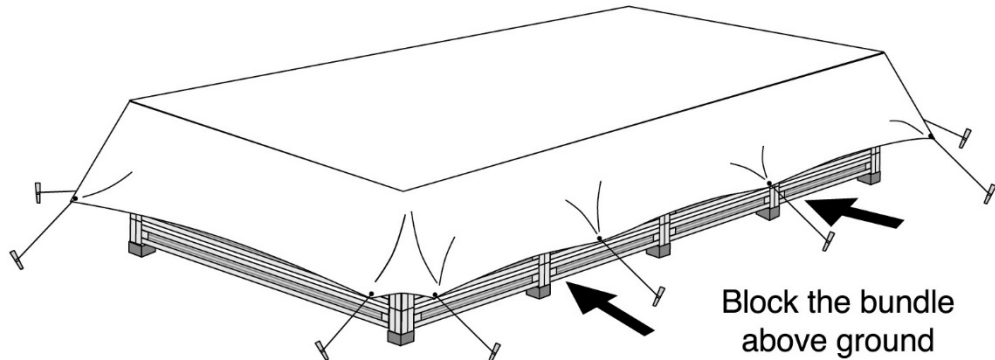
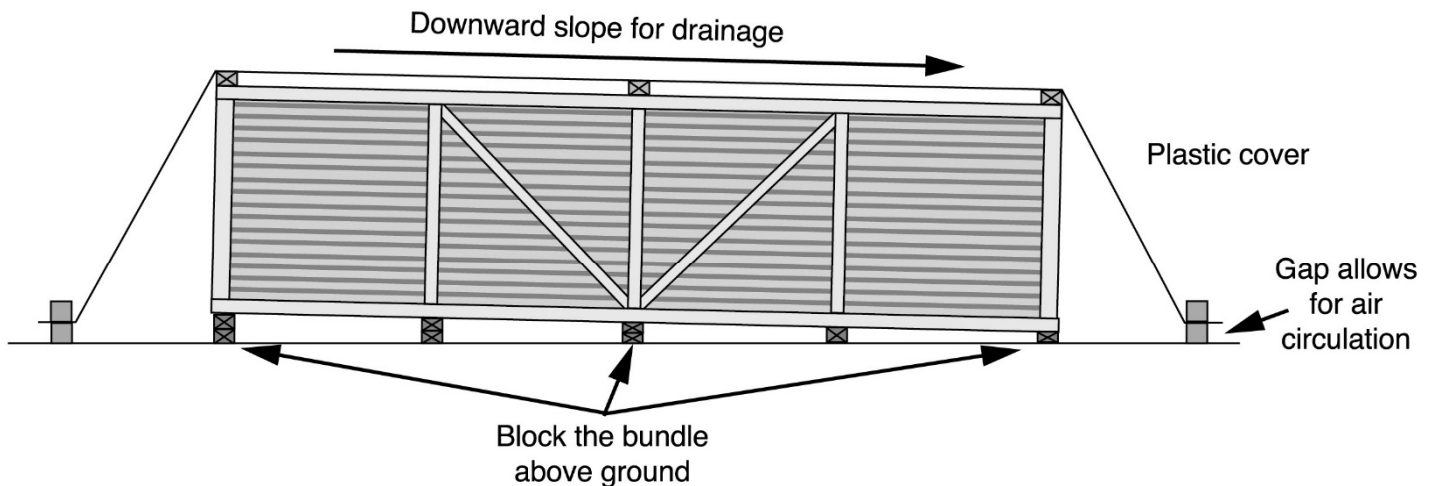


Figure 4: Proper Jobsite Bundle Storage



Unused portions of open bundles must be kept covered. The condition of the tarps and paper wrapping of stored bundles should be inspected daily for damage, puddles, and snow accumulation. Damage to packaging or tarps must be repaired, and snow accumulation or puddles should be removed. If water is present in the panel bundles, the panels must be separated and wiped dry with a clean, soft cloth and stacked with a space between each panel, so that air circulation can complete the drying process.

Handling

Proper handling of the individual panels and panel bundles is important for avoiding product damage and maintaining worker safety. Handling of panels and bundles is thoroughly addressed in NCCA’s Tool Kit #23 “Storage and Handling Guidelines for the Prepainted Metals Industry.”

Appendix

Test Methods for Evaluating Water Sensitivity of Prepainted Sheet Products

Standard Test Methods

1. ASTM D1735 Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus.
2. ASTM D4585/D4585M Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
3. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity.
4. ASTM D870 Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
5. ASTM D7376 Standard Practice for Outdoor Evaluation of Wet Stack Storage Conditions on Coil-Coated Metals.