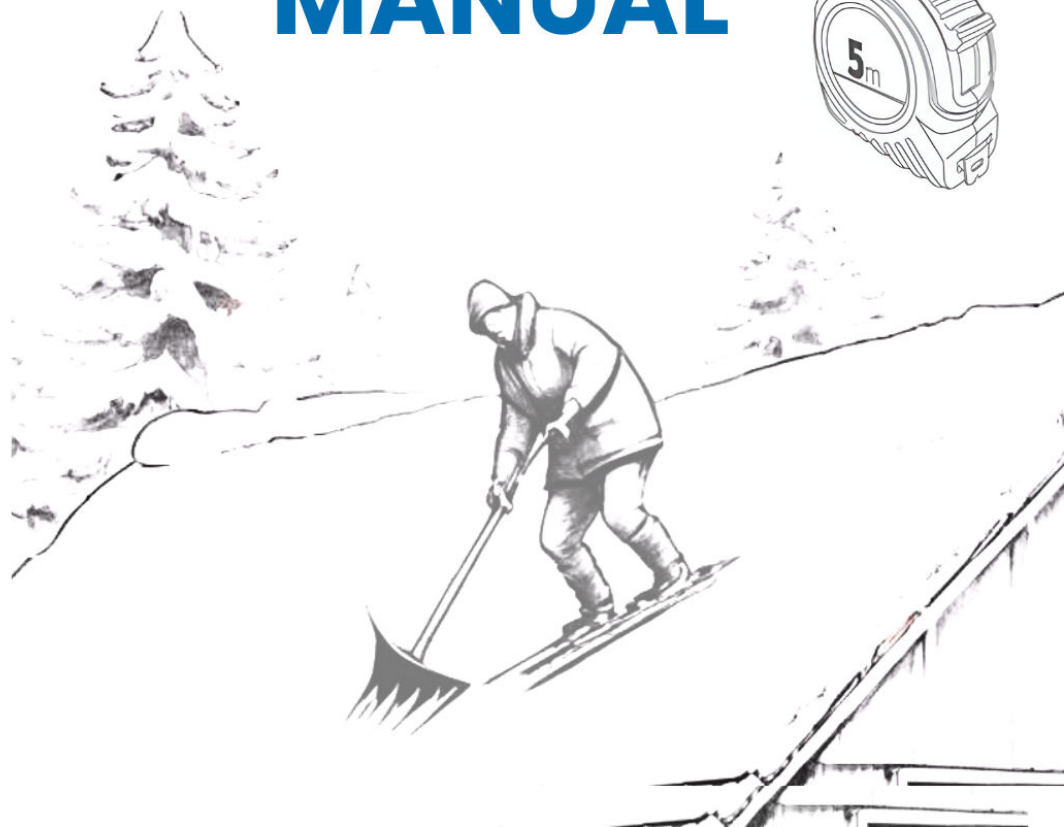


**NORSTEEL
BUILDINGS**

PREVENTATIVE MAINTENANCE MANUAL





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NORSTEEL BUILDINGS

1405 DENISON STREET, MARKHAM, ONTARIO L3R 5V2

Preface

At Norsteel Buildings, we pursue a policy of continuous, ongoing development to ensure that our buildings remain state-of-the-art in technology, combining the latest in high quality materials and safety features. For this reason, it is possible that the features described in this manual may differ from those on your building. Please be advised that this manual is designed to be an all-inclusive maintenance manual for all of our buildings and accessories. Your structure may not possess each feature described herein.

Furthermore, please note that the information, material and content in this manual are intended for general purposes only. Any use of content relating this material to any specific application, structure, or condition should be based on an independent evaluation, review, and verification of its unrestricted availability for such use. A specific determination of suitability for the application of procedures for your particular structure, should be made by professionally qualified personnel. Those making use of, or relying upon the information enclosed, assume all risks and liability arising from such use or reliance

Safety Symbol



Use of this symbol in the manual indicates a potential safety concern. Please read the accompanying text passages carefully for your own safety, for the safety of others and to prevent damage to your metal building.

**An effective building maintenance program may
help reduce the cost of insurance!**

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Introduction

Scope

Congratulations, and thank you for choosing a Norsteel building for your project. This manual is an important reference tool in maintaining your building. It provides guidance for inspections, adjustments, cleaning and for the care for your building.

Metal buildings have evolved into structures requiring minimal maintenance because of improvements in materials, design applications and fabrication techniques. However, like many other investments, your building does require some attention to maintain its value and appearance. This manual is provided to help you keep your Norsteel building in good condition. The information in this manual is not intended to cover major work that should be done by an authorized Builder, but only to provide a guide for periodic care. The information contained herein is only intended to provide recommendations for maintaining a typical building. If your structure has special features or is in an uncommon location, please consult applicable local and federal safety requirements and your local building contractor for more specific questions regarding maintenance work on your building. Failure to provide regular maintenance, as set forth in this manual, may void any warranty, actual or implied, that may be applicable to your building or to the components of your structure.

Frequency of Maintenance

The frequency with which preventative maintenance activities should be performed will depend on several factors including the specific maintenance task, the environmental influences based on the location of your building, the age and condition of the building and your commitment to a preventative maintenance program. Your maintenance schedule should begin immediately after a building is erected, modified or repaired.

We recommend most maintenance activities be performed at least twice annually. For buildings that are located in areas that have moderate to severe winters, inspections are recommended in the spring closely following winter, and in the fall, early enough to complete any necessary repairs prior to winter. Additional inspections and maintenance may be needed following severe or unusual storms.

Maintenance activities should be performed more frequently than twice per year on buildings located in coastal areas, areas subject to industrial pollution and areas with high humidity as a result of the increased exposure to corrosive elements. In addition, buildings used for activities that are potentially detrimental to the building (e.g. indoor pools, animal confinement or activities that generate corrosive chemicals) should have maintenance activities performed more frequently.

The best preventative maintenance is to perform scheduled inspections to identify and solve any issues as they occur. This will help to optimize the service life of your Norsteel Building, keeping it aesthetically pleasing, functional and virtually weather tight to protect your products, your facilities, and your personnel.

Safety

General Safety Recommendations



Always follow and comply with all federal, provincial and local rules and regulations when performing routine building maintenance and/or renovations. Failure to follow these regulations could result in personal injury or death to you or bystanders.

Always use approved Fall Protection when working in elevated places; do not walk on wet roof panels; do not walk, step, sit on skylights (translucent roof panels), ridge-caps or gutters because of the possibility they may collapse.

Always comply with governing regulations, use proper safety equipment and follow appropriate safety procedures for each maintenance activity. In addition, do not forget to consult your insurance carrier and fire hazard inspector about building maintenance or major renovations. They can be valuable resources for the latest information on safety risk and management.

The Inspection

The Perimeter Walk:

Take a walk around the perimeter of your building. Is there any “white rust”? Are there dents or scratches on the panels? Is the finish itself acceptable? Are there any blemishes? Are the fasteners all in place and well seated? Are the flashings in place at all locations? Are the cut ends de-burred and closed-off where appropriate? Has the building been properly made watertight? Are all of the small openings sealed against the elements, birds, insects, and rodents?

Are the downspouts in place as noted in your building plans? Are they free of debris and well-drained? Are there provisions for removing the water from the base of the building?

Are the doors and windows functional? Is the correct hardware in place? Are the doors keyed alike? Do you have all the keys? Is the trim around the doors and windows installed inside and out?

Is the insulation protruding out from the base, base trim, or any other area?

Have all chalk and construction markings been removed?

Are there structural parts left over? Do you know where they belong?

Inside Your Building:

First walk the perimeter of the inside of the building. Note whether the columns are in good shape and if they are all bolted down. Do the girts and flange braces seem to be in their appropriate places? Are the rods under tension or are they loose? Is the building properly insulated or can you see areas that appear to be missing insulation? Check to see if light shows through at the eave, rake, or sill of the building; this is a dead giveaway that there are still things to be finished off.

Next inspect the rafters and interior columns, if applicable. There should be no gaps between the connection plates where the rafters meet the columns at the bolt locations. Check to ensure that the interior columns are in good shape.

Your Roof:

Walk the perimeter of the roof. Are the gutters and downspout outlets in places as noted in your plans? Are they free of debris and well drained? Are the fasteners all in place and well seated? Are the flashings in place at all locations? Has the building been properly made weathertight? Are all of the small openings sealed against the elements, birds, insects, and rodents?

Walk the endlaps. Have the endlaps been installed according to your plans? Do the fasteners exhibit penetration through the mastics? Are the fasteners all in place and well seated? Are the cinch straps of the roof system properly installed and are the fasteners properly engaged? Are the stitch screws and structural screws of the roof correctly installed?

Walk the ridge or high eave. Has the ridge cap or high eave been installed according to your plans? Do the fasteners exhibit penetration through the mastics? Are the fasteners all in place and well seated? Is the ridge or high eave area free of debris and well drained? Are the end dams or closures weathertight and properly installed?

Inspect other areas. Is there ponding around curbs or in any other areas? Does the roof drain properly? Are there any “white or black rust”, dents or scratches on the panels or on the trim? Is the finish itself acceptable? Are the fasteners throughout the entire roof in place and well seated? Do the mastics and caulks appear to be properly placed? Are there any dissimilar materials coming into contact with Norsteel materials?

Annual Maintenance

STRUCTURAL FRAMING:

As a supplier of custom-made steel buildings, Norsteel provides a wide array of structural framing systems including clear-span rigid, modular rigid, tapered beam, and lean-to. All are available in standard or wide bay options. Crane support systems and mezzanines can also be included as part of the complete building package. Your Norsteel building was designed to achieve the optimal design solution for your particular building requirements.

Primary Structural Steel: Main Frames

MODIFICATIONS TO SHAPE

All structural steel designed, detailed and provided is an integral part of the building system order and must be off-loaded, stored and installed according to the erection instructions. It is important to understand that any omissions or modifications of materials can compromise the design integrity of the structure. Any modifications to the structural system must be reported to your Norsteel Representative. For many reasons, no change can be made without the prior approval of Norsteel. By making field modifications without consulting Norsteel, you may be voiding all warranties and causing the structure to become unsafe. You may also assume the costs and liability associated with any corrective action taken. Any party making such omissions or modifications without prior release from Norsteel, is taking design liability for the building system.

ADDING LOADS

Collateral loads, unless specified in the Norsteel Proposal or Order Documents, are assumed to be uniformly distributed. If suspended sprinkler systems, lighting, HVAC equipment, and the like, exceed 200 pounds, consult your Norsteel Representative for confirmation. Be particularly watchful for individual structural members that appear to be loaded significantly more than others. The roof structure of your building has been designed to the specific load criteria by qualified structural architects and engineers. Any changes or modifications to your structure which add additional loads may adversely affect the building's load capacity. Before hanging any items from the building's framing or adding any additional loads to the roof (sprinklers, piping, roof top units, jib cranes, etc.), contact your Norsteel Representative, your Erector, or a competent licensed structural design professional. Any additional loads placed on the structure or hung from the roof which deforms the purlins or other structural components may seriously impair the structural integrity of the building and create dangerous conditions.

PRIMER COATING

All structural members of the building system not fabricated or corrosion-resistant material or protected by a corrosion-resistant coating, are painted with one coat of shop primer. The coat of shop primer is intended to protect the steel framing for only a short period of exposure to ordinary atmospheric conditions. The coat of shop primer does not provide the uniformity of appearance or the durability and corrosion resistance of a field-applied finish coat of paint over a shop primer. Minor abrasions to the shop coat caused by handling, loading, shipping, unloading, and erection are unavoidable.

PRIMER TOUCH-UP

Structural steel normally requires no maintenance except in the event of oxidation. If the structural steel is intended to be left in an un-painted state, clean the affected area and re-prime to spot treat or touch-up. Additional touch-up primer is available through your Norsteel Representative. If the structural steel is to have a topical finish coat of paint applied, clean the affected area and consult with a qualified contractor for the use of proper primers and paints to achieve the desired results. Touch up priming, topical painting of the structural steel and compatibility of the factory applied shop coat to any field applied coating, is the responsibility of the customer.

Secondary Structural Steel: Purlins and Girts

MODIFICATIONS TO SHAPE

All structural steel designed, detailed and provided is an integral part of the building system order and must be off-loaded, stored, and installed according to instruction. It is important to understand that any omissions or modifications of materials, can compromise the design integrity of the structure. Any modifications to the structural system must be recorded. No change can be made without prior consent and approval from Norsteel. By making field modifications without consulting Norsteel, you may be voiding all warranties and causing the structure to become unsafe. You may also be assuming the costs and liability associated with any corrective action taken. Any party making such omissions or modifications without the consent of the manufacturer is taking design liability for the building system.

PRIMER COATING

All structural members of the building system not fabricated of corrosion-resistant material or protected by a corrosion-resistant coating, are painted with one coat of shop primer. The coat of shop primer is intended to protect the steel framing for only a short period of exposure to ordinary atmospheric conditions. The coat of shop primer does not provide the uniformity of appearance or the durability and corrosion resistance of a field-applied finish coat of paint over a shop primer. Minor abrasions to the shop coat caused by handling, loading, shipping, unloading, and erection are unavoidable.

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SUSPENDED LOADS

Any load hung from the roof must be with prior knowledge of Norsteel. The method of attachment to a roof support member varies with the type of load being suspended. In no case should any part of a purlin (roof zee) be deformed to accommodate a suspended load.

Under no circumstances can the purlin stiffening lip be field modified from the factory supplied condition. Do not hang anything from the purlin stiffening lip.

Should you need to hang a suspended load, contact Norsteel or your erector. No modifications to the structure to accommodate the addition of loads can be made without this contact or all warranties are void.

Crane Systems:

- Crane Structural Bolts normally require no maintenance except in instances where the structure is exposed to vibration, such as a structure with an overhead crane. **In this instance, bolts are required to be inspected at least once per year.** Bracing is also required to be checked at least once per year. Crane systems require constant maintenance. Please follow the guideline set by your crane systems manufacturer.
- Any Norsteel building designed for crane loads was designed and provided as per the initial requests indicated on your order documents. **Do not deviate from your engineered design.**

Wind Brace Rods:

- The bracing provided with your Norsteel Building is of significant structural importance. All bracing which is in place after erection of the building should remain in place. Never allow removal of any bracing by any contractor or maintenance personnel. If there are any questions regarding removal or relocation of any bracing, please contact Norsteel immediately.
- Check tension annually to insure that all wind bracing members (cables or rods) are under tension.

Building Evolution:

- **Adding and Removing Openings:** Often adding a framed opening is as easy as cutting a hole in your sheeting and framing it in. At times, wind bracing must be moved or opening locations affect column flange brace placement. By making field modifications without consulting Norsteel, you may unknowingly cause the structure to become unsafe. Always consult Norsteel if you have a project-specific question.
- **Additions to your Norsteel Building:** Please contact Norsteel directly if you require an expansion to your existing structure. Our buildings can be designed to accommodate expanding projects.

Roof and Wall Panels, Trims & Flashing Maintenance:

- Proper and timely maintenance is an integral part of the long-term success of a roof system in order for it to remain water-tight. Proper maintenance is also required in order to preserve the integrity of the Galvalume® protective coating of the steel sheets. Maintenance of the system is a requirement and responsibility of the building owner.
- All roof and wall panels, along with trims and flashings designed, detailed and provided by Norsteel, are an integral part of the building system. It is important to understand that any omissions or modifications of materials provided by Norsteel, can compromise the water-tightness or protective coating integrity of the materials.

- Once per year, check flashing and sheeting interfaces and lap joints in the metal for proper seal and potential loose fasteners, to ensure connection and water-tightness. Endlaps, eaves, ridges, curbs, translucent panels, and other interfaces should be inspected and maintained yearly. Normal adjustments or tightening of fasteners may be required.
- You should not store material on the surfaces of your panels, including roof areas of your building. Roof and Wall panels should not come in contact with or be marked with any graphite or lead markers. Roof and Wall panels should not come in contact with copper, lead flashing, exposed iron or debris. The use of treated lumber in association with painted or unpainted Galvalume® steel sheets is a known corrosive and will cause premature deterioration of the protective panel coating. Wall panels should be kept clear of dirt and soil. Air conditioning condensation water should not be allowed to drain onto your roof or wall panels and condensate lines should always be plumbed to the eave of the structure.
- To maintain good appearance and long life, wall and roof panels, translucent panels or fiberglass reinforced panels (FRP), should be hosed down or washed periodically. Cleaning removes the accumulation of dust, dirt and debris which can combine with sunlight and wind to attack exposed surfaces, both chemically and abrasively. When cleaning these panels non-corrosive cleaning compounds should be used. Avoid the use of compounds containing ammonia or chlorine since they may cause panel discolouration.
- Translucent panels should be cleaned periodically to allow for maximum light penetration. Depending on your building's location it may be necessary for these panels to be cleaned on a more frequent basis. A good time to check if the panels need to be cleaned or resurfaced is in the Fall, since the upcoming winter months will provide fewer daylight hours and the need for maximum light penetration is greatest.
- Panels may be repaired and refinished when panels show excessive amounts of dullness, discolouration and fiber exposure, known as blooming. All of these contribute to the reduction of light transmission through the panel. If the translucent panel is severely deteriorated, replacement should be considered.
- Application of a refinisher typically requires only a minimum amount of effort and panel preparation. In order to successfully apply a refinisher, wash panels off with water or non-corrosive cleaning compounds. Washing the translucent panels will normally remove any dirt that may be embedded in the panel's surface.

Structural Modifications

Before making any structural modifications you must contact a design professional for assistance. Always make certain you have a copy of the complete instructions and related information regarding any modifications from your design professional, prior to making any modification.

Some typical major modifications include, but are not restricted to:

1. Removal or relocation of X-rod or other types of bracing
2. Cutting into any structural component
3. Removal or relocation of frame flange brace angles
4. Addition of any load not specifically included in the certification letter for the original building design
5. Adding an adjacent building(s), especially if the new one is taller. Placing a new taller building adjacent to an existing building can result in snow drift loads on the existing building that were not considered in the original design. The new snow drift load could cause the original building to collapse. When adding a new building within 20 feet of an existing building, the existing building should be checked for potential additional loads and reinforced if necessary.

WALLS

Cutting and Drilling Panels

Field cutting and drilling of panels and trim is a normal process during the life of a metal building. The use of improper tools or cutting techniques can result in an unfavourable appearance of the finished product, and may void your warranty from the manufacturer.

Some of the most common activities that require field cutting of panels and trim are:

- Replacing damaged panels
- Adding holes at pipes or other areas
- Mounting external fixtures

Cutting: Full width panels should always be cut with a shear or power nibblers. The hot metal shavings produced by a grinder or hot saw will burn through the panel causing the primer to evaporate into ashes. In time, the finish coat collapses causing black steel to be exposed. This is one of the most common reasons for rust. This rust may appear immediately or may not appear for months, and is not covered under the warranty. By using a shear or nibblers, this hazard can be avoided.

Drilling: It is important that any shavings from drill bits and self-drilling screws be wiped off of the siding and roof panels. The by-products of the drilling process are actually hot metal shavings. These shavings can imbed themselves into the finished coat of the material, resulting in rust. Panel warranties do not cover this type of damage.

ROOF SYSTEM

General

Galvalume® and its chemical make-up is designed to withstand minor cuts and abrasions. The unique aluminum/zinc coating in the steel will virtually “heal” those minor abrasions that occur. That same “healing” property that protects the panel also causes the Galvalume® coating to be highly reactive when in contact with some types of foreign debris such as copper wires, drill shavings and the like. When left on the roof, these materials can cause the panel to rust. The Galvalume® roof must be kept free of debris in order to reach the expected service life.

The Roof System of your Norsteel Building will give you years of productive life if properly installed and maintained. However, a regularly scheduled program of preventative maintenance is required in order for the roof to function. A reasonable schedule of maintenance begins with proper inspection during construction and a follow-up plan within 60-days after occupancy. Your roof should be maintained annually thereafter.

In general, observe all panel side laps to make sure the erector properly seamed each side lap. Also review the panel surface for pitted, worn, stained or rusted areas. If there are areas of concern found on the roof panels, contact Norsteel immediately. Remove all debris from the roof at least once a year. Make sure all workers who enter the roof know to remove their trash and debris. This will simplify the maintenance process.

- 1. THE FLOATING ROOF SYSTEM:** Larger Roof Systems are designed to float or move as the temperature of the roof changes. This action of floating allows the roof to expand and contract with normal temperature changes. This is a unique feature of standing seam roofs on the market today. Since the roof moves, it must not be restrained in any way. Flashings at the ends of the building must be allowed to float in concert with the roof. Before adding additional fasteners or flashings to the building ends, be sure to contact your Norsteel representative for specific instructions.

2. **VERTICAL RIB ROOF SYSTEM:** This Roof System is a vertical rib panel that is perfect for architectural requirements. This is a weathertight roof system that is ideal for hips and valleys. The panels are installed with concealed fastener clips allowing for thermal movement. It is mechanically seamed for weather tightness.

3. **STANDARD ROOF SYSTEMS:** Smaller projects can often utilize this versatile roof system which is attached directly to the roof secondary members and does not allow the roof system movement as is the case in the larger, Floating Roof system. While the cost of the roof system and labour required to install this type of roof system is less, the need for routine maintenance is no less important.

4. **INSPECTION:** During erection, your roof is subjected to construction traffic. This is normal and should be minimal provided the contractor uses good judgement. It is recommended that the owner take the following steps before the erector leaves the job site. These same steps should be followed on your annual visit. Keep a log of your maintenance work. This will help you set a good schedule as well as document what steps were taken, and when. Periodic roof maintenance should start with a walk through the building interior to observe if modifications have been made to the primary or secondary support members. Make sure that hangars for heaters or sprinklers do not extend above the structural or touch the standing seam roof. Make sure that fire walls that extend to the roof do not restrict the panel movement or create ponding.

5. **SAFETY FIRST & THE BUILDING ERECTOR:** Walk the exterior edge of the building at ground level and repair any downspouts that have clogged or been dislodged in any way. Once on the roof, make sure you are aware of any potential safety issues such as steam from hot water vents, electrical lines, translucent panels and the like, and take the necessary precautions to prevent an accident. Be sure to follow all federal and local safety requirements as well as rules of good common sense. Beware of the potential for nests of birds, wasps or bees on the roof.

6. **FOOT TRAFFIC:** Roof traffic is a leading cause of roof leaks. If routine traffic is unavoidable, have your builder install a walkway designed for use with your roof panel. When walking on the roof is required:

- Avoid stepping on the ridge caps
- Avoid stepping on lap joints in roof panels and flashings
- Avoid walking near roof curbs or other roof penetrations
- Avoid stepping on panel ribs between purlins
- Do NOT step in or on gutters or the gutter hangar system
- Do NOT step on or near translucent panel skylights



IF SKYLIGHTS ARE PRESENT IN YOUR ROOF, EXTREME CARE SHOULD BE EXERCISED WHEN WORKING IN THOSE AREAS. NEVER STEP DIRECTLY ON A SKYLIGHT, OR IN THE SURROUNDING AREA ADJACENT TO A SKYLIGHT. Skylights may not support the weight of a worker, and bodily harm could result from a fall. Please follow federal and local safety guidelines applicable for your particular jurisdiction.

7. **WALKING THE EAVES:** Walk the eaves of the building, using approved safety methods and take care not to get too close to the edges. Make sure that all gutters and downspouts are clean and free of debris. Look for any irregularities, including missing fasteners, overlapping cinch straps, and stripped or broken fasteners. Any fastener that was not sealed properly will work itself out eventually. Replace any unsealed or loose fastener with the next larger fastener size.

8. **FASTENERS:** The fasteners provided with your structure are important to the long term success of your panel finishes and the design integrity of the system. Do not locally obtain or substitute fasteners on a project, unless otherwise authorized by Norsteel.

9. **PANEL ENDLAPS FOR THE LARGE ROOF SYSTEM:** These panel endlaps should be checked for any unsealed fasteners or back-up plates that may not be properly engaged. An endlap in which the back-up plate is properly engaged will feel firm underfoot. This indicates that the cinch strap is joined to the back-up plate.

Trouble Shooting

Should you find an improperly installed back-up plate on your Roof System, remove the cinch strap, pry the endlap apart, and clean any mastic from the panels. Affix the back-up plate in the proper position with the back-up plate tabs, re-install pre-cut mastic and apply gun grade caulk between the panels. Make sure the caulk covers the endlap completely, especially in the areas around the fastener holes. Thread an awl through the cinch strap, panels, mastic and back-up plate as indicated in the Erection Manual. Replace fasteners using the next larger size or the “goof” screw as supplied with your package.

- 10. PANEL ENDLAPS FOR THE VERTICAL RIB ROOF SYSTEM:** The panel endlaps for the Vertical Rib Roof System should be inspected for any unseated fasteners or back-up plates that may not be properly engaged. An endlap in which the back-up plate is properly engaged will feel firm underfoot.

- 11. PANEL ENDLAPS FOR STANDARD ROOF SYSTEMS:** The end laps on this Roof System are located over a purlin and are connected with screws. Check for any screws that are stripped, or washers that are not seated, along the end lap, ridge, rakes and eaves. Stripped screws must be replaced with an oversized fastener.

- 12. RIDGE AREAS:** Walk the area adjacent to the ridge, being careful not to step directly on the cap. The ridge should be free of pending water and debris. Check for and remove any debris in the area. Check for any fastener that may not have been seated well. Review interface between the ridge and the rake flash or any parapet condition. Inspect the rake flash and check for any area where the flash is not seated to the panel.

- 13. SINGLE SLOPE BUILDINGS:** Don't forget to walk the high side of a single slope building. Check for tightness of flashings and fasteners. Verify that the seal between the flashing and the end dam is in place. Five fasteners are required to make the trim to end dam connection on a Floating Roof System.

- 14. EXPANSION JOINTS:** Buildings with a Floating Roof System have longitudinal and transverse expansion joints. During your walk through, make sure to look for any irregularity in a flashing joint or for any loose fasteners.
- 15. STEP-DOWN OR PARAPET CONDITIONS:** Be sure to check step-down (high/low) conditions or areas where blowing rain and snow severely test the design and installation of your building. Flashings must be allowed to “float” on the Floating Roof System, yet prevent moisture from entering the building. When maintaining the roof, be sure to look for any loose fasteners or mastics. Remove any debris from step-down areas. Be careful of the addition of any fastener that will restrict movement of the roof. A restrained roof may cause maintenance problems in a system-related area.
- 16. ROOF CURBS AND HATCHES:** Look around all roof hatches and curbs for debris left by erectors or repair personnel. All debris must be removed from the roof. Check for seated fasteners and ponding water. Water must flow freely around all curbs. Never use tar or apply topical mastics to the surface of the panels. Topically applied sealants will only conceal the cause of a problem. You may want to consider some type of permanent work platform around those units that require constant maintenance. Condensate lines from air conditioner units expel water contaminated with lead or copper. This must not be allowed to come in contact with the roof panel. The copper and lead are very reactive with the steel panels and can cause rust. This water must be piped off the roof to the building exterior.
- 17. CORROSIVE MATERIALS:** Graphite, lead, copper, treated lumber, lead flashing, exposed iron, salt, chlorine, ammonia and miscellaneous debris including dirt and oils are all commonly known corrosives to the protective Galvalume® coating and can cause premature deterioration of panel finishes. These materials specifically, but not limited to other contaminants, can be severely detrimental to the integrity of the coatings provided. Failure to keep building contaminants from contact with your panel surfaces can void panel warranties.

- 18. DISSIMILAR MATERIALS:** Iron pipes for gas lines, structural steel framing for roof units, and similar installations must be painted to prevent rusting. Water run-off from rusted iron or steel will diminish the life of the panel and should be piped off of the roof. Lead or copper cannot be used on the roof for any reason. Never use a pencil to mark information on the roof. The graphite used in pencil leads is not compatible with Galvalume® and will quickly destroy the protective coating.
- 19. DEBRIS:** At least once a year, clean the roof and gutters of leaves or other debris which can trap or pond water on the roof. Wash dirt and debris from the panel surface. Local conditions govern the frequency of necessary routine maintenance. It is the responsibility of the owner to keep the roof free and clean of debris and corrosive materials at all times.
- 20. PENETRATIONS:** Penetrations are pipes, curbs, and other items that penetrate a metal roof panel. Penetrations must be flashed properly to assure a watertight roof assembly. When inspecting the roof, you should see that the pipe flashings have a weathertight seal at the panel surface. Ensure that the penetrations are secure and not prone to movement. Penetrations should not impede the flow of water. Curbs should be properly flashed, especially at the corners; skylight domes or panels should be checked for deterioration. As with any inspection, you should check for missing or loose fasteners, as well as possible corrosion of the metal panels.
- 21. PIPES, SUPPORTS AND CONDENSATION LINES:** Pipes, conduits and supports for roof-supported units shall be of a non-corrosive or rust-free material. Field painting of pipes and supports may be required to resist corrosion. Condensation from roof-top units shall be piped to interior or exterior locations. Damage due to condensate water is not covered under manufacturer's warranty.

22. SEALANTS AND MASTICS: Sealants and Mastics (gray and white tapes) are designed to be used as gaskets. In order for them to perform properly, clamping action is established by using fasteners at predetermined locations. Proper location of fasteners and mastics will assure that seals perform as designed. See the Erection Manual for specific locations. Mastics are effective only when applied between two pieces of metal and are not to be used topically.

23. BUTYL CAULKING: Butyl Caulking is applied between panel seams or joints as directed by the Erection Manual. Butyl Caulking is a non-skinning caulk that is effective when used between pieces of metal. It is not to be used topically.

24. POLY URETHANE CAULKING: Polyurethane Caulking is a skinning caulk applied between trim laps or joints as directed by the Erection Manual. This caulk is typically used in areas that may be exposed to the elements.

25. TOPICAL COATINGS: The use of tar and other topically applied products should not be permitted or utilized as a method of leak repair. The use of topical coatings will void panel warranties and is detrimental to the performance of the materials. The use of any topical coating or other topically applied product is prohibited, unless specified by the manufacturer.

26. SEALANT REMOVAL: Precautions should be taken to prevent sealants from getting on the painted surface, as they may be difficult to remove. Sealants should be removed promptly with a solvent such as alcohol or a naphtha type solvent.



It may be possible for solvents to extract materials from sealants that could stain the painted surface and could prove harmful to the sealants. Test a small inconspicuous area first, before wide spread use.

Accessories

Eave Gutters, Valley Gutters, and Downspouts



When working on or inspecting gutters, and downspouts, be aware of safety issues including, but not limited to, falling from the roof and injuries from using a high-pressure hose for cleaning. Always follow governing requirements for fall protection and tie-off.


Clear all debris (leaves, dirt, etc.) from gutters and downspouts as required periodically. Gutters and Downspouts must be kept free-flowing at all times. The frequency required is dependent on the building's surroundings.

Visually inspect gutters for accumulation of debris that would prevent gutters or downspouts from operating properly. Clean out all accumulated debris regularly using a water hose with sufficient pressure to flush dirt and small debris. Larger items such as rocks, cans, limbs and heavy accumulations of leaves or pine needles should be removed by hand. It is recommended that suitable gloves be worn.

Gutter obstructions can cause dirt to build up which holds moisture that can cause premature rusting and allow standing water to accumulate on the roof that may result in a leak through an improperly sealed side-lap or end-lap. Blocked downspouts can produce the same result if they are not allowed to drain freely. The weight of accumulated debris in a gutter compounded with ice and snow could exceed the load carrying capacity of the gutter and gutter support clips and cause the gutter to fall. Check for and repair any loose connections.

The purpose of a scupper is to provide an emergency overflow for water collected on the roof and to provide a visible warning that the primary drainage system may be blocked.

Service Doors

 Service Doors should be checked periodically to assure tightness of locksets, closure hardware and door hinges. Any loose fasteners should be tightened. Any moving parts that start to stick or squeak should be properly lubricated. Always make a point of checking the entire door for wind and physical damage. As a general rule, any air leaks should be repaired promptly with appropriate sealant, adjustments, and replacement parts.

The following is intended to serve as a general guideline for maintenance activities required for hollow metal doors and frames. Maintenance will be for the most part associated with the accessories and hardware attached to the door and frame. Maintenance of any product is important and necessary to obtain the maximum benefits of product service and longevity. Hollow metal doors and frame assemblies are no exception. In fact, in some cases where the door and frame assembly are used as a “fire rated” fire barrier or a “leakage rated” smoke and draft barrier, proper maintenance is crucial. Basic maintenance is imperative and well worth the effort to provide for life safety.

Although one person can perform most minor door maintenance, some activities such as complete removal or rehang of a door may require two or more people to prevent injury.

Service doors must be checked periodically. The following areas of inspection should be checked periodically. Since doors in different areas of a building experience different levels of traffic, the frequency of periodic inspections should reflect usage.

- 1. HINGES:** Check all hinges for loose screws, hinge pin wear, or other notable defects. Service the hinges or remove the defective parts and replace if necessary per the manufacturer’s recommendation. The door should always swing freely and smoothly from open to latched (when latching device is used) position without obstruction.
- 2. LOCKSETS, PANIC DEVICES, FIRE EXIT HARDWARE:** Check all locksets for loose screws, linkage arm wear, fluid leakage, hinge pin wear, or other notable defects. Service the lockset or remove defective parts and replace per the manufacturer’s recommendation. The door should always latch freely and smoothly without obstruction. Self-latching should always function freely and smoothly as the door swings into the closed position. Additional force should not be needed to achieve latching. Worn or defective hardware should be repaired or replaced by a qualified technician.
- 3. STRIKE PLATE:** The strike plate should be adjusted to seat the door leaf firmly against the jamb. The plate should also be firmly attached to the frame or inactive leaf of a pair of doors. Check for loose screws and other notable defects. Service or remove the strike plate if necessary.

4. **WEATHER STRIPPING:** Weather stripping should be adjusted to prevent air from leaking excessively around the door. Weather stripping should be cleaned periodically to assure a proper seal. Worn or damaged weather stripping should be replaced as required.
5. **CLOSING DEVICES:** Check all closing devices for loose screws, linkage arm and pin wear, fluid leakage, or other notable defects. Service the device or remove defective parts and replace as needed. The primary and secondary closing speed adjustments should also be set and maintained in accordance with the manufacturer's recommendations. The device should allow the door to operate freely and smoothly throughout its entire swing and positively latch (if so equipped) or remain in the closed position.
6. **SURFACE BOLTS/FLUSH BOLTS:** Check all surface bolts or flush bolts for loose screws, rod bolt adjustment, and strike plate (on both door and frame if so equipped) attachment. Service the device or remove defective parts and replace as needed. The rod bolts should retract, extend, and engage the strike or keeper hole freely and smoothly for both manually and automatic flush bolts.
7. **GLASS LIGHTS:** The glazing material should be checked for cracks and missing pieces of glazing. The glazing mounting frame should be checked to assure screws (if used) are tight and the unit is securely attached to the door. Service the glass light or remove defective parts and replace as needed. Also be sure to use approved safety glass in appropriate applications and locations; and fire rated glass and glazing in fire doors, windows or lights.
8. **DOOR AND FRAME FINISH:** A general visual inspection of the door and frame finish is appropriate. Any excessive finish defects should be repaired and repainted. Adequate protection is needed to prevent the product from rusting and shortening its service life.

Windows

Windows usually require very little maintenance. Lubricate the window track, clear sill drain holes and inspect sealant at top and sides of windows. Check for and repair any air and water leaks at windows and overhead doors. Remove all old caulk and apply new caulk as required.

Caulking in windows will deteriorate in time, usually resulting in window leakage. If this happens, remove the old caulk and apply new caulk in its place. Windows that become hard to slide should have the track area thoroughly cleaned and a light coat of lubricant applied to the tracks.

The following is intended to serve as a general guide line of maintenance activities required for aluminum windows and frames. Maintenance will be for the most part associated with the accessories and hardware attached to the window and frame. Maintenance of any product is important and necessary to obtain the maximum benefits of product service and longevity.

Aluminum windows and frame assemblies are no exception. Basic maintenance to ensure the proper functioning of the assembly is imperative and well worth the effort to provide for life safety.

The following items should be periodically checked. Since windows in different areas of a building experience different frequency of use, periodic inspections would occur with this in mind.

1. **HINGES:** Check all hinges for loose screws, hinge pin wear, or other notable defects. Service the lockset or remove defective parts and replace per the manufacturer's recommendation. The window should always latch freely and smoothly without obstruction from open to latched (when latching device is used) positions.
2. **LOCKSETS, FIRE EXIT HARDWARE:** Check all locksets for loose screws, hinge pin wear or other notable defects. Service the lockset or remove defective parts and replace. The window should always latch freely and smoothly, without obstruction.
3. **GLASS LIGHTS:** The glazing material should be checked for cracks and missing pieces of glazing. The glazing mounting frame should be checked to assure attaching screws (if used) are tight and the unit is securely attached to the window. Service the glass light or remove defective parts and replace as needed. Also be sure to use approved safety glass in appropriate applications and appropriate locations.
4. **WINDOW AND FRAME FINISH:** A general visual inspection of the window and frame finish is appropriate. Any excessive finish defects should be repaired.

Sliding Doors

Lubrication of door casters is generally not required as casters are packed with grease and sealed by the door manufacturer. If a sliding door becomes difficult to operate, adjustments to the base guide or caster height may be necessary. Check for and remove any dirt or debris in the door guide.

Overhead Doors

Check and tighten the bolted connections of the framing supporting an overhead door as needed. Contact the door manufacturer if the door becomes difficult to operate or is out of alignment. Only a qualified technician should perform torsion spring adjustments.

Roof Curbs

Heavy vibration from a mechanical unit can cause water leakage around a roof curb. Should this occur, check the sealant and fasteners around the curb. Any loose fasteners should be tightened or replaced with the next larger size. Any sealant or mastic that has deteriorated should be removed and replaced with new. If possible, isolate the unit from the curb to minimize vibration to the curb. Look around all roof hatches and curbs. Debris from the mechanical repairmen must be removed from the roof. Check for seated fasteners and ponding water. Water must flow freely around all curbs. Never use tar or topically applied mastics on the surface of the panels. Topically applied sealants will only conceal the cause of a problem. You may want to consider some type of permanent work platform around those units that require constant maintenance. Condensate lines from air conditioner units expel water contaminated with lead or copper. This must not be allowed to come in contact with the roof panel. These must be piped to the building exterior. Iron pipes for gas lines and the like, structural steel framing for roof units, etc., must be painted to prevent rusting. Water run-off from rusted iron or steel will diminish the life of the panel. Lead or copper cannot be used on the roof for any reason.

Pipe Flashings and Dektite®

Inspect pipe flashings and Dektite® annually. Water should not be allowed to pond on the pipe flashings or Dektite®. Remove any algae growth found on the pipe flashing or Dektite®.

Roof Ventilators

Gravity Roof vents are designed to allow inside air to be vented to the outside. The throat and dampers also can allow blowing rain and snow to enter the inside of the building. Inspect vents annually for debris, bird, rodent and insect intrusions. Inspect pull chains and lubricate mechanisms as required. Hard to operate roof vents are usually the result of pulleys and damper rods in need of lubrication or the chains and cords not being on track. Lubricate as needed.



Safety concerns when working on a roof ventilator include but are not limited to falling from the roof, and possible electrical shock hazards if the ventilator includes an electrically operated fan. Make sure to use proper fall protection and tie-off when working an elevated location and also, that the electric power to any electrical equipment is turned off and properly locked-out or tagged-out before maintenance is performed. The top of the ventilator will usually have an insect screen that prevents making adjustments or repairs to the interior of the ventilator without removing the ventilator. Maintenance or repair activities to the operational components inside of the ventilator will require accessing the unit from below, inside the building or removing the ventilator from the ridge and turning the ventilator over to gain access. If a ventilator is removed for maintenance, be sure to properly mark and cover the opening in the roof where the ventilator was removed to prevent a fall hazard.

Vents that do not have moving parts will require very little maintenance. Ventilators containing moving parts such as pulleys, rollers or cranks for flue operation, will require periodic lubrication at pivot points.

Wall Mounted Exhaust Fans and Louvers

The operating hardware within a louver occasionally needs to be cleared and a new light coat of oil or grease applied. This will improve the ease of operation.



Safety concerns when working on a wall mounted exhaust fan or louvers include but are not limited to falling if the fan or louver is elevated, and possible electrical shock hazards if the exhaust fan or louver is electrically operated. Make sure that you have proper fall protection equipment and that the electric power to any electrical equipment is turned off and properly locked-out or tagged-out before maintenance is performed.

Check operation of manual louvers and louvers electrically interlocked with exhaust fans, and repair or replace as needed. Fixed louvers that do not have moving parts will require very little maintenance. Operable louvers containing moving parts such as vanes will require periodic lubrication at pivot points. Simple operation from time to time will aid in breaking corrosion loose. A vibrating ventilation fan indicates that there may be a problem with the fan. Not only can a vibrating fan cause damage to itself, but may cause damage to the building as well. A fan that is vibrating needs to be checked promptly and appropriate corrective measures taken before additional damage is caused. Many times a vibration could mean a bent fan blade or worn belt.

Insulation



Although we are not aware of any long-term health related concerns with fiberglass blanket insulation, you should always wear protective clothing such as long sleeves, long pants, gloves, eye protection and a respiratory filter when working with insulation. Information concerning **recommended work practices for fiberglass, rock wool and slag wool (SVF) insulation products** is available from the North American Insulation Manufacturers Association (www.naima.org).

INSPECT THE EXTERIOR OF YOUR BUILDING FOR EXPOSED INSULATION AND CALL YOUR CONTRACTOR IMMEDIATELY IF FOUND. EXPOSED INSULATION WILL WICK AND HOLD WATER AGAINST THE ENDS AND BACK SIDE OF THE PANELS, CAUSING RUST TO OCCUR.

Check for wet or damaged insulation periodically. Wet or damaged insulation transfers heat, whether from the heated system in winter or from the sun in summer. This is not only costly but also uncomfortable for the people in your building.

1. INSULATION FACINGS:

Insulation facings should be monitored continuously and a thorough inspection made once per year. Torn insulation backing, which is usually white vinyl or foil (called a water vapour retarder), can allow moist air (water vapour) inside the building to move directly through the insulation. The moist air can condense in the insulation making it less effective, and on the inside surface of the roof and wall panels causing the panels to deteriorate. Pressure sensitive tapes with an exposed side that matches the facing used on the insulation are available from most insulation suppliers for use in repairing a torn vapour retarder.

2. CONDENSATION:

Pockets of extremely moist air in the building can cause condensation problems. The following procedures will help or possibly eliminate the problem:

1. Seal small tears in the water vapour retarder with vinyl tape
2. Replace large areas of damaged insulation
3. Install fans to disperse pockets of moisture-laden air
4. Eliminate the source of high moisture in the building

Caution: Condensation problems are easily mistaken for roof leaks. If your building is experiencing excessive condensation, have your contractor or engineer check humidity levels to determine if they are within projected values.

If your building is experiencing excessive condensation, consult your HVAC contractor to assure that humidity levels and air movement are as projected. Also have your building contractor check to make sure there are no obvious openings in the insulation splices. The unfaced surface of your insulation should always be in full contact with the exterior steel sheets.

3. LOOSE INSULATION:

Insulation tearing loose at various locations within the building (particularly at the eave or base) might not be the result of poor insulation, but rather a strong negative pressure inside the building resulting from improperly balanced HVAC system or an extra exhaust fan added after the erection of the structure. This, combined with a strong wind outside the building will often result in the insulation coming loose in these areas. The unfaced surface of your insulation should always be in full contact with the exterior steel sheets.

4. ROOF LEAKS:

Should you observe evidence of a roof leak, such as water on the floor, stained ceiling tiles or a bubble in the insulation vapour barrier, contact your building contractor immediately. After the leak has been repaired, have your contractor cut the vapour barrier where the water has collected to allow the wet insulation to drain. Once the insulation has thoroughly dried, repair the vapour barrier with patch tape. Ensure that the insulation is in full contact with the steel sheet.

There are various reasons a roof leak might occur:

- Improper installation
- A lack of routine maintenance
- Damage to a component
- Deterioration of a component
- Insulation air space void that creates condensation

5. NEGATIVE PRESSURE:

It is also possible that a leak might not be the result of the above referenced conditions, but rather the result of a strong **negative pressure** inside the building from an improperly balanced HVAC system.


Negative Air Pressure is a force that can compromise sealants and affect the weather tightness of a building system. If sealants become compromised, then it is entirely possible for a leak to develop over time. If a leak is left unaddressed, it can lead to potential water-infiltration into the insulation cavity. Over time this can create a wide range of issues from annoying leaks, to mold and mildew, to sagging insulation and to potential premature corrosion of the panels, trims and structurals in the affected area.

The phenomenon of negative air pressure is basically a condition of unbalanced air pressure between the inside air pressure and outside air pressure of the structure.

When a condition exists with too much outgoing or exhausting air combined with a lack of incoming air, then a vacuum is created. When the vacuum is created, it naturally wants to pull outside air into the structure. When the pressures are high enough, they also begin to pull any potential standing water into the structure as well. In order to restore the balance and equalize the pressure, additional incoming air supply is required. This is typically accomplished with the addition of make-up-air units added to the structure. Proper measuring and evaluation of needed make-up-air supply requirements is typically provided by a qualified engineer or contractor.

Negative pressure can also be a concern and primary source for water-penetration. The building owner should have a qualified mechanical engineer or contractor retained for proper testing of existing conditions to address the negative pressure. If Negative Pressure is evident on a project, then it needs to be addressed in full before attempting to address any additional pursuant leaks.

Painted Finishes

 Protective clothing, protective eyewear and a respiratory filter may be appropriate when working with chemicals, paints or cleaners. Use appropriate caution and safety equipment when using a high-pressure hose to clean surfaces

WARNING: Always test cleaning procedures in a small inconspicuous area before use on a large scale. A 5% solution of commonly used commercial detergents can be used on heavily soiled areas and will not harm your panel surface. Always rinse thoroughly with water. Do NOT use wire brushes, steel wool, sandpaper, abrasives, or similar cleaning tools which will mechanically abrade the coating surface. Use a cloth, sponge, or a soft bristle brush for application. For best results, cleaning should be done in the shade or on a mild cloudy day.

Cleaning Panel Paint Finishes

The high quality paint finishes used on the metal roof and wall panels will maintain their appearance and protective value for a long time if properly maintained. Improperly maintained panels will accumulate dirt and film deposits over time causing the panels to lose their original appearance. To prevent this it is important to establish a proper maintenance program to keep the finishes in prime condition.

The most important cleaning is done immediately after the erection of the building, as metal shavings are present and are somewhat magnetized because of the screw and drill rotation. Shavings are not always visible and must be swept off the roof and walls to prevent corrosion of the particles, which will stain the panel surface.

Under normal conditions, a fresh water washing two or three times per year using a regular garden hose under pressure will keep the paint finish in good condition.

- **Non-Water Soluble Deposits on Zinc-Aluminum Finishes:** Use mineral spirit (with a Neutral PH) to remove non-water soluble deposits (tar, grease, oil, paint, graffiti) from the panel surface. Do not use any other harsh caustics or acidic compounds or cleaners that could potentially cause premature failure of the coating and otherwise create permanent damage to the protective panel finish.

- **Non-Water Soluble Deposits on Silicon-Polyester & Kynar Paint Finishes:** Use a diluted mixture of the common household cleanser “Tide” and water to remove non-water soluble deposits (tar, grease, oil, paint, and graffiti) from the panel surface. Do not use any other harsh caustics or acidic compounds or cleaners that could potentially cause premature failure of the coating and otherwise create permanent damage to the protective panel finish. Solvents that may also be used to remove these items from paint panel finishes include:

I. Alcohols

- Not aesthetically detrimental when properly applied

- Denatured (Ethanol) Alcohol
- Isopropyl (Rubbing) Alcohol
- Methanol (Wood) Alcohol

NOTE: METHANOL IS TOXIC



II. Petroleum Solvents

- Not aesthetically detrimental when properly applied

- VM & P Naphtha
- Mineral Spirits
- Turpentine (Wood or Gum Spirits)

III. Aromatic and Other

- Use with Caution

- Xylol (Xylene)
- Toluol (Toluene)



WARNING: Limit contact time to under 5 minutes maximum and test before using. Prolonged Exposure may damage paint finish and damage your warranty. **DO NOT USE Acetone paint remover, Lacquer thinners, Esters, Ketones, Methyl Ethyl Ketone, or Methyl Isobutyl Ketone on Kynar or Silicon-Polyester paint surfaces.** Contact and exposure with these products can result in blemishes detrimental to the aesthetics of your metal building and will void your warranty. **Most organic solvents are flammable and/or toxic and must be handled accordingly. Keep away from open flames, sparks and electric motors.** Use adequate ventilation, protective clothing and goggles. A fresh water rinse should be used after application of alcohols, solvents, or aromatics to ensure that all residue is removed.

1. **LIGHT DIRT BUILD-UP:**

- After longer periods of time, it may occasionally be desirable to wash a building with a suitable cleaner, using a long handle 4" soft bristle push broom similar to that used for sweeping floors. The use of a bristle broom will allow reaching the side's wall panel ribs and the scrubbing action of the broom will work on top of the ribs and flat areas of the panels. Wetting down the area to be cleaned with fresh water prior to washing will greatly ease the cleaning operation.
- The use of detergents in this case is NOT recommended, since the residual material left on the surface by detergents may have a degrading effect on the paint film after a period of time. After cleaning with a cleaning solution (tri-sodium phosphate, or similar solution is a good cleaner), hosing down with fresh water will ensure against any harmful residual material being left on the paint finish.
- NEVER USE SOLVENTS OR THINNERS FOR WASHING DOWN ANY PAINTED SURFACE EXCEPT AS OTHERWISE PROVIDED HEREIN.
- Solvents and thinners may have a tendency to break down the surface of the paint and may cause spotty chalking on the paint finish whenever solvent is applied. Solvents have a tendency to convert the paint back to its original unbaked state.

2. **HEAVY DIRT BUILD-UP:**

- In areas where heavy dirt deposits dull the surface, a solution of water and a detergent (for example, 1/3 cup of Tide detergent per gallon of water), may be used. A soft bristle brush or broom with long handle may be useful. A clear water rinse should follow.

3. **FOLIAGE:**

- While landscaping will enhance the appearance of any building, care must be made to ensure that there is minimal contact of trees and shrubs with panel systems. Scratches in the paint surface may result from such contact and can eventually cause problems. Keep bushes and trees trimmed back from the panel surfaces.

4. **RUST:**

- Once per year inspect the panels for rust. Should any rust or stain be found, determine the source, such as steel filings from drilling, sawing, or grinding, and remove them. The rust stain can generally be cleaned off with one of the following: Soap and water, mineral spirits, or a mild polishing compound as used on a car finish.

5. **MILDEW:**

- Mildew may occur in areas subject to high humidity. To remove mildew along with dirt, the following solution is recommended:
 - 1/3 cup detergent (Tide, for example)
 - 2/3 cup tri-sodium phosphate (Soilex, for example)
 - 1 quart sodium chlorite, 5% solution (Clorox, for example)
 - 3 quarts water

6. **OIL, GREASE, TAR, WAX, AND CAULK CLEAN-UP:**

- A clean lint-free cloth soaked with mineral spirits should be used to remove oil, grease, tar, wax, or caulk. Wipe the mineral spirits dry with another clean lint-free cloth before the solvent has evaporated from the surface. Follow the mineral spirits wipe with a detergent cleaning and rinsing.

7. **TOUCH-UP PAINTING:**

- Scratches to the paint should be brush touched with touch-up paint. If the scratched area has not rusted, the paint may be applied without surface preparation. If the area is rusted, remove the rust; prime the affected area and brush with colour-matched touch-up paint.
- Field applied touch-up paint used to repair scratches is not as durable as the original factory applied finish but will provide satisfactory service if properly applied. The touch-up paint may fade at a faster rate than the factory applied paint so it is important to use as little touch-up paint as possible. This will minimize the colour differences as the paint ages. The smallest practical brush should be used in all cases where touch-up spray equipment is not available.
- Touch-up paint must be thoroughly mixed to obtain the correct colour and gloss. For best results do not apply touch-up paint when the surface to be coated is wet, or when the temperature is below 55 degrees F (12.8 degrees C), or above 90 degrees F (32 degrees C). Touch-up paint will usually dry in four to five hours after application at 75 degrees F (23.9 degrees C). One coat is sufficient for most applications.

Snow

Snow and Ice Removal

Several factors contribute to the decision regarding snow removal.

For this reason, NORSTEEL CANNOT MAKE ANY SPECIFIC RECOMMENDATION ON WHEN TO REMOVE SNOW FROM ROOFTOPS. It is up to the individual property owner to consider the benefits and dangers of snow removal and decide their own course of action. Remember to consider the depth and relative moisture of the snow and the capacity of your roof structure in making your decision on whether to remove snow.

Below you will find information to aid you in your decision regarding snow removal from the roof of your structure.



Be aware of weather conditions that may contribute to snow and ice accumulation on the roof.

If you decide that the snow and ice accumulation has loaded the roof beyond its capacity, you should have the snow and ice removed by people experienced in performing such work. An excessive amount of snow and ice can cause the roof to collapse resulting in damage to property and personal injury.

The most severe condition occurs when rain falls on a roof system already loaded by snow. In this case, the snow absorbs the rainwater, and loads can approach the weight of water. This condition must be monitored with extreme caution.

Due to the differences in density between fresh and frozen snow, there is no fixed correlation between snow depth and snow density. The density of snow can range from 10 pounds per cubic foot for relatively dry fresh snow, to 60 pounds per cubic foot for snow that has potentially thawed and then frozen.

One method of determining the density of snow on a roof is to carefully shovel or carve out a 1 foot by 1 foot column of snow through the snow's full depth. Be very careful not to damage the roof. Place this snow in a plastic trash bag for transporting the removed snow to a scale to weigh the contents. Measure the depth of snow where the sample was removed.

Using the measured weight and depth, calculate the density of the snow in pounds per cubic foot. By dividing the design snow load (in pounds per square foot) by the snow density (in pounds per cubic foot), you can determine the depth of snow at the design snow load, for the actual density of the snow.

The design snow load can also be estimated based on the design snow load and the estimated density of the snow and/or ice build-up. The density of fresh relatively dry snow in pounds per cubic foot is estimated to be 0.13 multiplied by the design snow load (in pounds per square foot, PSF) + 14. The following is a table of design snow loads and the corresponding one half design snow depths obtained by using this method.

A final approach is provided by the **FM Global Property Loss Prevention Data Sheet 1-54 paragraph 2.1.1.1.19 which recommends that roofs be cleared of snow when half of the safe maximum snow depth is reached (See Snow Removal Chart)**. Although it is difficult to accurately assess what a safe maximum accumulation of snow and ice would be, a close approximation can be made using the Snow Removal Chart guidelines. The first step is for the building owner to obtain the snow load that the building has been designed to carry. The design snow load is shown on the cover sheet of the engineered drawings and on the Letter of Certification for the building.

Snow Removal Chart for Fresh Dry Snow

AGAIN PLEASE NOTE: Several factors contribute to the decision regarding snow removal. For this reason, NORSTEEL DOES NOT MAKE ANY RECOMMENDATION ON WHEN TO REMOVE SNOW FROM ROOFTOPS. It is up to the individual property owner to consider the benefits and dangers of snow removal and decide their own course of action. The following chart is included only for the owner's convenience in making this decision.

The FM Global Property Loss Prevention Data Sheet 1-54 paragraph 2.1.1.1.19 recommends that roofs be cleared of snow when half of the safe maximum snow depth is reached (See Snow Removal Chart). According to these guidelines, the property owner should remove snow from the roof when the depth of snow in the "One Half Design Snow Depth" column is reached for each corresponding "Design Snow Load".

| Design Snow Load (psf) | One Half Design Snow Depth (inches) |
|------------------------|-------------------------------------|
| 10 | 4 |
| 15 | 6 |
| 20 | 7 |
| 25 | 8 |
| 30 | 10 |
| 35 | 11 |
| 40 | 12 |
| 50 | 14 |
| 60 | 17 |
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Snow and Ice Removal Procedure

Several factors contribute to the decision regarding snow removal.

For this reason, NORSTEEL DOES NOT MAKE ANY RECOMMENDATION ON WHEN TO REMOVE SNOW FROM ROOFS. It is up to the individual property owner to consider the benefits and dangers of snow removal and decide their own course of action.

If you have decided to remove the snow and ice from the roof of your structure, please consider the following procedural information:



There are many safety concerns related to the removal of snow or ice from a roof. Plan any effort to remove snow or ice carefully and remain alert and cautious during the removal activity. Risks include, but are not limited to, slipping and falling from the roof, and striking someone standing or walking below. In order to help prevent accidents and injuries when removing snow and ice you should always:

1. Post warning signs or place safety barricades to keep people from entering an area below a roof where snow removal is being performed. It is preferable to perform snow removal when a building is unoccupied.
2. Always comply fully with all safety regulations and provide proper safety equipment to workers before working on the roof. If possible, remove snow without getting on the roof by using draglines to remove the snow on the roof. Avoid standing in the path of sliding snow or ice as it is being removed from the roof.
3. Place ladders at the end of the building away from where the snow is being removed so that the sliding snow will not knock the ladders over.
4. Never send one person alone to remove snow. Always use a safety observer who can monitor the snow removal process and be prepared to provide or obtain immediate assistance if required.
5. Be cautious of snow or ice breaking away and sliding down the roof, even on buildings having a low sloped roof.
6. Use extreme care when working along the edge of the roof.
7. Watch for extreme deflections in roofing panels and listen for unusual noises when snow and ice build-up conditions exist. Extreme deflections and noise can indicate the structural integrity of the roof has been compromised. If either of these conditions exist, the area should be evacuated immediately and a trained professional should be called to remove the accumulation of snow and ice.



The following are some suggestions that generally apply; however, it is recommended that an Engineer be consulted before snow removal is initiated:

1. Remove all hanging icicles from eaves and gutters before removing snow from the roof. Snow may accumulate on icicles during snow removal, placing an additional load on the edge. Care must be exercised to avoid damage to the building and to avoid endangering people.
2. Remove snow in a pattern that does not cause an unbalanced loading condition on the roof. Avoid large differences in snow depth between adjacent areas of the roof. Remove the snow in layers from the entire roof thereby decreasing the load gradually and evenly across the entire surface of the roof.
3. Remove snow from drifted areas first, down to a level with other snow. For example, if an area has drifts four feet deep and the snow on the main roof is two feet deep, trim off the drifts to two feet before proceeding.
4. Remove snow incrementally, removing snow from the eave towards the ridge, sliding the snow off the roof over the gutter.
5. Remove the snow from the middle one-third of each bay for the full width of the building, beginning with the most snow-packed bay. Then complete snow removal on the remainder of the building.
6. On gable buildings, remove snow on both sides of the ridge at the same time.
7. **Never use metal shovels** on any type of roof. Do not use picks, axes or other sharp tools to break up ice on the roof. The use of such tools can easily damage the roof.
8. Do not remove snow to less than a 3" depth over the roof panels. Care must be taken to eliminate hitting panel fasteners or snow guards. If an ice layer above a roof panel is not excessively thick it should be left.
9. Care must be taken in removal of ice and snow around ventilator bases, pipe flashing and HVAC units, due to the ease of damaging neoprene boots, pipes, conduits, etc.
10. Snow or ice should not be allowed to accumulate at the base of metal wall panels. Accumulation of snow in this location may permanently damage panels.
11. Keep gutters, downspouts and roof drains open and free flowing to prevent water back-up and ice build-up on the roof system. Ice damming conditions are especially likely on the north side of a building and in shaded areas. Installing heat tape in gutters and downspouts can also be used as a precaution; however, heat tapes may not be 100% effective in extremely low temperatures and should be checked regularly.

The Annual Inspection

Scheduled annual inspections that identify and solve concerns as they occur, is the best way for you to provide preventative maintenance to your Norsteel Building. This will help to optimize the service life of the building, keep the building aesthetically pleasing, functional and virtually weather tight to protect your products, your facilities and your personnel. This inspection will require a critical examination of both the interior and the exterior components of existing assemblies, cladding, doors, windows, cranes, and flashings. Keeping a log of your maintenance work will help you maintain a good schedule, as well as document what steps were taken and when. Any preventative or corrective maintenance procedures should be designed to keep the building in a virtually weatherproof condition. Any modifications found to the structural systems during your inspection must be recorded.

Building owners should maintain historical records of all inspections. A historical record should be kept to provide the owner with data concerning the original erection of the structure, who the erector was, any special conditions, or any known contaminants that may be discharged onto the building surfaces. An owner should also use the historical record to document all subsequent inspections, maintenance and repairs performed on the building.

Before any inspections take place, please refresh your knowledge by reading through this Preventative Maintenance Manual. The manual is a good reference and goes into detail and explanation to help you to complete a thorough inspection.

As always, please apply all safety precautions and requirements as mandated by federal and local requirements, as well as rules of good common sense, while conducting your inspections.

Thank you again for purchasing a Norsteel Building. We look forward to hearing how your building has provided you with answers to your personal structural requirements. Please don't hesitate to contact us if you have any questions, or require any further service.