



Adhered Duro-Fleece® Roofing System

SPECIFICATION

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SECTION 1 - - - GENERAL

INTRODUCTION

This specification outlines the requirements for installing an adhered Duro-Fleece® roofing system. Each installation must be in compliance with the detail drawings and requirements stated herein.

Note: Within this specification the product referred to as “Duro-Last® membrane” does not have a fleece backing and is used for stripping material, prefabricated flashings and in some wall applications.

REQUIREMENTS

1. The Duro-Fleece roofing system must be installed by an authorized Duro-Last contractor.
2. The Duro-Fleece membrane must be installed over a compatible and properly prepared deck/substrate.
3. Perimeter edge termination details must include sealant as shown in the detail drawings included in this specification (i.e. DF3010, DF3020, DF3021, DF3030, DF3040, DF3110, DF3120, DF3500, DF3510, DF3560). Any other type of edge termination must be approved, in writing, by the Duro-Last Engineering Services Department prior to installation.
4. Duro-Last vinyl Gravel Stop or vinyl Drip Edge cannot be used as part of an adhered Duro-Fleece roofing system.
5. For non-residential installations a Duro-Last Technical Representative must inspect the Duro-Last roofing system for compliance with this specification before a full commercial warranty can be issued. Residential installations are not inspected by Duro-Last and receive a material warranty only.
6. Duro-Last does not perform destructive testing unless something found during the inspection triggers the need for further investigation.
7. All materials used in the installation of the Duro-Last roofing system must be products of Duro-Last, Inc. or accepted products as defined and described in this specification. The use of other materials must be approved, in writing, by the Duro-Last Engineering Services Department prior to being used.
8. The Duro-Last contractor is responsible for following all applicable building, plumbing, and electrical codes.
9. For buildings 40 foot (12 m) or taller and/or located within high wind zones (greater than 110 mph [177 km/h]) or special wind regions, the Duro-Last Engineering Services Department must be involved in determining the fastening requirements. Typically, the ASCE 7 Specification will be used to determine the fastening requirements. When appropriate, specifications set forth by entities such as FM Global, SPRI or State/Local Agencies will be utilized.
10. The Peel Stop detail described in detail drawings DF9060 and DF9060A is required when the Duro-Fleece membrane is adhered to polyisocyanurate rigid board insulation. The Peel Stop detail may also be required in other instances. Refer to detail drawings DF9060 and DF9060A for requirements.

TOOLS

The authorized Duro-Last contractor should have the following tools, which are necessary for the efficient and proper installation of the Duro-Last roofing system.

• Safety Equipment (such as fall protection)	• Equipment necessary to raise materials to the rooftop
• Automatic and Hand Welders (hot-air) with a spare heating element	• Silicone hand roller
• Extension cords - cord length of 100' (30 m), #12/3 wire with ground	• Ground fault interrupter
• Variable speed power screw driver with reverse	• P-3 screwdriver tips
• Electric hammer drill with depth gauge	• R-3 square drive tips for concrete screws

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<ul style="list-style-type: none">• Metal snips, hacksaw, keyhole saw, hammers, scissors, utility knives with retractable blades	<ul style="list-style-type: none">• Measuring tapes (100' and 25') (30 and 7.5 m), chalk line, markers, lumber crayon
<ul style="list-style-type: none">• 2" (50 mm) flat chisels, pry bar	<ul style="list-style-type: none">• Vise clamps, nail aprons, caulk gun, screw drivers
<ul style="list-style-type: none">• Tack claw	<ul style="list-style-type: none">• Ladders
<ul style="list-style-type: none">• Tarps	<ul style="list-style-type: none">• Pull tester
<ul style="list-style-type: none">• Core cutter	<ul style="list-style-type: none">• Panduit bander
<ul style="list-style-type: none">• Detergent-based cleaning fluid and rags	<ul style="list-style-type: none">• Paint rollers – 3/8" nap, solvent resistant
<ul style="list-style-type: none">• Push Brooms / Heavy duty squeegee	<ul style="list-style-type: none">• Insulation Adhesive application equipment
<ul style="list-style-type: none">• Roller – Minimum 150 lb. with foam cover	

MEMBRANE DESCRIPTION

Duro-Last Duro-Fleece (DLDF) membrane is composed of PVC film laminated to both sides of a weft insertion knitted scrim and laminated to a fleece backing. Refer to the product data sheet for the physical properties of the membrane.

APPLICABILITY

The Duro-Fleece roofing system consists of Duro-Fleece membrane, adhesives, fasteners, prefabricated corners, parapet flashings, stack flashings, curb flashings, and other related Duro-Last approved products. All materials used in the installation of the Duro-Fleece roofing system must be products of Duro-Last, Inc. or accepted products as defined and described in this specification. The use of other materials must be approved, in writing, by the Duro-Last Engineering Services Department prior to being used.

DRAINAGE / SLOPE

Duro-Last has found no adverse effects on its membrane because of a lack of positive drainage, however, good roofing practices incorporate the use of positive drainage for the safety of the structure. The installing contractor is responsible to make sure roof drainage meets local building code requirements.

WEATHER CONSIDERATIONS

Installation of the roofing system is subject to the temperature limitations of the adhesive used to adhere the Duro-Fleece membrane. If insulation and/or cover boards are being attached with adhesive or hot bitumen then the temperature limitations of these products must also be considered. Follow the manufacturer's guidelines regarding the appropriate temperature range of application. Always read the product data sheet and Material Safety Data Sheet (MSDS) for each product prior to installation.

Water-based adhesive must not be subjected to freezing temperatures, before installation, during installation or while curing. When applying water-based adhesive, the ambient temperature must be at least 50 °F (10 °C) and rising. Ensure that the water-based adhesive is allowed to cure for at least 72 hours during which the temperature remains above 40 °F (4.5 °C).

When using Duro-Fleece membrane adhesive, the ambient and substrate temperatures must be at least 40 °F (4.5 °C) and rising.

Only install as much insulation and/or cover board as can be covered by the end of the working day or onset of inclement weather. Never install the roof system when it is raining or snowing. Only apply adhesives to dry surfaces to ensure proper adhesion and to avoid trapping moisture.

DELIVERY

A complete Duro-Last roofing system and related materials will be delivered to the location designated by the Duro-Last contractor in the original packaging and with shipping labels intact. Containers will be labeled with manufacturer’s/supplier’s name, product name, and identification. Each shipment should be checked for damages and/or shortages at the time of delivery. The freight agent must note damaged materials and/or shortages on the freight bill. Concealed damage must be reported to the freight agent immediately. Materials damaged in shipping, handling, or storage cannot be used.

HANDLING

Once the Duro-Last roofing system is delivered, the contractor and contractor’s crew are responsible for all handling and installation of the roofing system. Adequate personnel and equipment should be available to safely lift and place the Duro-Last roofing system onto the rooftop. Place pallets, boxes, and membrane rolls near load-bearing members, and in a manner convenient to final placement.

STORAGE

Duro-Last materials should be kept clean and dry. Materials should be stored on pallets and covered with tarps. Care must be taken to place materials away from areas where water may pond or areas that water falls onto from higher elevations. Wet Duro-Fleece membrane must not be installed. Follow the storage guidelines stated in the product data sheet or Material Safety Data Sheet (MSDS) of each product. Keep combustible materials away from heat, sparks, and open flames. Follow precautions outlined on the containers or supplied by the material manufacturer.

CHEMICAL RESISTANCE

Duro-Last membrane is resistant to the chemicals listed below. If any other chemicals are present on a particular roof, please contact the Duro-Last Engineering Services Department.

Acrylic Paint	Linseed Oil	Copper Sulfate	Lard (Animal Fats)
Latex Paint	Masonry Cleaner	Ferric Chloride	Phosphoric Acid
Fertilizer Solution	Muriatic Acid	Fiberglass Mat	Polypropylene
Fruit Juice	Oleic Acid	Furnace Residue	Zinc Chloride
Hydrogen Peroxide	Sodium Hydroxide	Detergent Solution	Bleach

PAINT APPLICATION

The Duro-Last membrane may be painted, although the performance and maintenance of the paint is not covered by the Duro-Last system warranty. Refer to the *Chemical Resistance* section for approved paint types.

Vinyl edge and termination products must not be painted. These include vinyl Fascia Bar, vinyl Fascia Bar Cover and vinyl Termination Bar. Duro-Last, Inc. will not be held responsible for repair or replacement of these products if they have been painted. Contact the Duro-Last Quality Assurance Department with any questions.

Metal products supplied by Duro-Last may only be painted if they are made from PVC-clad metal or bonderized steel. The performance and maintenance of the paint is not covered by the Duro-Last system warranty.

VAPOR BARRIERS

Duro-Last recommends the use of vapor barriers, however it is the responsibility of the Duro-Last contractor of record to ensure that all applicable specifications, building codes, regulations and ordinances are complied with and followed. A roofing professional, such as a consultant or architect, should be utilized for correct roof system design prior to installing any roof system.

SECTION 2 - - - QUALITY ASSURANCE

PRE-JOB INSPECTION

When recovering an existing roofing system, the authorized Duro-Last contractor is responsible to conduct an inspection of the proposed job site roof conditions to determine the fastener type and length, evaluate the moisture content of the existing roofing system, and to note damaged areas to be repaired prior to installation of the Duro-Last roofing system.

CORE CUTS

1. The Duro-Last contractor is responsible for performing a series of core cuts to determine and verify the above information. The Duro-Last contractor and/or building owner is responsible for the repair of all core cuts.
2. Duro-Last, Inc. does not approve the practice of covering existing roof systems that contain excess water. Excess water is defined as water observed within a core cut or moisture squeezed from the core sample taken.
3. Duro-Last's post-installation warranty inspection does not check the moisture content of the substrate.

PULLOUT TESTS

1. Fastener pullout tests must be conducted on the roof deck with approved fasteners to verify the integrity of the deck and to establish fastening patterns for mechanically attached insulation and cover boards as well as the fastener spacing around roof penetrations.
2. It is the responsibility of the Duro-Last contractor to make sure that pullout tests are performed. The tests can be performed by either the fastener manufacturer or the authorized Duro-Last contractor. The sections of decking where integrity is in question should be the locations for the tests. The pullout tests must be documented on a roof drawing showing the location and pullout value of each test. In situations where new construction prevents on-site pullout tests, a pre-assembled deck representing the proposed deck type should be constructed and tested.
3. The number of pullout tests required will be as follows: perform a minimum of 10 tests for up to 50,000 ft² (4,645 m²) and five additional pull tests for each additional 50,000 ft² or portion thereof, on each project. Areas of low pullout results will require additional pullout tests.
4. It is the responsibility of the Duro-Last contractor to verify pullout values prior to installation.

ADHESION TESTS

1. Adhesion tests must be performed when attaching insulation or cover boards to an existing roof system. Install a 2 foot by 2 foot section of board to a representative area of the roof. Apply 2 beads of adhesive 12 inches apart and 6 inches from the edge. After the adhesive cures, attempt to pop the board off of the surface using a flat shovel or spud bar. If the board breaks apart while the contact between the adhesive and the roof remains intact, the test is a success. If the adhesive separates from the roof, the test is unsuccessful and an alternative method of attachment must be found.

MECHANICAL FASTENER SELECTION AND DECK TYPES

The fasteners used to attach insulation, cover board and Duro-Last membrane must be supplied by Duro-Last, Inc. The following tables summarize the appropriate fasteners to use for different deck types and system components. If a fastener type is needed that is not listed below, the Duro-Last Engineering Services Department must approve its use, in writing, prior to installation.

Mechanical Fastener Selection Based on Deck Type

Refer to this table when determining which fastener type to use for a specific deck type.

Deck Type	Fastener Type	Notes
Steel	Duro-Last HD Screws Duro-Last XHD Screws	Must penetrate a minimum of 1-inch (25 mm) from the top surface of deck.
Wood	Duro-Last HD Screws Duro-Last XHD Screws	Must penetrate a minimum of 1-inch (25 mm) from the top surface of deck.
Structural Concrete	Duro-Last Concrete Nail Duro-Last Concrete Screw Duro-Last HD Screws Duro-Last XHD Screws	Must penetrate a minimum of 1-inch (25 mm) from the top surface of deck. Pre-drill a minimum of 1/2-inch (12.7 mm) deeper than the required depth of the fasteners using a 3/16-inch (5 mm) bit.
Gypsum	Auger Fastener* Liquid Auger Fastener**	Pre-drill required for auger fasteners. Use a 7/16–9/16-inch (11 – 14mm) bit.
		* Must penetrate a minimum of 1-1/2-inch (38 mm) from the top surface of deck. * Factory Mutual designed systems require minimum of 2-inch (50 mm) penetration.
		** Liquid Augers must penetrate a minimum of 2-inches (50 mm) from the top surface of the deck.
Cementitious Wood Fiber (Tectum)	Auger Fastener* Liquid Auger Fastener**	<i>Do not pre-drill.</i>
		* Must penetrate a minimum of 1 1/2-inch (38 mm) from the top surface of deck. * Factory Mutual designed systems require minimum of 2-inch (50 mm) penetration.
		** Liquid Auger must penetrate a minimum of 2-inches (50 mm) beyond the top surface of the deck.
Lightweight Concrete	Auger Fastener* Liquid Auger Fastener** Duro-Last Concrete Screw Duro-Last Concrete Nail Duro-Last HD Screws Duro-Last XHD Screws	Pre-drill required. Augers: Use a 7/16–9/16-inch (11 – 14 mm) bit. Others: Use a 3/16-inch (5 mm) bit.
		* Must penetrate a minimum of 1-1/2-inch (38 mm) from the top surface of deck. * Factory Mutual designed systems require minimum of 2-inch (50 mm) penetration.
		** Liquid Auger must penetrate a minimum of 2-inches (50 mm) from the top surface of the deck.
Walls and Curbs		Notes
Cinder and Concrete Block	Zinc Plated Metal Anchors Duro-Last Concrete Screw Duro-Last Concrete Nail Duro-Last HD Screws Duro-Last XHD Screws	Must penetrate a minimum of 1-inch (25 mm) from the top surface. Pre-drill a minimum of 1/2-inch (12.7 mm) deeper than the required depth of the fasteners using a 3/16-inch (5 mm) bit (1/2-inch (12.7 mm) for metal anchors).

Plate Selection

Refer to this table when determining which plates to use and where to use them.

	2-inch (50 mm) Poly-Plate	2.4-inch (61 mm) Cleat Metal Plate	3-inch (76 mm) Square Metal Plate	Insulation Plate
Membrane Fastening				
Peel Stop*	No	Yes	Yes	No
Parapet Flashings	Yes**	Yes	Yes	No
Base of Walls/Penetrations	Yes**	Yes	Yes	No
Insulation Boards	Yes**	Yes	Yes – Preferred	Yes
Cover Boards	Yes**	Yes	Yes - Preferred	No

* Refer to detail drawing DF9060 for peel stop requirements.

** Poly-plates are not recommended since they have a higher profile than the other plate options and will form a visible bulge under the membrane.

DECK / SUBSTRATE CRITERIA

Duro-Fleece membrane may be adhered directly to some roof decks while insulation or cover boards must be used on others to provide a proper substrate to adhere the membrane to. In all cases, the surface being adhered to must be clean, smooth, dry, free of sharp edges, dust, contaminants, oil, grease, and loose foreign material. Acceptable substrates are listed below. Refer to Substrate Preparation in Section 3 for the proper preparation and the installation requirements for each type of substrate.

Roof Decks Which May Be Adhered Directly To

1. Structural Concrete (poured in place or precast)
2. Gypsum (poured in place or precast)
3. Lightweight Concrete (insulating or cellular)
4. Wood (plywood, OSB or lumber)
5. Existing smooth Built-Up Roofs (BUR)
6. Existing smooth Modified Bitumen Roofs

Roof Decks Requiring Insulation or Cover Board

1. All decks that are structurally sound but damaged or contaminated to the extent of not providing a proper surface for adhesion as described above.
2. Steel Decks

APPROVED INSULATION AND COVER BOARDS

The following products may be used as the substrate onto which Duro-Fleece membrane is adhered. These products can be attached to the roof deck using mechanical fasteners, approved insulation adhesives or hot bitumen. The use of any other insulation or cover board as the substrate must be approved, in writing, by the Duro-Last Engineering Services Department prior to installation.

Polyisocyanurate Rigid Board Insulation

1. Use polyisocyanurate boards that meet ASTM C1289 Class II, Grade 2 (20 psi) or Grade 3 (25 psi) requirements.
2. Maximum insulation board size is 4 ft x 8 ft when mechanically attached and 4 ft x 4 ft when attached with insulation adhesive or hot bitumen.
3. When attaching the insulation with insulation adhesive, follow the instructions on the Duro-Last product data sheet for the adhesive. Insulation adhesive must be supplied by Duro-Last, Inc.
4. When attaching the insulation with hot bitumen, follow the insulation board manufacturer’s guidelines for deck preparation and bitumen application.

5. When installing directly over a steel deck, the insulation board must have an adequate span rating, as published by the manufacturer, for the profile of the steel deck.
6. When installing rigid board insulation as part of a metal roof retrofit, insulation boards will be needed to fill the area between the metal ribs and provide support for the overlying board.

Cover Boards

1. Approved Cover Boards
 - a. DensDeck Prime® Roof Board, manufactured by Georgia-Pacific.
 - Preferred due to prime surface requiring less adhesive than unprimed surface.
 - b. DensDeck® Roof Board, manufactured by Georgia-Pacific.
 - c. SECUROCK® Gypsum-Fiber Roof Board, manufactured by USG Corporation.
2. Cover board must be a minimum of 1/4-inch (6.4 mm) thick.
3. Maximum cover board size is 4 ft x 8 ft when mechanically attached or attached with either insulation adhesive or hot bitumen.
4. When installing directly over a steel deck, the cover board must have an adequate span rating, as published by the manufacturer, for the profile of the steel deck.
5. When installing cover board as part of a metal roof retrofit, insulation boards will be needed to fill the area between the metal ribs and provide support for the overlying board.

When multiple layers of insulation are used, with or without a cover board, it is acceptable to mechanically attach through all layers into the roof deck. It is also acceptable to attach successive layers with insulation adhesive or hot bitumen. A combination of mechanical attachment and insulation adhesive or hot bitumen is also acceptable, such as mechanically fastening the base layer of insulation and then attaching the remaining layers with insulation adhesive or hot bitumen. Refer to the product data sheet of the insulation board, insulation adhesive or bitumen used for product compatibility information and installation guidelines.

APPROVED INSULATION ADHESIVES

The following insulation adhesives may be used within an adhered Duro-Fleece membrane system. Refer to the product data sheet of the insulation adhesive being used for application guidelines, requirements and limitations. The Material Safety Data Sheet (MSDS) for the product must also be read prior to use. The insulation adhesive must be supplied by Duro-Last, Inc. in order to qualify for the system warranty. The use of any other insulation adhesive must be approved, in writing, by the Duro-Last Engineering Services Department prior to installation.

1. Approved Insulation Adhesives
 - a. Insta-Stik™ manufactured by The DOW Chemical Company and supplied by Duro-Last, Inc.
 - b. Olybond products listed below, manufactured by OMG, Inc. and supplied by Duro-Last, Inc.
 - OlyBond500® and OlyBond500® SpotShot
 - OlyBond500® Green and OlyBond500® Green SpotShot
 - c. Millenium Weather-Tite® Products listed below, manufactured by Millenium Adhesive Products, Inc. and supplied by Duro-Last, Inc.
 - One Step™ Foamable Adhesive
 - Hurricane Force® PG-1 Pump Grade Insulation Adhesive

APPROVED DURO-FLEECE MEMBRANE ADHESIVES

The following membrane adhesives may be used to adhere Duro-Fleece membrane to an approved substrate. Refer to the product data sheet of the membrane adhesive being used for application guidelines, requirements and limitations. The Material Safety Data Sheet (MSDS) for the product must also be read prior to use. The membrane adhesive must be supplied by Duro-Last, Inc. in order to qualify for the system warranty. The use of any other membrane adhesive must be approved, in writing, by the Duro-Last Engineering Services Department prior to installation.

1. Approved Duro-Fleece Membrane Adhesives
 - a. Duro-Fleece Membrane Adhesive
 - b. Duro-Last WB II Adhesive

SECTION 3 - - - IMPLEMENTATION**SUBSTRATE PREPARATION**

Duro-Fleece membrane may be adhered directly to approved roof decks while insulation or cover boards must be used on others to provide a proper substrate. In all cases, the surface being adhered to must be properly prepared as outlined in this section.

In all cases the substrate onto which the Duro-Fleece membrane is to be adhered must be smooth and level without significant surface irregularities or depressions. It must be clean, dry and free of grease, moisture, dust and loose debris.

The Duro-Last contractor is responsible for providing a properly prepared surface for the installation of the Duro-Fleece membrane and any insulation and/or cover board used.

The Duro-Last contractor is also responsible for ensuring that the roofing system is watertight at the end of the work day or the onset of inclement weather.

New Construction

1. Structural Concrete Decks (Poured in place or pre-cast)
 - a. Deck must be cured and dry prior to the installation of the roof system.
 - b. Difference in height between adjacent concrete units that are greater than ¼-inch must be tapered with grout to provide a smooth transition.
 - c. If insulation or cover board is to be attached to concrete with hot bitumen, prime the deck with the appropriate primer per the insulation or cover board manufacturer's guidelines. Allow the primer to dry prior to installing the roof system.
2. Lightweight Concrete (Insulating or cellular)
 - a. Lightweight concrete deck must have a minimum density of 38 pcf and a minimum compressive strength of 200 psi.
 - b. Deck must be cured and dry prior to the installation of the roof system. Do not leave the deck exposed beyond the maximum exposure time as defined by the lightweight concrete manufacturer.
 - c. Do not allow the deck to be exposed to precipitation.
3. Gypsum (Poured in place or pre-cast)
 - a. Deck must be cured and dry prior to the installation of the roof system.
4. Wood (Plywood, OSB or Lumber)
 - a. Deck surface must be smooth, free of splintered wood and level without significant surface irregularities or depressions. Cracks or knotholes larger than ¼-inch must be repaired.

- b. Carefully examine deck for loose or high fasteners. These must be repaired or replaced so that they are flush with the surface of the wood.
5. Cementitious Wood Fiber
 - a. Rigid board insulation and/or a cover board must be used to provide a proper substrate on which to adhere the Duro-Fleece membrane. Refer to Approved Insulation and Cover Boards in Section 2 for acceptable products.
6. Steel
 - a. Rigid board insulation and/or a cover board must be used to provide a proper substrate on which to adhere the Duro-Fleece membrane. Refer to Approved Insulation and Cover Boards in Section 2 for acceptable products.
 - b. The insulation or cover board must have an adequate span rating, as published by the manufacturer, for the profile of the steel deck.

REROOF

Tear-Off

1. If Duro-Fleece membrane is to be adhered to a roof surface after the removal of an existing roof system, the requirements listed under New Construction, must be met.
2. If the roof deck cannot be adequately prepared for the direct adhesion of the Duro-Fleece membrane, a rigid insulation board or cover board must be used. Refer to Approved Insulation and Cover Boards in Section 2 for acceptable products.
3. If only a partial tear-off is being done, rigid board insulation and/or a cover board must be installed and mechanically attached through the remaining roof system components and into the roof deck.
4. Phenolic foam insulation must be completely removed.

Re-Cover

1. Existing Built-Up Roof (BUR) or Modified Bitumen Roof
 1. Only smooth surfaced roofs can be adhered to directly with Duro-Fleece membrane.
 2. The contractor shall be responsible to ensure that the existing roof material has adequate attachment to the roof deck.
 3. Adhesion tests must be performed when attaching Duro-Fleece membrane to an existing roof system. Install a 2 foot by 2 foot section of membrane to a representative area of the roof. Apply 2 beads of adhesive 12 inches apart and 6 inches from the edge. After the adhesive cures, grab the membrane at one corner and attempt to pull it off. If the adhesive separates from the roof, the test is unsuccessful and an alternative method of attachment must be found.
 4. Blisters, buckles and other surface irregularities must be repaired or removed. If the damage is extensive, rigid board insulation or a cover board must be installed.
 5. Areas with wet insulation and/or cover boards must be removed and replaced with products of similar thickness and R-Value.

INSTALLATION

WOOD NAILER

Wood nailers must be a #2 grade lumber, or better and must be fastened to the deck, wall or existing secured nailer in such a manner that they resist 180 lb. of force per linear foot (2,643 N/M) of nailer in any direction. Fasteners used to attach wood nailers must be spaced no greater than 18-inches (455 mm) apart. Wood nailers are required in any situation where 1-inch (25 mm) or greater of insulation is added to the roof perimeter edge. The top of the nailers must be flush with the top of the insulation. Wood nailers are not required at a change of plane such as the intersection between a parapet wall and the decking.

INSULATION AND COVER BOARD INSTALLATION

1. Refer to Approved Insulation and Cover Boards in Section 2 for approved products.
2. No more insulation or cover board should be installed than can be covered with membrane and completed before the end of the day's work or the onset of inclement weather.
3. Insulation must be neatly fitted to the roof deck and around penetrations. Insulation boards should be installed tightly against adjacent insulation boards and all joints staggered 50% from row to row. No gap should exceed 1/4-inch (6.4 mm) in width.
4. Cover boards must be neatly fitted to the roof deck and around penetrations. Cover boards may require a small gap between boards. Consult the product data sheet for the cover board for the gapping requirements. No gap should exceed 1/4-inch (6.4 mm) in width.
5. Attachment of Insulation and Cover Boards Using Mechanical Fasteners
 - a. Only fasteners and plates supplied by Duro-Last may be used to attach insulation and cover boards. Refer to Section 2 for approved fasteners and plates. The use of other fasteners must be approved, in writing, by the Duro-Last Engineering Services Department prior to being used.
 - b. Fastener pullout tests must be done as described in Section 2.
 - c. The minimum average pullout resistance is 250 lb. If the average pullout resistance is less than 250 lb. contact the Duro-Last Engineering Services Department for assistance in determining the fastening pattern to use.
 - d. For buildings 40 feet (12 m) or taller and/or located within high wind zones (greater than 110 mph [177 km/h]) or special wind regions, contact the Duro-Last Engineering Services Department for assistance in determining fastening pattern to use.
 - e. For buildings less than 40 feet (12 m) tall when fastener pullout resistance is 250 lb. or greater use the following fastening pattern.
 - Field Area: Attach boards with a minimum of 1 fastener per every 3.2 square feet. Use the fastening pattern shown in detail drawing DF9000.
 - Perimeter Area: Attach boards with a minimum of 1 fastener per every 2 square feet. Use the fastening pattern shown in detail drawing DF9010.
 - The width of the perimeter area is defined as whichever is less: 40% of the building eave height or 10% of the lesser roof plan dimension, but in no case less than 4 feet. The remainder of the roof is the field area.
6. Attachment of Insulation and Cover Boards Using Insulation Adhesive
 - a. Refer to Approved Insulation and Cover Boards in Section 2 for acceptable products.
 - b. Refer to Approved Insulation Adhesives in Section 2 for acceptable products.
 - c. For buildings 40 feet (12 m) or taller and/or located within high wind zones (greater than 110 mph [177 km/h]) or special wind regions, contact the Duro-Last Engineering Services Department for assistance in determining the fastening pattern to use.
 - d. For buildings less than 40 feet (12 m) tall use the following fastening pattern.
 - Field Area: Space beads of insulation adhesive a maximum of 12 inches on center.
 - Perimeter Area: Space beads of insulation adhesive a maximum of 6 inches on center.
 - The width of the perimeter area is defined as whichever is less: 40% of the building eave height or 10% of the lesser roof plan dimension, but in no case less than 4 feet. The remainder of the roof is the field area.

7. Attachment of Rigid Board Insulation Using Hot Bitumen
 - a. Only polyisocyanurate rigid board insulation may be adhered with hot bitumen. Consult the product data sheet of the insulation being used for requirements regarding attachment with hot bitumen.
 - b. Installation must be in accordance with the bitumen manufacturer's instruction and the NRCA and ARMA recommendations.
 - c. The insulation must rest evenly on the approved deck/substrate so that there are no air spaces between the board and the deck/substrate.
 - d. Maximum insulation board size is 4 feet x 4 feet.
 - e. Insulation boards cannot be attached directly to steel decks with hot bitumen.

MEMBRANE INSTALLATION

1. Duro-Fleece Adhesive
 - a. The Duro-Fleece adhesive will be installed in bands that are spaced either 6 or 12 inches apart. Refer to the Duro-Fleece adhesive product data sheet for the proper band spacing and the application guidelines.
 - b. Position and unroll successive sheets of membrane. Allow sheets to relax and pull out any wrinkles.
 - c. Align the sheets so that the selvage edge of one sheet overlaps the non-selvage edge of the next sheet by 3 inches.
 - d. Fold two adjacent sheets in half, lengthwise, to expose the substrate between the sheets.
 - e. Apply Duro-Fleece adhesive to the exposed substrate using the proper spacing between bands of adhesive.
 - f. Adhere the membrane sheet that does not have a selvage edge first since this is the sheet that will be on the bottom side of the seam joining the two sheets.
 - g. After the adhesive turns a caramel color push the membrane into it slowly and evenly to avoid introducing wrinkles and creating air pockets. Use a push broom or squeegee to help push the sheet out evenly and into the adhesive.
 - h. Repeat procedure above for the sheet with the selvage edge taking care to keep both the selvage edge and top of the underlying sheet free of adhesive.
 - i. Use a push broom or squeegee to smooth the membrane and then roll the top of membrane with a heavy duty roller weighing at least 150 pounds. The roller should have a foam cover.
 - j. Hot-air weld the selvage edge to the underlying sheet.
 - k. Repeat the procedures above for the remaining membrane sheets.
 - l. Roll ends must be butted together, not overlapped. Utilize a strip of Duro-Last membrane at least 6 inches wide to cover the joint between sheets. Hot-air weld the strip onto both sheets. The Duro-Last membrane used for stripping must be the same mil thickness as the Duro-Fleece membrane.
2. Duro-Last WB II Adhesive
 - a. Position and unroll successive sheets of membrane. Allow sheets to relax and pull out any wrinkles.
 - b. Align the sheets so that the selvage edge of one sheet overlaps the non-selvage edge of the next sheet by 3 inches.
 - c. Fold two adjacent sheets in half, lengthwise, to expose the substrate between the sheets.
 - d. Apply Duro-Last WB II adhesive to the exposed substrate. Refer to the Duro-Last WB II product data sheet for application rates and installation guidelines.
 - e. Roll the membrane into the adhesive IMMEDIATELY after it is applied. Do not wait for the adhesive to dry. Duro-Fleece membrane must be rolled into wet adhesive.

- f. Adhere the membrane sheet that does not have a selvage edge first since this sheet will be on the bottom side of the seam joining the two sheets.
- g. Push the membrane into the adhesive slowly and evenly to avoid introducing wrinkles and creating air pockets. Use push brooms and squeegees to help push the sheet out evenly and into the adhesive.
- h. Repeat the procedure above for the sheet with the selvage edge taking care to keep both the selvage edge and the top of non-selvage edge of the underlying sheet free of adhesive.
- i. Use push brooms and squeegees to smooth the membrane sheets and then roll them with a heavy duty roller weighing at least 150 pounds. The roller should have a foam cover.
- j. Hot-air weld the selvage edge to the underlying sheet.
- k. Repeat the procedures above for the remaining membrane sheets.
- l. Roll ends must be butted together, not overlapped. Utilize a strip of Duro-Last membrane at least 6 inches wide to cover the joint between sheets. Hot-air weld the strip onto both sheets. The Duro-Last membrane used for stripping must be the same mil thickness as the Duro-Fleece membrane.

HOT-AIR WELDING

1. Hot-air welds may be completed using either automatic or hand-held hot-air welders. The weld must be continuous and at least 1-1/2 inches (38 mm) wide.
2. After a weld cools, it must be inspected with a tack claw or similar tool (cotter key extractor), and all deficiencies repaired prior to inspection by Duro-Last, Inc.

WALLS AND PENETRATIONS

Both Duro-Last membrane and Duro-Fleece membrane may be adhered or mechanically fastened onto walls. Surface preparation requirements on walls are the same as described in Substrate Preparation above.

When the roof system will be terminated against a wall refer to detail drawing DF6020.

1. Walls Mechanically Attached
 - a. When mechanically attaching Duro-Last membrane or Duro-Fleece membrane to a perimeter wall a termination bar must be used at the roof-to-wall transition to secure the Duro-Fleece membrane that is adhered to the roof deck. Refer to detail drawing DF6000 for options regarding installation of the termination bar. The Duro-Last membrane on the wall may be installed as shown in detail drawings 6010 through 6160 of the Duro-Last Specification Manual© as long as termination bar is installed at the base of the wall instead of plates.
 - b. When termination bar is installed at the base of the wall, as shown in detail DF6000, any Duro-Last edge detail, including vinyl Drip Edge and Gravel Stop, may be used as shown in detail drawing 6150 of the Duro-Last Specification Manual.
 - c. Termination bar is only required at the base of perimeter walls. Duro-Last membrane installation at roof-to-wall transitions around structures such as stairwells or along the base of walls extending up to higher levels may be installed as shown in detail drawings 6010 through 6160 of the Duro-Last Specification Manual.

2. Walls Adhered - Duro-Fleece Membrane

- a. Duro-Fleece membrane may only be adhered to walls with Duro-Fleece adhesive.
- b. Apply the Duro-Fleece adhesive to the fleece side of the membrane using a band spacing of 6 inches on center.
- c. Allow the adhesive to turn to a caramel color and then apply the membrane to the wall.
- d. Use a push broom or squeegee to push the membrane into the adhesive.
- e. If extending up a wall more than 5 feet, rows of mechanical fasteners must be installed at each 5 foot increment.
- f. Refer to detail drawing DF6010 for options on securing the membrane at the roof-to-wall transition.
- g. When installing walls, it is recommended to work with smaller pieces for easier handling. The installer may wish to install the membrane on the walls prior to installing on the roof deck. This will avoid potential problems with keeping the new membrane on the roof deck clean while working on the walls.

3. Walls Adhered - Duro-Last Membrane

- a. When installing Duro-Last membrane, which does not have a fleece backing, use either Duro-Last SB IV or Duro-Last WB II adhesives. Do not use Duro-Fleece adhesive.
- b. Adhesive must be applied to both the substrate and to the membrane. See the product data sheet of the adhesive being used for coverage rates and application guidelines.
- c. For porous substrates, such as concrete block, apply an initial light coating of adhesive as a seal coat. Allow the seal coat to dry thoroughly prior to adhesive application as described above.
- d. Allow adhesive to dry to "finger tack" and then place membrane onto the substrate.
- e. Apply pressure with push brooms or squeegees to complete the bond.
- f. If extending up a wall more than 5 feet, rows of mechanical fasteners must be installed at each 5 foot increment.
- g. Refer to detail drawing DF6010 for options on securing the membrane at the roof-to-wall transition.
- h. It is recommended that wall sheets be kept small for easier handling. The installer may wish to install the membrane on the walls prior to installing on the roof deck. This will avoid potential problems with keeping the new membrane on the roof deck clean while working on the walls.

4. Roof Penetrations

- a. A minimum of one mechanical fastener is required at all roof penetrations. These include, but are not limited to, pipes, drains, curbs, pitch pans, and expansion joints.
- b. The pullout resistance of the fasteners determines the fastener spacing of the transition points and large penetrations. To determine the spacing, refer to the pullout chart in the "Mechanically Fastened Systems" specification within the Duro-Last Specification Manual.

FLASHINGS

1. The Duro-Last membrane must not contact surfaces which maintain or exceed temperatures of 120 °F including insulated chimney pipes, exhaust pipes, and combustible fuel pipes.
2. All flashings must be terminated at a minimum of 8-inches (203 mm) above the roof surface.

TWO WAY AIR VENTS

The Duro-Last 2-way air vents are not required as part of an adhered application. Duro-Last reserves the right to incorporate their use if needed.

ROOF DRAINS AND SCUPPERS

1. Drain Assemblies with Clamping Rings
 - a. All existing roofing materials must be removed from drain bowl and clamping ring.
 - b. Duro-Fleece membrane is not allowed to be installed into the clamping ring. A target patch of Duro-Last membrane must be used.
 - Target patch must extend beyond drain sump so that no hot-air welding is done within the sump. If no sump is present the target patch must extend beyond the drain assembly a minimum of 12 inches in all directions.
 - Target patch must be the same mil thickness as the Duro-Fleece membrane.
 - Refer to detail drawing DF2011.
 - c. Use Duro-Caulk® Plus (1/2 tube minimum) between the Duro-Last membrane and drain bowl assembly as shown in detail 2011 of the Duro-Last Specification Manual.
 - d. After the Duro-Last membrane is properly installed onto the bowl and the clamping ring set in place, all bolts securing the ring must be installed to provide constant, even compression on the sealant. If bolts are broken or missing, replacements must be installed.
2. Duro-Last Drain Boots
 - a. If a Duro-Last drain boot is to be used, apply one-half (1/2) tube of sealant minimum to the outside of the drain boot and insert it into the drain.
 - b. Install composite compression drain rings.
3. See Details 2011, 2020, 2021, 2025, 2030, 2041, 2050, 2060, 2061, 2070 and 2071 of the Duro-Last Specification Manual for installation references.

EXPANSION JOINTS

1. See Details 1140, 1150, 1160, 1170 and 6160 for installation references.

PITCH PAN

1. Use pitch pans only when standard Duro-Last flashings cannot be used.
2. Only Duro-Last Duro-Caulk Plus or approved sealer such as CSL may be used when creating a pitch pan.
3. See Details 4030, 4040 and 4045 for installation references.

WALKWAY PAD

1. Duro-Last Roof Trak® III Walkway Pad is recommended at all roof access points, service units and high traffic areas. The risk of potential third party damage to the Duro-Last roofing system may increase should the building owner choose not to utilize the Duro-Last Roof Trak III Walkway Pad. Note: Prior to inspection of the installation by Duro-Last, attach only one side of any Walkway Pads that will be covering any field seams. This will allow the Duro-Last Technical Representative to inspect the entire field seam. After the inspection, hot-air weld the remaining side to complete the attachment of the pad.

CAUTIONS AND WARNINGS

1. Duro-Last, Inc. is not responsible for damage that may occur as a result of moisture created from condensation occurring within or beneath a roof deck subassembly or building.
2. Duro-Last recommends the use of vapor barriers, however it is the responsibility of the Duro-Last contractor of record to ensure that all applicable specifications, building codes, regulations and ordinances are complied with and followed. A roofing professional, such as a consultant or architect, should be utilized for correct roof system design prior to installing any roof system.
3. Refer to the Material Safety Data Sheet (MSDS) prior to using any adhesive for information regarding the safe use of the product. It may be necessary to shut down air intake systems and block the intake vents to prevent fumes from entering the building.
4. Asphalt-based products are incompatible with the Duro-Last roofing membrane. Should the Duro-Last membrane become soiled with roofing asphalt, the affected membrane must be cleaned immediately, using approved cleaners and procedures. If the asphalt cannot be properly cleaned from the membrane, the affected membrane must be removed and new membrane installed. **Note: Extreme caution must be taken not to contaminate the roof area with loose asphalt.**
5. The Duro-Last membrane must not be in contact with substrates that maintain or exceed temperatures of 120 °F, including insulated chimney pipes and combustible fuel pipes. Refer to the appropriate detail drawings for information regarding the proper termination.
6. Duro-Last, Inc. does not approve the practice of roofing over existing roofing systems that contain excess water. This is water observed by taking core cuts, seeing standing water in the core or having water flowing into the cut, or squeezing the core sample and getting water droplets.
7. Phenolic foam is not an approved insulation in new construction or re-roofing applications. The Duro-Last roofing system may not, under any circumstance, be installed over phenolic foam.
8. Perlite and wood/mineral fiber-boards are not acceptable substrates for the Duro-Last membrane.
9. If asbestos is encountered, the building owner must be notified at once. The owner is solely responsible for determining the proper course of action.
10. A Duro-Last roof shall not be installed over areas of roofs if one or more of the following conditions exist:
 - a. The building structure is not sufficient to handle the load of the completed system.
 - b. It is not possible to find an approved fastener that will properly hold in the substrate.
 - c. Roofs are subject to hot embers, slag, or burning debris.
 - d. Incompatible chemicals exhausted directly onto the roof or may come in contact with the roof in liquid form. (See "Chemical Resistance", page 4)
 - e. Steam is exhausted directly onto the roof that is in excess of 120° F (49° C).