



This addendum forms a part of the Contract Documents and modifies the original Documents dated **February 14, 2024**, as noted below. Acknowledge receipt of this addendum in the space provided on the Official Bid Form. Failure to do so may subject the Bidder to disqualification.

**SUBSTITUTION REQUEST**  
**NOT APPROVED**

Duro-Last's Duro-Fleece 60-mil Fully Adhered PVC Roof System WHITE

This substitution request is not approved for the following reasons:

- Proposed substitution does not meet or exceed product standards of original specified item.

**END OF ADDENDUM 2**

ADDENDUM 2



CENTRAL CURRY SCHOOL DISTRICT  
DISTRICT WIDE ROOFING PROJECT  
SUBSTITUTION REQUEST FORM  
SECTION 01 6023

**SUBSTITUTION REQUEST: DATE SUBMITTED** February 27, 2024

**1.01 SUBMIT TO:** Mike Freeman, Program Manager, HMK Company, [mike.freeman@hmkco.org](mailto:mike.freeman@hmkco.org)

**1.02 PROJECT:** District Wide Roofing Project

**1.03 SPECIFIED ITEM:** Tremco TPA FB Single Ply Roof System

- A. SECTION NAME AND NUMBER: 07 5400 Thermoplastic Membrane Roofing
- B. PRODUCT TYPE AND NAME AND MODEL: Thermoplastic Membrane; TPA FB Roof Membrane; Fleece Backed PVC
- C. PARAGRAPH AND PRODUCT DESCRIPTION: 2.02. Membrane Roofing and Associated Materials

**1.04 PROPOSED SUBSTITUTION:** Duro-Last's Duro-Fleece 60-mil Fully Adhered PVC Roof System WHITE

- A. MANUFACTURER AND MODEL NUMBER(S): Duro-Last, Inc FleeceBack PVC
- B. PRODUCT DESCRIPTION: FleeceBack weft-inserted knitted scrim within PVC films
- C. Attached data includes product description, specifications, drawings, photographs, performance, test data and **point by point comparative matrix** adequate for evaluation of request including identification of applicable data portions. Attached data also includes description of changes to Contract Documents the proposed substitution requires for proper installation.
- D. It is the responsibility of the requestee to assemble a comparative matrix outlining key elements of proposed substitution.

**1.05 UNDERSIGNED CERTIFIES FOLLOWING ITEMS, UNLESS MODIFIED BY ATTACHMENTS, ARE CORRECT:**

- A. Proposed substitution does not affect dimensions shown on the drawings.
- B. Undersigned pays for changes to building design, including engineering design, detailing, and construction costs caused by proposed substitution.
- C. Proposed substitution has no adverse effect on other trades, construction schedule, or specified warranty requirements.
- D. Maintenance and service parts are available locally or readily obtainable for proposed substitution.

**1.06 UNDERSIGNED FURTHER CERTIFIES FUNCTION, APPEARANCE, AND QUALITY OF PROPOSED SUBSTITUTION ARE EQUIVALENT OR SUPERIOR TO SPECIFIED ITEM.**

**1.07 UNDERSIGNED FURTHER CERTIFIES THAT THE MANUFACTURER OF THE PROPOSED SUBSTITUTION IS AWARE OF THIS SUBSTITUTION REQUEST AND AGREES TO THE STATEMENTS NOTED ABOVE.**

**1.08 UNDERSIGNED AGREES THAT THE TERMS AND CONDITIONS FOR SUBSTITUTIONS FOUND IN BIDDING DOCUMENTS APPLY TO THIS PROPOSED SUBSTITUTION.**



CENTRAL CURRY SCHOOL DISTRICT  
DISTRICT WIDE ROOFING PROJECT  
SUBSTITUTION REQUEST FORM  
SECTION 01 6023

**1.09 SUBMITTED BY:**

- A. PRINT NAME: Will Williams  
SIGNATURE: *Will Williams*
- B. FIRM NAME: Edge 2 Edge Roof Solutions, LLC
- C. FULL MAILING ADDRESS: 2506 N Puget Sound Avenue  
City: Tacoma State: WA Zip: 98408
- D. PHONE: (253) 225-4858 E-MAIL: will@edge2edgebes.com

**1.10 FOR USE BY ARCHITECT OR ENGINEER**

- A. APPROVED OR APPROVED AS NOTED BY: \_\_\_\_\_
- B. NOT APPROVED BY: Meagan Baker-Wilmes, Soderstrom Architects
- C. RECEIVED TOO LATE: \_\_\_\_\_
- D. REMARKS: \_\_\_\_\_
- E. DATE OF RESPONSE: March 1, 2024

**END OF SECTION**



**Top Layer – Thickness over Scrim (weathering)**

**Middle Layer – Reinforcement**

**Bottom Layer – Weldable Base**

**\*Duro-Last knits their own Reinforcement which is Wefed and Non-Wicking**

Standard Specification for Sheet Roofing		PVC	DURO-LAST FLEECE 60-mil Membrane	TREMCO TPA FB Single Ply
Physical Property	Test Method	ASTM D4434 Requirement	Typical Value	Typical Value
Reinforcement			18 x 9 (840 x 1000 denier threads) polyester weft inserted scrim	high strength polyester fabric
Overall Thickness	ASTM D751	≥ 0.054 and ≤ 0.066 in. (≥ 54 and ≤ 66ml)	0.060 in. (60 mil) 78-mil with FLEECE	60-mil (1.52 mm.)
Thickness Over Scrim	ASTM D7635	≥ 0.016 in.	0.031 in. (31 mil)	no data
Breaking Strength <sup>1</sup>	ASTM D751 Grab Method	≥ 200 lbf./in.	554 x 408 lbf./in.	Tensil Strength 350 lbf (1550 N)
Elongation <sup>1</sup>	ASTM D751 Grab Method	≥ 15%	34% x 85%	35 % MD, 33 % XMD
Seam Strength	ASTM D751 Grab Method	≥ 415 lbf. (75% of Breaking Strength)	437 lbf.	no data
Tear Strength <sup>1</sup>	ASTM D751 Procedure B	≥ 45 lbf.	50 x 200 lbf.	100 lbf (440 N)
Low Temp. Bend	ASTM D2136	Must pass at -40 °F	PASS	-40 °F (-40°C)
Heat Aging	ASTM D3045	conditioned for 56 days in oven maintained at 176 °F	PASS	no data
Accelerated Weathering	ASTM G155	10,000 hours total test time Irradiance level of 0.35 Wm <sup>2</sup> -340nm. Cycle: 102 minutes light, 18 minutes light + H <sub>2</sub> O spray, 63± 2.5°C black panel, 30± 5% RH	PASS	no data
Dimensional Stability <sup>1</sup>	ASTM D1204	Conditioned for 6 hours in oven maintained at 176 °F Allowable change: ≤ 0.5%	0.10% x 0.00%	no data
Water Absorption	ASTM D570	Immersed in water at 158 °F for 168 hours Allowable weight change: ≤ 3%	2.30%	1.0%
Static Puncture	ASTM D5602	≥ 33 lbf.	≥ 33 lbf	no data
Dynamic Puncture	ASTM D5635	≥ 14.7ft-lbf. (20 J)	≥ 14.7 ft-lbf	no data
Fungi Resistance	ASTM G21	no Sustained Growth or Discoloration	no Sustained Growth or Discoloration	no data
Moisture Vapor Transmission	ASTM E96, Proc. B, Method A	< 0.35 US perms	< 0.35 US perms	no data
Solar Reflectance (White)	ASTM C1549	Initial 3 year	0.87 0.67	0.86 0.70
Thermal Emittance (White)	ASTM C1371	Initial 3 year	0.89 0.89	0.86 0.82
SRI (White)	ASTM E	Initial 3 year	110 81	108 84

Does not seem equivalent / better

0.3% at 6 hours

Does not seem equivalent / better

Does not seem equivalent / better

<sup>1</sup> Typical values are shown for both machine and cross machine directions. The machine direction results are listed first. All values obtained from Manufacturer's online data sheets

**Duro-Last Roofing System is a complete system including ES-1 Compliant Metal Edge systems fabricated in house, the most comprehensive warranties in the industry and a competitive advantage with custom fabrication.**

# DURO-FLEECE® 60-MIL MEMBRANE

**GUARANTEED THICKNESS**

**Advantages:**

Duro-Last® Duro-Fleece® 60-Mil (DF60) is an excellent choice for projects requiring a long lasting, energy efficient roofing membrane. The combination of fleece and the proven performance of Duro-Last roofing membrane results in an ideal product for use in adhered and mechanically fastened applications over a wide variety of roof substrates. A complete line of custom-fabricated accessories is available for use with DF60.

**Description:**

In addition to the fleece, DF60 incorporates a weft-inserted, knitted scrim within PVC films to provide exceptional strength and waterproofing.

**Duro-Fleece membranes must not be used with Duro-Last EV membranes.**

**PVC Film** – Proprietary thermoplastic PVC formulation of resins, plasticizers, stabilizers, biocides, flame retardants, and U.V. absorbents.

- PVC film above weft-inserted scrim – 31 mil, Guaranteed Thickness

**Weft-Inserted Scrim** – An 18 x 9 polyester fabric construction with weft insertion, composed of 840 x 1000 denier threads, provides superior tear and puncture resistance. The polyester thread is treated to prevent wicking.

**Fleece** – The 3.8-ounce per square yard needle-punched polypropylene fleece provides excellent properties for adhering to, or mechanically fastening over, a variety of substrates. Each roll of membrane has one selvage edge where the fleece is held back 2.25 inches to provide for hot-air welding to the underlying membrane.

**Total Membrane Thickness** – 60 mil, minimum

**Overall Thickness (with Fleece)** – 78 mil, minimum

**Weight** – 0.39 lb. per square foot.

**Color** – White.

**R-Value** – 0.1 R (0.1 ft<sup>2</sup>·°F·hr/Btu).

**Packaging** – DF60 is supplied in the roll sizes shown below. A full pallet contains ten rolls.

**Roll Dimensions**

Dimensions	Approximate Coverage <sup>1</sup>	Approximate Weight
120 in. x 100 ft.	975 sq. ft.	390 lb.
60 in. x 100 ft.	475 sq. ft.	195 lb.

<sup>1</sup> Assuming 3-inch overlap



**Overlap Line** – A line, 6 inches from one edge of the sheet, is factory-applied to the top of the sheet to assist in maintaining proper overlap between sheets.

**Energy Efficiency:**

White DF60 is an excellent product for complying with California Title 24, LEED® and other energy efficiency programs requiring the use of a highly reflective roof membrane.

**Cool Roof Rating Council (CRRC)**

	CRRC ID	Solar Reflectance		Thermal Emittance		Solar Reflective Index (SRI)	
		Initial	3-yr	Initial	3-yr	Initial	3-yr
<b>White</b>	0610-0010	0.87	0.67	0.89	0.89	110	81

**LEED-NC & LEED-EB Credits** – White DF60 alone can obtain 1 credit in either U.S. Green Building Council’s LEED-NC or LEED-EB programs. In combination with other design criteria the membrane may help attain many other credits.

LEED-NC Credit Category	Duro-Last Attribute
Sustainable Sites Heat Island Reduction	Solar Reflective Index (SRI) = 110

LEED-EB Credit Category	Duro-Last Attribute
Sustainable Sites Heat Island Reduction	Solar Reflective Index (SRI) = 110

**Warranty:**

The following warranties are available for projects utilizing DF60. Contact Duro-Last for warranty details.

**Consequential damage coverage is not available for Duro-Fleece installations.**

Available Warranties			
<b>Supreme</b>	Not applicable for this product		
<b>Ultra</b>	15-Year NDH High Wind Warranty	20-Year NDH High Wind Warranty	25-Year NDH High Wind Warranty <sup>1</sup>
<b>Basic</b>	15-Year NDH Warranty	20-Year NDH Warranty	25-Year NDH Warranty <sup>1</sup>
<b>Residential</b>	15-Year Residential Material Limited Warranty		20-Year Residential Material Limited Warranty

<sup>1</sup> Refer to the 25 and 30-Year Warranty Requirements for additional installation criteria.

**Codes and Standards:**

Underwriters Laboratories (US & Canada), UL Evaluation Report (ER10128), FM Approvals, Canadian Construction Materials Centre (CCMC 14011-L), State of Florida, Miami-Dade County, Texas Department of Insurance.

**Storage:**

Store rolls lengthwise on pallets. Use tarps to keep rolls dry.

**Membrane Attachment:**

**Adhered** – DF60 may be adhered to a variety of roof decks, walls, cover boards and insulations. It may be adhered directly to an existing built-up roof (BUR) by using approved membrane adhesives. Adhesion pull tests are required prior to adhering to BUR. The tests must be performed on a 1 x 1-foot area and receive minimum values of 150 pounds per square foot. Refer to the Adhered Duro-Fleece Roofing System Specification for substrate preparation, acceptable adhesives and system requirements.

**Mechanically Fastened** – DF60 may be mechanically fastened to a variety of roof deck and wall materials. An appropriate slip sheet, insulation or cover board may be required. Refer to the Roll Good Mechanically Fastened Roofing System Specification for system requirements.

**Physical Properties:**

DF60 has been subjected to the tests required by ASTM D4434 “Standard Specification for Poly (Vinyl Chloride) Sheet Roofing” and has been classified as a Type III, internally reinforced sheet with a fabric backing. The results of each test are listed below. ASTM’s Overall Thickness requirements for the membrane (guaranteed thickness) are of the listed Typical Value.

Physical Property	Test Method	ASTM D4434 Requirement	Result	Typical Value
Overall Thickness	ASTM D751	≥ 0.054 and ≤ 0.066 in. (≥ 54 and ≤ 66 mil)	PASS	0.060 in. (60 mil), minimum (With fleece: 78 mil)
Thickness Over Scrim	ASTM D7635	≥ 0.016 in.	PASS	0.031 in. (31 mil)
Breaking Strength <sup>1</sup>	ASTM D751 Grab Method	≥ 200 lbf./in.	PASS	554 x 408 lbf./in.
Elongation <sup>1</sup>	ASTM D751 Grab Method	≥ 15%	PASS	34% x 85%
Seam Strength	ASTM D751 Grab Method	≥ 415 lbf. (75% of Breaking Strength)	PASS	437 lbf.
Tear Strength <sup>1</sup>	ASTM D751 Procedure B	≥ 45 lbf.	PASS	50 x 200 lbf.
Low Temp. Bend	ASTM D2136	Must pass at -40° F	PASS	PASS
Heat Aging	ASTM D3045	Conditioned for 56 days in oven maintained at 176° F	PASS	PASS
Accelerated Weathering	ASTM G155	10,000 hours total test time. Irradiance level of 0.35 W/m <sup>2</sup> -340nm. Cycle: 102 minutes light, 18 minutes light + H <sub>2</sub> O spray, 63±2.5° C black panel, 30±5% RH	PASS	PASS
Dimensional Stability <sup>1</sup>	ASTM D1204	Conditioned for 6 hours in oven maintained at 176° F. Allowable change: ≤ 0.5%	PASS	0.10% x 0.00%
Water Absorption	ASTM D570	Immersed in water at 158° F for 168 hours. Allowable weight change: ≤ 3%	PASS	2.3%
Static Puncture	ASTM D5602	≥ 33 lbf.	PASS	≥ 33 lbf.
Dynamic Puncture	ASTM D5635	≥ 14.7 ft-lbf.	PASS	≥ 14.7 ft-lbf.

<sup>1</sup> Typical values are shown for both machine and cross machine directions. The machine direction results are listed first.

**Additional Tests**

Fungi Resistance	ASTM G21	No Sustained Growth or Discoloration
Moisture Vapor Transmission	ASTM E96, Proc. B, Method A	< 0.35 U.S. perms



# NOTIFICATION OF ENERGY STAR® PRODUCT CERTIFICATION

Partner's EPA-issued Organization ID #: 28148

Partner Name: Duro-Last Roofing Inc.

Product Brand Name: Duro-Last

Product Model Name: Duro-Fleece

CB Unique Model Identifier: ES-DUR-0003

ENERGY STAR Specification Version: 3.0

Initial Solar Reflectance: 0.87

Solar Reflectance After 3 Years: 0.67

Initial Emissivity: 0.89

Slope Category: Low Slope? Yes Steep Slope? Yes

The Cool Roof Rating Council (CRRC), an ISO/IEC 17065 accredited EPA Certification Body, has reviewed the test results data provided by an EPA-certified testing laboratory and has determined that this roofing product meets the qualification criteria of ENERGY STAR's Program Requirements Product Specification for Roof Products.

This Notification of Product Certification is subject to all terms and conditions of the ENERGY STAR Partnership Agreement, ENERGY STAR Program Requirements for Roof Products: Partner Commitments and Eligibility (in accordance with the version that product is certified under), Evaluation Services-CRRC Agreement, and the Evaluation Services Certification Program Manual.

This Notice of Product Certification is only valid based on the certification status of the product. To determine if the product is actively certified please visit ENERGY STAR's Qualified Product List at:

<http://www.energystar.gov/productfinder/product/certified-roof-products/results>



Application Review



Management Approval

2016-11-11

Date

Certificate provided by:  
Cool Roof Rating Council  
449 15th St. Suite 400  
Oakland, CA 94612

Certificate provided to:  
Duro-Last Roofing Inc.  
525 Morley Drive  
Saginaw MI 48601

# ENVIRONMENTAL PRODUCT DECLARATION

According to ISO 14025:2006 and ISO 21930:2017



## ENVIRONMENTAL PRODUCT DECLARATION VERIFICATION

EPD Information			
Program Operator		NSF International	
Declaration Holder		Duro-Last, Inc.	
Product Duro-Fleece 50-mil, 60-mil, and 80-mil	Date of Issue 01/04/2022	Valid Until 01/04/2027	Declaration Number EPD10677
This EPD was independently verified by NSF International in accordance with ISO 14025 and ISO 21930:  <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External		 Tony Favilla <a href="mailto:afavilla@nsf.org">afavilla@nsf.org</a>	
This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR:		 Jack Geibig <a href="mailto:jgeibig@ecoform.com">jgeibig@ecoform.com</a>	
LCA Information			
EPD Project report		A Cradle-to-Gate Life Cycle Assessment of Duro-Last Inc's Single-ply PVC Roofing Membranes, December 2021	
LCA Preparer  		Lindita Bushi Ph.D., Mr. Jamie Meil and Mr. Grant Finlayson Athena Sustainable Materials Institute 280 Albert Street, Suite 404 Ottawa, Ontario, Canada K1P 5G8 <a href="mailto:info@athenasmi.org">info@athenasmi.org</a> <a href="http://www.athenasmi.org">www.athenasmi.org</a>	
This EPD project report was critically reviewed in accordance with ISO 14025, ISO 14040/44, and the reference PCR by:		Jack Geibig <a href="mailto:jgeibig@ecoform.com">jgeibig@ecoform.com</a>	
PCR Information			
Program Operator		NSF International	
Reference PCR		NSF International, Product Category Rules for Preparing an Environmental Product Declaration for Single Ply Roofing Membranes	
Date of Issue		October 2019	
PCR review was conducted by:		Thomas P. Gloria, PhD (Chair), Industrial Ecology Consultants Mr. Jack Geibig, EcoForm Mr. Bill Stough, Sustainable Research Group	

EPD Program Operator  
 NSF International  
 789 N. Dixboro Rd.  
 Ann Arbor MI 48105 USA  
[www.nsfustainability.org](http://www.nsfustainability.org)



Date of Issue: 01/04/2022  
 Valid Until: 01/04/2027  
 Declaration#: EPD10677

## LOW PRESSURE POLYURETHANE FOAM INFORMATION

<b>Description</b>	Low pressure, two-component spray polyurethane foam adhesive
<b>SPF</b>	Spray Polyurethane Foam
<b>Applications</b>	Designed to adhere to a variety of substrates and insulation board stock in both new and recover applications.
<b>Preparation for use</b>	Substrate must be clean, dry, firm, free of loose particles, and free of dust, grease and mold release agents. Protect surfaces not to be foamed. Read SDS, Operating Instructions, and Product Stewardship Guidelines. For additional information go to <a href="http://www.polysetadhesives.com">www.polysetadhesives.com</a>
<b>Use</b>	Warm/Cool chemical to 70-85°F (21-29°C). Follow instructions for set-up found in the operating instructions.
<b>PPE</b>	 <p>Wear protective glasses with side shields or goggles, nitrile gloves, and clothing that protects against dermal exposure. Recommend dispensing product in a well-ventilated area with certified respiratory protection; however, well ventilated exterior applications may not need respiratory protection. It is the responsibility of the employer to complete a PPE evaluation and/or exposure assessment to determine if respiratory protection is required. Read all instructions, ICP Product Stewardship Guidelines, and SDS (Section 8) prior to use of any product.</p>
<b>Note</b>	FOR PROFESSIONAL USE ONLY. Always check the local building code before use. Cured low pressure polyurethane foam is non-toxic and inert.
<b>Temperature</b>	Please see temperature guidelines located on page 2. Lower substrate application temperatures will increase gel and tack free times. The applicator can also expect a slower rise time.
<b>Product Storage</b>	Store in a dry area. Optimum chemical storage temperature is 50-90°F (10-32°C). Excessive heat can cause premature aging of components resulting in a shorter shelf-life. Do not allow material to freeze.
<b>Disposal</b>	Refer to SDS (Section 13) for instructions. Always dispose of empty cylinders in according to applicable federal, state, provincial and local regulations.
<b>Shelf-life</b>	18 months
<b>Compatibility</b>	Cured low pressure polyurethane foam is chemically inert and non-reactive in approved applications. See compatibility chart located on page 2.
<b>Limitations</b>	Do not use when ambient substrate temperatures are below 30°F (-1°C). Do not use during inclement weather, on wet surfaces or on any roof deck showing signs of deterioration or loss of structural integrity. Do not use after the expiration date. Do not use on insulating board stock larger than 4 x 4 ft.

TECHNICAL DATA	STANDARD	RESULTS
<b>Tensile Strength</b>	ASTM D412	29 psi
<b>Density</b>	ASTM D1622	2.8 lbs/ft <sup>3</sup>
<b>Compressive Strength</b>	ASTM D1621	11 psi
<b>Water Absorption</b>	ASTM D471	4.2%
<b>Fire Rating at 1" Thickness</b>	ASTM E84	Flame Spread Index 15 Smoke Developed 200

**APPROVALS/STANDARDS/CLASSIFICATIONS**

**UL - Underwriters Laboratories**  
**FM - Factory Mutual**  
**Miami Dade NOA**  
**FBC - Florida Product Approval**



**PROPERTIES\***

<b>Open Time</b>	1 – 10 minutes
<b>Mixing Nozzle Working Time</b>	30 seconds
<b>Set-up Time</b>	10 – 30 minutes
<b>Cure Time</b>	24 hours
<b>VOC Content (EPA Method 24)</b>	98 g/L

\*Times may be affected by temperature and weather conditions

**TEMPERATURE GUIDELINES**

<b>Chemical Storage Temperature</b>	50-90°F (10-32°C)
<b>Outside Application Temperature/Ambient</b>	30-100°F (-1-38°C)
<b>Process Core Chemical Temperature</b>	70-85°F (21-29°C)
<b>Surface Temperature (Substrate/Deck)</b>	30-100°F (-1-38°C)
<b>Cured Foam</b>	-200°F to +240°F (-129°C to +116°C)

**YIELD\* AND WEIGHT**

<b>Product Number</b>	<b>Maximum Yield Spatter Pattern</b>	<b>Maximum Yield 2.5" bead, 12" OC</b>	<b>Net Weight</b>
<b>P12050</b>	30 Squares	35 Squares	44.5 lbs. (20.2 kg) A component 44.1 lbs. (20.0 kg) B component
<b>P12051</b>	9 Squares	11 Squares	27.7 lbs. (12.7 kg) / Kit

\*Coverage rates may vary based on ambient temperature and application

**COMPATIBLE ROOF DECKS AND SUBSTRATES**

**COMPATIBLE ROOF INSULATIONS AND COVER BOARDS**

Structural Concrete	Polyisocyanurate (flat or tapered)
Asphalt Primed Concrete	Extruded or Expanded Polystyrene
Pre-cast Concrete	High density wood fiber
Various BUR (smooth or gravel)	Gypsum boards
Steel-22 gauge or lower with approved cross section	Cement roof boards
Lightweight Structural Concrete	
Cementitious Wood Fiber Planks	
Insulating Concrete	
Vapor Retarders (hot, cold, torch-applied)	
Gypsum	

**NOTE:** Physical properties shown are typical and are to serve only as a guide for engineering design. Results are obtained from specimens under ideal laboratory conditions and may vary upon use, temperature and ambient conditions. Right to change physical properties as a result of technical progress is reserved. Yields shown are optimum and will vary slightly depending on ambient conditions and application. This information supersedes all previously published data. The customer is responsible for deciding whether products and associated TDS information are appropriate for customer's use.

**WARNING:**

ICP low pressure one-component polyurethane foam sealants and adhesives (OCF), low pressure spray polyurethane foams and foam adhesives (SPF), and low pressure pour-in-place polyurethane foams (PIP) are composed of diisocyanate, hydrofluorocarbon, hydrocarbon, hydrofluoroolefin or hydrochlorofluoroolefin blowing agent, and a polyol blend. The urethane foam produced from these ingredients will support combustion and may present a fire hazard if exposed to a fire or excessive heat about 240°F (116°C). Read all instructions, ICP Product Stewardship Guidelines and SDS (Section 8) prior to use of any product. ICP polyurethane products are for professional use only.

Before using any OCF, SPF or PIP product, read the SDS and instructions carefully before use ([www.polysetadhesives.com](http://www.polysetadhesives.com)). **OCF Products:** wear protective glasses with side shields or goggles, nitrile gloves, and clothing that protects against dermal exposure. Recommend using in a well-ventilated area. Avoid breathing vapors. **SPF/PIP Products:** wear protective glasses with side shields or goggles unless using a full-face respirator, nitrile gloves, and clothing that protects against dermal exposure. Recommend dispensing product in a well-ventilated area and with certified respiratory protection or a powered air purifying respirator (PAPR); however, well ventilated exterior applications may not need respiratory protection. It is the responsibility of the employer to complete a PPE evaluation and/or exposure assessment to determine if respiratory protection is required. Personal Protective Equipment can be purchased through ICP Building Solutions Group by ordering the Polyset® Contractor Safety Kit (F65251). The Contractor Safety Kit includes nitrile gloves, contractor safety glasses, and a size Medium NIOSH-approved negative pressure half mask respirator.

Refer to each product's TDS for specifications, testing results, and other attributes. The customer is ultimately responsible for deciding whether products and associated TDS information are appropriate for customer's use. For professional use only. Building practices unrelated to materials can lead to potential mold issues. Material suppliers cannot provide assurance that mold will not develop in any specific system. Product uses a non-flammable compressed gas. Keep away from heat. Smoking and open flames, including hot work, should be prohibited in the vicinity of a foaming operation. Avoid contact with skin and eyes. May cause sensitization by inhalation and/or direct skin contact. Persons previously sensitized to Isocyanates may develop a cross-sensitization reaction to other isocyanates. Avoid prolonged or repeated breathing of vapor. Use in conformance with all local, state and federal regulations and safety requirements. Failure to strictly adhere to any recommended procedures and reasonable safety precautions shall release ICP Building Solutions Group of all liability with respect to the materials or the use thereof. For additional information and location of your nearest distributor, call ICP Building Solutions Group 330.753.4585.



2775 Barber Road | Norton, OH 44203  
330-753-4585 | [www.icpgroup.com](http://www.icpgroup.com)

**MADE IN USA**  
WITH GLOBALLY SOURCED MATERIALS

# DURO-GUARD® DENSDECK® PRIME 1/2-INCH ROOF BOARD

## Description

DensDeck® Prime Roof Board has been enhanced to provide a broader compatibility and higher performance with roofing adhesives. Face mat enhancements allow adhesives to be applied more uniformly and consistently. DensDeck Prime Roof Boards reduce the amount of mastic or adhesive used and potentially eliminates field primers. The DensDeck Prime Roof Board design employs fiberglass mats front and back that are mechanically bonded to a high density gypsum core, providing excellent fire resistance and wind uplift properties. The unique construction of DensDeck Prime Roof Board provides superior flute spanning that stiffens and provides increased foot traffic resistance to the roof deck. Additionally, DensDeck Prime Roof Board has been shown to withstand delamination, deterioration and job-site damage far more effectively than roofing membrane substrates such as paperfaced gypsum board, fiberboard and perlite insulation.

## Primary Uses

DensDeck Prime Roof Board can be used as a recovery board and overlayment protection board for polyisocyanurate and polystyrene insulation.

## Standards and Code Approvals

DensDeck Prime Roof Boards are manufactured to meet ASTM C1177 and have the following approvals:

- Florida Product Approved
- Miami-Dade County, Product Control Approved

## Recommendations and Limitations

DensDeck Prime Roof Boards are manufactured to act with a properly designed roof system following good roofing practices. The actual use of DensDeck Prime Roof Board as a roofing component in any system or assembly is the responsibility of the roofing system's design authority. Consult with the appropriate design authority for system and assembly specifications and instructions on applying other products to DensDeck Prime Roof Board.

DensDeck Prime Roof Boards should not be subjected to abnormal or excessive loads or foot traffic, such as, but not limited to, use on plaza decks or under steel-wheeled equipment that may fracture or damage the panels. Provide suitable roofing system protection when required.

## Moisture Management

**DensDeck Prime Roof Boards, like other components used in roofing systems, must be protected from exposure to moisture before, during and after installation.**

Remove the plastic packaging from all DensDeck Prime Roof Board immediately upon receipt of delivery. Failure to remove the plastic packaging may result in entrapment of condensation or moisture. DensDeck Prime Roof Board stored outside must be stored level and off the ground and protected by a breathable waterproof covering. Provide means for air circulation around and under stored bundles of DensDeck Prime Roof Board. DensDeck Prime Roof Board must be covered the same day as installed.

Avoid application of DensDeck Prime Roof Boards during rain, heavy fog and any other conditions that may deposit moisture on the surface, and avoid the overuse of non-vented, direct-fired heaters during winter months. When roofing systems are installed on newly poured concrete or light weight concrete decks or when re-roofing over an existing concrete deck, a vapor barrier should be installed above the concrete to limit the migration of water from the concrete into the roof assembly. Always consult a design authority for specific instructions for applying other products to DensDeck Prime Roof Boards.

Moisture vapor movement by convection must be eliminated, and the flow of water by gravity through imperfections in the roof system must be controlled. After a leak has occurred, no condensation on the upper surface of the system should be tolerated, and the water introduced by the leak must be dissipated to the building interior in a minimum amount of time.

Although DensDeck Prime Roof Boards are engineered with fiberglass facings and high density gypsum cores, the presence of free moisture can have a detrimental effect on the performance of the product. Moisture accumulation may also significantly decrease wind uplift and vertical pull resistance in the system or assembly. DensDeck Prime Roof Boards containing excessive free moisture content may need to be evaluated for structural stability to assure wind uplift performance.

**Fire Resistance Classifications**

DensDeck Prime Roof Boards are excellent fire barriers over combustible and noncombustible roof decks, including steel decks.

*UL 790 Classification.* DensDeck Prime Roof Boards have been classified by Underwriters Laboratories (UL) for use as a fire barrier over combustible and noncombustible decks in accordance with the ANSI/UL 790 test standard. The UL classification includes a comprehensive Class A, B or C rating. For additional information concerning the UL 790 classification, consult the UL Certification Directory.

*UL 1256 Classification.* DensDeck Prime Roof Boards have also been classified by UL in roof deck constructions for internal (under deck) fire exposure in accordance with the ANSI/UL 1256 Steiner Tunnel test. For additional information concerning the UL 1256 classification, consult the UL Certification Directory.

*FM Class 1 Approvals.* DensDeck Prime Roof Boards are included in numerous roofing assemblies with a Factory Mutual (FM) Class 1 fire rating. For more information concerning FM Approvals and FM Class 1 assemblies with DensDeck Roof Boards, consult FM or RoofNav®.

*UL Fire Resistance Ratings.* For information concerning UL fire rated assemblies, please visit [www.ul.com](http://www.ul.com).

*Flame Spread and Smoke Developed.* When tested in accordance with ASTM E84, DensDeck Prime Roof Boards had Flame Spread 0, Smoke Developed 0.

**Wind Uplift**

DensDeck Roof Boards are included in numerous assemblies evaluated by FM or other independent laboratories for wind uplift performance. For information concerning such assemblies, please visit [www.roofnav.com](http://www.roofnav.com).

**Handling and Use—CAUTION**

This product contains fiberglass facings which may cause skin irritation. Dust and fibers produced during the handling and installation of the product may cause skin, eye and respiratory tract irritation. Avoid breathing dust and minimize contact with skin and eyes. Wear long sleeve shirts, long pants and eye protection. Always maintain adequate ventilation. Use a dust mask or NIOSH/MSHA approved respirator as appropriate in dusty or poorly ventilated areas.

**Physical Properties**

Properties	1/2" (12.7 mm)
Thickness, nominal	1/2" (12.7 mm) ± 1/32" (.8 mm)
Width, standard	4' (1219 mm) ± 1/8" (3 mm)
Length, standard	4' (1219 mm) and 8' (2438 mm) ± 1/4" (6.4 mm)
Weight, nominal, lbs./sq. ft. (Kg/m <sup>2</sup> )	2.0 (9.8)
Surfacing	Fiberglass mat with non-asphaltic coating
Flexural Strength <sup>1</sup> , parallel, lbf. min.	≥80 (356)
Flute Spanability <sup>2</sup>	5" (127 mm)
Permeance <sup>3</sup> , perms	>23 (1300)
R Value <sup>4</sup> , ft <sup>2</sup> •°F•hr/BTU (m <sup>2</sup> •K/W)	.56
Linear Variation with Change in Temp., in/in °F (mm/mm/C°)	8.5 x 10 <sup>-6</sup> (15.3 x 10 <sup>-6</sup> )
Linear Variation with Change in Moisture	6.25 x 10 <sup>-6</sup>
Water Absorption <sup>5</sup> , % max	<10
Compressive Strength <sup>6</sup> , psi nominal	900
Surface Water Absorption, grams, nominal	<2.0
Flame Spread, Smoke Developed (ASTM E84)	0/0
Bending Radius	6' (1829 mm)

Specified product is 5%

Specified product is 1.0

1. Tested in accordance with ASTM C473 method B.
2. Tested in accordance with ASTM E661.
3. Tested in accordance with ASTM E96 (dry cup method).
4. Tested in accordance with ASTM C518 (heat flow meter).
5. Tested in accordance with ASTM C1177.
6. Tested in accordance with ASTM C473.

**FIRE SAFETY CAUTION**

Passing a fire test in a controlled laboratory setting and/or certifying or labeling a product as having a one-hour, two-hour, or any other fire resistance or protection rating and, therefore, as acceptable for use in certain fire rated assemblies/systems, does not mean that either a particular assembly/system incorporating the product, or any given piece of the product itself, will necessarily provide one-hour fire resistance, two-hour fire resistance, or any other specified fire resistance or protection in an actual fire. In the event of an actual fire, you should immediately take any and all actions necessary for your safety and the safety of others without regard for any fire rating of any product or assembly/system.

# DURO-GUARD® ISO II

## FLAT AND TAPERED PANELS

### Description:

Duro-Guard® ISO II is a closed-cell polyisocyanurate foam core insulation board with an integrally laminated, fiber-reinforced facer which is compatible with Duro-Last® roof membranes.

- Available in both flat and tapered panels in order to meet thermal insulation needs as well as provide slope for proper roof drainage.
- Manufactured with a blowing agent that has zero ozone depletion potential (ODP) and virtually no global warming potential (GWP).
- Approved for direct application to steel and other deck types.
- Available in two grades of compressive strength per ASTM C 1289:
  - Type II, Class 1, Grade 2 (20 psi).
  - Type II, Class 1, Grade 3 (25 psi).
- Refer to Table 3 for physical properties.

### Recommended Uses:

- Mechanically attached Duro-Last roof systems.
- Adhered/Fully Bonded Duro-Last roof systems.
- Duro-Bond® roof systems.
- Metal retrofit roof systems.

### Underwriters Laboratories, Inc. Classifications:

- UL 1256.
- Insulated Metal Deck Constructions:
  - No. 120, 123, 292.
- UL 790.
- UL 263 Hourly Rated P Series Roof Assemblies.
- UL Classified for use in Canada.

### Factory Mutual Approvals:

- FM 4450, FM 4470.
- Approved for Class 1 insulated steel, wood, concrete and gypsum roof deck construction.
- Refer to FM Approval's RoofNav for details on FM Approved systems ([www.roofnav.com](http://www.roofnav.com)).

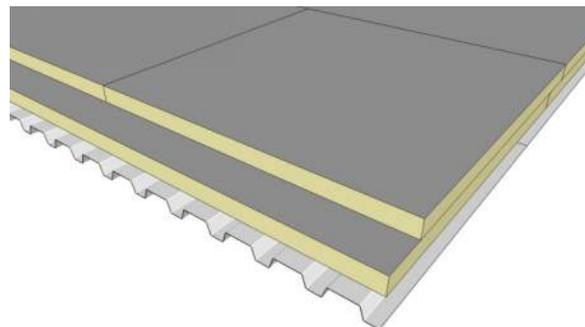


Figure 1. Duro-Guard ISO II Flat On Steel Deck

### Flat Panels:

- Available sizes:
  - 4 ft. x 4 ft.
  - 4 ft. x 8 ft.
  - Thicknesses: 1 to 4 inches.
- Refer to Table 2 for R-value and flute spanability.

### Tapered Panels:

- Available sizes:
  - 4 ft. x 4 ft.
  - Thicknesses: ½ to 4-½ inches.
- Precut miters and crickets are also available.
- Taper designs and shop drawings available.

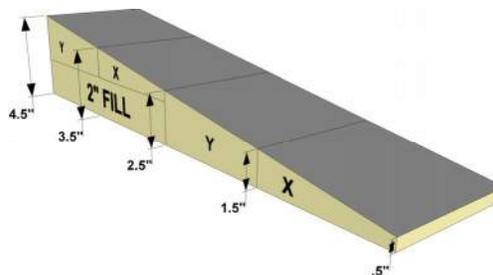


Figure 2. Duro-Guard ISO II Taper

TABLE 1. TYPICAL TAPER PANEL DIMENSIONS					
ID	SLOPE*		SIZE	MIN	MAX
Q	½" per ft.	4%	4 ft. x 4 ft.	½"	2-½"
QQ	½" per ft.	4%	4 ft. x 4 ft.	2-½"	4-½"
X	¼" per ft.	2%	4 ft. x 4 ft.	½"	1-½"
Y	¼" per ft.	2%	4 ft. x 4 ft.	1-½"	2-½"
Z	¼" per ft.	2%	4 ft. x 4 ft.	2-½"	3-½"
G	¼" per ft.	2%	4 ft. x 4 ft.	1"	2"
H	¼" per ft.	2%	4 ft. x 4 ft.	2"	3"
AA	⅛" per ft.	1%	4 ft. x 4 ft.	½"	1"
A	⅛" per ft.	1%	4 ft. x 4 ft.	1"	1-½"
B	⅛" per ft.	1%	4 ft. x 4 ft.	1-½"	2"
C	⅛" per ft.	1%	4 ft. x 4 ft.	2"	2-½"

\* Contact Duro-Last for additional slope options.

**Installation:**

- Panels must be kept dry before, during and after installation. Install only as much insulation as can be covered the same day with completed roofing.
- The use of multiple layers of insulation with joints staggered a minimum of 6 inches between layers is recommended to eliminate thermal bridging.
- Abut panel edges together and stagger joints of adjacent panels.
- Boards must be neatly fitted to roof deck and around penetrations with no gaps greater than ¼ inch.
- Refer to the appropriate Duro-Last roof system specification and detail drawings for deck preparation and attachment requirements.
- Precautions must be taken to ensure that new concrete decks have fully hydrated and do not continue to release moisture.

**Panel Attachment:**

- Panels may be attached to the roof deck using mechanical fasteners, insulation adhesive or hot bitumen. It is acceptable to use these products in combination.

*Mechanical Attachment*

- When installing multiple layers (which may include insulation, cover boards and thermal barriers) it is acceptable to mechanically secure through all layers.
- Use fasteners and plates supplied by or approved by Duro-Last, Inc.

*Adhesive Attachment*

- Insulation adhesive must be supplied by Duro-Last, Inc. Refer to the adhesive’s product data sheet for application guidelines. Acceptable products:
  - Duro-Grip® Insta-Stik™ .
  - Duro-Grip Olybond® .
  - Duro-Grip Millenium Weather-Tite® .
  - Duro-Grip CR-20.
- Subsequent layers of insulation and approved cover boards may be attached with insulation adhesive.
- Maximum panel dimensions are 4 ft. x 4 ft.

*Hot Bitumen Attachment*

- When using hot bitumen on concrete decks, priming is necessary.
- Temperature of the bitumen shall be approximately 50° F below the inter-ply hand mopping EVT.
- The deck shall be dry and care must be taken to apply the bitumen in sufficient quantity to totally cover the available deck surface.

THICKNESS*		LTTR R-VALUE	FLUTE SPANABILITY	
inches	mm		inches	mm
1.00	25	5.70	2.625	67
1.50	38	8.60	4.375	111
1.60	41	9.10	4.375	111
1.70	43	9.70	4.375	111
2.00	51	11.40	4.375	111
2.50	64	14.40	4.375	111
2.60	66	15.00	4.375	111
2.70	69	15.60	4.375	111
2.90	74	16.80	4.375	111
3.00	76	17.40	4.375	111
3.30	84	19.20	4.375	111
3.50	89	20.50	4.375	111
3.60	91	21.10	4.375	111
4.00	102	23.60	4.375	111

\* Contact Duro-Last for additional thickness options.

Compressive Strength	ASTM D 1621 ASTM C 1289	Grade 2	20 psi (138 kPa)
		Grade 3	25 psi (172 kPa)
Dimensional Stability	ASTM D 2126	2% linear change (7 days)	
Moisture Vapor Transmission	ASTM E 96	< 1 perm (85.0 ng/Pa·s·m <sup>2</sup> )	
Water Absorption	ASTM C 209	< 1% volume	
Service Temperature		-40° to 200° F (-40° to 93° C)	

- To ensure embedment, the board shall also be “stepped in” at several points while the bitumen is still hot enough to allow positive attachment.
- Maximum panel dimensions are 4 ft. x 4 ft.
- Any roof membrane contaminated with bitumen must be replaced.

**Storage:**

- Insulation must be protected from open flame and kept dry at all times.
- Factory applied packaging is intended only for protection during transit. Slit or remove the packaging to prevent accumulation of condensation.
- Store elevated (at least 3 inches) and completely covered with a weatherproof covering such as a tarpaulin.
- Do not use panels which are wet or damaged.
- Refer to PIMA Technical Bulletin No. 109: *Storage and Handling Recommendations for Polyiso Roof Insulation* for additional guidelines (www.pima.org).

**Limitations:**

- Duro-Last, Inc. will not be responsible or liable for any defects or problems related to building or roof design by others, to deficiencies in construction, to dangerous conditions on the job site, or to improper storage, handling or installation by others.

# EHD SCREWS

**DESCRIPTION:**

Duro-Last®, Inc. Duro-Coated Screws are used for the mechanical fastening of the Duro-Last roofing system and insulation board. Duro-Last EHD (Extra Heavy-Duty) Screws are #15 diameter fasteners equipped with a P-3 truss head, and a drill point.

When greater fastener pullout resistance is needed, the Duro-Last EHD Screw should be used.

Duro-Last EHD Screws can be used in most types of roofing applications. These Duro-Coated Screws ✓twice pass the FM 4470 standard for corrosion resistance, totaling 30 cycles in a Kesternich cabinet. Duro-Coated Screws pass 20° and 40° bend tests (hardness) and are able to penetrate a 20-gauge deck in under three seconds with a 50-pound load.

**ORDERING:**

Duro-Last, Inc. stocks EHD Screws in the sizes and quantities noted in Table 1. Additional sizes are available on a drop ship basis. Allow adequate time for ordering and delivery of special orders.

**PRECAUTIONS:**

1. Read Safety Data Sheets (SDS) prior to using.
2. Wear proper personal protective equipment, such as gloves and eye protection, per the SDS.

**INSTALLATION:**

1. Penetration into all deck types is a minimum of 1 in. (25 mm) from the top surface of the deck. Take care to orient the fastener perpendicular to the deck and not to overdrive the fastener.



TABLE 1. EHD SCREW DIMENSIONS AND PACKAGING		
Overall Length	Thread Length	Quantity per Pail
2 in. (51 mm)	2 in. (51 mm)	1,000
3 in. (76 mm)	2.875 in. (73 mm)	1,000
4 in. (102 mm)	2.875 in. (73 mm)	1,000
5 in. (127 mm)	3.875 in. (98 mm)	1,000
6 in. (152 mm)	3.875 in. (98 mm)	500
7 in. (178 mm)	3.875 in. (98 mm)	500
8 in. (203 mm)	3.875 in. (98 mm)	500
9 in. (229 mm)	3.875 in. (98 mm)	250
10 in. (254 mm)	3.875 in. (98 mm)	250
11 in. (279 mm)	3.875 in. (98 mm)	250
12 in. (305 mm)	3.875 in. (98 mm)	250
14 in. (356 mm)	3.875 in. (98 mm)	250
16 in. (406 mm)	3.875 in. (98 mm)	250
18 in. (457 mm)	3.875 in. (98 mm)	250
20 in. (508 mm)	3.875 in. (98 mm)	250

# DURO-LAST<sup>®</sup> INSULATION PLATE

## DESCRIPTION:

The Duro-Last<sup>®</sup> Insulation Plate is a 0.375 inch (9.5mm) thick, 3 inch (76.5mm) diameter distribution plate designed to hold insulation and underlayment boards under the Duro-Last roofing system. Duro-Last Insulation Plates are packaged and sold in quantities of 1,000.

The Duro-Last Insulation Plate includes a recessed 0.280 inch (7 mm) diameter hole in the center, keeping the head of the fastener from coming into contact with the Duro-Last roofing membrane. To maintain necessary strength and position, the Duro-Last Insulation Plate is manufactured with a thick center that embeds into the insulation and a thin flexible exterior to help reduce facer tear. In addition, there are tabs pressing against the fastener head to prevent the fastener from backing out.

The Duro-Last Insulation Plate is a long-lasting, durable plate that is available only from Duro-Last, Inc.

## MATERIAL SAFETY DATA SHEET:

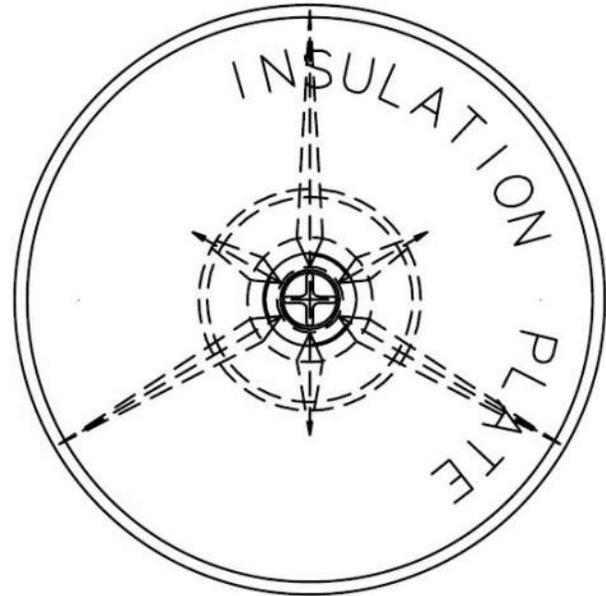
Product Identity: Duro-Last Insulation Plates

## INSTALLATION:

1. Refer to details 1020 and 1030 installation information.

## NOTE:

- Duro-Last Insulation Plates shall only be used to attach insulation or cover boards in mechanically fastened systems. They shall not be used in adhered systems.



# DURO-LAST® VB PRIMER

Unclear if this meets low-VOC requirements specified

## DESCRIPTION:

Duro-Last® VB Primer is a solvent-based primer composed of a blend of natural resins and synthetic rubber. Duro-Last VB Primer is designed to enhance the adhesion of Duro-Last Vapor Barrier to a variety of surfaces such as structural concrete, gypsum, lightweight concrete, wood, and masonry.

## ORDERING:

Duro-Last VB Primer is ordered in individual 5-gallon pails.

- 33-lb. pail (Item #1345)

## STORAGE AND HANDLING

Product can be stored for up to 36 months in original sealed containers. Store in a cool, well-ventilated area between 14 and 75° F. Keep away from any source of heat, dampness, humidity, oxidizing agents or direct sunlight.

**Product is flammable prior to curing. Keep away from open flames and any other source of ignition.**

## PRECAUTIONS:

1. Read Safety Data Sheets (SDS) prior to using.
2. Wear proper personal protective equipment, such as gloves and eye protection, per the SDS.
3. **This product is not intended for use with any Duro-Last membrane.**

## INSTALLATION:

1. Limitations
  - a. The minimum ambient and surface temperature before application should be 14° F and rising.
  - b. Apply to a clean and structurally sound substrate.
2. Shake product thoroughly prior to application.
3. Apply to deck at a rate of 75 – 125 sq. ft. per gallon using either a brush or roller.
4. Do not install Duro-Last Vapor Barrier until Duro-Last VB Primer has completely dried. **Do not accelerate drying by use of heat.**



DURO-LAST VB PRIMER	
Specific gravity at 68° F	6.59 lbs./gal <sup>1</sup>
Solids by weight	24% <sup>1</sup>
Viscosity, Brookfield at 77° F	200 cP <sup>1</sup>
Set time	Between 15 and 60 minutes, depending on temperature and quantity applied.
Application temperature	14° F and rising
Coverage	75 – 125 sq. ft. per gallon

<sup>1</sup> Nominal.

## CLEANING:

Tools can be cleaned with petroleum solvents such as mineral spirits, Varsol™, xylene, etc. **Do not allow cleaning solvents to come in contact with any Duro-Last membrane.**

# DURO-LAST® VAPOR BARRIER

## DESCRIPTION:

Duro-Last® Vapor Barrier (DL VB) is a self-adhesive vapor barrier composed of SBS modified bitumen adhesive on the bottom surface and a tri-laminated woven polyethylene on the top surface. A silicone release film covers the self-adhesive on the bottom surface.

DL VB can be used within a Duro-Last roofing system to minimize vapor transmission. 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 roofing system design prior to installing any roofing system.

DL VB can provide a durable, walkable, temporary surface that protects the decking for up to 4 months until a Duro-Last roofing system can be installed (See Figure 1). Duro-Last does not warrant the water-tightness of DL VB when used as a temporary surface. Temporary surfaces do not carry any type of warranty and must only be used under the direction of a licensed roofing consultant or architect.

## BENEFITS

- Meets IECC air barrier requirements for mechanically fastened roofing systems
- Quick release film
- Self-sealing
- Temporarily protects against inclement weather
- Slip resistant
- Substrate board not required for most applications
- UV protection for up to 4 months
- Puncture resistant
- No primer required on steel decks or within mechanically fastened roofing systems.
- Ideal for mechanically fastened or adhered roofing systems
- Highly resistant to work crew traffic

## ACCEPTABLE DECKS:

Prior to installation of DL VB, the deck must be smooth and level without significant surface irregularities or depressions. It must be clean, dry and free of grease, dust and loose debris. Do not apply to wet or damp surfaces. Concrete and gypsum decks must be cured prior to installation.



Figure 1. Duro-Last Vapor Barrier as temporary surface

The installing contractor is responsible for following applicable building, plumbing and electrical codes. Duro-Last VB Primer (DL VB Primer) is not required when the roofing system is mechanically fastened or when the deck is steel. When used within an adhered roofing system, the following decks will require the use of DL VB Primer prior to installing DL VB:

- Structural Concrete (poured in place or precast)
- Gypsum (poured in place or precast)
- Lightweight Concrete (insulating or cellular)
- Wood (Plywood, OSB or Lumber)
- Cement Block/Masonry

## APPROVED DIRECT-CONTACT ASSEMBLIES

The following membrane assemblies are approved for direct contact with DL VB. All other assemblies must be separated from DL VB by any Duro-Last slip sheet, insulation or cover board.

- Duro-Fleece® and Duro-Fleece Plus®
    - Adhered directly to DL VB with Duro-Fleece Membrane Adhesive or Duro-Fleece CR-20 Membrane Adhesive (Splatter)
  - Duro-Last, Duro-Tuff® and Duro-Last EV
    - Adhered directly to DL VB with SB IV Adhesive
- WB II Adhesive is not allowed.

## FACTORY MUTUAL REQUIREMENTS

Factory Mutual projects that require DL VB will require an increase in the preliminary attachment of insulation and/or cover boards underneath mechanically fastened roofing systems. Each board must be fastened at a rate of one fastener and plate per two square feet. Corner and perimeter enhancements are not required for preliminary attachment.

**PRECAUTIONS:**

1. Read Safety Data Sheets (SDS) prior to using.
2. Wear proper personal protective equipment, such as gloves and eye protection, per the SDS.

**ORDERING:**

Rolls may be ordered individually. Each roll measures 3.75 ft. by 133 ft. and will cover 465 square feet with a 3-inch overlap.

- 80-lb roll (Item #1344)

**INSTALLATION:**

1. Limitations
  - a. **The minimum ambient and surface temperature before application should be 14° F and rising.**
  - b. Do not use during wet weather.
  - c. Do not use on wet surfaces.
  - d. Do not use on dirty or greasy surfaces.
  - e. Do not use on surfaces that show signs of deterioration or loss of structural integrity.
  - f. Do not use product after expiration date.
2. When DL VB is immediately covered by a roofing system
  - a. Install according to the 6 steps shown in the pictures below.

3. When DL VB is used as a temporary surface and not immediately covered by a roofing system
  - a. Install according to the 6 steps shown below.
  - b. Cover and seal all T joints, transitions and any other openings with Sopramastic.
  - c. Contractors are responsible for providing adequate slope to roof drains to allow for proper drainage of the roof area.

TABLE 1. PHYSICAL PROPERTIES <sup>2</sup>		
	Standards	Results
Thickness	-	31 mils
Weight	-	0.16 lb/sqft
Tensile Strength	ASTM D 5147	54 lbf/in x 74 lbf/in <sup>1</sup>
Elongation	ASTM D 5147	33% x 25% <sup>1</sup>
Cold Bending	ASTM D 5147	-58° F
Static Puncture	ASTM D 5602	90 lbf
Tear Resistance	ASTM D 1970	95 lbf x 103 lbf <sup>1</sup>
Lap Adhesion	ASTM D 1876	68 lbf/ft
Water Absorption	ASTM D 5147	0.1% maximum
Peel Resistance	ASTM D 903	5.4 lbf/in
Water Vapor Permeance	ASTM E 96 (Pro. B)	.03 perm
Air Permeability	ASTM E 283 (75 Pa)	< 0.001 L/secm <sup>2</sup>

<sup>1</sup> Values are shown for both machine and cross machine directions. The machine direction results are listed first.  
<sup>2</sup> All values are nominal.

The installation photos shown below were taken on a ground-level mock deck for demonstration purposes. Safety equipment should always be used in actual roofing situations.



1. Roll out the Duro-Last Vapor Barrier over a clean, dry deck.



2. Once the vapor barrier is in place, while holding the product tight, peel off the silicone release film by pulling diagonally.



3. Install subsequent rolls of vapor barrier in the same way, taking care to overlap the longitudinal joints by 3 inches.



4. On steel decks, at the end of a roll, install a metal plate (6 in. by 42 in.) to support the vapor barrier end lap between the metal flutes ensuring a complete end lap seal. End laps must overlap by 6 inches.



5. The vapor barrier offers extra protection from heavy foot traffic during installation. The slip-resistant surface allows for safe movement across the roof.



6. Once installation is complete, the Duro-Last Vapor Barrier temporarily protects against inclement weather. If not immediately covered, follow extra steps per 3a and 3b in the instructions above.

# DURO-LAST<sup>®</sup> TERMINATION BAR

## DESCRIPTION:

Duro-Last<sup>®</sup> Termination Bar (available in white, gray and tan colors) is fabricated from a rigid exterior vinyl with slotted holes 6 inches (152 mm) on center. Duro-Last Termination Bar may be used as perimeter detail for the Duro-Last roofing system and as termination on any square or rectangular penetration. Because of its symmetrical design, it is reversible.

Duro-Last Termination Bar is available in 10 ft. (3 m) lengths only. Duro-Last, Inc. will supply the termination bar in multiples of 10 ft. (3 m) and has two standard packages. The small tube package contains a maximum of 170 ft. (52 m) while a large box contains a maximum of 500 ft. (152 m).

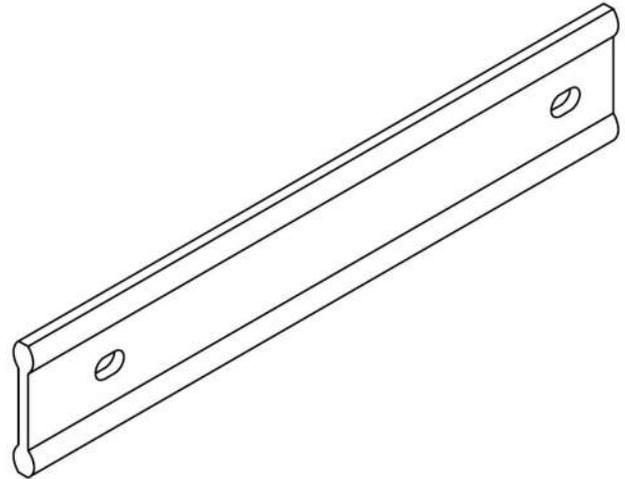
## MATERIAL SAFETY DATA SHEET:

Product Identity: 10 foot Extrusions

MSDS Number: 1225

## INSTALLATION:

1. Duro-Last Termination Bar shall be fastened 6 inches (152 mm) on center with approved fasteners.
2. All termination bar must be fastened 1 inch (25 mm), maximum, from each corner or end of the bar.
3. The top edge of all sections of termination bar must be caulked.
4. It is necessary to leave a ¼ inch (6.3 mm) space between all sections of termination bar to account for expansion and contraction.
5. All vertical applications require caulk on both sides.
6. Refer to details 3010 & 3020 for installation information.



# DURO-LAST® STACK FLASHINGS

## DESCRIPTION:

Duro-Last® Stack Flashings are required for all round penetrations encountered on a roofing project. The stack flashings are made with Duro-Last specially formulated roofing membrane. The combination of reinforced membrane and prefabrication ensures a long lasting, watertight flashing.

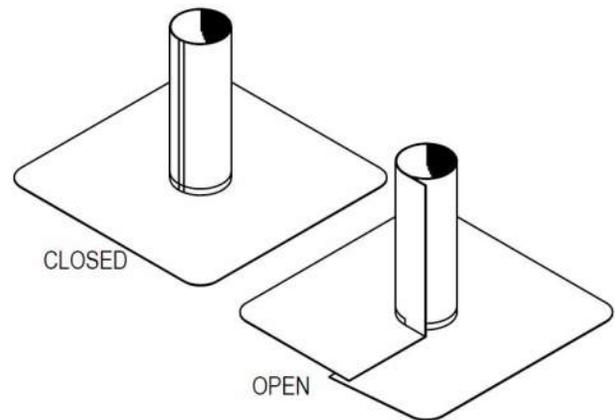
Stack flashings are available in white, tan, gray and dark gray colors. They can also be ordered with Designer Series membrane (slate gray Shingle-Ply, sandstone Shingle-Ply or Rock-Ply) bases and solid color risers. They are available in diameters of 1 in. (25 mm), 1.5 in. (38 mm) and in 1 in. increments between 2 and 15 in. (51-381 mm). Stack Flashings with diameters of 16 in. (406 mm) and larger are available in 2 in. (51 mm) increments.

The flashings are manufactured oversized to account for the thickness a schedule 40 pipe wall by the following amounts:

- 1.5 - 4 in. (38 - 101 mm) diameter stack flashings are 5/8 in. (15 mm) oversized.
- All other sizes are 3/8 in. (9 mm) oversized.

## INSTALLATION:

1. The roof membrane installed around the penetration must be fastened prior to installing the stack flashing. Use the same fastener spacing that was used to install the roof membrane but do not exceed 18 in. (457 mm) on center. At least one fastener must be installed. On reroofing applications, remove the existing flashings to ensure a watertight fit.
2. Place the stack flashing around the penetration. Heat weld the vertical seam if the stack was ordered "open".
3. Weld the stack flashing skirt to the roof membrane. Care should be taken to smooth out the skirt so that it is wrinkle-free.
4. Apply a bead of Duro-Caulk Plus® to the penetration 1/4 in. (6 mm) below the top of the stack flashing.
5. Install a stainless steel band approximately 1/4 in. (6 mm) from the top of the stack flashing. Tighten the band to draw the flashing firmly into the sealant. Apply a bead of the Duro-Caulk Plus around the top of the flashing to assure a positive seal.



6. See details 4070, 4080 and 4081 for information on installing stack flashings to specific types of round penetrations.

## NOTE:

- Stack flashings and bands shall be furnished by Duro-Last, Inc.
- Field fabrication of flashings for round penetrations is not allowed.
- Stack flashings with diameters 16 in. (406 mm) and larger are available "open" only.
- An "open" stack flashing requires a heat weld (hot-air) to close the flashing. The extra material necessary for this weld is included as part of the stack flashing.

STACK FLASHING DIMENSIONS				
Diameter	Available		Height	Base/Skirt
	Closed	Open		
1 in. (25 mm)	Yes	No	8 in. (203 mm)	18 x 18 in. Base (457 x 457 mm)
1.5 in. (38 mm)	Yes	Yes	8 in. (203 mm)	18 x 18 in. Base (457 x 457 mm)
2 – 8 in. (51 – 203 mm)	Yes	Yes	8 in. (203 mm)	18 x 18 in. Base (457 x 457 mm)
9 – 15 in. (228 – 381 mm)	Yes	Yes	8 in. (203 mm)	24 x 24 in. Base (609 x 609 mm)
16 in. (406 mm) and Larger	No	Yes	8 in. (203 mm)	6 or 12 in Skirt (152 or 305 mm)

## **Duro-Last Duro-Fleece Recent installation:**

### **Port Angeles Aquatic Center-**

Duro-Last SA Vapor Barrier

R38 DuroGuard ISO

1/2" DuroGuard Gypsum Coverboard

DuroTuff Charcoal 60-Mil Fleeceback Fully Adhered

Charcoal DuroRibs 24" OC Welded to the DL Membrane

June 2020

Wetherholt & Associates Inc

425-822-8397

Don Davis

### **Capitol High School**

60-Mil DF Gray

Olympia, WA

McGranhan Architects 253-0393-3084

### **Google Buildings B & C**

60-Mil DF White

Kirkland, WA

SMR Development

Rosen Properties/Daryl Reichstein 425-830-4954

**DURO-LAST®**

# 20-Year NDL Warranty

Warranty No. \_\_\_\_\_

## I. TERMS and CONDITIONS

Duro-Last®, Inc., (“Duro-Last”) grants this No-Dollar Limit (“NDL”) Warranty to the owner of a building (“Owner”) containing a **Duro-Last Roofing System (“Duro-Last System”)** installed by a Duro-Last Authorized Dealer/Contractor (“Contractor”), subject to the terms and conditions and limitations contained herein.

Duro-Last’s obligation during the 1<sup>st</sup> through 20<sup>th</sup> year shall be to repair any leak in the Duro-Last System caused by any defect in a component of the Duro-Last System or by the workmanship of the Contractor, but only as the workmanship relates to the installation of the Duro-Last System itself and not as it relates to other work performed, if any. Duro-Last’s obligation includes, at Duro-Last’s discretion, either the repair or replacement of part or all of the Duro-Last System and also includes the furnishing or cost of labor to repair the Duro-Last System provided the following conditions are met:

- A. Duro-Last and Contractor have been paid in full for the Duro-Last System, its installation and any outstanding invoices issued by Duro-Last that arise after the installation;
- B. The Duro-Last System has been approved by Duro-Last following inspection by an authorized Duro-Last Quality Assurance Technical Representative (“Duro-Last QA Tech Rep”), this No-Dollar Limit Warranty has been signed by a Duro-Last QA Tech Rep or Quality Assurance Manager, and the Contractor confirms that the Duro-Last System was installed in accordance with Duro-Last’s specifications and written installation requirements;
- C. The Owner has notified Duro-Last within 14 days of the discovery of any leak, failure or other alleged Duro-Last System defect. Owner must notify Duro-Last by calling the Duro-Last Quality Assurance Department at 1-866-284-9424, by e-mailing ws@duro-last.com, or by certified mail, return receipt requested;
- D. The Owner allows Duro-Last’s QA Tech Rep(s) and/or Duro-Last Contractor(s) access to the roof including, if necessary, the removal and replacement by Owner at Owner’s expense any and all obstructions, including but not limited to: rooftop gardens, earth, soil, pavers, ballast, decks, patio and walking surface materials, photovoltaic system, and other overburden; and
- E. Duro-Last authorizes the repair and, at Duro-Last’s option, either Duro-Last’s QA Tech Rep(s) or an authorized Contractor makes the repair.

## II. OWNER’S RESPONSIBILITIES

The Owner is not entitled to recover under this No-Dollar Limit Warranty unless Owner exercises reasonable and diligent care in the maintenance of the Duro-Last System, including but not limited to inspecting and maintaining the Duro-Last System regularly and as needed, including after storms or natural disasters, and for removing any debris from the Duro-Last System, rooftop, and adjacent areas, and maintaining and keeping all drains in working order and clear of debris and other obstructions.

## III. LIMITATIONS and EXCLUSIONS

- A. This No-Dollar Limit Warranty does not apply to a Duro-Last System installed on a single-family residence.
- B. Duro-Last shall not be liable for damages arising from defects in the design or construction of the building or roof assembly, including inadequate or insufficient drainage; nor shall Duro-Last be liable for any other products aside from the Duro-Last System.
- C. Duro-Last is not liable for any Duro-Last System failure nor for subsequent damages arising from Acts of God or causes outside Duro-Last’s control including, but not limited to:
  - 1) Damage caused by fire, lightning, hurricane, gale, hail, tornado, flood, earthquake, animals, insects; or
  - 2) Damage caused by accident, vandalism, intentional act, negligence or failure to use reasonable care, whether on the part of the Owner or another; or
  - 3) Damage caused by any unauthorized modification to the Duro-Last System including, but not limited to: damage caused by unauthorized components used in installation or repair, by additional equipment or structures added to or made a part of the roof, by traffic, or by chemicals not normally found in nature or the like; or
  - 4) Interior condensation and/or moisture entering the Duro-Last System through walls, copings, structural defects, HVAC systems, or any part of the building structure, including from adjacent buildings.
- D. Duro-Last does not warrant the watertightness of metal products that are located outside of the termination of the Duro-Last membrane.
- E. Duro-Last does not warrant against color change and/or pattern change and/or print change in the Duro-Last System.
- F. Duro-Last shall have no liability under any theory of law for any claims, repairs, or other damages relating to the presence of asbestos or any vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like on or in the Duro-Last System or in the building or in the air or water serving the building.
- G. This No-Dollar Limit Warranty is transferable to subsequent Owners only upon the express written consent of Duro-Last and at Duro-Last’s sole discretion. Duro-Last reserves the right to require an inspection of the Duro-Last

**OVER: CONTINUED ON BACK**

System prior to transfer of this No-Dollar Limit Warranty. The Owner (undersigned below) must pay a \$500 warranty transfer fee and must pay for any non-warranted repairs identified by Duro-Last during any pre-transfer inspection. A transfer of this No-Dollar Limit Warranty shall not be effective unless all outstanding Duro-Last invoices have been satisfied.

- H.** This No-Dollar Limit Warranty must be signed by a Duro-Last QA Tech Rep or Quality Assurance Manager. Coverage under the terms of this No-Dollar Limit Warranty begins on the Effective Date. The Effective Date is determined by Duro-Last. Failure of the Owner or Contractor to sign this No-Dollar Limit Warranty does not alter the Effective Date.
- I.** This No-Dollar Limit Warranty shall be governed by the laws of the State of Michigan without regard to principles of conflicts of law. Duro-Last and Owner hereby agree that the Circuit Court for the County of Saginaw, State of Michigan, or the United States Federal District Court for the Eastern District of Michigan in Bay City, shall have the exclusive jurisdiction to determine any and all disputes, or claims relating to this No-Dollar Limit Warranty and do hereby submit themselves to the sole personal jurisdiction of those Courts.
- J.** No claim, suit, or other proceeding arising out of or related to the Duro-Last products or these terms, including without limitation this No-Dollar Limit Warranty, may be brought by the Owner or anyone else after one (1) year from the date it accrues.
- K.** Duro-Last does not waive any rights under this No-Dollar Limit Warranty by refraining from exercising its rights in full in one or more instances.

**THIS NO-DOLLAR LIMIT WARRANTY AND THE RESPONSIBILITIES AND REMEDIES STATED HEREIN ARE EXPRESSLY AGREED TO BY OWNER AND DURO-LAST AND CONSTITUTE THE SOLE WARRANTY AND REMEDIES OF THE OWNER FOR ANY ALLEGED DEFECT OR FAILURE OF THE DURO-LAST SYSTEM, WHETHER MEMBRANE, ACCESSORIES, OR CONTRACTOR WORKMANSHIP.**

**THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE (EITHER EXPRESS OR IMPLIED IN FACT, LAW OR CUSTOM) THAT EXTEND BEYOND THE EXPRESS TERMS STATED IN THIS NO-DOLLAR LIMIT WARRANTY TO THE FULL EXTENT DISCLAIMER IS PERMITTED BY LAW. OWNER AND DURO-LAST TOGETHER JOINTLY DISCLAIM ANY OTHER OR FURTHER WARRANTIES EXCEPT THOSE INCLUDED IN THIS DOCUMENT. IN ANY EVENT, ANY IMPLIED WARRANTY THAT MAY ARISE BY LAW IS LIMITED IN DURATION TO THE TERM HEREIN. THE REPAIR, OR REPLACEMENT PROVIDED HEREIN IS EXCLUSIVE AND IN LIEU OF ALL OTHER REMEDIES. DURO-LAST WILL HAVE NO LIABILITY TO ANYONE FOR CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, EXEMPLARY, OR PUNITIVE DAMAGES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION PROPERTY DAMAGE, LOST PROFITS, LOST USE OR ANY OTHER PECUNIARY DAMAGE, WHETHER DUE TO ANY DEFECT IN THE PRODUCTS, BREACH OF THIS AGREEMENT, DELAY, NON-DELIVERY, NON-PERFORMANCE, RECALL, OR ANY OTHER REASON. ALL CLAIMS FOR NEGLIGENCE AND FOR FAILURE OF ESSENTIAL PURPOSE ARE EXPRESSLY WAIVED, RELEASED, AND EXCLUDED.**

**THERE ARE NO THIRD-PARTY BENEFICIARIES TO THESE TERMS. OWNER ACKNOWLEDGES THESE LIMITATIONS AND WAIVERS, DECLARES THAT THEY HAVE BEEN READ AND UNDERSTOOD, AND AGREES TO BE SO BOUND. ANY PAYMENT FOR THE DURO-LAST SYSTEM OR REGISTRATION OF THE WARRANTY WITH DURO-LAST SIGNIFIES THAT THE OWNER HAS VOLUNTARILY AND KNOWINGLY CONSENTED TO ALL TERMS.**

The Contractor is not an agent of Duro-Last and does not have authority to bind Duro-Last. If any Contractor or sales representative made any statements about Duro-Last, its products, services, obligations, or warranties, those statements cannot be relied upon by Owner or any other party and cannot be attributed to Duro-Last. Furthermore, no person may change or modify any terms or conditions of this No-Dollar Limit Warranty, unless in writing and signed by the authorized representative of the Owner and by a Duro-Last officer or by the Duro-Last Quality Assurance Manager.

**SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO SUCH A LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.** If any provision or individual term herein is invalid or unenforceable under any applicable law, the provision or term will be ineffective to that extent and for the duration of the illegality, but the remaining provisions and terms will be unaffected.

**DURO-LAST® , INC.  
525 Morley Drive  
Saginaw, MI 48601**

\_\_\_\_\_  
Signature of Duro-Last QA Tech Rep or QA Manager

\_\_\_\_\_  
Name of Building

\_\_\_\_\_  
Signature of Owner

\_\_\_\_\_  
Address of Building

\_\_\_\_\_  
Owner (printed)

\_\_\_\_\_  
City, State & Zip of Building

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Building Designation

\_\_\_\_\_  
Contractor (printed)

\_\_\_\_\_  
Effective Date

\_\_\_\_\_  
Square Footage

\_\_\_\_\_  
Serial No.

\_\_\_\_\_  
Warranty No.

# 25-Year NDL Warranty

Warranty No. \_\_\_\_\_

## I. TERMS and CONDITIONS

Duro-Last®, Inc., (“Duro-Last”) grants this No Dollar Limit Warranty (“Warranty”) to the owner (“Owner”) of a building containing a **Duro-Last Roofing System (“Duro-Last System”)** installed by a Duro-Last authorized Dealer/Contractor (“Contractor”), subject to the conditions and limitations contained herein. Duro-Last’s obligation during the 1<sup>st</sup> through the 25<sup>th</sup> year shall be to repair any leak in the Duro-Last System caused by any defect in a component of the Duro-Last System or by the workmanship of the Contractor, but only as the workmanship relates to the installation of the Duro-Last System itself and not as it relates to other work performed, if any. Owner acknowledges that Duro-Last is the manufacturer of the Duro-Last System, and is not responsible for compliance with any applicable building codes or regulations. Duro-Last’s obligation includes, at Duro-Last’s sole discretion, either the repair or replacement of all or any part of the Duro-Last System. Duro-Last reserves the right to determine the appropriate repair or replacement product, including the manner or method of any repairs or replacement. The foregoing shall be the only remedies to the Owner under this Warranty, provided that each of the following conditions are met:

- A. Duro-Last and Contractor have been paid in full for the Duro-Last System, its installation and any outstanding invoices issued by Duro-Last that arise after the installation;
- B. The Duro-Last System has been approved by Duro-Last following inspection by an authorized Duro-Last Quality Assurance Technical Representative (“Duro-Last QA Tech Rep”). Owner acknowledges that the Duro-Last inspection is only to determine if the Duro-Last Warranty may be issued, and is not an inspection to determine compliance with any applicable building code or regulation pertaining to the building;
- C. The Owner must exercise reasonable and diligent care in the maintenance of the Duro-Last System in accordance with the attached Care and Maintenance Guide, which can also be located at [www.duro-last.com/duro-last/careandmaintenance](http://www.duro-last.com/duro-last/careandmaintenance);
- D. The Owner has notified Duro-Last within seven (7) days of the discovery of any leak, failure, emergency repairs or any other alleged Duro-Last System defect. Owner must notify Duro-Last by e-mailing [ws@duro-last.com](mailto:ws@duro-last.com), or by certified mail, return receipt requested. If upon Duro-Last’s inspection Duro-Last determines that the reported leak, failure or defect is not covered by the Warranty, then the Owner shall be responsible for all direct expenses incurred by Duro-Last to conduct the inspection;
- E. The Owner allows Duro-Last’s QA Tech Rep(s), and/or Duro-Last Contractor(s) access to the roof including, if necessary, the removal and replacement by Owner at Owner’s expense any and all obstructions, including but not limited to: rooftop gardens, earth, soil, pavers, ballast, decks, patio and walking surface materials, photovoltaic system, and other overburden; and
- F. Duro-Last authorizes the repair and, at Duro-Last’s option, either Duro-Last’s QA Tech Rep(s), or authorized Duro-Last Contractor makes the repair.

## II. LIMITATIONS and EXCLUSIONS

- A. This Warranty does not apply to a Duro-Last System installed on a single-family residence.
- B. Duro-Last shall not be liable for damages arising from defects in the design or construction of the building or roof assembly aside from the Duro-Last System. Duro-Last shall not be liable for any condensation in the roof assembly or any design defects that result in water penetrating into the building. Duro-Last shall not be liable for any damage to the building or leaks caused by inadequate or insufficient drainage and/or ponding water.
- C. Duro-Last shall not be liable for any other products aside from the Duro-Last System.
- D. Duro-Last is not liable for any Duro-Last System defect or failure nor for subsequent damages arising from Acts of God or causes outside Duro-Last’s control including, but not limited to:
  - 1) Damage caused by fire, lightning, hurricane, gale, hail, tornado, flood, earthquake, animals, insects; or
  - 2) Damage caused by accident, vandalism, intentional act, negligence or failure to use reasonable care, whether on the part of the Owner or another; or
  - 3) Damage caused by any unauthorized modification to the Duro-Last System including, but not limited to: damage caused by unauthorized components used in installation or repair, by additional equipment or structures added to or made a part of the roof, by rooftop traffic, or by chemicals not normally found in nature or the like; or
  - 4) Construction generated moisture, interior condensation and/or moisture entering the Duro-Last System through walls, copings, structural defects, HVAC Systems, or any part of the building structure, including from adjacent buildings.
  - 5) Incompatible substrates or materials not supplied by Duro-Last that come in contact with the Duro-Last membrane.
- E. Duro-Last does not warranty the watertightness of tie-ins to 1) a standing seam metal roof or 2) any other roofing system.
- F. Duro-Last does not warranty the watertightness of metal products that are located outside of the termination of the Duro-Last membrane.
- G. Duro-Last does not warranty against color change and/or pattern change and/or print change in the Duro-Last System.
- H. Duro-Last shall have no liability under any theory of law for any claims, repairs, or other damages relating to the presence of asbestos or any vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like on or in the Duro-Last System or in the building or in the air or water serving the building.
- I. Any change in the building’s use or purpose voids this Warranty.
- J. This Warranty is transferable to subsequent Owners upon the express written authority of Duro-Last and at Duro-Last’s sole discretion. Duro-Last reserves the right to require an inspection of the Duro-Last System prior to the transfer of this Warranty. The Owner, (under-signed below) must pay Duro-Last’s then in effect warranty transfer fee and must also pay for any non-warranty related repairs identified

**Over: Continued on Back**

during any pre-transfer inspection. A transfer of this Warranty shall not be effective until all outstanding Duro-Last invoices have been satisfied.

- K. This Warranty must be signed by the Owner, the Contractor and a Duro-Last QA Tech Rep or Quality Assurance Manager. Coverage under the terms of this Warranty begins on the Effective Date. The Effective Date is determined by Duro-Last. Failure of the Owner or Contractor to sign this Warranty does not alter the Effective Date.
- L. This Warranty shall be governed by the laws of the State of Michigan without regard to principles of conflicts of law. Duro-Last and Owner hereby agree that the Circuit Court for the County of Saginaw, State of Michigan, or the United States Federal District Court for the Eastern District of Michigan in Bay City, shall have the exclusive jurisdiction to determine any and all disputes or claims relating to this Warranty and do hereby submit themselves to the sole personal jurisdiction of those Courts.
- M. Owner shall maintain and keep in force: property, casualty and liability insurance necessary to protect against all insurable losses. Owner agrees to waive any and all rights of subrogation against Duro-Last for losses covered by such insurance.
- N. No claim, suit, or other proceeding arising out of or related to the Duro-Last products or these terms, including without limitation this Warranty, may be brought by the Owner or anyone else after one (1) year from the date it accrues.
- O. Duro-Last does not waive any rights under this Warranty by refraining from exercising its rights in full in one or more instances.

**THIS WARRANTY AND THE RESPONSIBILITIES AND REMEDIES STATED HEREIN ARE EXPRESSLY AGREED TO BY OWNER AND DURO-LAST AND CONSTITUTE THE SOLE WARRANTY AND REMEDIES OF THE OWNER FOR ANY ALLEGED DEFECT OR FAILURE OF THE DURO-LAST SYSTEM, WHETHER MEMBRANE, ACCESSORIES, OR CONTRACTOR WORKMANSHIP.**

**THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE (EITHER EXPRESS OR IMPLIED IN FACT, LAW OR CUSTOM) THAT EXTEND BEYOND THE EXPRESS TERMS STATED IN THIS WARRANTY TO THE FULL EXTENT DISCLAIMER IS PERMITTED BY LAW. OWNER AND DURO-LAST TOGETHER JOINTLY DISCLAIM ANY OTHER OR FURTHER WARRANTIES EXCEPT THOSE INCLUDED IN THIS WARRANTY. IN ANY EVENT, ANY IMPLIED WARRANTY THAT MAY ARISE BY LAW IS LIMITED IN DURATION TO THE TERM HEREIN. THE REPAIR OR REPLACEMENT PROVIDED HEREIN IS EXCLUSIVE AND IN LIEU OF ALL OTHER REMEDIES. DURO-LAST WILL HAVE NO LIABILITY TO ANYONE FOR CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, EXEMPLARY, OR PUNITIVE DAMAGES OF ANY KIND WHATSOEVER, INCLUDING WITHOUT LIMITATION PROPERTY DAMAGE, LOST PROFITS, LOST USE OR ANY OTHER PECUNIARY DAMAGE, WHETHER DUE TO ANY DEFECT IN THE PRODUCTS, BREACH OF THIS AGREEMENT, DELAY, NON-DELIVERY, NON-PERFORMANCE, RECALL, OR ANY OTHER REASON. ALL CLAIMS FOR NEGLIGENCE AND FOR FAILURE OF ESSENTIAL PURPOSE ARE EXPRESSLY WAIVED, RELEASED, AND EXCLUDED.**

**THERE ARE NO THIRD-PARTY BENEFICIARIES TO THESE TERMS. OWNER ACKNOWLEDGES THESE LIMITATIONS AND WAIVERS, DECLARES THAT THEY HAVE BEEN READ AND UNDERSTOOD, AND AGREES TO BE SO BOUND. ANY PAYMENT FOR THE DURO-LAST SYSTEM OR REGISTRATION OF THE WARRANTY WITH DURO-LAST SIGNIFIES THAT THE OWNER HAS VOLUNTARILY AND KNOWINGLY CONSENTED TO ALL TERMS.**

The Contractor is not an agent of Duro-Last and does not have authority to bind Duro-Last. If any Contractor or sales representative made any statements about Duro-Last, its products, services, obligations, or warranties, those statements cannot be relied upon by Owner or any other party and cannot be attributed to Duro-Last. Furthermore, no person may change or modify any terms or conditions of this Warranty, unless in writing and signed by the authorized representative of the Owner and by a Duro-Last officer or by the Duro-Last Quality Assurance Manager.

**SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO SUCH A LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.** If any provision or individual term herein is invalid or unenforceable under any applicable law, the provision or term will be ineffective to that extent and for the duration of the illegality, but the remaining provisions and terms will be unaffected.

**DURO-LAST<sup>®</sup>, INC.  
525 Morley Drive  
Saginaw, MI 48601**

\_\_\_\_\_  
Name of Building

\_\_\_\_\_  
Address of Building

\_\_\_\_\_  
City, State & Zip of Building

\_\_\_\_\_  
Building Designation

\_\_\_\_\_  
Effective Date

\_\_\_\_\_  
Serial No.

\_\_\_\_\_  
Signature of Duro-Last QA Tech Rep or QA Manager

\_\_\_\_\_  
Signature of Owner

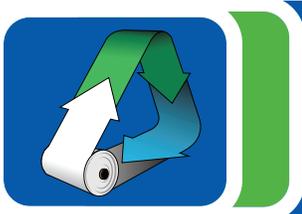
\_\_\_\_\_  
Owner (printed)

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Contractor (printed)

\_\_\_\_\_  
Square Footage

\_\_\_\_\_  
Warranty No.



# DURO-FLEECE® MEMBRANE

Product Environmental Profile

Duro-Last® Duro-Fleece membrane is an excellent choice for projects requiring a long lasting, energy efficient roofing product. The combination of fleece and the proven performance of Duro-Last roofing membrane results in an ideal product for use in adhered and mechanically attached applications for a wide variety of roof substrates. Duro-Fleece is available in 50 mil, 60 mil, and 80 mil nominal thicknesses in 7 different colors and also offers a complete line of custom prefabricated accessories. The Duro-Fleece membrane incorporates a weft-inserted knitted scrim to provide exceptional strength and waterproofing.

## Environmental Facts:



### POST-INDUSTRIAL RECYCLING

Up to 100% recyclable. Post-industrial scrap from the manufacturing of Duro-Fleece is recycled into concrete expansion joints.



### SOLAR READY

Is solar ready with low-maintenance custom fabricated flashings which are ideal for any rack-mounted commercial rooftop solar application.



### ENERGY EFFICIENT

Duro-Fleece white reflective roofs, when designed and installed properly, can help increase energy efficiency, especially during periods of peak demand.



### SUSTAINABILITY CERTIFICATION

The Duro-Fleece membrane is NSF 347 gold certified as a more durable, energy efficient, and sustainable, single-ply membrane product.



### GREEN CODES

Complies with California Title 24, IgCC, and efficiency programs requiring the use of a highly reflective roof membrane.

*Duro-Last membranes are tested for radiative properties by the Cool Roof Rating Council.*

Cool Roof Rating Council (CRRC)						
	Solar Reflectance		Thermal Emittance		Solar Reflective Index (SRI)	
	Initial	3-Year	Initial	3-Year	Initial	3-Year
White	0.87	0.67	0.89	0.89	110	81
Blue	0.14	Pending	0.89	Pending	Pending	Pending
Copper	0.18	Pending	0.89	Pending	Pending	Pending
Charcoal	0.08	Pending	0.89	Pending	Pending	Pending
Green	0.08	Pending	0.88	Pending	3	Pending
Light Gray	0.43	Pending	0.89	Pending	Pending	Pending
Patina	0.31	Pending	0.89	Pending	Pending	Pending
Light Tan	0.71	Pending	0.89	Pending	Pending	Pending

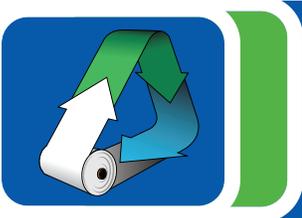


## Product Environmental Profile: Duro-Fleece

The Duro-Fleece roofing system can help buildings obtain credits under the U.S. Green Building Council's LEED® (Leadership in Energy and Environmental Design) rating system, as well as GBI's (Green Building Institute) Green Globes certification. Both programs promote sustainable building management and construction practices.

LEED® Contributions (version 4)			
Program	Category	Credit	Contribution
LEED BD+C: New Construction	Sustainable Sites	SSc5: Heat island reduction	Initial Solar Reflective Index white membrane: 110 3-year aged SRI: 81 Duro-Fleece roofs can also be installed under a vegetative roof.
	Energy & Atmosphere	EAc2: Optimize energy performance	Cool roofs can help reduce heating and cooling loads which reduces building energy consumption.
	Materials & Resources	MRc1: Building life-cycle impact reduction	The Duro-Fleece life-cycle assessment (LCA) is featured in the Athena Sustainable Materials Institute's Building Impact Estimator so project teams can easily model a whole building LCA
		MRc2: Building product disclosure & optimization - environmental product declaration	Duro-Fleece has a 3rd party verified environmental product declaration (EPD), which is valued as one whole product.
		MRc3: Building product disclosure & optimization - sourcing of raw materials	Duro-Last offers a take-back program so old roofs can be recycled into new product.
LEED O+M: Existing Buildings	Sustainable Sites	SSc3: Heat island reduction	Initial Solar Reflective Index white membrane: 110 3-year aged SRI: 81 Duro-Fleece roofs can also be installed under a vegetative roof.
	Energy & Atmosphere	EAc4: Optimize energy performance	Cool roofs can help reduce heating and cooling loads which reduces building energy consumption.
	Materials & Resources	MRc3: Purchasing - facility maintenance & renovation	Duro-Fleece contains post-industrial recycled content.
Pilot Credit		Certified multi-attribute products & materials	Duro-Fleece is NSF/ANSI 347 Gold certified, and has achieved two points in credit 5.2.2

Green Globes® Contributions (version 2.2)			
Program	Category	Credit	Contribution
Green Globes New Construction	3.2.2 Ecological Impacts	3.2.2.4 Heat island effect	Initial Solar Reflective Index white membrane: 110 3-year aged SRI: 81 Duro-Fleece roofs can also be installed under a vegetative roof.
	3.5.1 Building Core & Shell	3.5.1.1 Path A: Performance path for building core & shell	The Duro-Fleece LCA is featured in the Athena Sustainable Materials Institute's Building Impact Estimator so project teams can easily model a whole building LCA
		3.5.1.2 Path B: Prescriptive path for building core & shell	Duro-Fleece is NSF/ANSI 347 gold certified, and has a brand specific 3rd-party verified EPD to comply with this credit.
	3.5.6 Resource Conservation	3.5.6.1 Minimized use of raw materials	Custom fabricated accessories help reduce waste created onsite.
	3.5.7 Building Envelope - Roofing/ Openings	3.5.7.1 Roofing membrane assemblies and systems	Most Duro-Fleece roofs are inspected by a trained QA technical representative.
		3.5.7.2 Flashings	Most Duro-Fleece flashings, provided by EXCEPTIONAL® Metals, are inspected by a trained QA technical representative.
	3.5.10 Envelope - Barriers	3.5.10.1 Air barriers	Duro-Guard® Soprapav'r is a self-adhesive vapor membrane that works as an air barrier to stop thermal discontinuities.
		3.5.10.2 Vapor retarders	Duro-Guard Soprapav'r is an air barrier as well as a vapor retarder.



# DURO-GUARD® ISO II

Product Environmental Profile

Duro-Guard ISO II insulation is a closed-cell polyisocyanurate foam core insulation board with an integrally laminated, fiber-reinforced facer which is compatible with Duro-Last® roof membranes.

## Environmental Facts:



### SUSTAINABLE MATERIALS

Manufactured with a blowing agent free of ozone depleting chemicals, CFCs and HCFCs.



### RECYCLED CONTENT

Contains up to 28% post-consumer and 10% pre-consumer recycled content, depending on the foam thickness.



### ENERGY EFFICIENT

Polyiso provides high thermal resistance per inch of material which helps promote energy savings.



### GREEN CODES

Complies with California Title 24, IgCC, and efficiency programs requiring high R-values.

## Thermal Values

Thickness		LTTR R-Value	Flute Spanability	
Inches	mm		Inches	mm
1.00	25	5.60	2.625	67
1.50	38	8.50	4.375	111
1.60	41	9.10	4.375	111
1.70	43	9.60	4.375	111
2.00	51	11.40	4.375	111
2.50	64	14.40	4.375	111
2.70	69	15.60	4.375	111
3.00	76	17.40	4.375	111
3.30	84	19.20	4.375	111
3.50	89	20.80	4.375	111
3.60	91	21.10	4.375	111
4.00	102	23.60	4.375	111

**Product Environmental Profile: Duro-Guard ISO II**

Duro-Guard ISO II insulation can help buildings obtain credits under the U.S. Green Building Council’s LEED® (Leadership in Energy and Environmental Design) rating system, as well as GBI’s (Green Building Institute) Green Globes certification. Both programs promote sustainable building management and construction practices.

LEED® Contributions (version 4)			
Program	Category	Credit	Contribution
LEED BD+C: New Construction	Energy & Atmosphere	EAc2: Optimize energy performance	ISO insulation provides high thermal resistance per inch of material which helps reduce building energy consumption.
	Materials & Resources	MRc1: Building life-cycle impact reduction	The Polyisocyanurate Insulation Manufacturers Association (PIMA) published an industry-wide environmental product declaration (EPD) which can be used in Athena Sustainable Materials Institute’s Building Impact Estimator so project teams can easily model a whole building LCA
		MRc2: Building product disclosure & optimization - environmental product declaration	PIMA published an industry-wide EPD which contributes to this credit.
		MRc3: Building product disclosure & optimization - sourcing of raw materials	Duro-Guard ISO insulation contains up to 28% post-consumer and 10% pre-consumer recycled content, depending on the foam thickness.
LEED O+M: Existing Buildings	Energy & Atmosphere	EAc4: Optimize energy performance	ISO provides high thermal resistance per inch of material which helps reduce building energy consumption.
	Materials & Resources	MRc3: Purchasing - facility maintenance & renovation	Can contain up to 25% pre-consumer recycled content, by request.
		MRc5: Solid waste management - facility maintenance & renovation	ISO insulation can be recycled in some markets through construction and demolition waste management companies.

Green Globes® Contributions (version 2.2)			
Program	Category	Credit	Contribution
Green Globes New Construction	3.5.1 Building Core & Shell	3.5.1.1 Path A: Performance path for building core & shell	The Polyisocyanurate Insulation Manufacturers Association (PIMA) published an industry-wide environmental product declaration (EPD) which can be used in Athena Sustainable Materials Institute’s Building Impact Estimator so project teams can easily model a whole building LCA
	3.3.4 Building Opaque Envelope	3.3.4.1 Thermal resistance & transmittance	Duro-Guard ISO II insulation in thicknesses greater than 2.7 inches meet the minimum R-value criteria.
	3.5.7 Building Envelope - Roofing/ Openings	3.5.7.1 Roofing membrane assemblies and systems	Insulation is part of a properly installed roofing assembly.



800-248-0280 | duro-last.com

“Duro-Last”, “Duro-Guard” and the “World’s Best Roof” are registered trademarks owned by Duro-Last, Inc. LEED is a trademark owned by the U.S. Green Building Council® and is used with permission. Product\_Environmental\_Profile\_Duro-Guard\_ISO II ORIG: 4.10.15 REV: 3.21.17\_V1 – DL140062

# The Path to a Greener Roof

## Duro-Last® and NSF/ANSI 347

The roof is a huge part of any building project, and as the imperative for “greener” buildings grows, there is greater pressure to find an environmentally sustainable roof. But sustainability for membrane roofs had never previously been quantified.

### IN THE PAST

The focus was on one or more of several individual attributes:

- Volatile Organic Compounds (VOCs) released by the material or its installation
  - Energy savings of the roofing system
  - Recyclability of the raw material
- But there was no objective composite score.



Duro-Last did well in all three areas. But there was no way to compile “points” for a full, fair comparison to other products!



### NSF/ANSI 347

New standard developed by major standards organizations (NSF, ANSI) with roofing industry stakeholders:

- Architects
- Roofing consultants
- Engineers
- Non-government organizations
- Manufacturers

Based on total life cycle, NSF 347 quantifies and documents sustainable qualities of each membrane roofing material:

- Polyvinyl chloride (PVC)
- Thermoplastic polyolefin (TPO)
- Ethylene propylene diene terpolymer (EPDM)
- Ketone ethylene ester (KEE)
- Polyisobutylene (PIB) products

### TOTAL LIFE CYCLE

From raw material to disposal, NSF 347 rates each product in five different areas:

Product design	42 points
Product manufacturing	27 points
Membrane durability	40 points
Corporate governance	7 points
Innovation	7 points
<b>Total</b>	<b>123 points</b>



RECYCLED

Four levels of third-party verified certification: conformant (lowest), silver, gold, platinum (highest)



### Product Manufacturing

During the manufacturing process, the maker practices:

- Conservation of energy
- Conservation of water
- Protection of clean air
- Material waste reduction processes

#### Recycling Manufacturing Scrap

- Duro-Last recycles material in three ways:
- Scrap is recycled back into production
  - Leftover material is reground to produce resilient commercial flooring
  - Pieces of off-spec membrane are used to make prefabricated roof accessories



### Corporate Governance

Is the manufacturer responsible to its stakeholders?

- Training and outreach for installers and designers
- A good corporate citizen
- Good employer

#### Duro-Last's Community Commitment

- Duro-Last community investment credit
- Annual donation of roof to local church or school
- Donated roof for new teaching hospital
- Employees given opportunity to volunteer for Habitat for Humanity



### Product Design

The membrane is made from environmentally sustainable raw material:

- Minimal chemicals of concern
- Informed selection of suppliers
- Reclaims post-consumer single-ply roofing membrane

### Membrane Durability

How long will it last? The roof's service life is a key factor. It is measured by:

- Quality control measures
- Demonstrated durability in the field
- How much the material itself contributes to durability

For true sustainability, service life in the field is key. Two quality control measures must be in place:

- Documented installer training program
- Post-inspection protocol.

### Innovation

Has the company introduced new technology, or added sustainability value to old technology? Points awarded for:

- Increasing environmentally sustainable content
- Reduction of energy consumption
- Investment of capital in renewable energy at manufacturing plant
- Reduced water consumption and minimization of waste materials



Want to Learn More?

For more information about NSF/ANSI 347 and Duro-Last's Platinum certification, visit [duro-last.com/sustainability](http://duro-last.com/sustainability) or contact us at 866-735-8824.



# Reduce, Recycle, Reimagine

## Duro-Last® was Sustainable Before it was Cool

Sustainability has been a part of the Duro-Last culture for more than 20 years. Our founder, John R. Burt, came up with the idea of reimagining old PVC roofs and manufacturing excess into resilient flooring, walkway pads and concrete expansion joints.

## Recycling

Duro-Last has a focus on recycling at every step of the product life-cycle. In addition to our manufacturing process that allows excess material to be recycled back into production, our custom-fabricated roof systems allow roofing contractors to reduce scrap on the job site — meaning less waste ends up in a landfill.

*To date, sister company Oscoda Plastics®, Inc., in partnership with Duro-Last, has recycled more than 80 million pounds of PVC material.*

## Recycle Your Roof

Duro-Last offers a take back program which allows mechanically-attached PVC roofs, at the end of their useful life, to be returned to our facility where they are recycled.

- These roofs are reprocessed into other products, giving them new life and significantly reducing environmental impact.
- Duro-Last offers this program at all of our plants.



# Certified Sustainable

## Energy

White Duro-Last Roofing Systems can greatly reduce energy consumption and electricity bills by meeting or exceeding industry standards for reflectivity and thermal emissivity.

## Cool Roofs, Big Savings

Duro-Last's high reflectivity is particularly helpful in reducing peak energy demand, or the sharp peak in electrical demand observed in almost every building during the busiest hours of the day. Peak demand is a problem because it:

- Requires additional power plant capacity
- Causes imbalances in the power grid
- Can increase air pollution
- May result in monthly charges to building owners that are many times higher than base electrical rates

Cool roofing technology is one of the best ways to shrink peak demand. A recent analysis demonstrates that the peak demand and net energy savings offered by cool, white roofs are available for both new and existing buildings in all climates within North America.



**800-248-0280**  
duro-last.com/sustainability

"Duro-Last", "Rock-Ply", "Shingle-Ply", "Duro-Tuff", "Duro-Fleece", "Duro-Fleece Plus" and the "World's Best Roof" are registered trademarks owned by Duro-Last, Inc. Oscoda Plastics is a registered trademark owned by Oscoda Plastics, Inc. LEED is a registered trademark owned by the U.S. Green Building Council. Green Globes is a registered trademark owned by The Green Building Initiative. ENERGY STAR® is only valid in the United States. Sustainability Sheet ORIG: 1.20.16 / REV: 12.21.17, 9.11.18 — DL080004

## Certifications = Transparency

Although many building products make grand sustainability claims, finding products that have third-party certifications is becoming increasingly important. Duro-Last's flagship membrane, as well as the Rock-Ply® and Shingle-Ply® membranes, have obtained NSF/ANSI 347 Platinum Certification - the highest possible certification - which takes product design, product manufacturing, membrane durability, corporate governance and innovation into consideration. Duro-Last's Duro-Tuff®, Duro-Fleece®, Duro-Fleece Plus® and Duro-Last EV membranes each earned NSF/ANSI 347 Gold Certifications.

Duro-Last also published the first product-specific PVC environmental product declaration (EPD) in the commercial roofing industry. Certified by global public health organization NSF International, EPDs report environmental impact data which assists building contractors, architects and designers in making more informed purchasing decisions.

EPDs are recognized globally and by LEED® (leadership in energy and environmental design) Green Building Rating System as a preferred reporting tool. Additionally, LEED version 4, Green Globes®, IgCC (International Green Construction Code), and ASHRAE 189.1 Standard for the Design of High Performance Green Buildings, offers additional credits for building materials with EPDs.



### INTRODUCTION

Duro-Last roofing membrane and roofing systems have been classified and listed by Underwriters Laboratories (UL) and Underwriters Laboratories of Canada (ULC). These listings include systems rated for protection from external fire exposure, uplift resistance and impact resistance. Duro-Last membrane is also listed in ceiling-roof designs evaluated for performance during internal fire exposures shown below as “Roofing Membranes (CHCI / United States)”. Duro-Last, Inc. is authorized to use the appropriate UL Mark and is subject to UL’s Follow-Up Service to ensure that the roofing materials and production procedures continue to comply with UL’s requirements.

The roofing material and system listings can be found in the “Roofing Materials & Systems Directory” published by UL and can also be found on UL’s website ([www.ul.com](http://www.ul.com)) within the Online Certifications Directory. For Canada, the listings can be found on ULC’s website ([www.ulc.ca](http://www.ulc.ca)) within the ULC Online Directories. The directories include extensive information on important topics such as testing standards, acceptable roof deck construction and guidance to building department officials. Brief descriptions of the categories under which Duro-Last roofing systems are listed by UL are included below. Please note, the category listings that have been included in this section were taken directly from the UL and ULC Online Certification Directories and are subject to change. Refer to the online directories for the most current listings. Contact the Duro-Last Engineering Services Department for assistance.

### ROOFING SYSTEMS (TGFU & TGFUC)

This category covers materials intended for roofing systems which provide Class A, B or C coverings on combustible and noncombustible decks. These coverings are intended to provide protection from external fire exposure and the level of protection is indicated by the classification (A, B or C) shown for each system. Roofing systems investigated for impact resistance are so indicated in the individual classifications by the appearance of the word “Impact” and the applicable Class Number (3 or 4). The basic standards used to investigate products in this category are ANSI/UL790 “Test for Fire Resistance of Roof Covering Materials” and UL2218 “The Standard for Impact Resistance of Prepared Roof Covering Materials.” For Canada, the standard is CAN/ULC-S107 “Method of Fire Tests for Roof Coverings.” TGFU and TGFUC listings are included in this section for the United States and Canada, respectively.

### ROOFING SYSTEMS, UPLIFT RESISTANCE (TGIK)

This category covers roofing materials that have been investigated for damageability from uplift pressures associated with high velocity winds. The classification for uplift resistance, expressed in lbs. per sq. ft. (psf) is derived from tests conducted in accordance with UL1897 “Uplift Tests for Roof Covering Systems.” The TGIK listings are included in this section

### ROOFING MEMBRANES (CHCI / UNITED STATES)

This category covers single-ply roofing membranes which are intended for use as roof coverings in ceiling-roof designs. Listings can be found in the “Fire Resistance Directory” published by UL and can also be found on UL’s website ([www.ul.com](http://www.ul.com)) within the “Online Certifications Directory.” The membranes have been evaluated for use in specified designs when installed in accordance with the details described for each classified company. The CHCI listings are included in this section. (See # 3 tab of this section)

### DESIGN NUMBERS (BXUVC / CANADA)

As a result of meeting the applicable requirements of CAN/ULC-S101 ULC has determined that the Duro-Last PVC membrane can be used in the following Design Numbers as published in the Fire Resistance Ratings (BXUVC) category of the ULC Directory. These design numbers can be accessed via the ULC Online Directories ([www.ulc.ca](http://www.ulc.ca)).

R210	R212	R214	R220	R221	R222	R223	R600
R700	R701	R703	R801	R802	R803	R805	R806



# FM APPROVED ASSEMBLIES

## CODES AND APPROVALS

### INTRODUCTION

The Duro-Last® roofing system has been evaluated by FM Approvals, the certification and testing service of FM Global, and at the time of this publication Duro-Last, Inc. has over 800 FM approved roof assemblies. All FM approved roof assemblies have been evaluated for performance criteria that include interior fire exposure, exterior fire exposure, wind uplift resistance, corrosion resistance for roof fasteners, accelerated weathering, hail damage resistance, leakage resistance and foot traffic resistance.

Duro-Last, Inc. currently has FM approved assemblies conforming to one or more FM Approval Standards. These standards include Approval Standards 4450 for *Class 1 Insulated Steel Deck Roofs*, Approval Standard 4470 for *Class 1 Roof Covers*, Approval Standard 4471 for *Class 1 Panel Roofs* or Approval Standard 4435 for *Roof Perimeter Flashing*, or 4451 for *Steel Roof Decking*.

Design professionals who will be specifying FM approved roof assemblies are strongly urged to utilize the tools made available on FM Approval's web site RoofNav ([www.roofnav.com](http://www.roofnav.com)). The web site includes a calculator which can be used to determine the appropriate FM Class to use on a project. The calculator utilizes project specific information such as building height, ground roughness, building category, and basic wind speed. The calculator allows the user to choose the level of protection from interior and exterior fire hazards as well as hail damage. The calculator is easy to use and help is provided for each step involved. Also available on RoofNav are: the complete collection of FM approved roof products and assemblies, pertinent FM Data Sheets and Standards, useful background information and a glossary of terms.

### Approved Roof Assemblies

The roof assemblies within RoofNav are FM approved only when assembled as listed for each specific cover, insulation, fastener, deck or structural substrate. Their compatibility with other roofing components within the construction is the responsibility of the listed manufacturer, who should be consulted prior to their use. Their performance is extremely dependent upon the substrate to which the system is attached or anchored.

It is impractical to list all of Duro-Last's FM approved assemblies in this section. Refer to the RoofNav website for the complete listing. RoofNav has extensive tools for searching for approved products and assemblies. Contact Duro-Last Technical Services if you need assistance regarding FM approved products and roof assemblies.

### FM Global Insured Projects

If the building in question is FM Global insured, contact FM Global Field Engineering. An FM Global Field Engineer will review the work to be done and provide assistance in determining the proper roof assembly to use. If you have not been through this process, contact the Duro-Last Technical Services Department for assistance.

### Wind Uplift Ratings

FM approved roof assemblies have a minimum Class 1-60 wind uplift rating. In addition to the minimum Class 1-60 rating, FM approved roofs may also be rated in 15 psf increments; e.g. Class 1-75, Class 1-90, Class 1-105, etc. Duro-Last currently has FM approved roof assemblies ranging from Class 1-60 up to Class 1-495 and additional assemblies are tested for approval each year.

FM Approvals also evaluates perimeter flashings for use with FM approved roof assemblies. Duro-Last has approved perimeter flashings that range from Class 1-90 to Class 1-990. These products are listed in Table 1 on page FM-4.

**CORNER AND PERIMETER ENHANCEMENT**

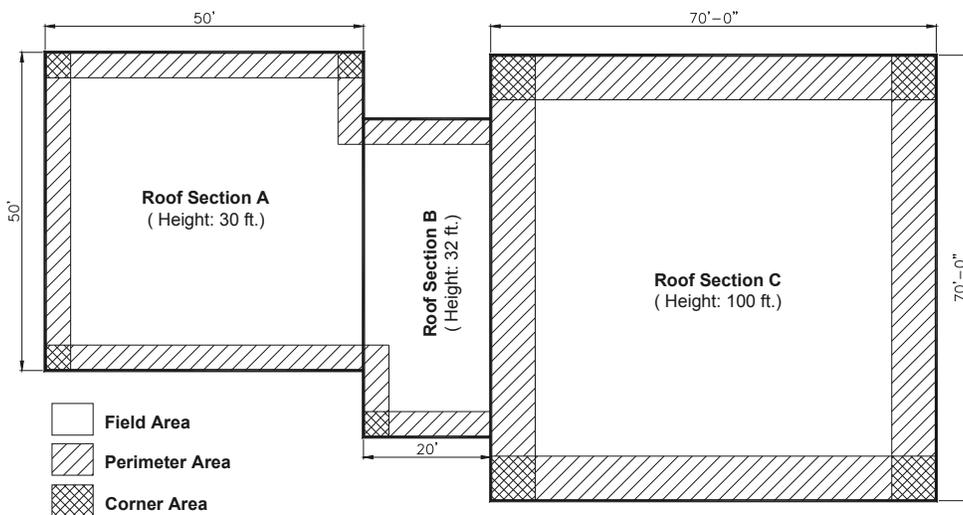
The FM approved roof assemblies have been evaluated for exposure to wind loads in the field (interior) of the roof. The wind uplift loads acting at the roof corners and the roof perimeters are generally higher than the load acting in the field of the roof. To compensate for these higher loads, enhancements must be made for the securement of all components in the roof assembly. These enhancements are discussed in detail in FM Global Property Loss Prevention Data Sheets 1-28 and 1-29.

There are two ways to compensate for the higher loads in the perimeter and corner zones,

1. Install an FM approved assembly in each area that has a wind uplift rating equal to or greater than the minimum wind rating for that area listed in Table 1 of FM Global Property Loss Prevention Data Sheet 1-29.
2. Utilize the prescriptive enhancement options as outlined in FM Global Property Loss Prevention Data Sheet 1-29. Care should be exercised when utilizing one of the prescriptive options to ensure that the option is acceptable for the project. Contact Duro-Last Technical Services for assistance in determining the appropriate option.

The width (x) of the perimeter area is defined as the lesser of either 40% of the building eave height or 10% of the lesser roof plan dimension, but in no case less than 5 ft. (Note: Duro-Last requires a minimum perimeter width of 5 ft on FM installations. This exceeds FM's minimum requirements.) The corner area is defined as x by x ft. Figure A illustrates the location of the field, perimeter and corner areas for three roofs and shows the calculations used to determine the perimeter width for each roof. Note the following when multi-level roofs meet at a common wall.

1. When the roof heights differ by less than 3 ft the edge of both the upper and lower roofs are treated as field area, except for the rectangular areas at each end, which are treated as perimeters. This is the case where roof section A is adjacent to roof section B in the drawing below.
2. When the roof heights differ by 3 ft or more the edge of the upper roof is treated as either perimeter or corner area while the edge of the lower roof is treated as field and perimeter area. This is the case where roof section B is adjacent to roof section C in the drawing below.



**Roof Section A**

- 40% of height =  $0.4 \times 30 \text{ ft.} = 12 \text{ ft.}$
- 10% of lesser plan dimension =  $0.1 \times 50 \text{ ft.} = 5 \text{ ft.}$
- Perimeter width to use = 5 ft.

**Roof Section B**

- 40% of height =  $0.4 \times 32 \text{ ft.} = 12.8 \text{ ft.}$
- 10% of lesser plan dimension =  $0.1 \times 20 \text{ ft.} = 2 \text{ ft.}$
- Perimeter width to use = 5 ft. (Duro-Last's minimum width)

**Roof Section C**

- 40% of height =  $0.4 \times 100 \text{ ft.} = 40 \text{ ft.}$
- 10% of lesser plan dimension =  $0.1 \times 70 \text{ ft.} = 7 \text{ ft.}$
- Perimeter width to use = 7 ft.

## BOARD FASTENING

Insulation boards must be installed per specific FM approved assemblies whenever possible. Installation of assemblies which are not FM approved may still be acceptable to FM when installed in accordance with the design recommendations outlined in FM Global Property Loss Prevention Data Sheet 1-29. For FM Global insured projects such assemblies must be reviewed by an FM Global Field Engineer.

Refer to FM Global Property Loss Prevention Data Sheet 1-29 for a complete discussion of proper board attachment. Several key points to consider include,

1. When installing multiple layers of insulation it is acceptable to mechanically secure through all of the layers provided that:
  - a. All layers are the same FM approved insulation.
  - b. Total insulation thickness does not exceed maximum FM approved thickness of the insulation.
  - c. The roof cover/insulation/fastener combination is FM approved.
2. Acceptable board dimensions are listed in FM approved assembly or as follows:
  - a. Mechanically attached board: maximum size is 4 x 8 ft. (1.2 by 2.4 m).
  - b. Adhesive or asphalt attached board: maximum size is 4 x 4 ft. (1.2 by 1.2 m).

(Exception: Flexible boards, such as DensDeck<sup>®</sup>, up to 4 x 8 ft (1.2 by 2.4 m).

3. Provide preliminary securement of insulation boards when mechanically fastened roof covers are used as follows.
  - a. Install a minimum of four fasteners per 4 x 4 ft (1.2 x 1.2 m) board.
  - b. Install five fasteners per 4 x 8 ft. (1.2 x 2.4 m) board. (Note: this fastener density meets the Duro-Last specification which exceeds the FM requirements.)
  - c. Additional insulation fastening is not required in the perimeter or corner areas when the roof system is mechanically attached.

Exception: As stated in the FM Global Property Loss Prevention Data Sheet 1-29, if a vapor retarder is installed below the insulation or coverboard of a mechanically secured single-ply membrane on Panel-type decks (decks with seams such as steel, wood, pre-cast planks, etc.), secure the insulation or coverboard with fasteners or plates by either:

1. A rate of 1 per 2 ft<sup>2</sup> (1 per 0.19m<sup>2</sup>) throughout the entire roof area, OR
2. A rate throughout the entire roof area that will obtain a minimum 1-90 uplift FM Approval with an adhered single-ply roofing membrane as specified in a RoofNav listing. The insulation/coverboard type used below the mechanically secured membrane must match that specified by the RoofNav listing for the adhered membrane, and the thickness of the insulation / coverboard must be equal to or greater than that specified by the RoofNav listing.

## MECHANICALLY ATTACHED ASSEMBLIES INTO STEEL DECKS

Installation of mechanically attached single-ply roof covers over a steel deck (new or recover) require that the roof cover be laid so that the rows of fasteners are perpendicular to the ribs of the steel roof deck. This requirement is made to take advantage of the steel deck rib module and to engage the top flange of the steel deck. (Exception: For Class 1-75 and below, fastener rows may be installed parallel to the ribs of the steel deck within the defined building perimeter width. The fasteners still must engage the top flange of the deck.)

**FM APPROVED PRODUCTS**

The following Duro-Last products are approved for use in FM approved assemblies.

FM Approved Product Name	Approved Use
Duro-Last Membrane (40, 50 and 60 mil)	Cover (Single-ply)
Duro-Last Duro-Fleece <sup>®</sup> Membrane (50 and 60 mil)	Cover (Single-ply)
Duro-Fleece Adhesive	Adhesive (Full Application and Ribbons)
Duro-Grip Polyurethane Foam Insulation Adhesive	Adhesive (Full Application and Ribbons)
Duro-Last SB I, SB II and SB IV Adhesives	Adhesive (Full Application)
Duro-Last WB I and WB II Adhesives	Adhesive (Full Application)
Duro-Last 4725 Tab Sealer	Adhesive (Full Application)
Duro-Guard <sup>®</sup> HD-A	Cover Board and Insulation (Board Stock)
Duro-Guard Iso Composite-H	Insulation (Board Stock)
Duro-Guard Iso HD-H	Cover Board and Insulation (Board Stock)
Duro-Guard Iso II-H	Insulation (Board Stock)
Duro-Guard Iso II-H Tapered	Insulation (Board Stock)
Duro-Guard Iso III-H	Insulation (Board Stock)
Duro-Guard Iso III-H Tapered	Insulation (Board Stock)
Duro-Guard Iso II-A	Insulation (Board Stock)
Duro-Guard Iso II-A Tapered	Insulation (Board Stock)
Duro-Guard Iso III-A	Insulation (Board Stock)
Duro-Guard Iso III-A Tapered	Insulation (Board Stock)
Duro-Guard Iso IV-A	Insulation (Board Stock)
Duro-Guard Iso IV-A Tapered	Insulation (Board Stock)
Duro-Fold <sup>®</sup>	Insulation (Board Stock)
Duro-Last Fascia System	Fascia
Duro-Guard Metal Compression System	Fascia
Duro-Last Drip Edge	Fascia
Duro-Last Fascia System	Fascia
Duro-Last Gravel Stop Edgings	Fascia
Duro-Last #15 Extra Heavy Duty Drill Point Fastener	Fastening (Fastener)
Duro-Last #14 HD Fastener	Fastening (Fastener)
Duro-Last Concrete Screw	Fastening (Fastener)
Duro-Last Fluted Concrete Nails	Fastening (Fastener)
Duro-Last Liquid Auger Fastener	Fastening (Fastener)
Duro-Last Insulation Plate	Fastening (Stress Plate)
Duro-Last Poly-Plates	Fastening (Stress Plate)
Duro-Last Cleat Plate	Fastening (Stress Plate)
Duro-Last 3 in. Metal Plates	Fastening (Stress Plate)
Rhinobond Insulation Plate	Fastener (Stress Plate)



® Duro-Last Roofing, Inc.