

SPF and LEED Platinum Certification: What is LEED, and How Are Projects Certified?

Murphy Mahaffey, PMC and Rick Duncan, SPFA
Session 2E
Thursday 1/31 @ 11:15am
Room 202B



ANTITRUST POLICY STATEMENT FOR SPRAY POLYURETHANE FOAM ALLIANCE MEETINGS

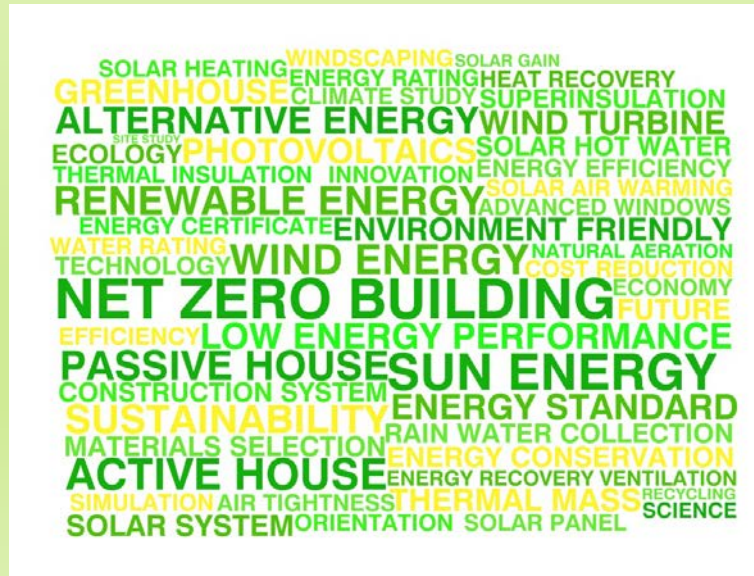
- ▶ It is and shall remain the policy of the Spray Polyurethane Foam Alliance ("SPFA"), and it is the continuing responsibility of every SPFA member company, SPFA meeting or event participant, as well as SPFA staff and leadership to comply in all respects with federal and state antitrust laws. No activity or discussion at any SPFA meeting or other function may be engaged in for the purpose of bringing about any understanding or agreement among members to (1) raise, lower or stabilize prices; (2) regulate production; (3) allocate markets; (4) encourage boycotts; (5) foster unfair or deceptive trade practices; (6) assist in monopolization; or (7) in any way violate or give the appearance of violating federal or state antitrust laws.
- ▶ Any concerns or questions regarding the meaning or applicability of this policy, as well as any concerns regarding activities or discussions at SPFA meetings should be promptly brought to the attention of SPFA's Executive Director and/or its legal counsel.



PRODUCT DISCLOSURES FOR THE CONSTRUCTION MARKET

The construction materials market is changing rapidly...

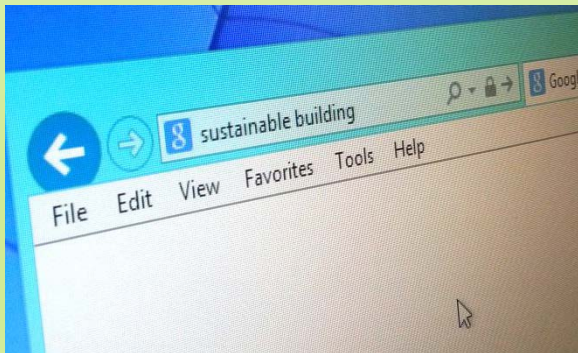
...driven by architects, specifiers and building owners through sustainable building design programs



PRODUCT DISCLOSURES FOR THE CONSTRUCTION MARKET

The following groups are asking for comprehensive product disclosures:

- Green building publications (media)
- Large, influential architect-engineer firms
- Sustainability consultants, programs and databases



PRODUCT DISCLOSURES FOR THE CONSTRUCTION MARKET

Product disclosure requirements have been or will be added to every major U.S. sustainable building program:

- LEED v4: Three-tier material disclosure credits
- ASHRAE 189.1: Proposed Addendum AW includes disclosure requirements
- IgCC 2015 : Several disclosure requirements are included



PRODUCT DISCLOSURES FOR THE CONSTRUCTION MARKET

The following product disclosures are being considered by these programs:

- Life Cycle Assessment (LCA)
- Environmental Product Declaration (EPD)
- Health Product Declaration (HPD)
- Other Disclosures
 - Corporate Sustainability Report (CSR)
 - Green Labels



PRODUCT DISCLOSURES FOR THE CONSTRUCTION MARKET

The following product disclosures are being considered by these programs:

- Life Cycle Assessment (LCA)
 - Environmental Product Declaration (EPD)
 - Health Product Declaration (HPD)
 - Other Disclosures
 - Corporate Sustainability Report (CSR)
 - Green Labels
- } SPFA Industry Level Project



WHAT IS A LIFE-CYCLE ASSESSMENT ?

Life-Cycle Assessment (LCA) is a technique to assess environmental impacts associated with ALL stages of a product's life

SPFA's LCA was based on Cradle to End-of-Life. Note some LCAs are only Cradle to Gate

Most stages have negative environmental impacts, but insulation products have positive environmental impacts during use stage



WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

An extension of an LCA developed to provide specific and comparable environmental information in a common format

The EPD format follows set rules per the Product Category Rules (PCR)

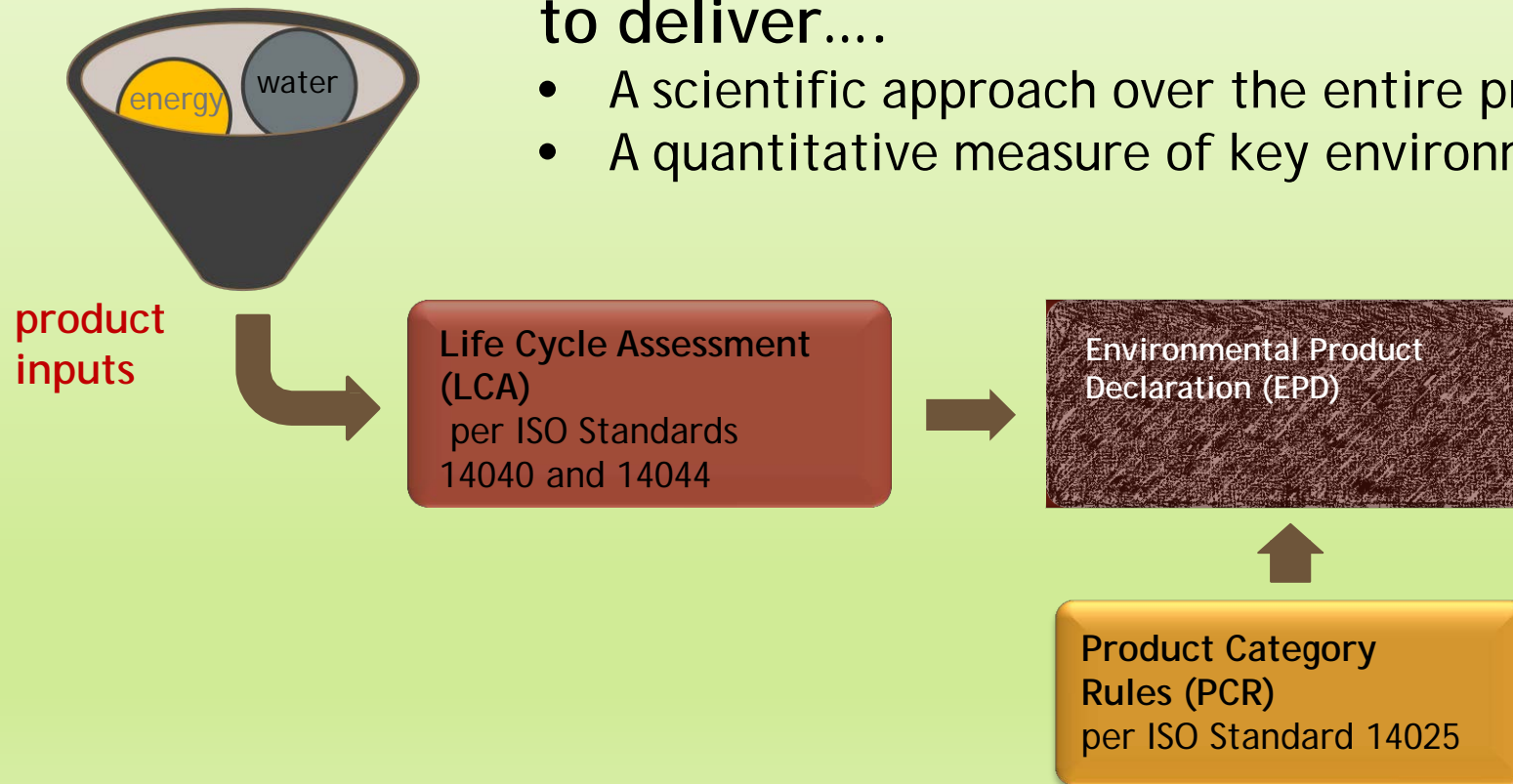
- PCRs are developed to the ISO 14025 Standard
- PCRs created by consensus process by trade associations and other organizations
- The U.S. Insulation PCR was jointly developed in 2011 and updated in 2017 by NAIMA, PIMA, XPSA, EPSMA, CIMA, RIMA and SPFA.
- Program operator for the U.S. Insulation PCR is UL Environments



WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

A properly-developed EPD follows an ISO-process to deliver....

- A scientific approach over the entire product life cycle
- A quantitative measure of key environmental impacts



EPD BENEFICIARIES...

MANUFACTURERS

- Consider joint development of generic EPDs for key industry product segments
- Use the EPD format to tell the entire story for your product
- Get the information to the data integrators - and make sure they are using the best information available



DESIGN PROFESSIONALS

- Recognize that EPDs are still in the early stages of development and their data is difficult to use and compare
- Encourage suppliers to develop EPDs and support improvement of impact databases and whole-building LCA



SPFA LCA - PRODUCT SCOPE

SPF Formulations

Product	2013	2018
Open-Cell LD SPF	XX	X
Closed-Cell MD SPF - HFC	XX	X
Roofing SPF - HFC	X	X
Low-Pressure MD SPF - HFC		X
Closed-Cell MD SPF - HFO		X
Roofing SPF - HFO		X
Low-Pressure MD SPF - HFO		x



SPFA LCA - IMPACT CATEGORIES

Impact Category Characterization Factor	Description	Unit
Global Warming Potential (GWP)	A measure of greenhouse gas emissions, such as CO ₂ and methane.	kg CO ₂ equivalent
Eutrophication Potential (EP)	Eutrophication covers all potential impacts of excessively high levels of macronutrients, the most important of which nitrogen (N) and phosphorus (P)..	kg Nitrogen equivalent
Acidification Potential (AP)	The acidification potential is a measure of a molecule's capacity to increase the hydrogen ion (H ⁺) concentration in the presence of water, thus decreasing the pH value.	mol H ⁺ equivalent
Photochemical Ozone Creation Potential (POCP)	A measure of emissions of precursors that contribute to ground level smog formation (mainly ozone O ₃),	kg O ₃ equivalent
Ozone Depletion Potential (ODP)	A measure of air emissions that contribute to the depletion of the stratospheric ozone layer.	kg CFC-11 equivalent
Additional Inventory/Impact Category	Description	Unit
Primary Energy Demand (PED) ^[1]	A measure of the total amount of primary energy extracted from the earth, expressed in energy demand from non-renewable or renewable resources	MJ

[1] PED is a special inventory flow created by PEI using the concept of "primary energy"



SPFA LCA - INTERPRETATION

Project Documents

Several documents are publically available summarizing the key results from this project....

- Detailed Technical Report (SPFA) [SPFA website](#)
- Summary Brochure (SPFA) [SPFA website](#)
- Environmental Product Declaration (EPD) [ULe website](#)
- [2018 Update available later this year.](#)



Polyurethane Foam and LEED Platinum Certification: What is LEED, and How Are Projects Certified?

By Murphy Mahaffey

Director of International Sales

Polyurethane Machinery Corporation



**POLYURETHANE
MACHINERY
CORPORATION**



Presentation Goals

What is “LEED”?

How does a LEED project get certified?

What are the LEED advantages of polyurea over polyurethane foam?

Examine profile of LEED Platinum Project using polyurethane foam and polyurea coating.



What is LEED?

► *LEED* Stands for Leadership in Energy and Environmental Design

- an ecology-oriented building certification program run under the auspices of the U.S. Green Building Council (USGBC)
 - a nationally accepted benchmark for the design, construction and operation of high-performance green buildings
 - provides building owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance
- adopted by state and local governments
- LEED projects in 40 countries including Canada, Mexico, and Brazil*



LEED Certification Levels

Achieve better buildings with LEED

Projects pursuing LEED certification earn points across several categories, including energy use and air quality. Based on the number of points achieved, a project then earns one of four LEED rating levels: Certified, Silver, Gold or Platinum.



Certified

40-49 points earned



Silver

50-59 points earned



Gold

60-79 points earned



Platinum

80+ points earned

The process is designed to inspire project teams to seek innovative solutions that support public health and our environment, while saving building owners money over a project's life cycle. Here's how to get started:

LEED Process- How does it happen?

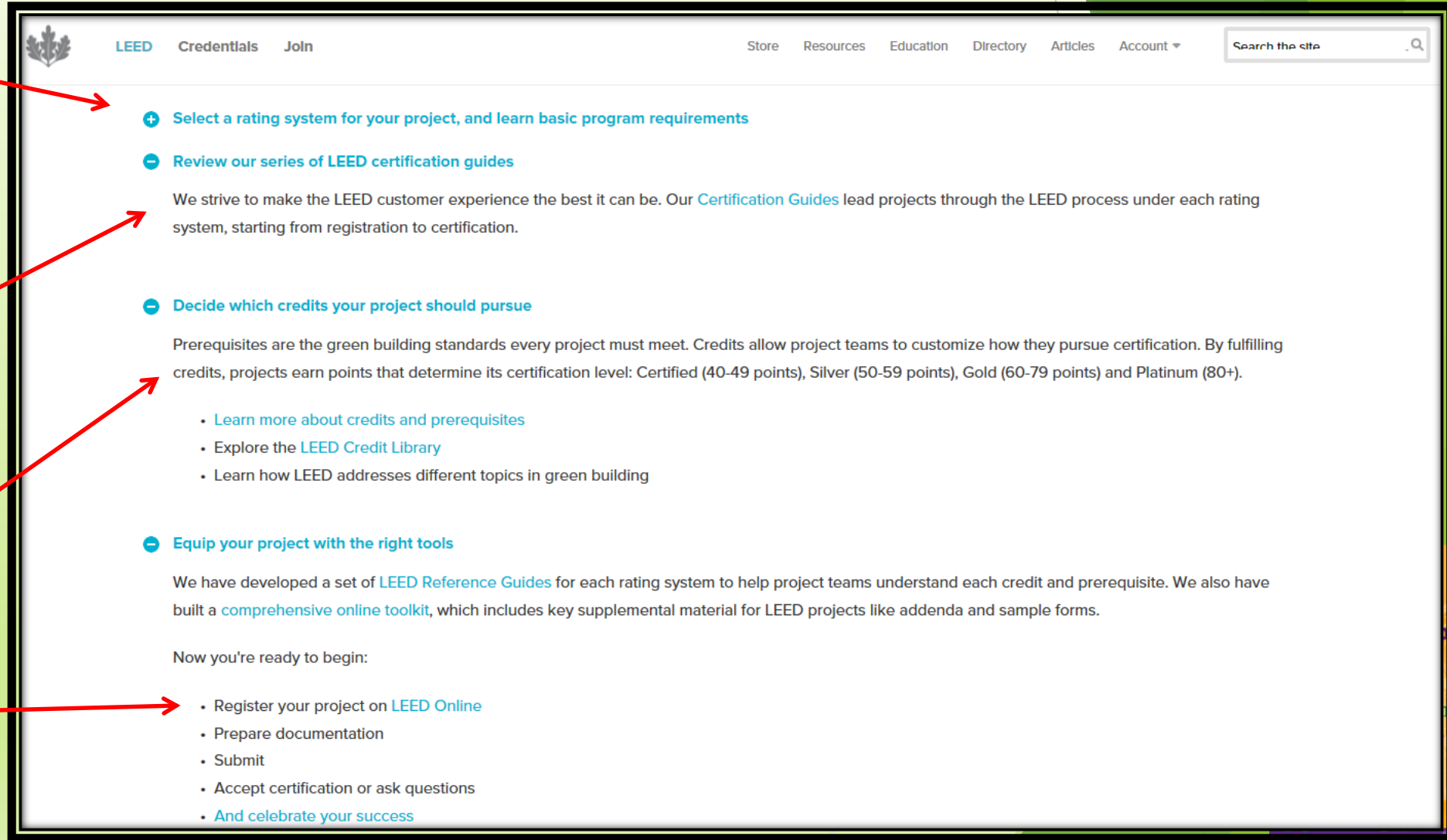
Select rating system

(Commercial, Residential, etc.)

Review certification guides

Decide on credits for project

Register Online and document



The screenshot displays the LEED website's main navigation and a list of steps for the certification process. The navigation bar includes the LEED logo, links for Credentials and Join, and a top menu with Store, Resources, Education, Directory, Articles, and Account. A search bar is located in the top right corner. The main content area lists five steps, each with a plus or minus icon in a blue circle. Red arrows from the text on the left point to specific steps: 'Select rating system' points to the first step, '(Commercial, Residential, etc.)' points to the second step, 'Review certification guides' points to the third step, 'Decide on credits for project' points to the fourth step, and 'Register Online and document' points to the fifth step.

- Select a rating system for your project, and learn basic program requirements**
- Review our series of LEED certification guides**

We strive to make the LEED customer experience the best it can be. Our [Certification Guides](#) lead projects through the LEED process under each rating system, starting from registration to certification.
- Decide which credits your project should pursue**

Prerequisites are the green building standards every project must meet. Credits allow project teams to customize how they pursue certification. By fulfilling credits, projects earn points that determine its certification level: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points) and Platinum (80+).

 - [Learn more about credits and prerequisites](#)
 - Explore the [LEED Credit Library](#)
 - Learn how LEED addresses different topics in green building
- Equip your project with the right tools**

We have developed a set of [LEED Reference Guides](#) for each rating system to help project teams understand each credit and prerequisite. We also have built a [comprehensive online toolkit](#), which includes key supplemental material for LEED projects like addenda and sample forms.

Now you're ready to begin:

 - Register your project on [LEED Online](#)
 - Prepare documentation
 - Submit
 - Accept certification or ask questions
 - [And celebrate your success](#)

LEED Scorecard



WATER EFFICIENCY

POSSIBLE: 11

Prereq	Outdoor water use reduction	REQUIRED
Prereq	Indoor water use reduction	REQUIRED
Prereq	Building-level water metering	REQUIRED
Credit	Outdoor water use reduction	2
Credit	Indoor water use reduction	6
Credit	Cooling tower water use	2
Credit	Water metering	1



ENERGY & ATMOSPHERE

POSSIBLE: 33

Prereq	Fundamental commissioning and verification	REQUIRED
Prereq	Minimum energy performance	REQUIRED
Prereq	Building-level energy metering	REQUIRED
Prereq	Fundamental refrigerant management	REQUIRED
Credit	Enhanced commissioning	6
Credit	Optimize energy performance	18
Credit	Advanced energy metering	1
Credit	Demand response	2
Credit	Renewable energy production	3
Credit	Enhanced refrigerant management	1
Credit	Green power and carbon offsets	2



INNOVATION

POSSIBLE: 6

Credit	Innovation	5
Credit	LEED Accredited Professional	1



REGIONAL PRIORITY

POSSIBLE: 4

Credit	Regional priority	4
--------	-------------------	---

TOTAL

110

40-49 Points CERTIFIED	50-59 Points SILVER	60-79 Points GOLD	80+ Points PLATINUM
---------------------------	------------------------	----------------------	------------------------

18 Points possible for Optimal Energy Performance =
22.5% Platinum points requirement
30% Gold points requirement
36% Silver points requirement
45%- Certified points requirement



LEED BD+C: New Construction | v4 - LEED v4

Optimize energy performance

Possible 18 points

Language

Guide

Resources

Addenda

Forum

Intent

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.

Requirements

Establish an energy performance target no later than the schematic design phase. The target must be established as kBtu per square foot-year (kW per square meter-year) of source energy use.

Choose one of the options below.

Option 1. Whole-building energy simulation (1–18 points except Schools and Healthcare, 1–16 points Schools, 1–20 points Healthcare)

Analyze efficiency measures during the design process and account for the results in design decision making. Use energy simulation of efficiency opportunities, past energy simulation analyses for similar buildings, or published data (e.g., Advanced Energy Design Guides) from analyses for similar buildings.

Analyze efficiency measures, focusing on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility. Project potential energy savings and holistic project cost implications related to all affected systems.

Project teams pursuing the Integrative Process credit must complete the basic energy analysis for that credit before conducting the energy simulation.

Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline. Points are awarded according to Table 1.

Table 1. Points for percentage improvement in energy performance

Example: Optimize energy performance- 18 points possible

- Each section notes the intent and requirements to achieve points.



Leading up to LEED- Lay the Groundwork

- ▶ Foam Tight Insulation, Inc./BN Contracting, LLC :
 - worked closely with their client's site representative in developing the building's budget and performance,
 - expectations and in keeping with green construction.
 - The support of the material supplier Oak Ridge Plastics was key to success of the project.
- ▶ Knowing the LEED system requirements and designing around them helped to make this a Platinum Project from the start.



Formulators and contractors working together for success



- ▶ B&N contacted Oak Ridge Foam and Coating Systems, Inc. for the development of a specification that would provide for a meaningful warranty from both BN Contracting and Oak Ridge Foam and Coating Systems, Inc. Product data sheets, material safety data and sample copy of the warranty were all submitted for approval before the work commenced.



► LEED Roof Specification for PSE&G Project

The original specification for the roof area incorporated:

- sealing all seams and joints of the metal panel substrate using a 3 lb. /ft³ 48 kg/m³ density spray foam
- adhered insulation board using polyurethane foam adhesive
- 5 cm / 2 inches of 3 lb. /ft³ - 48 kg/m³ spray foam insulation added
- top coated using 100 % solids, 0 VOC pure Polyurea elastomeric coating
- coating membrane of 80 dry mils / 2mm minimum for the paver/live roof installation
- polyurea encapsulated the entire roof area including the adjoining parapet walls
- overall application of insulation provided for a positive slope to drain
- paver walkway at the outer perimeter
- a live roof planter for all seasons



Safety- First and Last

- ▶ Onsite safety, a major concern for the client, was strictly enforced at all times.
- Personnel Protection Equipment or PPE included safety shoes, respirators, gloves and eyewear.
- Storage of Polyurea and Spray Foam components required their own containment and storage arrangements.



Sealing Seams and Joints

The Metal “Q” deck was effectively sealed using a 48kg m³ / 3 lb. density spray foam and any openings through to the interior were also sealed from water migration to the building’s interior.



Job Challenges- wet conditions

Due to weather constraints, the contractor needed to keep the substrate dry which involved removing a lot of accumulated water from the metal deck and protection of the installed board insulation.



Adhering Insulation Board



Plates and screws along with foam adhesive were used to install the tapered 5 cm / 2 in. insulation board.

5 cm of 48kg³ Roofing Spray Foam



Spray foam effectively sealed and waterproofed the entire roof surfaces extending up and onto the parapet walls.



Polyurea Application

- ▶ 2mm / 80 dry mils of Oak Ridge Aluminum Pure Polyurea
- ▶ Applied with the PMC
- ▶ AP-2 spray gun and
- ▶ PHX-40 proportioner



Polyurea Application

► 1,858 m²
20,000 ft²

► 8 days
spray
time
including
foam and
polyurea



Polyurea Formulation

- Polyurea formulated for a variety of roofing substrates including Spray Foam, single-ply, metal, BUR and modified membranes, concrete, wood.
- exhibits 100% solids technology with Zero VOCs
- fast reactivity and cure provides for faster turn-around time



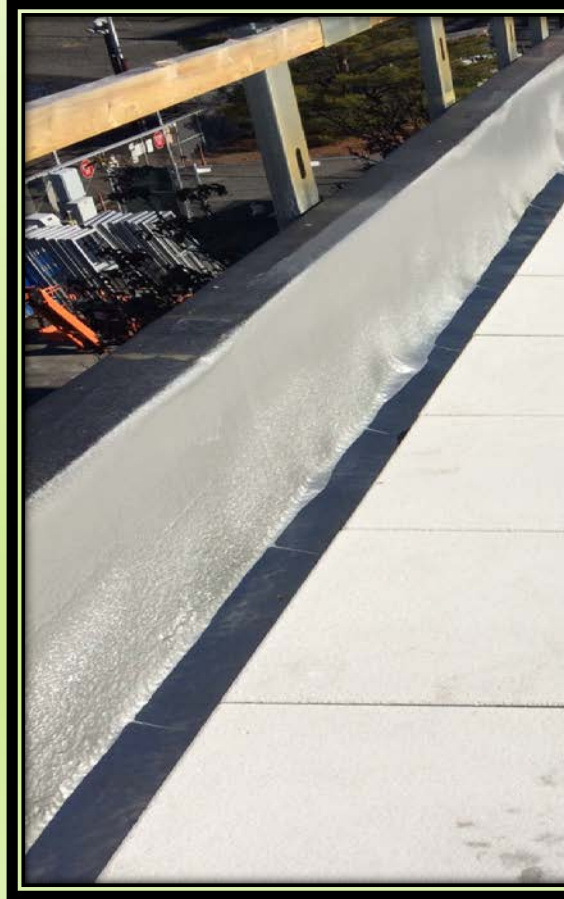
Advantages of Polyurea over Foam Substrate

- Seamless
- Positive slope to drain, no ponding water
- Foam extends up parapet walls
- Self-flashing
- Monolithic
- Air / moisture barrier
- Average R-value on project was R 68!



Paver Walkway Installation

► Stone pavers installed at all four sides of the outer parameter over a protection separation mat material creating walkways for maintenance access.



Living Roof Installation

- uses local plants
- adds to insulation rating
- 2 weeks for green roof and walkway pad installation



► LEED Roof and Insulation Job Complete



LEED Incentives Now

► Henry Thompson of the energy company commented on the installation saying, "It was an easy install as well as convenient and has worked very well. The living roof was specifically arranged for our climate and allowed us to take advantage of obtaining monies for this installation."



SUMMARY: LEED Advantages of Polyurea over Polyurethane Foam

- Overall R-value averaged R 68.
- Closed Cell Polyurethane Foam provides a positive slope to drain, is a self-flashing and monolithic installation.
- Provides for an air-barrier and moisture barrier sealing out heat transfer and air-infiltration
- Longer membrane life with polyurea
- Achieves maximum LEED points



Resources and Contributors

- ▶ Oak Ridge Plastics- Rich Franklin
- ▶ Foamtight B/N Contracting- Stan Betts
- ▶ United States Building Council
- ▶ *TechTarget. com



Thank you for
your time!



Polyurethane Foam and LEED Platinum Certification: What is LEED, and How Are Projects Certified?

By Murphy Mahaffey

Director of International Sales

Polyurethane Machinery Corporation



**POLYURETHANE
MACHINERY
CORPORATION**

