HALOGENATED FLAME RETARDANTS IN BUILDING INSULATION
WHAT PRODUCTS DO WE USE?

- Mineral Wool
  - Interior and Exterior applications

- Extruded Polystyrene (XPS)
  - Roofing, below deck pavers, vertical envelopes, below grade

- Expanded Polystyrene (EPS)
  - Build-Ups under concrete slabs or in planters

- Polyisocyanurate (Polyiso)
  - Roofing and vertical envelopes

- Polyurethane Spray
  - Vertical envelope barrier
AWARENESS OF TOXINS:

- Asbestos
- Formaldehydes
- Halogenated Flame Retardants
- Pentane
POLYURETHANE SPRAY
HOW WOULD CONTRACTORS SELECT NON-TOXIC INSULATION?

- All purchase and install per our contract Specification
- Some sustainability-minded firms specify/select HFR-Free
- Sellen’s approach:
  - Leverage Design-Build opportunities
  - Assist Clients who value toxic material reduction
  - Proactive outreach to Architects RE: Healthy Materials
HFR-FREE SELECTION CHALLENGES?

- **Quality**
  - Confirm product meets Specifications and ASTM Standards
  - Ensure material compatibility issues addressed

- **Safety**
  - Follow SDS, PPE and installation directions
  - Off-gassing of blowing agent and HFRs
  - Future impacts of those regrettable substitutions

- **Sustainability**
  - Building Certification documentation: EPD, HPD, Declare Label
  - Healthy Materials
  - Low Global Warming Potential and Ozone Depletion Potential
  - Embodied Carbon footprint
HOW DO YOU IDENTIFY HFR-FREE?

- **Easy: Website or Product Data Sheets**
  - ✓ Product name says HFR-Free
  - ✓ Website – see example

- **Somewhat time consuming: Look for Certifications**
  - ✓ Declare Label- Red List Free
  - ✓ Health Product Declaration (HPD)

- **More time consuming: Manufacturer**
  - ✓ SDS review for CAS#
  - ✓ Call Manufacturer for missing components
SUSTAINABILITY FACT SHEET Jet Stream® Ultra

PRODUCT: Jet Stream® Ultra Loosefill insulation for walls and ceilings

DESCRIPTION: Inorganic glass fiber building insulation with a small amount of organic lubricant for use with essentially all Loosefill insulation blowing machines. The product has a high degree of recycled content.

SUSTAINABILITY ATTRIBUTES:
- High Recycled Content
- No Fire Retardants Added
- Type III Environmental Product Declaration
- GREENGARD Gold
- Formaldehyde Free
- Complete Ingredient Disclosure
- Red List Free
- Meets California Department of Public Health (CDPH) Standard Method V1.1-2010

LIVING BUILDING CHALLENGE: Jet Stream® Ultra has a Declare® label and is Redlist Free.

See the following link:
http://declareproducts.com/content/knauf-jetstream-ultra-loosefill-insulation

MANUFACTURING FACILITY LOCATIONS:
Shelbyville, IN 46176
Lanett, AL 36863
Shasta Lake, CA 96019
Inwood, WV 25428
Albion, MI 49224

ENVIRONMENTAL PRODUCT DECLARATION: The Type III EPD is available online at the following link:

RECYCLED CONTENT: The recycled content is 3rd party validated by UL Environment at the following link:

RAPIDLY RENEWABLE CONTENT: None

INDOOR ENVIRONMENTAL INFORMATION: This product is certified as GREENGUARD Gold by the UL GREENGUARD Environmental Institute. This product is also validated to be Formaldehyde Free by UL GREENGUARD, see all certificates and validations at:
**Name**: ENRGY 3® E

**Product ID**: JM Polystyrene Insulation, ENRGY 3® E

**Classification**: 07 01 00.00 Thermal and Moisture Protection (Insulation water barrier); Operation and Maintenance of Thermal and Moisture Protection

**Website**: www.jm.com/en/building-materials/commercial-roofing

**Manufacturer**
- **Address**: 717 17th St, Denver, Co 80202
- **Contact Name**: Kelly Sandlin
- **Title**: Senior Product Regulatory and Safety Specialist
- **Phone**: 303 978 2605
- **Email**: kelly.sandlin@jm.com

**Description**: Next generation polysiocyanurate insulation foam where the fire resistance has been engineered into the polymer backbone without the need for added halogenated flame retardants.

**Release Date**: 2014-06-20

**Expiry Date**: 2017-06-20


<table>
<thead>
<tr>
<th>POLYISOCYANURATE FOAM</th>
<th>9053-78-9</th>
<th>71 %</th>
<th>LT-U</th>
<th>PC</th>
<th>N</th>
<th>Insulating foam</th>
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</thead>
<tbody>
<tr>
<td>None found</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No warnings found on HPD Priority lists</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cellulose</th>
<th>65996-61-4</th>
<th>21 %</th>
<th>BO</th>
<th>N</th>
<th></th>
<th>Facer</th>
</tr>
</thead>
<tbody>
<tr>
<td>None found</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No warnings found on HPD Priority lists</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Amount varies with the thickness of the final product</td>
</tr>
</tbody>
</table>

| PENTANE                  | 109-68-0   | 5 %  | LT-P1| N  | N | blowing agent |

| MAMMALIAN                |            |      |      |    |   | EU H-Statements: H304: May be fatal if swallowed and enters airways |
| ACUTE AQUATIC            |            |      |      |    |   | EU R-Phrases: R51: Toxic to aquatic organisms. |
| CHRON AQUATIC            |            |      |      |    |   | EU H-Statements: H411 - Aquatic Chronic 2 - Toxic to aquatic life with long lasting effects |
| FLAMMABLE                |            |      |      |    |   | EU H-Statements: H225 Highly flammable liquid and vapour. |
| MULTIPLE                 |            |      |      |    |   | YuVvW5. Class 2 Hazard to Waters |

**HEALTH PRODUCT DECLARATION- EXAMPLE**
SELEN’S APPROACH

- Leverage Design-Build opportunities
  - Chemicals of Concern Specification Section*
  - Specify HFR-Free Products*

- Assist Clients who value toxic material reduction
  - Campus-client encouraged WELL Standard 25 Toxic Material Reduction
  - Town Hall Seattle – Research CAS# of all Materials before Specify

- Proactive outreach to Architects about Healthy Materials
  - Members of Healthy Materials Collaborative
  - Participate in the AIA Materials Matter program
  - Educated staff about green chemicals and safer alternatives

*Actions in progress
Perfluorinated Compound Limitation

No perfluorinated compounds (PFCs) are present in the following condition:

a. At levels equal to or greater than 100 ppm in components that constitute at least 5% by weight of a furniture or furnishing (drapes/curtains) assembly.

PART 2
Flame Retardant Limitation

Halogenated flame retardants are limited in the following components to 0.01% (100 ppm) to the extent allowable by local code:

a. Window and waterproofing membranes, door and window frames and siding.

b. Floorings, ceiling tiles and wall coverings.

c. Piping and electrical cables, conduits and junction boxes.

d. Sound and thermal insulation.

e. Upholstered furniture and furnishings, textiles and fabrics.

PART 3
Phthalate (Plasticizers) Limitation

DEHP, DBP, BBP, DINP, DIDP or DNOP (often found in polyvinyl chloride [PVC]) are limited in the following components to 0.01% (100 ppm):

a. Floorings, including resilient and hard surface flooring and carpet.
TOWN HALL: RESEARCHED NON-TOXIC MATERIALS TO SPECIFY
### TOWN HALL RENOVATION - Material Matrix

<table>
<thead>
<tr>
<th>#</th>
<th>SPEC SECTION</th>
<th>PRODUCT NAME</th>
<th>PRODUCT MANUFACTURER</th>
<th>IS PRODUCT SPECIFIED? OR BULLITT PRE-APPROVED</th>
<th>NOTES</th>
</tr>
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</table>
Step 2: RED LIST MATERIAL LOOK-UP BY CAS#

<table>
<thead>
<tr>
<th>MATERIAL 1</th>
<th>MATERIAL 2</th>
<th>MATERIAL 3</th>
<th>MATERIAL 4</th>
<th>MATERIAL 5</th>
<th>MATERIAL 6</th>
<th>MATERIAL 7</th>
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<tbody>
<tr>
<td>7429-90-5</td>
<td>FREE</td>
<td>FREE</td>
<td>FREE</td>
<td>25640-14-6</td>
<td>XX-XX-XX</td>
<td>RED</td>
</tr>
<tr>
<td>1317-65-3</td>
<td>FREE</td>
<td>FREE</td>
<td>xx-xx-xx</td>
<td>13463-67-7</td>
<td>FREE</td>
<td>80-15-9</td>
</tr>
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</table>

Note: The table above lists materials with their respective CAS numbers. Materials marked with 'FREE' are not restricted, while those marked with 'RED' are restricted.
### Step 3 & 4: REVIEW, APPROVE, SUBSTITUTE

#### STEP 2: REVIEW PROCESS

<table>
<thead>
<tr>
<th>Date</th>
<th>Product</th>
<th>Package</th>
<th>Reviewed by Sellen</th>
<th>Sellen's Recommendation</th>
<th>Date Sent to Point32 for Approval</th>
<th>Notes2</th>
<th>Point32 Product Decision</th>
<th>Contact Vendor to Request Substitution</th>
<th>Is a Code-Compliant Alternative Available?</th>
<th>Notes (lead time, cost impacts, etc.)</th>
<th>Line Item of Sub Product</th>
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<tbody>
<tr>
<td>12/10/2015</td>
<td>As-Is</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Need architect to specify alternate.</td>
<td></td>
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<tr>
<td>11/25/2015</td>
<td>Substitute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rejected</td>
<td>Not Started</td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>11/11/2015</td>
<td>As-Is</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Approved</td>
<td>N/A</td>
<td>N/A</td>
<td>NA</td>
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</tr>
</tbody>
</table>

#### STEP 3: SUBSTITUTION PROCESS, if applicable

<table>
<thead>
<tr>
<th>1-CAS #</th>
</tr>
</thead>
</table>

#### RED LIST MATERIAL LOOK-UP

- **STEP 2:** REVIEW PROCESS
  - 2-A: SELLEN REVIEW
  - 2-B: POINT32 REVIEW
- **STEP 3:** SUBSTITUTION PROCESS, if applicable
  - RED LIST MATERIAL LOOK-UP

---

### Notes
- **Point32 Product Decision:**
  - **As-Is:**
    - 12/10/2015: Rejected
    - 11/25/2015: Approved
    - 11/11/2015: Approved
- **Contact Vendor to Request Substitution:**
  - 12/10/2015: Not Started
  - 11/25/2015: Not Started
  - 11/11/2015: Not Started
- **Is a Code-Compliant Alternative Available?**
  - 12/10/2015: Need architect to specify alternate.
  - 11/25/2015: Not applicable
  - 11/11/2015: Not applicable
- **Notes (lead time, cost impacts, etc.):**
  - 12/10/2015: Need architect to specify alternate.
  - 11/25/2015: Not applicable
  - 11/11/2015: Not applicable

---

### RED LIST MATERIAL LOOK-UP

- **1-CAS #:**
  - 12/10/2015: Not applicable
  - 11/25/2015: Not applicable
  - 11/11/2015: Not applicable

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### Sellen

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Letter to Manufacturers

As part of a comprehensive sustainability strategy, Town Hall has committed to minimize the toxics introduced to their space through construction, and promote transparency in chemical disclosure. We are looking to your firm for leadership and collaboration with their efforts.

We recognize that manufacturers must find ways to protect our health and environment, which is why we are sending the following:

1. Educated Manufacturer about HPDs and Red List
   ✓ Provided useful links
   ✓ Provided Red List
   ✓ Personal follow-up

2. Requested documentation

3. Highlighted the self-verification approach

We would like to hear from you, regardless of your choice to provide an HPD/Red List Free Letter or not, so we can understand the barriers to your firm. Our team looks forward to collaborating with you on reducing toxicity in materials.
TOWN HALL NON-TOXIC REMODEL EXAMPLE

SPECIFICATIONS AND MATERIAL VETTING REPORT

1.9 064100 - ARCHITECTURAL WOOD CASEWORK

1. Living Building Challenge: 2014 Bullitt Center As-Built Product List

2. Hardware Resource Aluminum Pulls - Hardware Resources

2. MATERIALS

3. Cabinet units:

3.1 Quality Grade: Unless otherwise indicated provide products of quality specified by AWWA/WWA/WI Architectural Woodwork Standards for Grades as indicated.

3.1.1 Wood Veneer Faced Cabinets: Premium Grade

- Hardwood Exotic with finish faces and self-edge

Comment [2013]: See Board to design.
Adams Rite MS 1850S MS Single Point Lock
ASSA ABLOY

Final Assembly: Phoenix, AZ, USA
Life Expectancy: 20 Years
End of Life Options: Recyclable (96%), Landfill (4%)

Ingredients:
Lock Housing and Deadbolt: Iron, Zinc,
Manganese; Coating: Metallic Coating,
Ceramic, Nickel

Living Building Challenge Criteria:

ASA-2005
VOC Content: N/A
VOC Emissions: N/A
• LBC Red List Free
□ LBC Compliant
□ Declared

MANUFACTURER RESPONSIBLE FOR LABEL ACCURACY
INTERNATIONAL LIVING FUTURE INSTITUTE™ declareproducts.com
MINERAL WOOL (BIOINSOLUBLE, WITH ALKALINE OXIDE AND ALKALI EARTH OXIDE CONTENT GREATER THAN 18 % BY WEIGHT)

%: 50.0000 - 80.0000

GS: LT-UNK

RC: PreC

NANO: No

ROLE: Core

HAZARDS:

AGENCY(IES) WITH WARNINGS:

CANCER

EU - R-phrases

R40 - Limited Evidence of Carcinogenic Effects

CANCER

EU - GHS (H-Statements)

H351 - Suspected of causing cancer

SUBSTANCE NOTES: Mineral fiber is not classified as a carcinogen by IARC, NTP, CA Proposition 65 or OSHA. The R40 and H351 phrases below are triggered by a special provision "Note Q", found only in the EU’s CLP Regulation and for which the applicability to the provided products is neither certain nor adopted by the manufacturer. The world’s leading institute on carcinogen classification, the International Agency for Research on Cancer (IARC) has determined that there is insufficient evidence to classify this material as carcinogenic. The EU’s CLP Regulation focused on creating criteria to characterize biosolubility, but did not provide data to support a causal relationship between the EU test method and actual carcinogenicity.

VOLATILE ORGANIC COMPOUND (VOC) CONTENT

VOC Content is not applicable for this product category.

CERTIFICATIONS AND COMPLIANCE

See Section 3 for additional listings.


LCA: Environmental Product Declaration

Other: International Living Future Institute - Ultima AirGuard Decoled Label
December 7, 2015

RE: Owens Corning Confirmation of Foamular® – Zero Ozone Depletion Formula to the ILBC v. 2.0/2.1 Red List of Materials

This letter describes compliance of Owens Foamular® extruded polystyrene insulation with the Red List requirements of the Living Building Challenge.

Owens Corning Foamular® extruded polystyrene insulation does contain a halogenated flame retardant, but there is a specific exemption in the Materials Petal Handbook allowing the use of a halogenated flame retardant for products of this type (I10-E12 9/2010). Besides the halogenated flame retardant, there are no other Red List chemicals or materials in the Foamular® extruded polystyrene insulation.
WHAT DRIVES THE MARKET?

- COST PER R-VALUE
  - Energy efficiency trend changing market from cost per square foot or per inch to cost per R-Value

- BUILDING CODES AND FIRE-LIFE SAFETY CODES
  - Other experts will discuss

- WALL THICKNESS REDUCES LEASABLE SPACE
  - Non-HFR products typically are thicker to achieve same R-Value

- OWNER REQUIREMENTS & SPECIFICATIONS
  - LEED, Living Building Challenge, WELL Standard
  - Specification language and requirements

- EASE OF INSTALL & RISK REDUCTION
  - Reduce need for PPE and confined space permits
  - Consider risk of trapping moisture or replacing wet material
PATHS TO HFR-FREE INSULATION:

- **STATE SPECIFICATIONS**
  - Specify HFR-Free insulation
  - Specify Insulation with a Declare Label Red List Free
  - Specify WELL Standard #25 Toxic Material Reduction

- **INDUSTRY STAKEHOLDERS & MANUFACTURERS**
  - Beyond insulation, consider fire sealants and gypsum firms

- **PARTNER WITH LARGE PRIVATE DEVELOPMENT**

- **MANUFACTURERS SEE DEMAND OR COST BENEFIT**
  - Build a business case through employee healthcare costs

- **EDUCATION AND OUTREACH**

- **REVISE FIRE-TEST STANDARDS & BUILDING CODES**

- **MAKE POLICY**
Presentation by:

Jennifer Frey, LIVING FUTURE®
LFA, LEED® AP O+M, CESCL
Sustainability Program Manager

Sellen //
T 206.805.7115 // C 206.445.8671