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## Presented at the 2018 Conference on Health, Environment and Energy Avoiding Toxic Chemicals in Insulation and Air Sealing Materials

William Weber





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## Our Mission

To advance human and environmental health by improving hazardous chemical transparency and inspiring product innovation.



**HEALTHY  
BUILDING  
NETWORK**

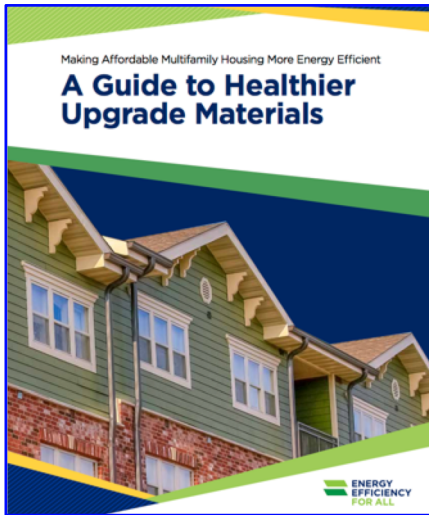


Images: CCH/Mithun, Liberty Bank Building; HBN; MSR, Rose



A national initiative supporting affordable housing leaders who are improving human health by using less toxic building materials.

[homefree.healthybuilding.net](http://homefree.healthybuilding.net)



## EEFA & Healthy Affordable Building Materials Project (HABM)

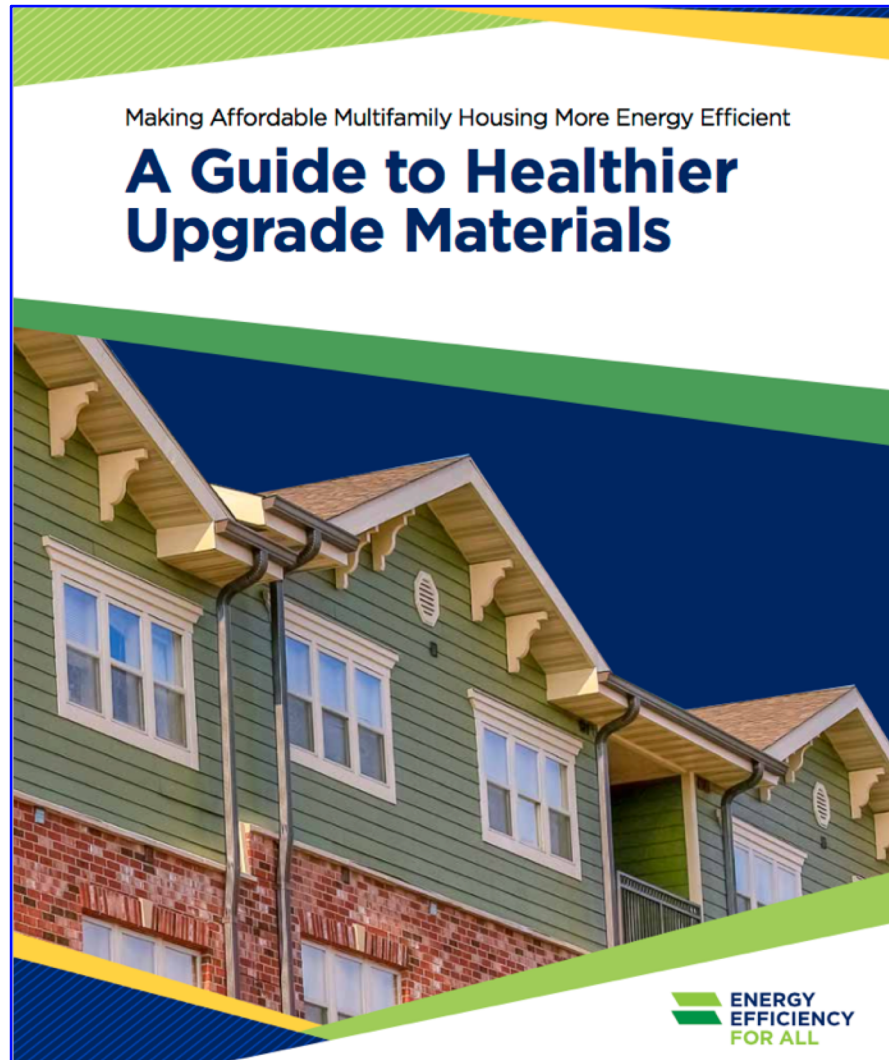
- Work in Context

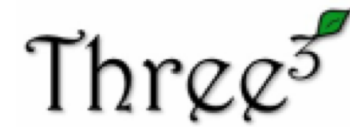
## Product Profiles/Material Options

- Insulation
- Sealants



Linoleum	▼
Solid Wood Floors (pre-finished)	▼
Engineered Wood Floors (pre-finished)	▼
Ceramic Tiles (made in the USA/lead-free with no CRT content)	▼
Solid Wood Floors (finished on site)	▼
Biobased Floors	▼
Rubber or Rubber/Cork Floors (made without crumb rubber)	▼







**Materials Research  
&  
Recommendations**



**Policy Research &  
Recommendations**

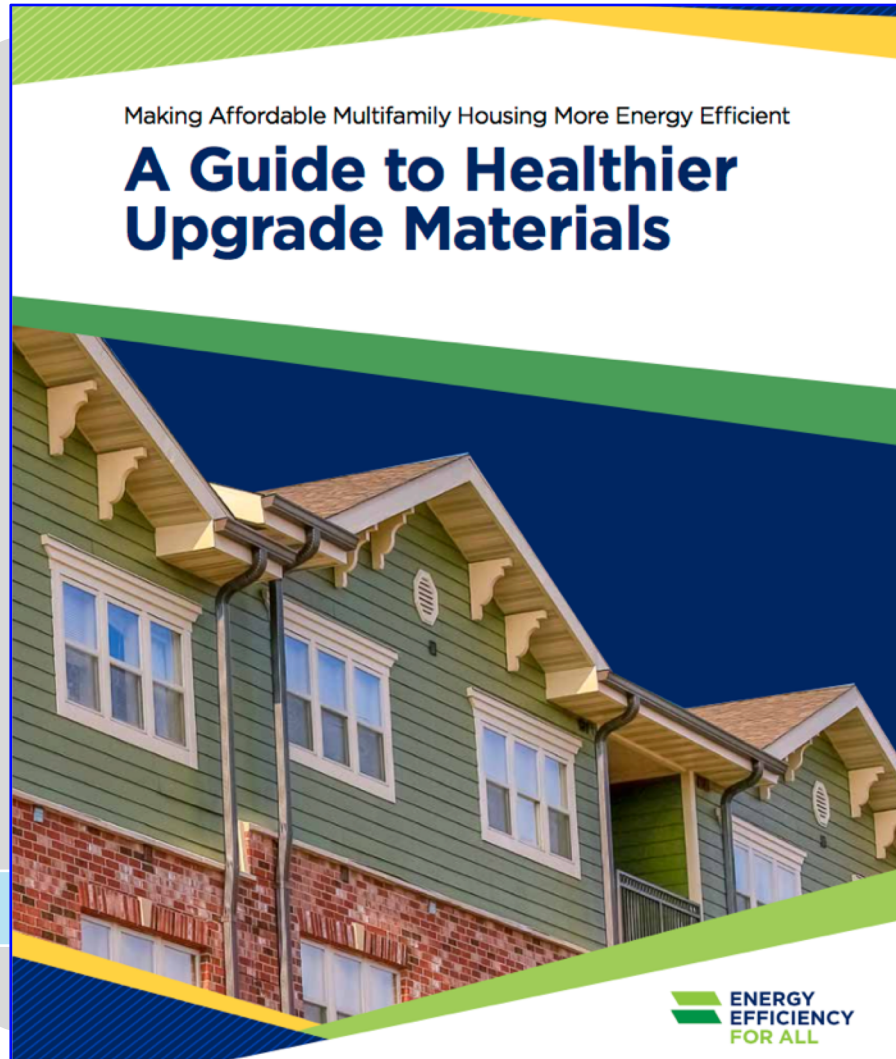


**Case Studies**





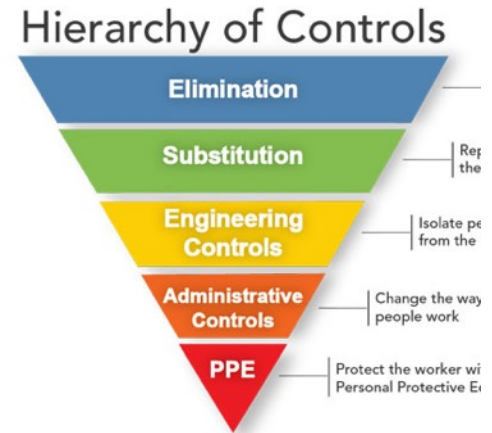
**Materials Research  
&  
Recommendations**







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Solid Wood Floors (pre-finished)	▼
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Solid Wood Floors (Finished on site)	▼
Biobased Floors	▼
Rubber or Rubber/Cork Floors (made without crumb rubber)	▼
Laminate	▼
Carpet (with no fly ash, no vinyl or polyurethane backing, and no PFAS)	▼
Engineered Wood Floors (Finished on site)	▼



**Audience**

- Program Managers
- Specifiers
- Contractors
- Developers
- Scientific Advisor
- Architects
- Engineers

**Defining Health Issues**

- Chemicals of Concern
- Reproductive and Developmental Impacts
- Carcinogens
- Asthmagens

**Ranking Healthy Materials**

- Common Content
- Hierarchy of Controls

# Four-Step Methodology

Product Targeting

Identify common products for insulation and air sealing

Product Research

Determine the common content, and develop Common Product Profiles

Hazard Screening

Screen chemicals in the Common Product Profiles against the Pharos Library

Product Comparisons

Comparison of products on performance factors including health hazards



Photo Credit: Florida Center for Instructional Technology (FCIT)

## Filling data gaps

### Manufacturers Don't Disclose 100%

Individual products have holes in their data

### Most Products Disclose Something

There are different holes in different products

### Review Enough Products...

& other sources to fill in (most of) the holes

### Sources include

Specific product literature (SDS, TDS, HPD, EPD, etc.)

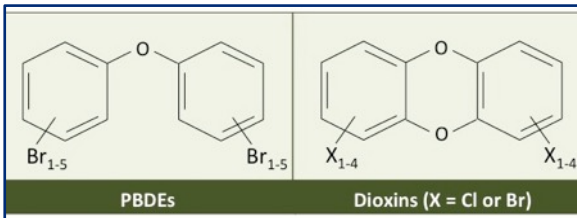
Trade association data

Standards

Academic literature

Patent research

- Linoleum
- Solid Wood Floors (pre-finished)
- Engineered Wood Floors (pre-finished)
- Ceramic Tiles (made in the USA/lead-free with no CRT content)
- Solid Wood Floors (Finished on site)
- Biobased Floors
- Rubber or Rubber/Cork Floors (made without crumb rubber)
- Linoleum



## Persistent, Bioaccumulative Toxicants (PBTs)

- Organotin catalysts

## Halogenated flame retardants

- HBCD
- TCPP

## Formaldehyde-based binders

## Isocyanates

## Phthalates



## Insulation Hazard Spectrum

The Healthy Building Network has researched a variety of insulation products used in the interior walls, ceilings, and floors of a structure. We rank these products on a simplified spectrum below. Products appearing green are better options than those that appear red, and products that appear yellow are generally less preferable to those at the top, but better choices than those at the bottom.

[Read more..](#) ▼

### Related Product News

#### Just Released: These Healthier Insulations and Sealants Also Improve Energy Efficiency

Addressing concerns that some insulation products release unhealthy chemicals, HBN is proud to have conducted the extensive materials research detailed in a new guide to healthier insulation and air sealing materials.

#### Q&A from "When is it "green"? Preventing the Toxic Effects of Spray Foam Insulation"

Thanks to all who attended our webinar "When is it "green"? Preventing the Toxic Effects of Spray Foam Insulation!"

[Cork](#) ▼

[Blown-In Fiber Glass \(Loose Fill, Dense Pack, and Spray-Applied\)](#) ▼

[Kraft-Faced and Unfaced Fiber Glass Batt](#) ▼

[Unfaced Cellulose/Cotton Batt](#) ▼

[Blown-In Cellulose \(Loose Fill, Dense Pack, and Wet-Blown\)](#) ▼

[PSK or FSK-Faced Fiber Glass Batt or Blanket](#) ▼

# HAZARD SPECTRUM – CHEMICALS OF CONCERN



← Formaldehyde binder

← Halogenated flame retardants

← Organotin catalyst  
Isocyanates

# HAZARD SPECTRUM - Recommendations

Cork

Blown-In Fiber Glass (Loose Fill, Dense Pack, and Spray-Applied)

Kraft-Faced and Unfaced Fiber Glass Batts

Unfaced Cellulose/Cotton Batts

Blown-In Cellulose (Loose Fill, Dense Pack, and Wet-Blown)

PSK or FSK-Faced Fiber Glass Batts or Blankets

Mineral Fiber Batts and Boards

Fiber Glass Board (Duct Insulation)

Polyisocyanurate

Expanded Polystyrene (EPS)

Extruded Polystyrene (XPS)

Spray Foam Insulation (SPF)

Recommended Materials

Halogenated flame retardants

# HAZARD SPECTRUM – RELATIVE \$/R-VALUE

<b>Health-Based Ranking</b>  (Green is best; red is worst)	<b>Insulation Type</b>	<b>R-Value per Inch*</b>	<b>Relative Installed Cost per R-Value**</b>	<b>Special Installation Equipment Required</b>	<b>Vapor Retarder^</b>	<b>Air Barrier Material^^</b>	<b>Level of Transparency on Chemical Content^^^</b>  (More shading indicates less transparency within product type)
	Expanded Cork Board	3.6-4.2	\$\$\$\$	no	Class III	Information not available	
<b>Blown-In Fiber Glass</b>							
	Loose-Fill Fiber Glass	2.2-3.1	\$	yes	Vapor permeable	Not an air barrier	
	Dense-Pack Fiber Glass	3.7-4.6	\$-\$	yes	Vapor permeable	Not an air barrier but does reduce airflow	
	Spray-Applied Fiber Glass	4.0-4.3	\$-\$	yes	Vapor permeable	Not an air barrier but does reduce airflow	
	Fiber Glass Batts/Blankets (Kraft-Faced and Unfaced)	2.9-4.3	\$	no	Kraft-faced: Class II, Unfaced: Vapor permeable	Not an air barrier	
	Fiber Glass Batts/Blankets (PSK or FSK-Faced, Basement Wall Insulation)	Duct wrap: 2.7-3.2 <sup>†</sup> , Basement wall insulation: 3.0-3.5	\$-\$	no	Class I (except basement wall insulation where facing is perforated to allow for moisture transfer)	Facing may be an air barrier material	
	Cellulose/Cotton Batts and Blankets	3.5-4.0	\$\$-\$\$\$	no	Vapor permeable	Not an air	



# HAZARD SPECTRUM – RELATIVE \$/R-VALUE

<b>Expanded Cork</b>	<b>\$\$\$\$</b>
<b>Fiber Glass</b>	<b>\$-\$</b>
<b>Cellulose</b>	<b>\$-\$ (blown) \$\$-\$\$\$ (blanket)</b>
<b>Mineral Wool</b>	<b>\$ (batts) \$\$-\$\$\$ (boards)</b>
<b>Polyiso and EPS</b>	<b>\$\$-\$\$\$</b>
<b>XPS</b>	<b>\$\$\$</b>
<b>Spray Foam</b>	<b>\$\$-\$\$\$ (open cell) \$\$\$ (closed cell)</b>

## Minnesota

PROJECTS

BASELINE SPECIFICATION REVIEW

### INSULATION

- 9 New Construction
- 3 Rehabs
- 2 Substantial Rehabs
- 7 not provided

## Specification Recommendations

- For batt insulation, specify residential fiber glass batt insulation -- it has been reformulated to be free of formaldehyde -- or formaldehyde-free mineral wool batts. Unfaced batts are most preferable.
- For blown insulation, prefer cellulose or unbonded fiber glass.

6.10

*Optional | 12 points maximum*  
**Asthmagen-Free Materials**

**REQUIREMENTS**

Do not install products that contain ingredients that are known to cause or trigger asthma. Key products to avoid are:

- *Insulation:* Do not use spray polyurethane foam (SPF) or formaldehyde-containing fiberglass batts. [4 points]
- *Flooring:* Do not use flexible vinyl (PVC) roll or sheet flooring or carpet backed with vinyl with phthalates. Do not use fluid applied finish floors. [4 points]
- *Wall coverings:* Do not use wallpaper made from vinyl (PVC) with phthalates or site-applied high-performance coatings that are epoxy- or polyurethane-based. [4 points]
- *Composite wood:* Use only ULEF (Ultra Low Emitting Formaldehyde) or NAF (No Added Formaldehyde) products for cabinetry, subflooring and other interior composite wood uses. [4 points]



## Sealant Hazard Spectrum

The Healthy Building Network has researched a variety of sealant products, and we rank these products on a simplified spectrum below.[1] Products in the green categories are better options than those that appear in the orange or red, and products in the yellow categories are generally less preferable than those at the top, but are better choices than those at the bottom.

[Read more..](#) ▼

### Related Product News

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


#### New Sealant Category for Healthier Energy Efficiency Programs

Healthy Building Network has introduced a new sealant category on HomeFree, our

- [Non-Combustible Sodium Silicate Caulk](#) ▼
- [Expanding Polyurethane Foam Sealant Tape](#) ▼
- [Acrylic Latex Sealant](#) ▼
- [Siliconized Acrylic Sealant](#) ▼
- [Intumescent Acrylic Firestop Sealant](#) ▼

# HAZARD SPECTRUM – Sealants

**TABLE 8. MULTIPURPOSE SEALANTS**

<b>Health-Based Ranking</b>  (Green is best; red is worst)	<b>Sealant Type</b>	<b>Relative Material Cost*</b>	<b>Installation Considerations<sup>105</sup></b>	<b>Level of Transparency on Chemical Content^^</b>  (Less shading indicates more transparency within a product type)
	Noncombustible Sodium Silicate Caulk	\$\$\$	Noncombustible backing material needed for large, deep openings; not recommended where there is continuous vibration or in areas expected to come into contact with water	
	Expanding Polyurethane Foam Sealant Tape	\$-\$\$\$\$^	Usually expands to fill 1 to 1 1/2"	
	Acrylic Latex Sealant	\$\$	Backing material needed for gaps deeper than about 1/2"; not for gaps wider than about 1/2"	
	Siliconized Acrylic Sealant	\$\$	Backing material needed for gaps deeper than about 1/2"; some products can be used for gaps up to 1"	
	Intumescent Acrylic Firestop Sealant	\$\$\$\$	Noncombustible backing material needed for large or deep openings	
	One-Component Silicone Sealant	\$\$\$	Backing material needed for gaps deeper than about 1/2"; not for gaps wider than 1"	
	Modified Polymer Sealant (STPE Sealant)	\$\$\$	Backing material needed for gaps deeper than about 1/2"; not for gaps wider than 1"	
	One-Part Polyurethane Spray Foam Sealant	\$	For gaps up to about 1 1/2"; variations available for gaps of up to about 3"	
	One-Component Polyurethane Sealant	\$\$\$	Backing material needed for gaps deeper than about 1/2"; not for gaps wider than about 1 1/2"	

\* Estimate of relative material cost per linear foot sealed at a set width and depth. Based on information compiled from various sources. Scale of project, location, and other factors may affect relative costs. Relative costs are not comparable across the different tables in this report.

^ There can be a wide variation in cost for expanding polyurethane foam sealant tape. Interior-only sealant tapes are usually cheaper than dual-purpose, interior and exterior tapes. The tape expands to fill the gap that is present, so for smaller gaps, the cost per volume filled will be greater than for larger gaps.

## Recommendations

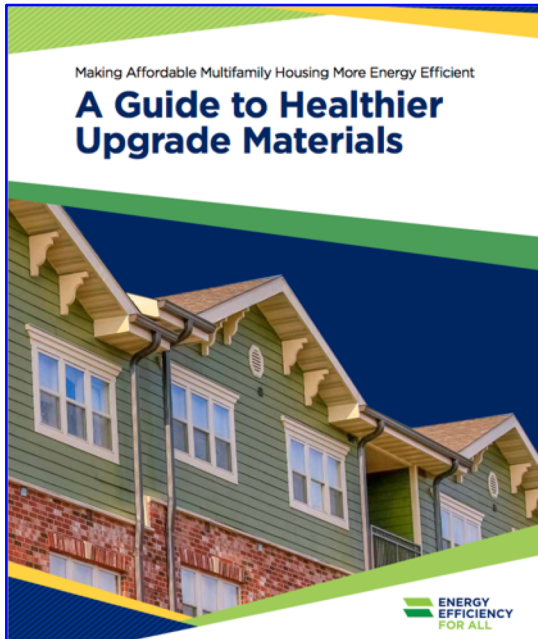
**Avoid hazardous phthalates.**

**Prefer caulk-type sealants to spray foam sealants.**

**If foam sealing products are needed, prefer those that are not reacted on site**, like foam sealant tape, instead of a spray foam sealant.

For a multi-purpose sealant, absent full disclosure, **look for acrylic-based sealants with very low VOCs** - options with  $\leq 25$  grams per liter (g/L) are available for many applications.

**Avoid products that are marketed as being antimicrobial**



## Material Spec Guidance

### Policy Matters:

### Making Energy Upgrades Healthier for Residents, Workers, and Neighbors


- Brief
- Information Sheet

### Case Study: Energy Performance for Properties Retrofit with Less Toxic Insulation

### On-the-ground Insights On Drivers, Adoptability, And Performance Of 'Greener' And 'Healthier' Energy-efficiency Retrofit Materials Used For Affordable Multifamily Housing

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**DOORS**



**Data Summary**

- About 90% of projects specified doors with a composite core, and about 25% specified hollow core doors with a composite face.
- About 60% of projects that included wood door with composite core or facing specified no urea formaldehyde - one project further specified that all components be formaldehyde-free.
- Only 2 projects specified a particular product or series; the others provided general information about which materials should be used and often included approved manufacturers.
- Over 80% of projects specified factory finished wood doors with an additional 10% specifying a combination of factory finished and site finished.

**Specification Recommendations**

- Prefer solid wood products over composite.
- When using composite wood, specify core



## Products

- Flooring
- Paint
- Drywall
- Countertops
- Cabinetry & Millwork
- Insulation
- Flooring Adhesives
- Sealants

## Baseline Specifications

- California
- Louisiana
- Minnesota
- Pacific Northwest
- Washington, DC
- Metro

## Case Study

- Demonstration
- Projects



# KNOW BETTER

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