

**Environmentally Preferable Insulation
Decision Making Matrix
for DOE Weatherization Program**
Contact: S.D. Cannon (509-529-1535 - sandra.cannon@pnl.gov)
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Attribute	Weatherization Program Specs http://www.eren.doe.gov/buildings/weatherization_assistance/	BioBased Systems BioBase 501/1702 http://www.biobased.net/architects_main.asp?i=a	United Soy Systems Soy Therm 50 www.soyol.com
Type per ASTM D-2856		501 - Polyurethane spray-in-place foam, semi-open celled 1702 - Polyurethane spray-in-place foam, 97.5% closed-cell –	
Effective in		Especially steel-framed structures, older homes, metal buildings	
Application for	Per Eric Beaton: I think that with any spray foam type of insulation, it will be virtually impossible to install such insulation in an existing wall given that walls are not exposed as they are in new construction. I think the applications that will be best would be attic floors, basement ceilings, and crawl spaces. Per Alex Moore: popular current uses of foams in the Weatherization Program are for air sealing of attic bypasses, knee walls in Cape Cods, and duct sealing and duct connections	Walls, ceiling, floors	
Medium		Expands 100:1	
Texture		Foam of millions of air pockets	

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Results in		Sealed thermal envelope adhered to almost all surfaces; can be trimmed if necessary *	
Process and contents		Liquid chemical components: A – isocyanate B –[see MSDS]9099 (“55-gal A, 55-gal B, 5-gal C”) 501 - Manufactured by Biobased Chemicals, LLC 1702 - Manufactured by Stepan Company*	
Recycled Content% (required = 5%)		501 - None 1702 - Yes*	
Biobased Content% (possible – 15%)	Per ASTM D6886-04 Standard Test Methods for Determining the Biobased Content of Materials Using Radioactive and Isotope Ratio Mass Spectrometry Analysis (certain % of biobased materials have to be new bio)	Yes* Soybean oil	
Weatherization Assistance Program Appendix A specifications		Yes per 7/19/04 mtg with Alex Moore and 8/18/04 e-mail	
Material Storage Reqs		Component A – 60-90F Component B – 32-90F Component C – 32-90F *	
Installation Method		One-step spray expands to fill cracks and voids *	
Installation Reqs		Certified dealers; no ambient	

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		requirements (hot, humid, freezing temperatures); If the substrate on the walls are frozen, may need a portable heater to warm up the walls because the foam will not adhere as well to a wet wall*	
Installation Time		501 - 1800 sq ft bldg in a day	
Drying time			
Installed density per ASTM D-1622		501 - 0.5 lb/cubic ft*** – ORNL testing showed 0.58 lb/ft ² 1702 - 1.70-2.00 lb/cubic ft*	
Compressive Strength per ASTM D-1621		1702 - 20-30 psi (10% deflection, parallel)*	
Thermal Resistance per ASTM C-518* Conductivity per ASTM C-117**	Per 16 CFR 1209	1702 - 7/inch* 501 - 3.7/inch* 501 - 3.4/inch (based on initial ORNL analysis)* 501 - 0.28/inch**	
Effective R-value in 3.5" stud wall		501 - 13/inch	
Air permeability per ASTM E-283 3.25" @ 75Pa.* 5.25" @ 75Pa.* 3" @ 75 Pa.** 6" @ 75 Pa.**		501 - 0.0080 l/sec/m ² * 501 - 0.0049 l/sec/m ² *	
Water permeability ASTM E-96			

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@ 3" thickness* @ 5" thickness* @ 3" thickness** @ 5" thickness**		501 - 16 perms (3.5" thickness) 501 - 10 perms (5.5" thickness)	
Water Absorption per ASTM D-2842		1702 - 0.12 lbs water/sq ft* 1702 - 6.6 % water by volume*	
Acoustical properties per ASTM E-90 per ASTM C-423		501 - STC 37 501 - NRC 70	
Burn characteristics per ASTM E-84 Flame spread index Smoke development Fuel contribution Per ASTM D2863**	Per 16 CFR 1209	501 - 20 or less***, 1702 - 45* 501 - 400 or less***, 1702 - over 500* 501 - 2 Oxygen Index 23.5%*** Contributes no fuel Will not sustain flame upon removal from source Requires thermal barriers/applicable building code Major components in smoke are carbon dioxide and carbon monoxide <i>BioBased 1702 must be separated from living areas by a 15 minute thermal fire barrier.*</i>	
UPITT protocol test		501 - Passed per SW research,	

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(offgassing when burned) required by NYC MEA standards		indicating offgassing of toxins (which is offgassed by numerous materials when burned) is below the maximum level allowed.	
Stability (Dimensional) per ASTM D-2126 at 100F/100% R.H.		<u>501</u> - Inert; physical and insulating properties are constant* <u>1702</u> 7 days – 1.2 % volume change* 14 days – 1.1% volume change* 28 days – 0.5% volume change*	
Strength (Shear) per ASTM C-273		1702 - 30-35 psi*	
Strength (Tensile) per ASTM D-1623		1702 - 45-55 psi*	
Tumbling Friability per ASTM C-421		1702 - 3.2% loss*	
Resistance to fungal growth per ASTM C-1338		501 - Pass – no growth of fungi	
Air emissions		501 - Contains no materials that emit harmful gases No VOCs, CFC, formaldehyde, or HCFCs	
Longevity			
How to remove		501 - Peel off and throw away; comes off easily; scrapping to make beams paintable	
Benefits – corrosion/pH		501 - Non-corrosive	
Benefits – electrical wiring		501 - No electric wiring overheating problems	

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Benefits – food value for insects/rodents		501 - No food value for insects or rodents	
Benefits - moisture		501 - Will not absorb water or promote mold growth	
Benefits – sound proofing		501 - Effective air seal; superior in controlling mid-range frequencies	
Susceptibility to environmental factors, such as UV degradation		1702 - should be covered with a fluid applied membrane when used on areas that will be exposed to changing weather conditions.*	
References/Track Record			
Cost – material and installation		501 - \$0.25-0.40/board foot	
Sources of Information		BioBased Systems * www.biobased.net ** Handout *** Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112 (800) 966-5253	
Contact Info	Northeast Regional Office Eric Beaton, 617-565-9732 Eric.Beaton@EE.DOE.GOV Alex Moore D&R International, Ltd. 1300 Spring Street, Suite 500 Silver Spring, MD 20910 (301) 588-9387, Ext.14 amoore@drintl.com	10A Wolfer Industrial Pk Spring Valley, IL 61362 800-803-5189 info@biobased.net 1315 N 13th Street Rogers, Arkansas 72756 800-803-5189 Massachusetts Contact	United Soy Systems Richard Kurth Tel. 815-879-5300, Ext 202 Cell 815-878-9556 rkurth@soyol.com Larry Armbruster Pennsylvania (processing in South Dakota) Soy Therm 50

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