ICYNENE LD-R-50™

Q: What is ICYNENE LD-R-50™?

ICYNENE LD-R-50™ is Icynene's next generation, renewable-based, 0.5 lb., water-blown spray foam insulation and air barrier material. ICYNENE LD-R-50™ is formulated using a high-yield castor oil, which is considered a 100% organic material. ICYNENE LD-R-50™ contains over 7% renewable content in the installed foam. This exceeds USDA and ICC-SAVE requirements for a rapidly renewable product.

ICYNENE LD-R-50™ is a climate-friendly, light density, spray foam insulation and air barrier that contributes to a healthier, quieter, more energy efficient building. Responsibly made using castor oil, it's renewable-based and HFC-free formulation allows a building to be insulated and air-sealed for superior energy conservation while minimizing environmental impact.

ICYNENE LD-R-50™ exhibits the same performance characteristics as Icynene's original spray-in–place formula but it now has renewable content.

ICYNENE LD-R-50™ is an open-cell, water blown, spray foam insulation and air barrier material that seals walls, floors and ceiling cavities against air movement, including spaces around electrical outlets and light fixtures and where walls meet windows and doors, subject to local code requirements. This means, when applied along with proper sealants for gaps between double stud joints and double sill plates etc, ICYNENE LD-R-50™ can provide an effective air barrier insulation to minimize air infiltration (either hot or cold) through walls & ceilings, preventing drafts, cold spots and energy loss. It also means that humid indoor/outdoor air is restricted from entering the walls & ceilings and condensing, thereby minimizing the possibility of moisture entrapment & build-up within the wall & ceiling cavities. This is conducive to preventing building envelope failure due to moisture damage.

Trained and licensed Icynene installers will do a custom installation on the building site, completing a proper fill of all sized & shaped cavities. Also, Icynene reduces many labor-intensive jobs such as taping, caulking and any air-tightening details generally associated with conventional (air-permeable) insulation products. It can shorten the construction time as well as lower the labor costs by providing both the building envelope air seal as well as insulation. By virtue of its millions of tiny inter-connected air cells and its stable chemical & physical properties, ICYNENE LD-R-50™ can maintain its installed R-values throughout its service life, contrary to air permeable insulation types that lose their field thermal performance over time due to the deterioration in the insulation quality such as sagging and shrinking, including ongoing convective current loops within the insulation (up to 50% loss).

Q: What is LD-R-50™'s renewable content, how is it measured and certified, and why is it important?

Castor oil has been used in place of a portion of the petroleum-based polyol. ICYNENE LD-R-50™ has a renewable content of greater than 7% as measured by the weight (%) of the total finished product in its cured form. This result has been determined via testing in accordance with ASTM D 6866.

This is an important result because it means that ICYNENE LD-R-50™ exceeds the minimum renewable requirement for a bio-based material and can contribute toward a building's achievement of credits/points under various federal programs and national green building standards, including:

Federal Biobased Program

Made from renewable plant and animal sources, the USDA has concluded that biobased products are generally safer for the environment than their petroleum-based counterparts. Under the USDA BioPreferred$_{SM}$ Program, spray-in-place plastic foam products designed to provide a sealed thermal barrier for residential or commercial construction applications must meet a 7% - Minimum Biobased Content (http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx)

LEED-NC Version 2.2: Materials and Innovation Section 6.0

To make construction practices more sustainable, many architects have begun specifying "rapidly renewable materials." Unlike products made from petroleum, which is nonrenewable, these raw materials have very short harvest cycles. The LEED system of building certification from the U.S. Green Building Council (USGBC) offers points for rapidly renewable materials. Castor beans are a rapidly renewable material, as per the USGBC definition, requiring a 10-year or less re-growth timeframe.

To qualify for a credit (1 point) in a new construction project, the value of these materials must represent at least 2.5 percent of the cost of the products used in the building.

NAHB National Green Building Standard: Chapter 6- Resource Efficiency 606.1

Products that meet minimum content requirements of the USDA's designation of BioPreferred$_{SM}$ can contribute points. A minimum of two bio-based materials must be used and each for more than 0.5% of the project's projected building material cost.

ICYNENE LD-R-50™ meets USDA BioPreferred$_{SM}$ minimum content requirements and, depending on material costs, may qualify to contribute points.

Q: What are some of the other environmentally and socially desirable features of Castor oil? (Source: Supplier)

1. Castor oil is 100% naturally filtered, no chemical additives required
2. Castor crops are non-irrigated (relying only on natural rainfall), therefore saving scarce water supplies
3. Castor bean plants do not require treatment with pesticides or fungicides
4. Castor oil's production process has low energy dependence, consisting of simply de-husking and pressing. Harvesting is manual.
5. Castor beans are a high oil yield crop. The castor oil used in ICYNENE LD-R-50™ has a yield (by weight) of ~40% vs. ~17% yield for soya oil
6. Castor beans do not compete with food crops, as castor beans can be grown on marginal lands, which are not competitive with food production lands
7. Castor oil is a safe ingredient that poses no health concerns. It is even approved for use in personal skin care products such as lip balms
8. The castor beans, used for the castor oil Icynene purchases, are processed under the guidelines of the Responsible Care® Initiative - www.responsiblecare.org

Q: What contribution does ICYNENE LD-R-50™ make toward climate control and a reduction in Global Warming?

The average house in the US emits 22,000 lbs (11 tonnes) of greenhouse gases a year- twice the annual *greenhouse gas* (GHG) emissions of the average car (11,500 lbs.) The largest part of that, about 40 per cent, comes from heating and cooling. Source: www.energystar.gov

1. In the US, the relationship between a building's energy consumption and GHG emissions is approximately 1:1. Using ICYNENE LD-R-50™ in place of air-permeable insulation can reduce a home's energy consumption by up to 50%, therefore also reducing related GHG emissions by as much as 50%.

2. An important advantage to castor beans is that the plants absorb carbon dioxide when grown, thereby reducing greenhouse gas accumulations in the atmosphere. The estimated carbon dioxide absorption level of castor bean plants is 34.6 tonnes per hectare, with two growing cycles per year. Source: www.DoveBiotech.com

3. For every kg of castor oil produced in place of petroleum based polyols there is a reduction of nearly 3.5 kg of CO2 to the atmosphere. In comparison, Agrol® brand soy polyol claims a reduction of 2.54 kg (5.6 lb) in CO2 versus petroleum polyol. Source: http://www.biobasedpolyol.com

4. Employing castor oil versus petroleum polyol reduces fossil resource use and greenhouse gas generation. Based on a cradle-to-gate study commissioned by the DOE, there were essentially zero net greenhouse gas emissions for the production of castor oil. Source: US DOE Technology Roadmap for Plant/Crop-Based Renewable Resources Technical Report

5. ICYNENE LD-R-50™ is HFC-free (no HFC-245fa, 1,1,1,3,3,-pentafluoropropane). HFC 245fa is a high "global warming potential (GWP)" gas with a GWP of 950. This means HFC 245fa is 950 times more damaging than CO_2. Source: EPA

   The production of most closed cell foams requires the use of HFCs including HFC-245fa and HFC-356mfc as blowing agents. Emission rates are estimated to be three percent annually with a 32.5% loss in the first year. The insulating foam sector is predicted to become the second largest source of HFC emissions. By 2015, experts estimate that HFC emissions from closed cell foams will reach 20 million tonnes CO2-eq. per year. Source: www.eia-international.org/files/reports155-1.pdf

Q: Does ICYNENE LD-R-50™ meet nationally recognized requirements for an Environmentally Preferable Product?

Yes. ICYNENE LD-R-50™ is considered an environmentally preferable product because of its contribution to indoor air quality as well as reductions in energy consumption and greenhouse gas emissions

ICYNENE LD-R-50™ was tested in accordance with Section 01350 of the Material Specifications, adopted by California High Performance Schools (CHPS). This was done using test method California Department of Health Services Standard Practice for the Testing of VOC Emissions Sources Using Small Scale Environmental Chambers (CA/DHS/EHLB/ R-174) and incorporates the chamber testing portion of California Specification 01350 for schools and residential buildings.

ICYNENE LD-R-50™ is CHPS E.Q. 2.2/Section 01350 Compliant and meets requirements for use in a classroom (school).

This compliance is documented in the California High Performance Schools (CHPS) Low-Emitting Materials (LEM) Table which can be found at http://www.chps.net/manual/lem_table.htm#BuildingI. The table also lists ICYNENE LD-R-50™ as a product with rapidly renewable content.

LEED Rating Systems provide credits for Environmentally Preferable Products (EPPs) under LEED-NC EQ 4.1 and LEED-H MR2.2. These credits are obtainable by using products that meet California Specification 01350 (CA/DHS/EHLB/ R-174).

NAHB's National Green Building Standard provides 4 points for materials whose VOC emissions are in compliance with CA/DHS/EHLB/R-174.

Q: What is the average R-value per inch? What is the R-value at 3 ½ and 5 ½ inches?

As per ASTM C518, ICYNENE LD-R-50™ has an average R-value of 3.7* per inch. It delivers

*R-13 at 3 ½ inches
*R-21 at 5 ½ inches

*ICYNENE LD-R-50™'s air-sealing capability provides enhanced field energy performance beyond the rated R-value.

R-values of insulating materials are measured in laboratories under ideal conditions and the conductive heat transfer property is the only property that is measured. However, in reality, convective heat transfer plays a big role when it comes to energy performance of a house. Icynene provides superior energy performance over air-permeable insulation because of its air barrier capability even though they both have similar R-values.

Extensive computer modeling and field data have shown that the energy performance of ICYNENE LD-R-50™ at much lower R-values almost always outperforms fiberglass insulation in the field due to its superior air-sealing ability. Hence, although we usually recommend lower R-values than fiberglass, ICYNENE LD-R-50™ thermal performance in the field is superior in terms of the energy efficiency of a house.

Q: Are These Aged R-Values?

Closed cell foams that contain blowing agents, like HFC or HFA, can suffer from reduced R-values as a result of blowing agent loss and air leakage into the cell structure. The R-value of ICYNENE LD-R-50™ is generated by millions of tiny inter-connected, air-filled cells and the R-value therefore does not decline as it ages.

Q: Does ICYNENE LD-R-50™ meet US air barrier material requirements?

Yes, ICYNENE LD-R-50™ meets US requirements for an Air Barrier material, based on ASTM E 283 testing. Its Air Permeance is <0.02 L/s-m^2 @75 Pa for 3.0 inches.

Q: Is ICYNENE LD-R-50™ PBDE-free like original Icynene?

Yes.

ICYNENE LD-R-50™ does not contain PBDE Flame retardants (poly-brominated diphenyl ethers) or any other brominated compounds. This was an important consideration when developing the product as an increasing number of states and other countries are banning this fire retardant chemical due to health concerns.

Q: What is ICYNENE LD-R-50™'s Flammability and Fire Rating?

ICYNENE LD-R-50™ insulation has achieved a flame spread index* less than 25 and smoke development index less than 450 based on ASTM E 84 testing. This is a Class 1 fire rating for construction materials. Also, ICYNENE LD-R-50™ has no fuel contribution effect, meaning it does not support fire by itself. Nonetheless, it is a combustible material and as per building code requirement, it requires a 15min. thermal barrier to separate it from the interior occupied space.

* Flame spread rating not intended to reflect hazards under actual fire conditions.

Q: How long does it take to cure?

ICYNENE LD-R-50™ takes less than 10 seconds to expand to 100 times its original volume and become fully cured, ready for drywall application.

Q: Does the ICYNENE LD-R-50™ Absorb Water?

No, it is hydrophobic and it does not absorb water. However, water can work its way through the foam under pressure or by gravity force. When the foam is placed on water it will float and upon removal it will not contain any water and it does not lose any of its insulating properties. But, if it is immersed under water, water can be forced into the open cell foam by the hydrostatic pressure; however, once it is removed from water and allowed to drain and dry out, the original insulating properties will return.

Q: Does the ICYNENE LD-R-50™ Foam Entrap Moisture?

ICYNENE LD-R-50™ is vapor permeable and this allows water vapor molecules to diffuse through the foam. This means that moisture in the building's concrete or lumber can escape through the insulation as the building dries out, thus eliminating moisture that could cause rot or mold.

Q: I have heard that "bio-or plant-based" foam insulations are susceptible to mold growth.

ICYNENE LD-R-50™ offers no food value; therefore it does not support bacteria or fungal growth. It also does not retain water, making it an unappealing environment for fungal spores.

ICYNENE LD-R-50™ was tested as per the requirements of ASTM C 1338: Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings and it passed the test.

Q: Does the Foam Change Physically Over Time?

No, it is a chemically inert material and it will not change chemically or physically over time.

Q: What about Mice, Insects or Termites?

ICYNENE LD-R-50™ offers no food value, but it would not present a barrier to their entry if they decided to gnaw through it or nest in it.

Q: What Are the Acoustic Properties?

As an effective air-seal, ICYNENE LD-R-50™ eliminates the air gaps through which airborne sound travels and is superior in reducing mid-range frequencies noise, which includes the most common sounds, the human voice and stereo music. ICYNENE LD-R-50™ thereby adds to the acoustic property of the building envelope.

Q: How is ICYNENE LD-R-50™ Installed?

ICYNENE LD-R-50™ is sprayed into open building envelope cavities such as stud walls, ceilings and floors. An Icynene trained, licensed Dealer must be retained to do the job.

With any open cavity, ICYNENE LD-R-50™ insulation can be directly spray-applied once electrical and plumbing services are in place. It then expands to 100 times its initial volume in seconds, permanently adhering to the surfaces of the surrounding building materials and sealing all gaps and voids.

Q: Does ICYNENE LD-R-50™ come with a warranty against product defects?

Yes, it has a Lifetime Limited Warranty and is subject to the same conditions and limitations. For full details please refer to the Icynene Limited Lifetime warranty statement.