



INSULATION

Basics & Tips

INSULITE HANDBOOK

Let's analyze, **how does heat enter your home?**



1

Through the ROOF & WALLS: Studies show that 75% of the heat inside your home comes through the roof. When the sun heats your roof, the roof re-radiates its gained energy into the relatively cooler house. At night, heat from sun-baked walls will begin to penetrate into the house for several hours creating the most unpleasant conditions as you are getting ready to go to bed.



3

Poor VENTILATION: Without air movement, sweat cannot evaporate from our bodies, thus we feel hotter.

2

Through outside HEAT & HUMIDITY: If you leave your windows open in summer, you will let outside hot air ("singaw") in. Combine that with the high humidity, which PAGASA pegs at an average of 70% to 82% RH, then you have a recipe for your very own steam room (see "What is Humidity?" on next page). Your neighbor's low metal roof and the concrete road are also sure ways to heat up your home.



Heat travels from a warm area to a cool area by a combination of conduction, convection and radiation:

By Conduction:

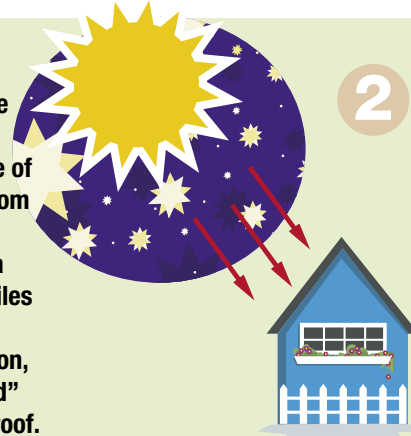
Heat flows by conduction from a hotter material to a colder material when two materials touch. An example would be the heat from your coffee transferring through the cup, to your hand.

1



By Radiation:

Radiant heat travels in a straight line away from the hot surface and heats anything solid as the wave of energy hits it. Radiation from heat source is transmitted through air or vacuum to a cold surface at 186,000 miles per second. An example would be the sun's radiation, traveling through the "cold" outer space, to heat your roof.



2

By Convection:

Heat transfers by convection occurs when a liquid or gas is heated, becomes less dense, and rises. An example would be warm air rising from a chimney.



3

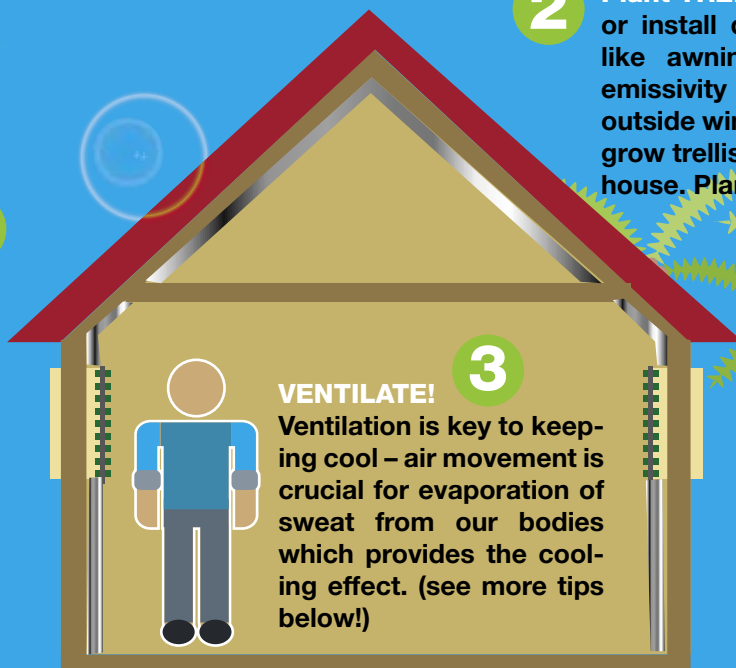
Houses in the Philippines are getting too hot for comfort, and we resort to airconditioners to solve the problem. **Here are strategies to keep your home cooler by 2 to 5°C, economically!**



1

INSULATE Roof & Walls:

The Philippine Department of Energy states that “roofs should be provided with adequate insulation in order to conserve energy. All roofs shall be provided with insulation”. Insulation materials, like Airofoam, can reduce up to 80% of your roof’s absorbed heat, providing you with a much more comfortable, productive & livable home. It pays for itself by reducing your cooling bills. Lighter colors for roof and walls can also help because dark colors absorb more heat.



2

Plant TREES, or install double-glazed windows or window treatments like awnings, generous curtains, blinds and/or low-emissivity films. You can also install aluminum louvers outside windows (especially facing west or southwest) and grow trellis to help reduce sunrays coming directly into the house. Plants absorb heat and keep temperatures down.

3

VENTILATE!

Ventilation is key to keeping cool – air movement is crucial for evaporation of sweat from our bodies which provides the cooling effect. (see more tips below!)

What is Humidity?

Humidity is defined as the amount of moisture or water vapor in the air. Humans are sensitive to humidity, as the skin relies on the air to get rid of moisture. The process of sweating is your body’s attempt to keep cool and maintain its current temperature. If the air is at 100% relative humidity (100% RH), sweat will not evaporate into the air. As a result, we feel much hotter than the actual temperature when the RH is high. People tend to feel most comfortable at 45% RH. Airconditioners and dehumidifiers help to keep indoor humidity at a comfortable level.

The heat index lists how hot a given temperature will feel to us in various RH levels:

Relative Humidity	Air Temperature (Degree Celsius)					
	24	26	29	32	35	37
0%	20	22	25	28	30	32
20%	22	25	27	30	34	37
40%	23	26	29	34	37	43
50%	24	26	31	35	41	48
60%	25	27	32	37	46	55
70%	25	28	34	40	50	62
80%	25	29	36	45	57	69
90%	26	31	38	49	65	76
100%	26	32	42	54	74	

More Ventilation Tips:

Passive strategies for cooling:

1. If you are still designing your house, orient it to catch prevailing breezes.
2. Roof ventilation should be improved with ridge/eaves vent or dormer. This sucks hot air out of the roof space reducing heat transfer through the ceiling; they can also be used to assist breezes through the house with ceiling vents.
3. Avoid sliding windows; louvered windows or casements should be adopted. Casements should be angled to catch the breeze.
4. Window opening on opposite sides of your house enhance cross ventilation driven by breezes. “Stacks” (tall spaces) can also be incorporated within the house design: with openings near the top of the stack, warm air can escape, while cooler air enters the house from openings near the ground.
5. You can also try this: close all doors & windows from lunch time to sunset, and open it at night to flush the heat away.
 - 12NN to 6PM - Close windows and doors facing West (afternoon sun); or at the moment the temperature outside reaches the indoor temperature.**
 - 7PM to 8PM - Open mechanical roof exhaust/ventilator and ceiling vents.**
 - 7PM to 8AM - Open all windows.**

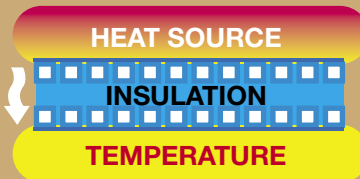
Choose **your Insulation wisely!**

There are two main types of commercial insulation:

1 BULK INSULATION:

Bulk or mass insulation mainly resists the transfer of conducted heat, relying on pockets of trapped air within its structure. Its thermal resistance (R-value) is essentially the same regardless of the direction of heat flow through it. Bulk insulation includes materials such as glasswool (fiberglass blanket), polystyrene (styropor) and polyurethane (like those inside the walls of your fridge). All products come with one material-R-value for a given thickness. The thicker the bulk insulation, the better it insulates.

A polystyrene foam cup gives us a good idea of how bulk insulation work. The tiny air pockets inside the cup walls actually resist the transfer of heat coming from the hot coffee with which it is in direct contact.

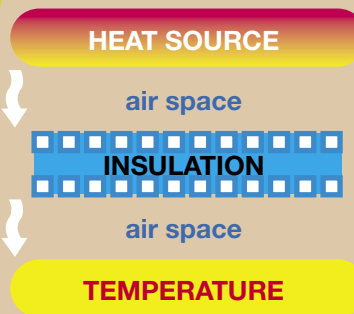


Material-R-Value:

R-value or Thermal Resistance measures an insulation material's ability to resist heat flow. The higher the R-value, the better the insulator. The material R-value measures the insulating value of an insulator alone. In the laboratory, the insulator is in direct contact with the heat source; the heat detected on the other side of the insulator determines its material R-value.

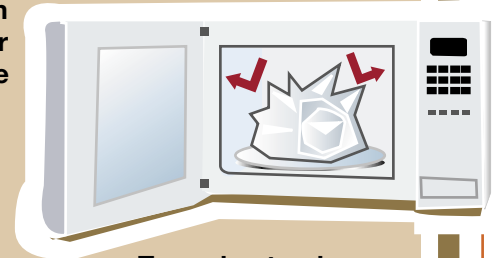
2 REFLECTIVE INSULATION:

Reflective insulation mainly resists radiant heat flow due to its high reflectivity and low emissivity (or the ability to re-radiate heat). It relies on the presence of an air layer of at least 15mm next to the shiny surface. The thermal resistance of reflective insulation varies with the direction of heat flow through it. Reflective insulation is usually shiny aluminum foil or aluminized plastic film laminated onto paper or plastic or plastic bubble sheet.



System-R-Value:

The system-R-value measures the insulating value of an insulation system being installed with air spaces. In the lab, air spaces between (1) heat source and insulator, and between (2) insulator and thermometer, are included in the "air-to-air" system. As such, an insulator's system-R-value is usually higher than its own material-R-value. When comparing two insulators, be sure to compare them on the same category: material vs. material, system vs. system.



To understand how reflective insulation works, wrap a piece of ice cube with aluminum foil and heat it inside a microwave oven. The ice will not melt because the aluminum foil will reflect the microwaves.

Why Airofoam?

Airofoam is a composite material the combines the best of reflective and bulk insulation technologies. Airofoam has one or two layers of reflective material and a micro-cellular polyethylene foam core.

1 Superior Material-R-Values & System-R-Values!

Airofoam has material-R-values 48x better than concrete. Get system-R-values of up to R-18 and you can combine Airofoam with other materials to get system-R-values of up to R-34!

6 Value For Money:

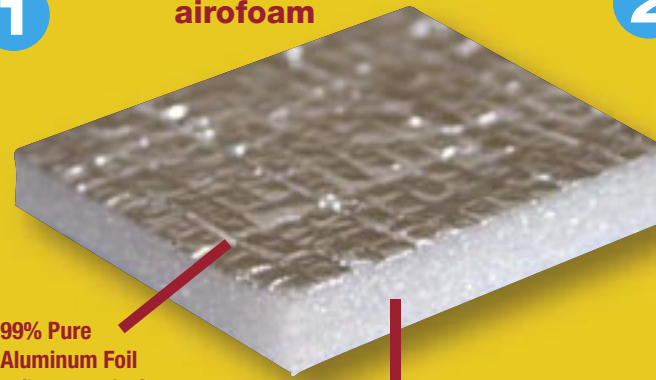
It pays to insulate! Airofoam is reasonably priced, giving you a shorter payback period (due to energy savings) from your investment.

5 CFC-Free & Recyclable:

Airofoam is environment friendly: it is made from fully recyclable materials and is free of ozone depleting substances.

1

airofoam



2

Durable & Acid-Proof:

Airofoam Premium has acid-protection and guaranteed to last at least 10 years! Airofoam is inhospitable to insects, birds and rodents. Its closed-cell and non-absorbent structure keep moisture out and effectiveness in.

3

Flame Retardant:

Airofoam Premium is acceptable in accordance with the full scale corner room burn test of ASTM Guide E603-77(83) and UL Standard 1715.

4

Clean & Non-Toxic:

No health hazards. Completely free from all synthetic mineral fibers and therefore no special clothing or respirators is required for installers. Airofoam uses same material as your powdered milk's pouches: aluminum and polyethylene.

5

99% Pure Aluminum Foil reflects 97% of radiant heat transfer.

High Grade Foam Core blocks up to 90% of conductive heat transfer.

Did you know that other brands' aluminum foil can oxidize and corrode in as short as two years time? If left untreated, it turns black, loses its original reflective power and, loses its R-values. Airofoam Premium's aluminum foil is specially coated to withstand the elements!

Did you know that some insulation products absorbing moisture can easily lose up to 50% of its thermal efficiency? Airofoam is closed-cell and non-absorbent!

Make the right choice today! Install the right insulation product today and it will keep working well into the next decade.

Did you know that NASA's space shuttles are insulated using tiles, foam & aluminum to protect them from the sun's heat?



Airofoam Variants:

GRADE	AIROFOAM PREMIUM	AIROFOAM ADVANTAGE	AIROFOAM CLASSIC
Reflective Material	99% polished pure aluminum foil with acid protection	99% polished pure aluminum foil	PET Aluminized Film Core Material
Core Material	Micro-cellular polyethylene, closed-cell, non-absorbent, self-extinguishing, with anti-oxidants	Micro-cellular polyethylene, closed-cell, non-absorbent	Micro-cellular polyethylene, closed-cell, non-absorbent
High System-R-Values	Up to R-18	Up to R-18	N.A.
High Reflectivity	97%	97%	N.A.
Low Emissivity	3%	3%	N.A.
High Core R-Value	Up to R-10	Up to R-10	Up to R-10
Acid-Proof Facing	YES	NO	YES
Anti-Oxidants	YES	NO	NO
Self-Extinguishing	YES	YES	NO
Health-Friendly		YES	
Moisture-Proof		YES	
Lightweight		YES	
Environment Friendly		YES	
Value for Money		YES	
Tough & Durable		YES	
Roll Dimension	1Mx50M; thickness: 5mm/10mm/12mm		1Mx50M; thickness 0.5mm-50mm

Product Comparison Sheet

PROPERTIES	AIROFOAM 25mm / 2 pure	Fiberglass 16 kg. x 50mm / 1 foil	Bubble Sheet 2 bubble / 2 pure foil	REMARKS
Material-R-Value Insulating value of the product alone	4	4	1.1(a)	Bubble sheet (alone) has a very low R-value.
System-R-Value Insulating value of system including air spaces	14	N. A.	10(b)	R-values of reflective insulation materials (RIMs) increase dramatically with aluminum foil facing an air space. Aluminum foil's inherent high reflectivity & low emittance enhances RIMs' overall performance.
Reflective Material	99.35% pure aluminum foil 9 microns	None	99% pure aluminum foil 7.6 microns	Most aluminum foils on the market today have about the same emissivity values, choose the RIM with the best core material.
Core Material	Polyethylene foam (R-4), closed-cell, non-absorbent	Fiberglass batt (R-4), opened-cell, absorbent	Bubble Pack (R-1.1), closed-cell, non-absorbent	High humidity and roof-leaks reduce R-values of absorbent mass insulations.
Permeability	.008	N. A.	.002	Choose the material that does not pose as health threats to both installers and occupants.
Health	Clean, non-toxic	Suspected carcinogen(C)	Clean, non-toxic Suspected	Aluminum foil's flame retardant property protects RIM composites from flaming.
Flammability	Flame-retardant <1.5 in./min.	Class 0	Bubble pack core has no flame retardant	Prolong the life of your insulation by following the supplier's recommendations.
Durability	Depends on installation	Depends on installation	Depends on installation	Support high quality, Philippine-made products. Support the Filipino worker.
Origin	Proudly Philippine-made, imported raw materials	Local & imported	Imported	

Sources:

- (a) "Insulation Facts #61", North American Insulation Manufacturers Association
- (b) "Appendix A: Introductory Comments on Thermal Resistances for Reflective Insulation Systems", Understanding and Using Reflective Insulation, Radiant Barriers and Radiant Control Coatings, Reflective Insulation Manufacturers Association, April 1999, p.25.
- (c) "9th Annual Report on Carcinogens", U.S. Department of Health and Human Services, National Toxicology Program, 2000.