WHY SHOULD YOU INSULATE 1

1. The insulating value of the “building envelope system”

   * **minimizes heat loss from the interior in winter months, and**

   * **minimizes heat transfer from outside in the summer months**

   to substantially improve resident comfort level and reduce HVAC requirements thus lowering operating costs.

6. Insulation is the single most cost-effective way to improve energy efficiency based on cost comparison per square foot.

8. Governments are recognizing this with new energy efficiency legislation and national and international commitments.

10. Inadequate insulation and air leakage are leading causes

WHY SHOULD YOU INSULATE 2

5. To maintain comfort, the heat lost in winter must be replaced by your heating system and the heat gained in summer must be removed by your air conditioner.

6. Insulating ceilings and walls, decreases the heating or cooling needed by providing an effective resistance to the flow of heat.

7. By insulating a building or home , you

* save money and the nation's limited energy resources

* maintain a uniform, comfortable temperature throughout your surroundings , throughout the year.

8. Once the energy savings have paid for the installation cost, energy conserved is money saved - and saving energy will be even more important as utility rates go up.

KOOL TILE (Wall) – Function

Our External Wall Insulation System -

- provides an insulated weather-proof, durable architectural facade
- helps conserves energy
- helps reduce heat loss
- helps control condensation
- helps to eliminates thermal bridging
- provides substantial reduction in sound transmission
- suitable for both new constructions and old

KOOL TILE (Wall) – BENEFITS

- enables thermal management of buildings
- improves internal comfort levels
- maintains a dry, stable structure
- reduces the risk of condensation
- contributes to the reduction of **CO_2** emissions
- provides beneficial whole life costs
- combines aesthetics with durability
- reduces building maintenance

KOOL TILE (WALL) - SPECIFICATIONS

The varied criteria for selecting KOOL TILES for Wall insulation is as listed below :

		KOOL TILE (REGULAR)	KOOL TILE (HD)	KOOL TILE (SUPREME)	EXPLANATION
1	**Insulation Thickness (mm)**	37.5	37.5	37.5	
2	**Shuttering Thickness for Plaster**	12	12	12	
3	**Constituent Material**	EPS (Self Extinguishing)	EPS (Self Extinguishing)	EPS with Graphite (Self Extinguishing)	
4	**Color**	white	white	grey	
5	**Density (Kg/cu.m)**	16	18	18	
6	**Thermal Conductivity (K Value) as per IS:4671 (mW/cm^{0}C) at 10^{0}C**	0.37	0.35	0.31	Each Sq. Mt of roof exposed to say 20^{0}C temp diff. (outside 45^{0}C inside 25^{0}C) will cause a heat loss of 19.74 to 16.54 W
7	**Thermal Conductivity (R Value) for TILE (W/m^{20}C) at 10^{0}C**	0.987	0.933	0.827	
8	**Thermal Resistance (m^{20} C /W) at 10^{0}C**	1.014	1.071	1.21	
9	**Water Absorption (% vol on 7 days immersion)**	<1%	<0.6%	<0.1%	
10	**Cross breaking strength (kPa)**	140	160		

Dimensional stability – Optimal ability to retain volume and shape with changing temperatures

Thermostability – Short term and long term thermal stability of Kool Tiles are optimal

Resistance to rotting/decaying and ageing – since it is not a naturally occuring organic product, there is no chance of decay or decomposition

KOOL TILE (WALL) - HOW MUCH DO YOU SAVE ?

LAYER NO.	LAYER PARTICULARS	THICKNESS (d)	TEMP AT BOUNDARY (T)	TEMP. DROP (ΔT)	THERMAL PERMEABILITY (λ)	THERMAL RESISSTANCE (d/λ)	
	UNIT	cm	^{0}C	^{0}C	W/m^{0}C	m^{20}C/W	
1	INTERNAL AIR		24	0.0			
2	AIR ON INSIDE WALL SURFACE	1	26.43	2.43	7.7	0.13	
3	CEMENT PLASTER	1.2	26.59	0.16	1.4	0.009	
4	BRICK MORTAR WALL	11.4	28.54	1.95	1.1	0.104	
5	CEMENT PLASTER	1.2	28.7	0.16	0.14	0.009	
6	BITUMEN (grade 85-25) LAYER FOR ADHESION	0.2	28.76	0.22	0.17	0.012	
7	KOOL TILE (HD)	3.75	48.78	20.08	0.035	1.071	R VALUE
8	CEMENT PLASTER	1.2	28.92	0.16	1.4	0.009	
9	FINISHING LAYER	0.5	48.87	0.09	1.05	0.005	
10	AIR ON OUTSIDE WALL SURFACE	1	29.67	0.75	25	0.04	
11	OUTSIDE AIR		50	26			K VALUE
				U VALUE of wall WITH KOOLTILE		1.387	0.72
				U VALUE of wall WITHOUT KOOL TILE		0.316	3.16
						ΔK	2.44

SAVINGS per year in ENERGY COST per sq mt. Rs. 587.01

$$\frac{86.4 \times \Delta K \times (\Delta T \times DAYS) \times ENERGY\ COSTS}{1000 \times EFFICIENCY \times HEAT\ VALUE}$$

POWER COST Rs./KW Hr)	5
HEAT VALUE REMOVED BY AC (MJ/KW Hr)	3.6
EFFICIENCY OF AC IN REMOVING HEAT	80%
DEGREE DAYS (AVG TEMP DIFF. x NO. OF DAYS)	1600
AVG. TEMP, DIFFERENCE (40 – 24)	16
DAYS / YEAR OF REGULAR AIRCON USE	100

KOOL TILES – & OTHER COMPETING PRODUCTS 1

S. NO.	PROPERTY		EPS SHEET	KOOL TILE	XPS BOARD
1	**DENSITY** (to meet the approximate pre-requisite thermal conductivity coefficient of 0.03)	a	UNCERTAIN - ONLY BULK DENSITY & NOT OF INDIVIDUAL SHEETS ASSURED AS THEY ARE CUT FROM MOLDED BLOCKS	ASSURED – INDIVIDUALLY MOLDED TILES WITH STAMP OF GRADE (24-40)	ASSURED – BY MANUFACTURER (32-45)
		b	INCORRECT DENSITY OFTEN SELECTED DUE TO POOR AWARENESS OF APPLICATOR AND/OR END USER	EXPERIENCED TECHNICAL TEAM FOR ADVICE ON. SELECTION OF SUITABLE PRODUCT GRADE	SOLD THROUGH DEALERS WITH LIMITED TECHNICAL KNOWLEDGE OR EXPERIENCE
		c	NOT GUARANTEED - NON BRANDED PRODUCT SOLD THRU MULTIPLE CHANNEL PARTNERS	GUARANTEED - BRANDED PRODUCT SOLD DIRECTLY BY MANUFACTURER	GUARANTEED - BRANDED PRODUCT
2	**HEAT RESISTANCE (R-value)**		(PROPERTY DEPENDS ON THE CONSTITUENT MATERIAL & ITS DENSITY)		
	$m^{2.0}C/W$ per 25 mm thickness	a	NOT GUARANTEED, AS PER REASON GIVEN ABOVE	GUARANTEED, AS PER REASON GIVEN ABOVE	GUARANTEED DUE TO BRANDED PRODUCT SOLD THRU DEALERS
			RANGE (DEPENDING ON ACTUAL DENSITIES) FROM :		
		b	0.625 (AT 14 D HIGHEST AVLBL IN RETAIL) TO 0.806 (36+D)	GUARANTEED BETWEEN 0.76 & 0.81 (DENSITY 24-40)	BETWEEN 0.63 & 0.88 (DENSITY > 34)
3	**WATER ABSORPTION % VOL**		CAN RANGE FROM 2% IN 14 D TO 1% IN 36 D	RANGES FROM 0.1% TO 0.4%	<1%
4	**FIRE RESISTANCE**		COMMONLY USED GRADE POSES A FIRE HAZARD	GRAPHITE EMBEDDED IN RAW MATERIAL PROVIDES SELF -EXTINGUISHING PROPERTY	COMES WITH WARNING FOR COMBUSTIBILITY

KOOL TILES – & OTHER COMPETING PRODUCTS 2

S. NO.	PROPERTY		EPS SHEET	KOOL TILE	XPS BOARD
5.1	LONG TERM PERFORMANCE - (IN-SITU R-VALUE RETENTION)		SAMPLES TESTED AFTER 15 YEARS OF INSTALLATION IN SIMILAR LOCATIONS USING ASTM C518 (STANDARD TEST METHOD FOR STEADY STATE THERMAL TRANSMISSION PROPERTIES BY HEAT FLOW APPARATUS)		
	HEAT RESISTANCE	a	STABLE R-VALUE OVER TIME		R-VALUE DECREASES
		b	RETENTION PROVEN UPTO 94% OF ORIGINAL R-VALUE		RETAINS 52% OF R-VALUE on testing after 15 years of installation
5.2	WATER ABSORPTION		SAMPLES TESTED AS IN (5.1)		
			4.80%		18.90%
6	GENERAL APPLICATION	a	LOW COST - 85:25 GRADE BITUMEN USED WITH EXCELLENT RESULTS		REQUIRES EXPENSIVE, SPECIAL ADHESIVES & FINISHES
		b	LEAKAGES LIKELY DUE TO GAPS BETWEEN JOINTS	NO LEAKAGES DUE TO LAP JOINTS. 1 LAYER OF INSULATION GIVES EFFECT OF 2 LAYERS	DOVETAIL / LAP JOINTING AVAILABLE ONLY IN A FEW BRANDS
		c	NO WARPAGE		WARPAGE ON EXPOSURE TO THE SUN
		d	HIGH WATER RESISTANTCE & PERMEABILITY - VERY LOW WATER RETENTION EVEN ON IMMERSION UNDER WATER		LOW PERMEABILITY - CUT AREAS CAN ABSORB WATER ON EXPOSURE TO MOISTURE DURING INSTALLATION
		e	FLEXIBILE & EASILY WORKED UPON TO SUIT SITE REQUIREMENTS (e.g. curved sections)		BRITTLE - SMOOTH FINISH DIFFICULT
7	MATERIAL COST PER UNIT OF HEAT RESISTANCE / Sq Mt		Rs. 243	Rs. 231	Rs. 529

KOOL TILE (WALL) - APPLICATION