

WHY SHOULD YOU INSULATE1

1. The insulating value of the roof 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.

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

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

□□. Inadequate insulation and air leakage are leading causes

WHY SHOULD YOU INSULATE2

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 (ROOF) - WHAT IS NEW?

- Individually molded Roof Insulation Tiles with guarantee of product quality of every single piece so that the entire roof has an uniform insulation value.
- The tiles are molded and not cut from an EPS block. Hence, each tile has got molded water repellant finish on both surfaces unlike the cut surfaces of sheets which may absorb water through surface porosities.
- Benefits of a double layer insulation provided by Lap jointing of each tile to ensure water-tight joints of the tiles, thus giving the perfect sealing effect.
- Tremendous savings in costs; other competing products with similar critical properties, like XPS or PUF, are three to five times as expensive.
- Quality, Costs and Customer Satisfaction guaranteed as the manufacturer can provide the entire customer servicing system (up to the final product application), technically and commercially.

KOOL TILE (ROOF) – BENEFITS

1. Significantly improved comfort level of the top floor as the roof is insulated against the blistering heat in summers.
3. 40-50% Electricity saving in case air conditioner is used (40% saving in Delhi over one year & hence payback of insulation cost is <1year).
5. No ageing cracks in the water proofing of roof (even for bitumen based ones) and hence no seepage/ dampness after heavy rains.
7. Protection of structure due to lifetime durability & reliability.

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

LAYER NO.	LAYER PARTICULARS	THICKNESS (d)	TEMP AT BOUNDARY (T)	TEMP. DROP (ΔT)	THERMAL PERMEABILITY (λ)	THERMAL RESISTANCE (d/λ)	
	UNIT	CM	°C	°C	W/m°C	m ² C/W	
1	INTERNAL AIR		27				
2	AIR ON INSIDE WALL SURFACE	1.0	28.51	1.51	7.700	0.130	
3	CEMENT PLASTER	1.2	28.61	0.10	1.400	0.009	
4	CONCRETE LINTEL	10.0	29.18	0.57	2.040	0.049	
5	BITUMINOUS MEMBRANE / LAYER	0.3	29.37	0.19	0.180	0.017	
6	BRICK BAT COBA FOR SLOPE (AVG.)	5.0	30.14	0.77	0.760	0.066	
7	KOOL TILE (HD)	5.0	48.60	18.46	0.032	1.587	R VALUE
8	CEMENT PLASTER	1.2	48.70	0.10	1.400	0.009	
9	BRICK TILE (FOR FINISHING)	7.5	49.53	0.83	1.050	0.071	
10	AIR ON OUTSIDE WALL SURFACE	1.0	50.00	0.47	25.000	0.040	
11	OUTSIDE AIR		50	23.00			K VALUE
U VALUE (for building) WITH KOOLTILE						1.977	0.51
VALUE WITHOUT KOOL TILE						0.390	2.56
						ΔK	2.06

ANNUAL SAVINGS IN ENERGY COST per sq meter ----- Rs. 401.85

$86.4 \times \Delta K \times (\Delta T \times \text{DAYS}) \times \text{ENERGY COSTS}$

$1000 \times \text{EFFICIENCY} \times \text{HEAT VALUE}$

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)	1300
AVG. TEMP, DIFFERENCE (40-27)	13
DAYS / YEAR OF REGULAR AIR CON USE	100

KOOL TILES – & OTHER COMPETING PRODUCTS

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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
	HEAT RESISTANCE (R-value)	(PROPERTY DEPENDS ON THE CONSTITUENT MATERIAL & ITS DENSITY)			
2	m^2C/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
			RANGES FROM (DEPENDING ON ACTUAL DENSITIES) :		
		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%

KOOL TILES – & OTHER COMPETING PRODUCTS2

S. NO.	PROPERTY		EPS SHEET	KOOL TILE	XPS BOARD
4.1	LONG TERM PERFORMANCE	a	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)		
	(IN-SITU R-VALUE RETENTION)				
	HEAT RESISTANCE		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	
4.2	WATER ABSORPTION	SAMPLES TESTED AS IN (4.1)			
		4.80%	18.90%		
5	GENERAL APPLICATION	a	LOW COST - 85:25 GRADE BITUMEN USED WITH EXCELLENT RESULTS	EXPENSIVE, SPECIAL ADHESIVES REQUIRED	
		b	LEAKAGES LIKELY DUE TO GAPS BETWEEN JOINTS	NO LEAKAGES DUE TO LAP JOINTS. 1 LAYER INSULATION GIVES EFFECT OF 2	DOVETAIL / LAP JOINTING AVLBL ONLY IN FEW BRANDS
		c	NO WARPAGE	NO WARPAGE	WARPAGE ON EXPOSURE TO THE SUN
		d	HIGH WATER RESISTANTCE & PERMEABILITY - VERY LOW WATER RETENTION EVEN ON IMMERSION UNDER WATER FOR 7 DAYS	LOW PERMEABILITY - CUT AREAS CAN ABSORB WATER ON EXPOSURE TO MOISTURE DURING INSTALLATION	
		e	FLEXIBLE & EASILY WORKED UPON TO SUIT SITE REQUIREMENTS (e.g. curved sections)	BRITTLE - SMOOTH FINISH DIFFICULT	

KOOL TILE (ROOF) - SPECIFICATIONS

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

SPECIFICATIONS	KOOL TILE			EXPLANATION
	KOOL TILE (REGULAR)	TILE (HD)	KOOL TILE (SUPREME)	
Thickness (mm)	50	50	50	
Density (Kgs/cu.m)	24	32	40	
Thermal Conductivity (K Value) as per IS: 4671 (mW/cm°C) at 10°C	0.330	0.315	0.310	
Thermal Conductivity (R Value) for TILE (W/m ² °C) at 10°C	0.660	0.630	0.620	Each Sq.M of roof exposed to say 20°C temp diff. (outside 45°C inside 25°C) will cause a heat loss of 12.4 to 13.2 W
Thermal Resistance (m ² C /W) at 10°C	1.515	1.587	1.613	
Water Absorption (% vol on 7 days immersion)	<0.4%	<0.2%	<0.1%	
Compressive Stress at 10% strain (kPa)	140	250	350	wt. equivalent of 14-35 men (standing over 1 sq.ft area) reqd to compress KOOL TILE by 5mm
Sustained Compressive load bearing capacity with 2% (~1 mm compression) compressive strain after 50 years (kPa)*	50	90	150	

*A man weighing 100 Kg exerts a force of 10 kPa on the roof (assumed 900cm² standing area)

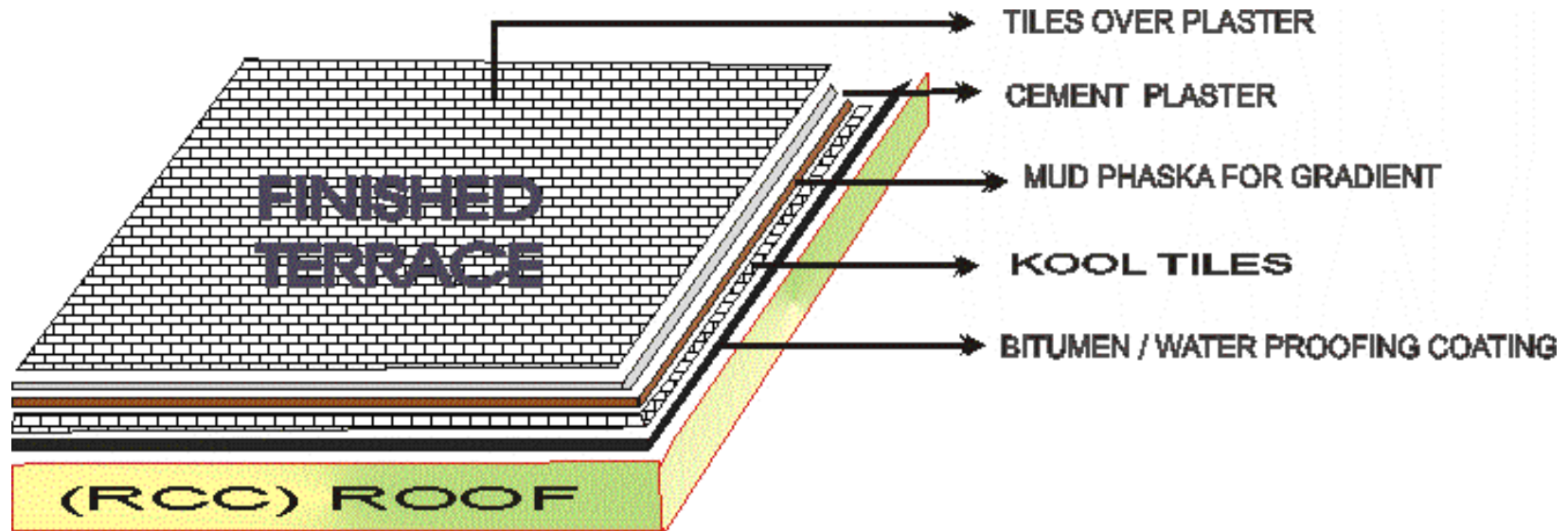
Dimensional stability – Optimal ability to retain volume and shape with changing temperatures

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 occurring organic product, there is no chance of decay or decomposition

KOOL TILE (ROOF) - APPLICATION

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NOTE : For new roof,

- (1) Waterproofing is done directly over the RCC slab, followed by
- (2) KOOL TILES applied directly over the above surface
- (3) Mud phaska, combined with termite treatment, provides a gradient for drainage
- (4) Cement - sand plaster is applied to get a smooth sloping surface over which Tiles are fixed for exterior finish.

KOOL TILE (ROOF) - APPLICATION2

APPLYING BITUMEN & KOOL TILE

- With a brush, apply a coat of bitumenised primer over the surface.
- Apply a coat of 85/25 grade bitumen heated to $<90^{\circ}\text{C}$ for water proofing and tile adhesion.
- Place the **KOOL TILES** from one end of the roof before the bitumen starts drying. Apply a thin coat of bitumen over the lap & joining edges of the individual tiles.
- Press the tiles to make bitumen ooze out from the joints.
- Caution – Bitumen should be of above specified grade & temperature only & should not be poured over the tiles, else they can get corroded.
- Cover the **KOOL TILES** applied directly on this surface with mud phaska before final cement plaster.
- Provide a surface finish of your choice on the terrace (brick tiles, mosaic, etc.)