# India Insulation Forum

## Preaching the Power of Insulation

India Insulation Forum

# Agenda

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- India Insulation Forum (IIF)
- Insulation & It's benefits
- Insulation Materials
- Scope of Insulation in Buildings & ECBC Recommendations
- Various Insulation Application  Methods
- Challenges
- Recommendations

# India Insulation Forum (IIF)

- BEE and IPUA (India Polyurethane Association) have collaborated the establishment of "India Insulation Forum (IIF)“ in 2013. The objective of IIF is to enhance awareness of using thermal insulation in building envelope and cold chain industry for energy conservation.
- IIF also coordinate advocacy activities with Government bodies & nodal agencies.
- IIF is proposed to be represented by reputed companies making different insulation materials used for energy efficiency in Buildings.
- The IIF membership is open to all concerned with building insulation, beginning with raw material suppliers, processors & applicators, builders & contractors, architects, regulators and end users.

# Content

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## Your partner to increase your value

1. Stakeholder Awareness
2. Training of Applicators
3. Testing of Insulation Materials.

# Comprehensive Delivery

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# Members of the IIF

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HUNTSMAN
Enriching lives through innovation

covestro

The Total Solutions Company
Lloyd Insulations (India) Limited
Thermal Insulation | Acoustics | Pre-Engineered Buildings
Cold Storages | Specialised Metal Roofing & Cladding Systems

RINAC
ENGINEERING EVOLUTION

GKSPL

Kingspan | JINDAL

RELIABLE INSUPACKS

DOW

EXPANDED POLYMER SYSTEMS

armacell

ALP GROUP

SPL

UniFix PUF
Rigid Polyureyhane Foam
Sandwich Panel

ROCKWOOL INDIA
Excellence Through Insulation Pvt Ltd

iF Industrial Foams (P) Ltd
An ISO 9001 : 2008 Certified Company

Omkar Puf Insulation Pvt. Ltd.

Shree Venus Energy System Pvt. Ltd.

BASF
We create chemistry

Pioneer
Pioneer Coldstore & Cladding Pvt. Ltd.
...Care, Commitment and Pioneer

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Our vision is that peop

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# ENHANCE TH COMFORT :

Insulation protects the external walls a

# Applicator Orientation

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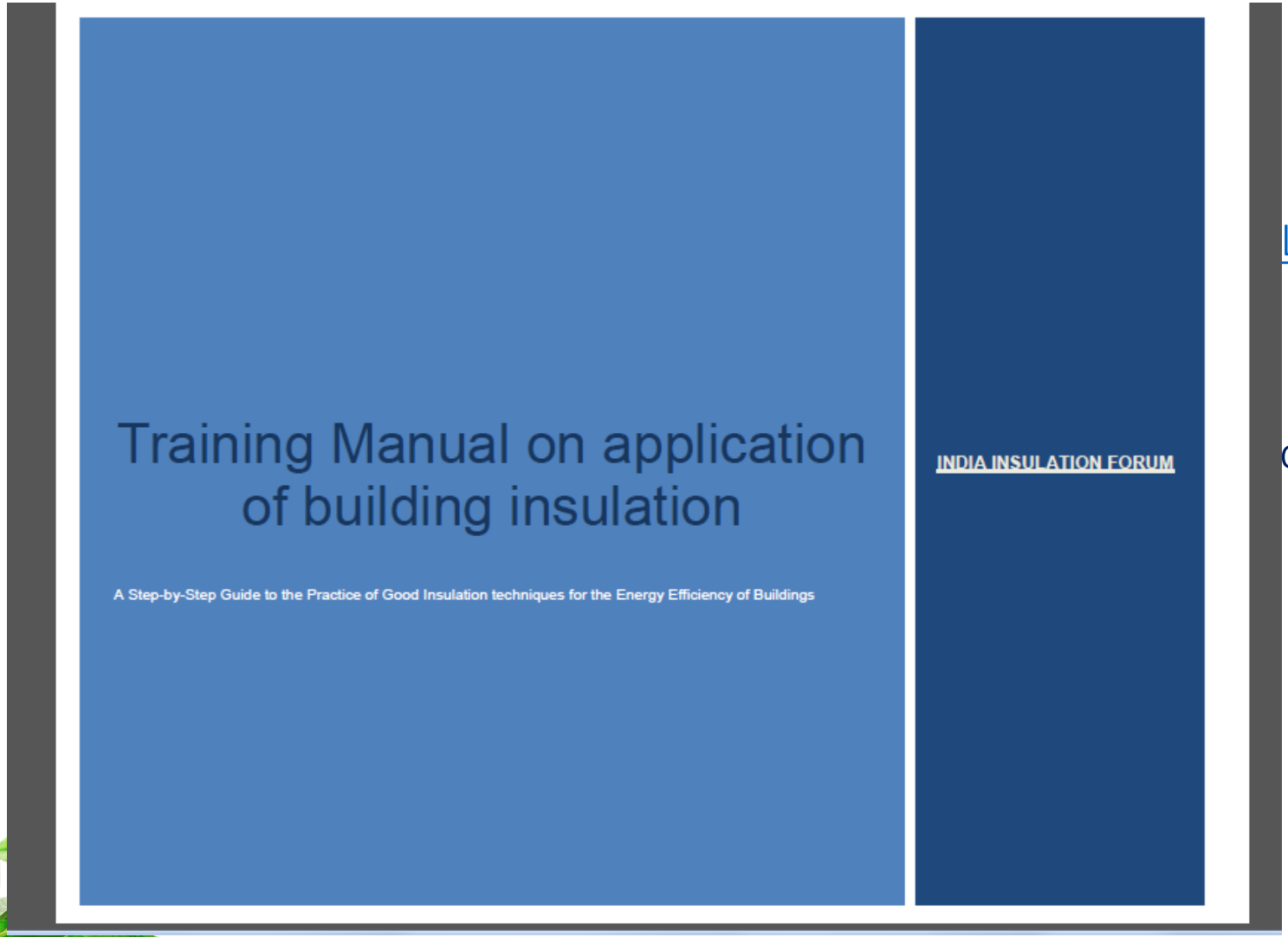


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# Modern society expectation

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**HOT & SCORCHING SUMMER 45$^0$C**

HUMAN COMFORT

**COLD & CHILLING WINTER 0-4$^0$C**

## Value for Investment

# Is it only Comfort ?

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# Is it only Comfort ?

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- *Cleaner air, better health*
- *Security of energy supply*
- *Reduce global warming*
- *Reduce energy costs*
- *International competitiveness*

# Energy Efficiency – The Largest Fuel

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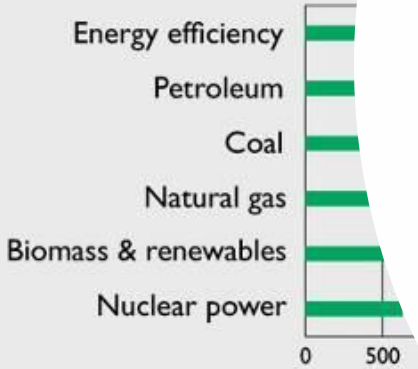
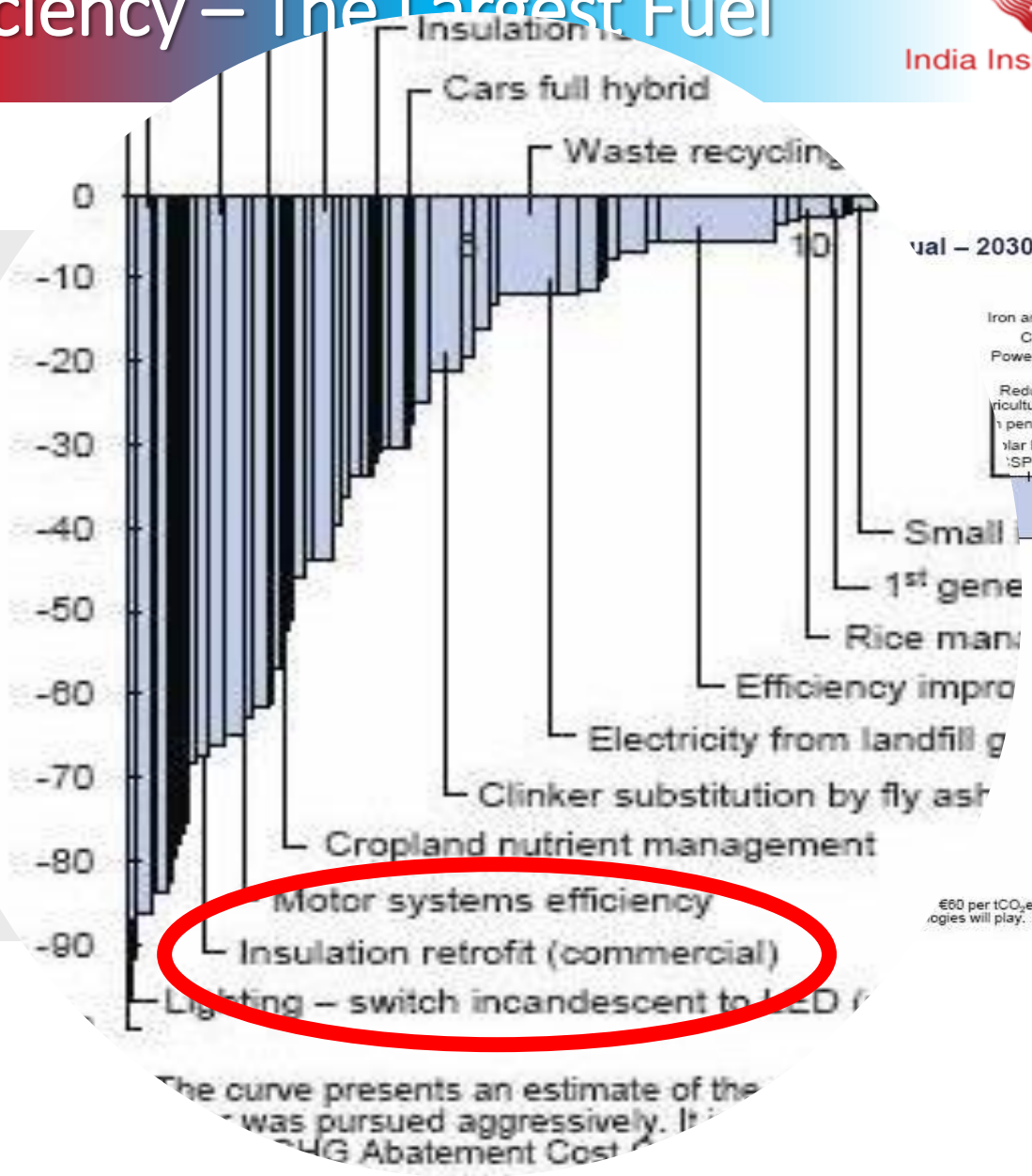
**The sixth fuel: Energy efficier**

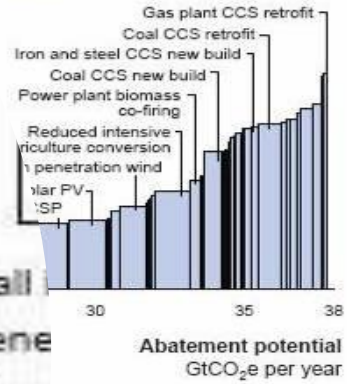
Oil production would need to d
made since the oil crises.

The role of different resource




Source: Cenef Bulletin no 35, April-June 2002




# What is Thermal Insulation

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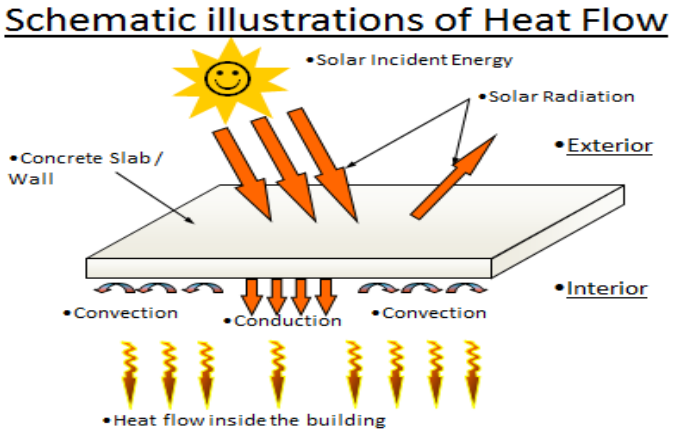
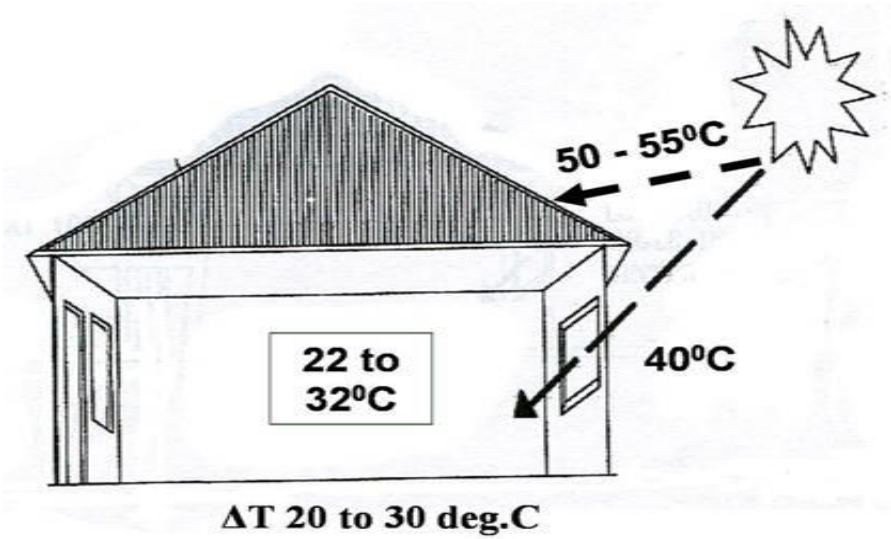
**Thermal Insulation is an effort /method/application to**

**Stop the unwanted heat coming in**

**Or**

**Stop the useful heat going out**




# Heat Load Components

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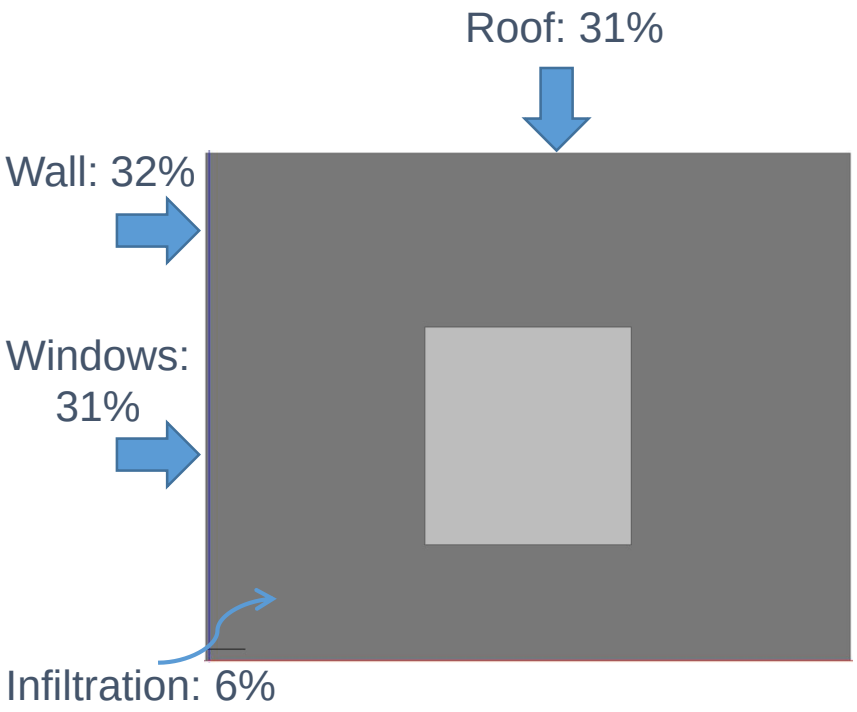
## Composite Climate (New Delhi)




**Direct heat gain from windows not accounted*

| Summer Heat Flow (May) | |
|---|---|
| Weather Conditions | |
| Temperature | Min.: 18.7°C, Max.: 42.6°C, Avg.: ~32°C |
| Relative Humidity | Min.: 13%, Max.: 97%, Avg.: ~50% |

| Net heat flow per unit area | |
|---|---|
| Roof (15 $m^2$) | 24.6 kWh/$m^2$ |
| Wall (47.6 $m^2$) | 8.1 kWh/$m^2$ |
| Window (8.4 $m^2$) | 43.3 kWh/$m^2$ |
| Infiltration (based on floor area 15 $m^2$) | 5.0 kWh/m2 |

# What Thermal Insulation Can do

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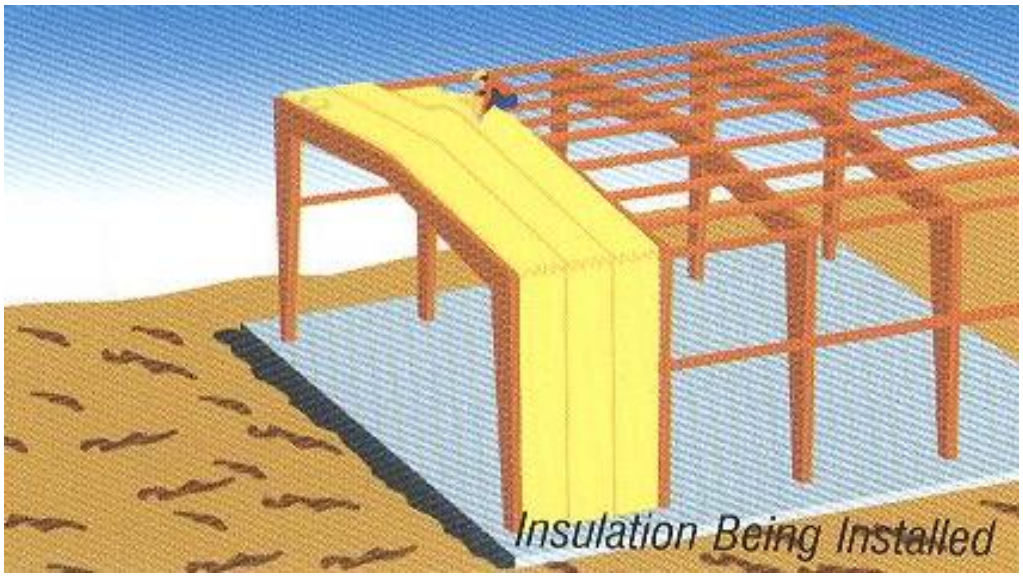
- Creates an envelope outside the building
- Stop heat / cold ingress from outside
- Maintains at least 8-9 degrees temp. difference
- Maintains controlled temp. for longer periods
- Human comfort
- High Quality of Life



# Impact of Insulation

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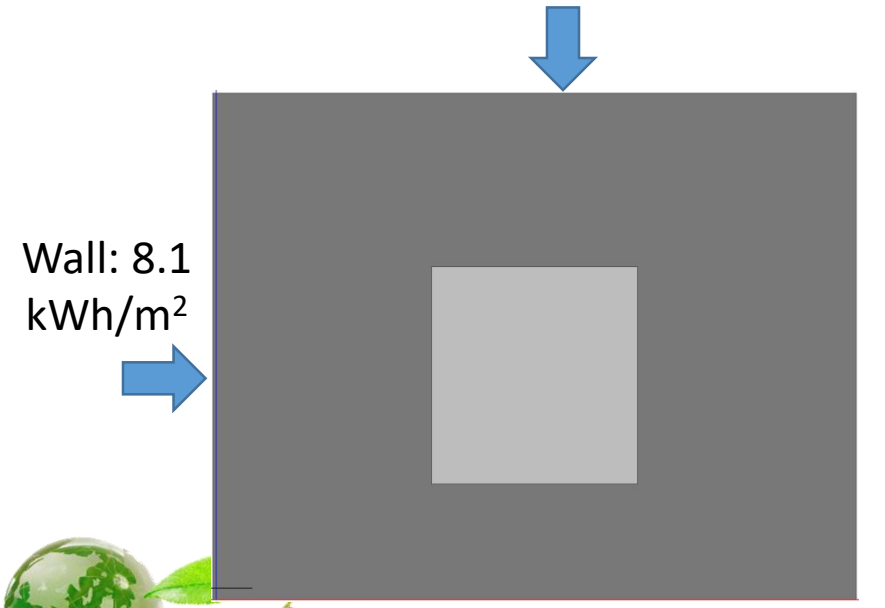
**Composite Climate (New Delhi)** **Summer: Heat in-flow (May)**

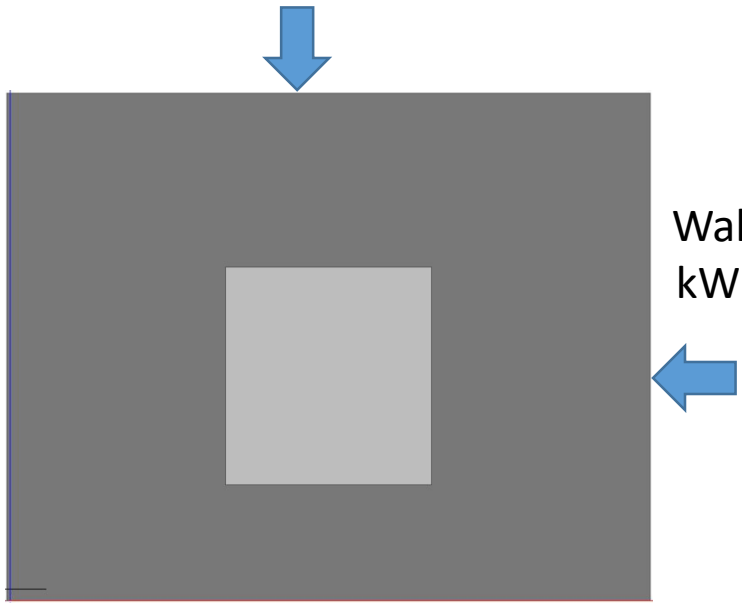
- Business-as-usual construction
- Roof U-value: 4.2 W/m$^2$.K
- Wall U-value: 2.1 W/m$^2$.K

- ECBC compliant roof & wall
- Roof U-value: 0.261 W/m$^2$.K
- Wall U-value: 0.44 W/m$^2$.K

Roof: 24.6 kWh/m$^2$

Roof: 2.1 kWh/m$^2$




**Reduction in heat in-flow through roof ~ 90%**

**Reduction in heat in-flow through walls ~ 70%**

# Impact of Roof & Wall Insulation

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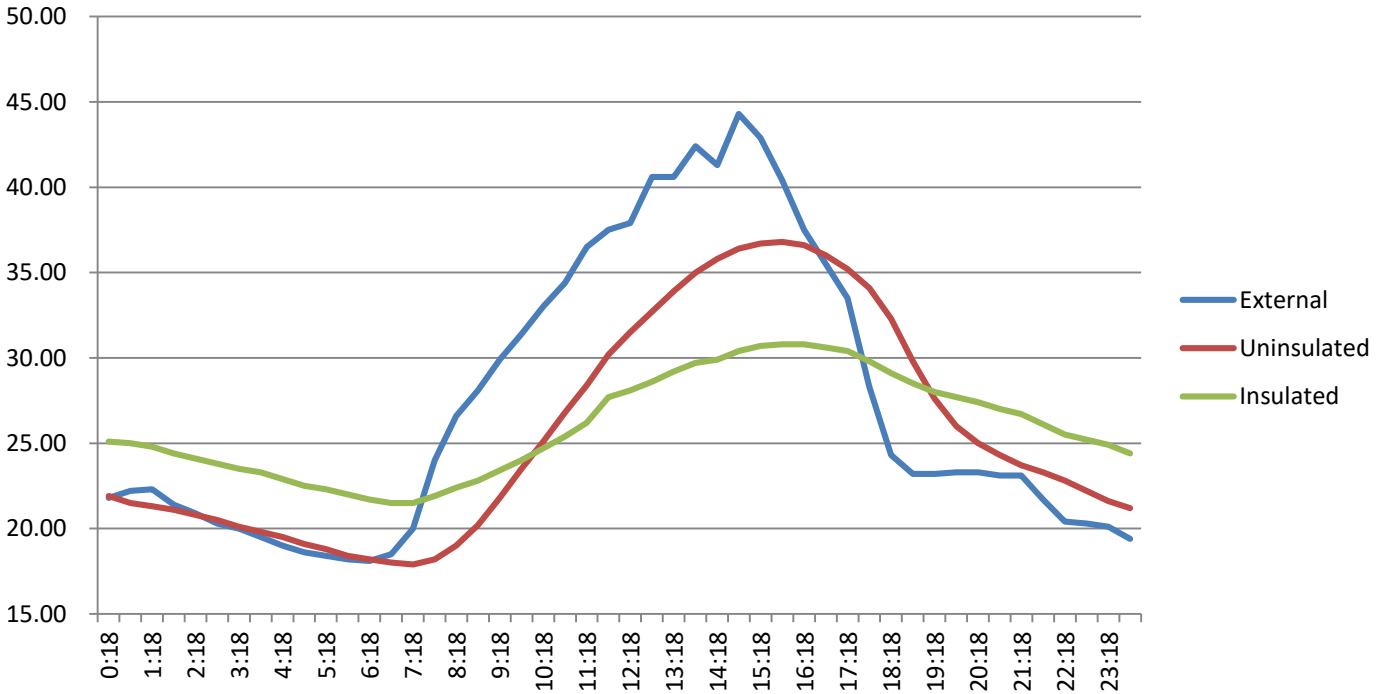
- Typical summer day in Composite climate (Delhi)
- With a 50mm Envelop insulation.




# What Thermal Insulation can do

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## Typical hot summer roof situation

| DAYTIME | TEMP. (DEG.C) | | |
|---|---|---|---|
| | AMBIENT | WORKING FLOOR | INSULATED ROOF FLOOR WORKING |
| 10 AM -12 PM | 39 | 35 | 30 |
| 12 PM - 2 PM | 41 | 37 | 32 |
| 2 PM - 4 PM | 41 | 37 | 32 |
| 4 PM - 6 PM | 40 | 36 | 31 |

Normal building with 150mm RCC, Water Proofed, Brick Wall Insulation : 50-75mm

# Insulation Benefits
## People, Planet, Profit

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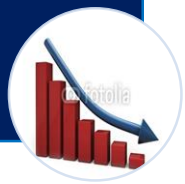
- Stop heat / cold ingress from outside
- Saves on fossil fuel
- Reduces emission of GHG.
- Lower energy losses; avoid the danger of oversized heating or cooling systems that works hard to compensate for the heat or cold losses through the building envelope.

**Environmental**

- Effective insulation lowers heating or cooling bills, thus no longer being affected by rising energy costs
- Maintains controlled temp. for longer periods.

**Economical**



- Human Comfort – improves the efficiency of occupier/user.
- Provides fungus-free and microbe-free healthier environ, due to absence of cold walls

**Social**

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# Insulation Materials – ECBC Context

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| Fibrous | Rigid | Flexible* |
|---|---|---|
| Rockwool Insulation<br>Glass wool Insulation | Rigid polyurethane foam<br>Rigid Poly Isocyanurate foam<br>Sprayed rigid polyurethane foam<br>Extruded polystyrene foam<br>Expanded polystyrene foam<br>Phenolic foam | Nitrile Rubber<br>Cross linked polyethylene<br>Expanded polyethylene |

*Flexible Insulation: They are non-fibrous rubber or thermoplastic material in nature which are easily shaped to any design or geometry and predominantly used in HVAC.

# Scope of Building Insulations

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- Roof Insulation
  - Underdeck
  - Overdeck
- Wall Insulation
  - External
  - Internal
  - Sandwich Wall/Cavity Wall
- Floor Insulation*

*(In Cold Climatic Conditions)*

# Climatic Zone Map of India

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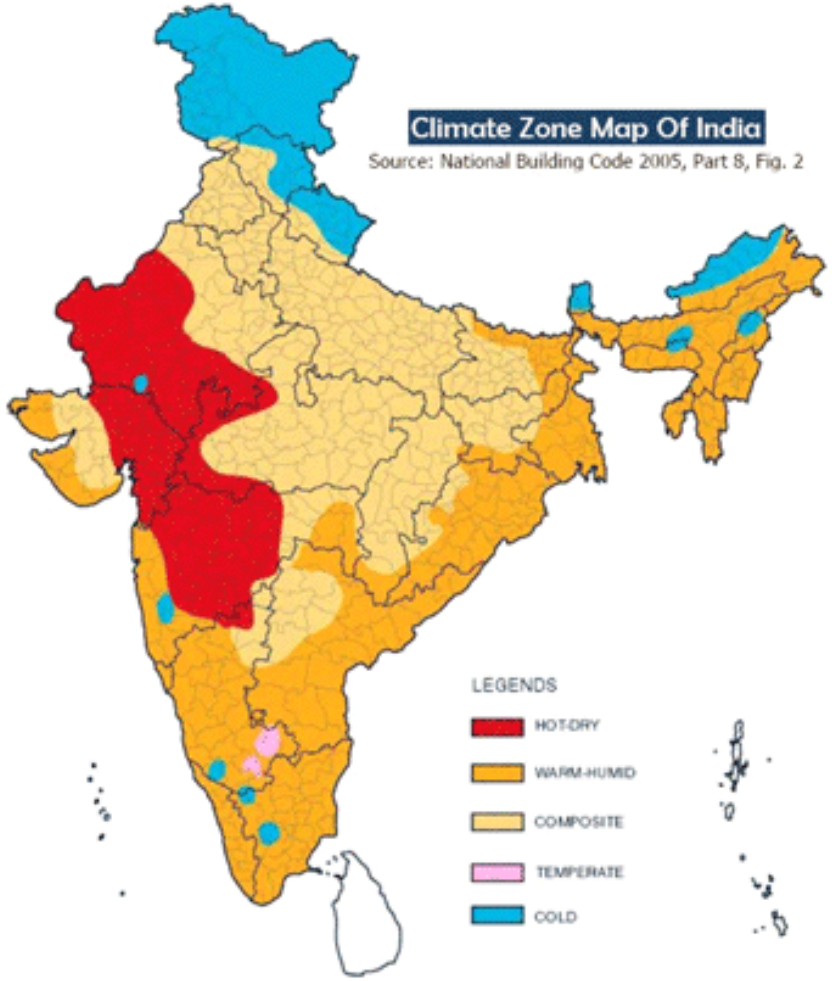
**Hot and Dry**
- Jaisalmer, Jodhpur and Sholapur

**Warm and Humid**
- Mumbai Chennai and Kolkata

**Composite**
- Delhi, Kanpur, Allahabad

**Moderate**
- Pune and Bangalore

**Cold**
- Leh, Shimla, Shillong




# Roof Assembly - ECBC

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*Roof assembly U-factor and Insulation R-value Requirements**

| Climate Zone | 24-Hour use buildings Hospitals, Hotels, Call Centers etc. | | Daytime use buildings Other Building Types | |
|---|---|---|---|---|
| | Maximum U-factor of the overall assembly ($W/m^2$-°C) | Minimum R-value of insulation alone ($m^2$-°C/W) | Maximum U-factor of the overall assembly ($W/m^2$-°C) | Minimum R-value of insulation alone ($m^2$-°C/W) |
| Composite | U-0.261 | R-3.5 | U-0.409 | R-2.1 |
| Hot and Dry | U-0.261 | R-3.5 | U-0.409 | R-2.1 |
| Warm and Humid | U-0.261 | R-3.5 | U-0.409 | R-2.1 |
| Moderate | U-0.409 | R-2.1 | U-0.409 | R-2.1 |
| Cold | U-0.261 | R-3.5 | U-0.409 | R-2.1 |

# Wall Assembly - ECBC

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*Opaque Wall Assembly U-factor and Insulation R-value Requirements*

| Climate Zone | Hospitals, Hotels, Call Centers (24-Hour) | | Other Building Types (Daytime) | |
|---|---|---|---|---|
| | Maximum U-factor of the overall assembly ($W/m^2$-°C) | Minimum R-value of insulation alone ($m^2$-°C/W) | Maximum U-factor of the overall assembly ($W/m^2$-°C) | Minimum R-value of insulation alone ($m^2$-°C/W) |
| Composite | U-0.440 | R-2.10 | U-0.440 | R-2.10 |
| Hot and Dry | U-0.440 | R-2.10 | U-0.440 | R-2.10 |
| Warm and Humid | U-0.440 | R-2.10 | U-0.440 | R-2.10 |
| Moderate | U-0.431 | R-1.80 | U-0.397 | R-2.00 |
| Cold | U-0.369 | R-2.20 | U-0.352 | R-2.35 |

# Insulation Application Mannal

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***For Buildings***

- A well drafted document for understanding  various application methods of Thermal Insulation in a Building
- Document describes the application procedure in detailed steps
- Application sketches & photographs are included
- Insulation material properties tabled
- www.indiainsulationforum.in

# Building Insulation Applications

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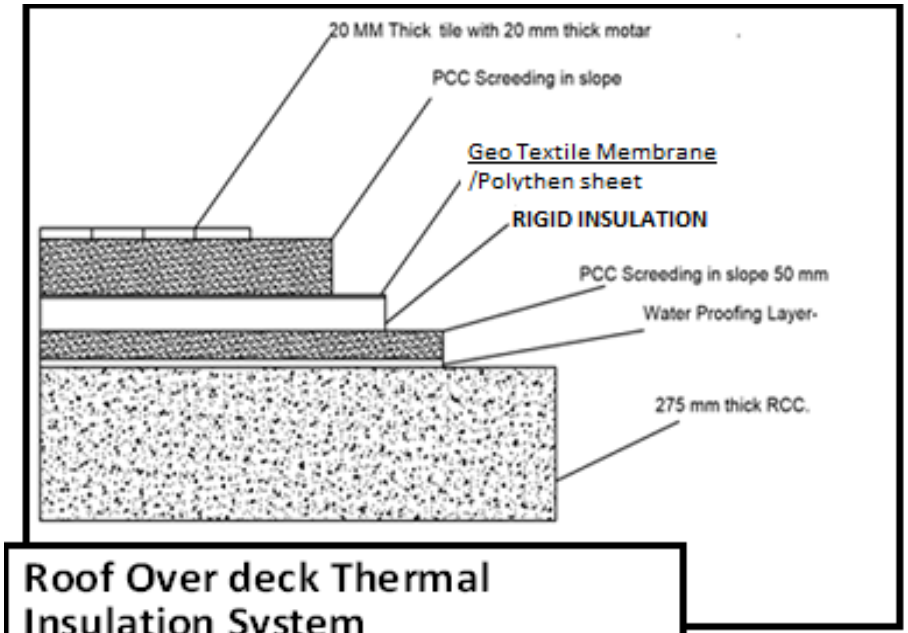
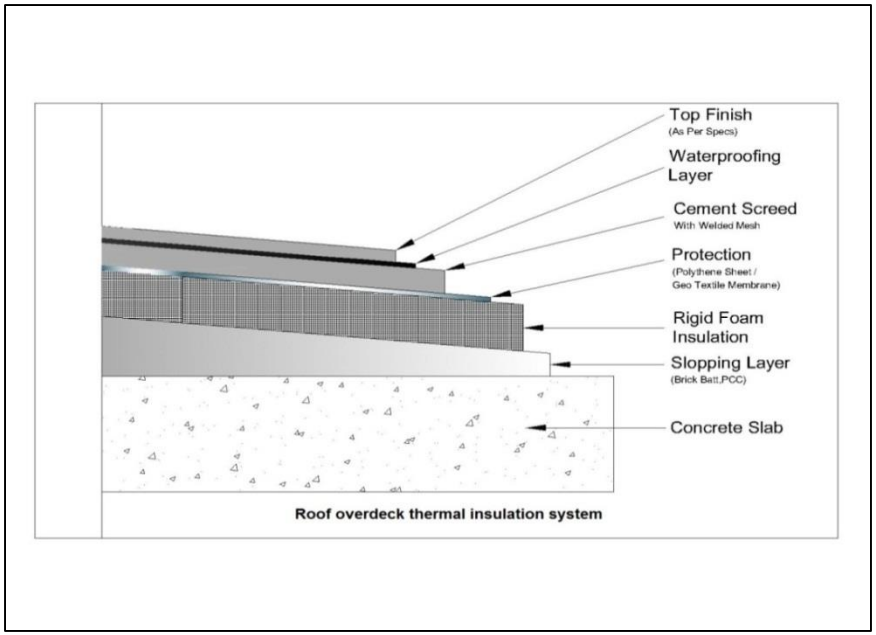



Roof Over deck Thermal Insulation System




# Overdeck Insulation

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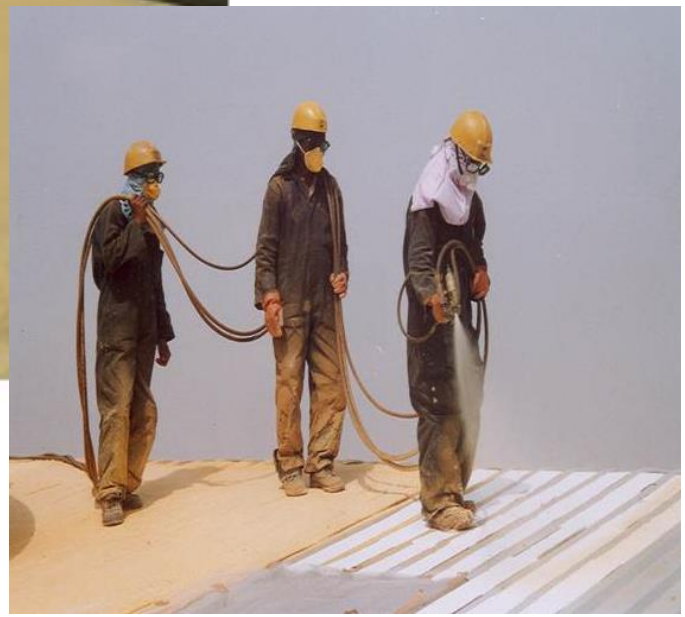
***Sprayed Rigid Foam Application***



# Overdeck Insulation

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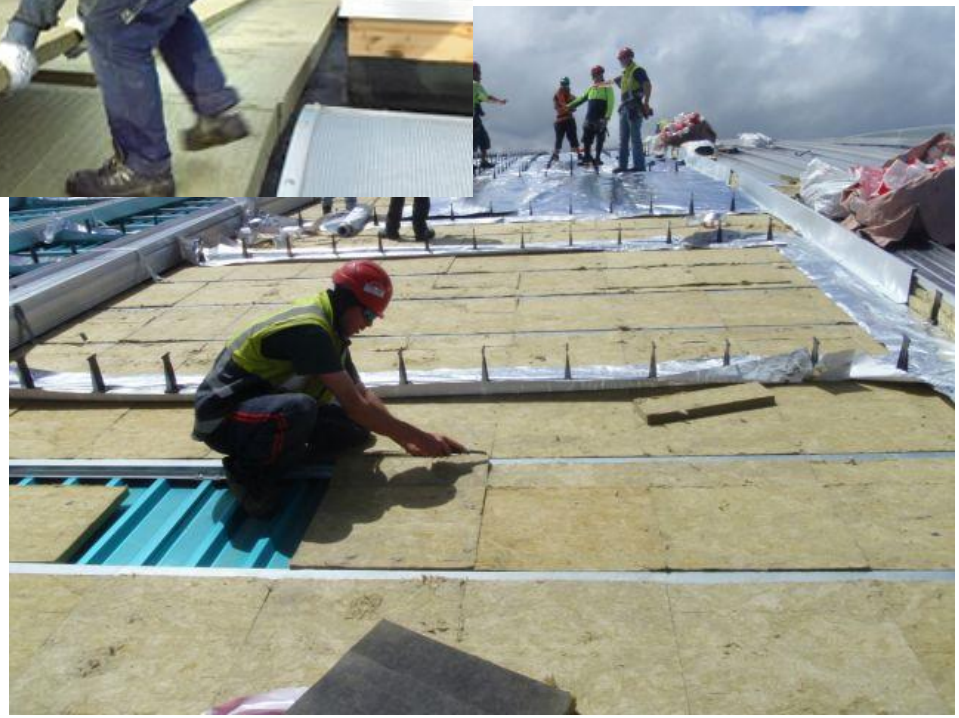
***Mineralwool Slabs***



# Underdeck Insulation

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***Mineralwool Application***

UNDERDECK INSULATION WITH RIGID INSULATION

# Cavity Wall Construction

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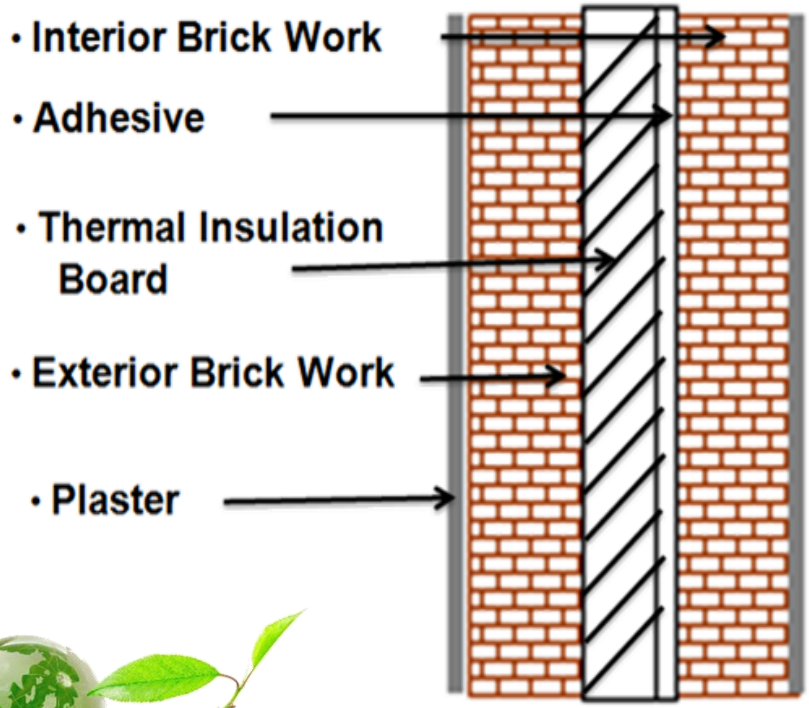
***Rigid Board Application***




***Spray Application***

# Cavity Wall Insulation -

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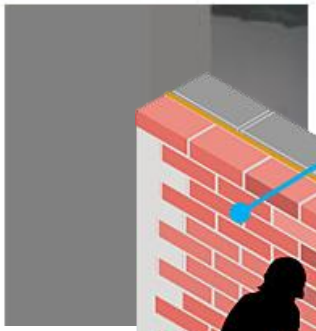
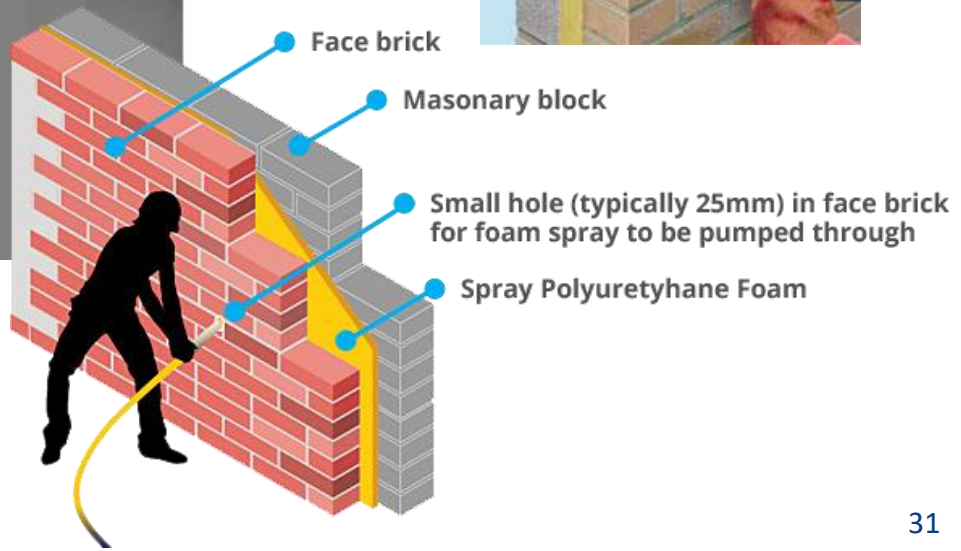
***Spray Application - PU***








# Cavity Wall Insulation

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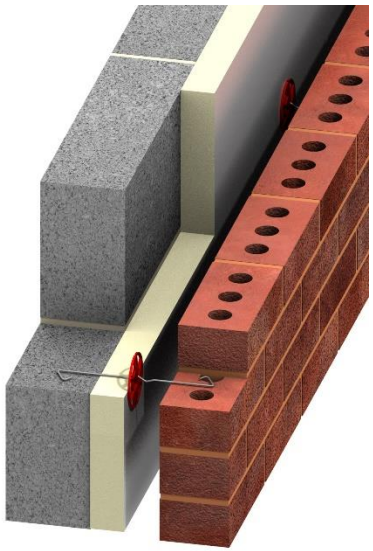
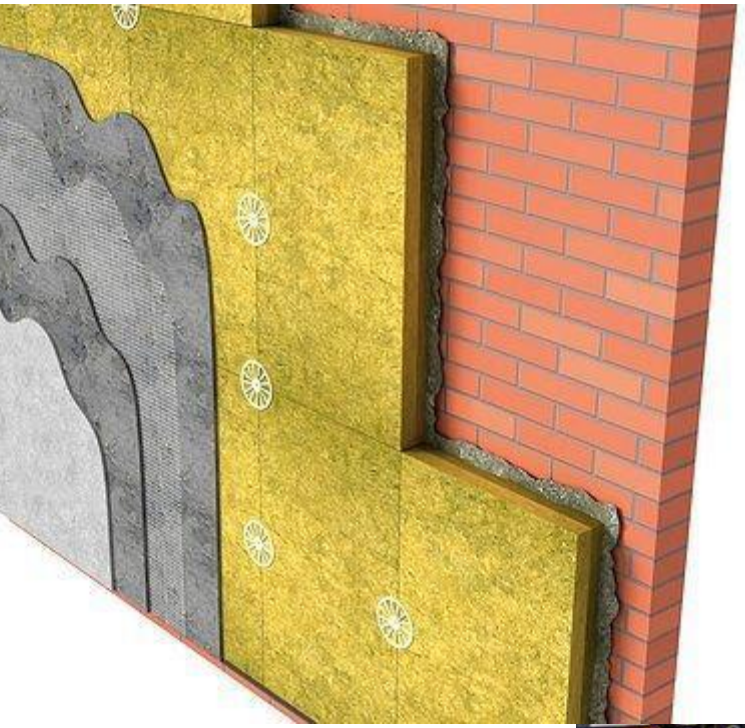
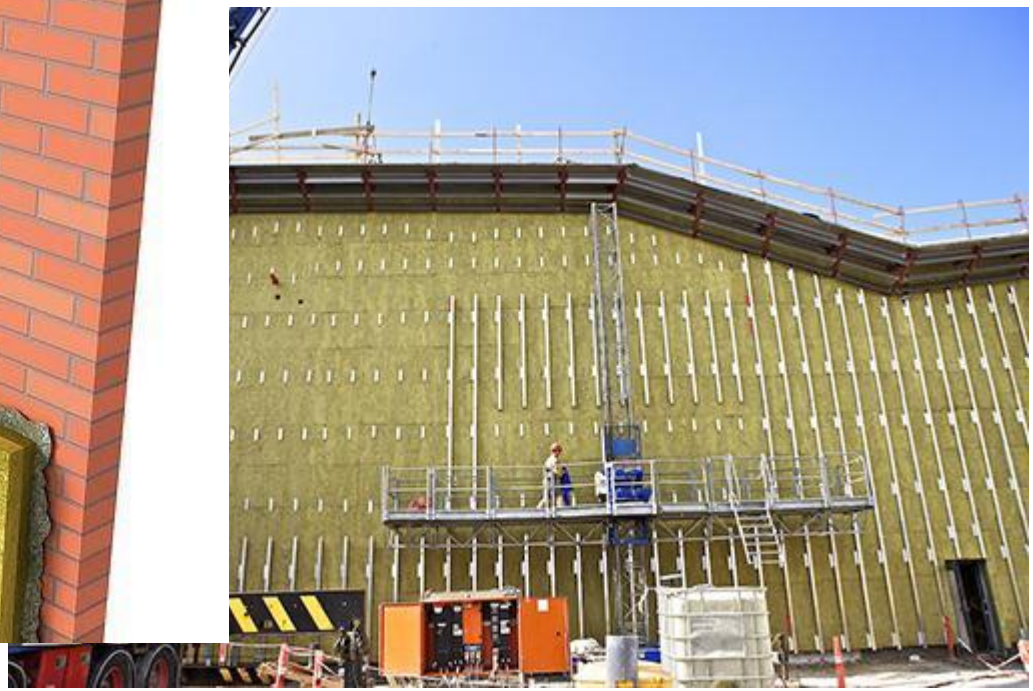
***Mineralwool***

***XPS***



***EPS***





# External Wall Insulation - Facades

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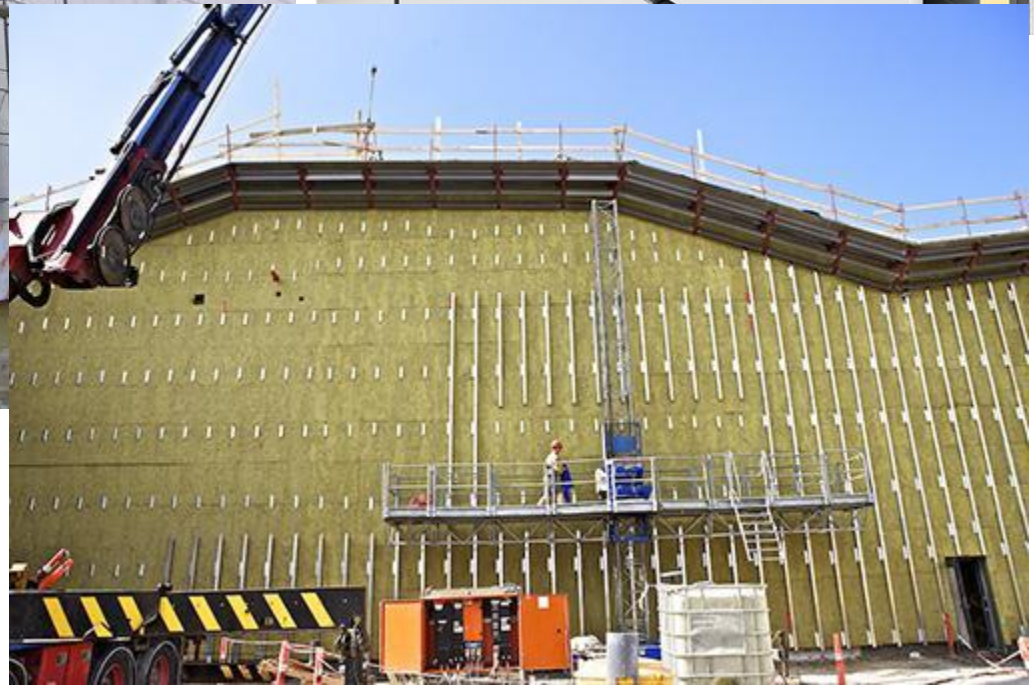
***Aluminium Cladding***



# External Wall Insulation - Facades

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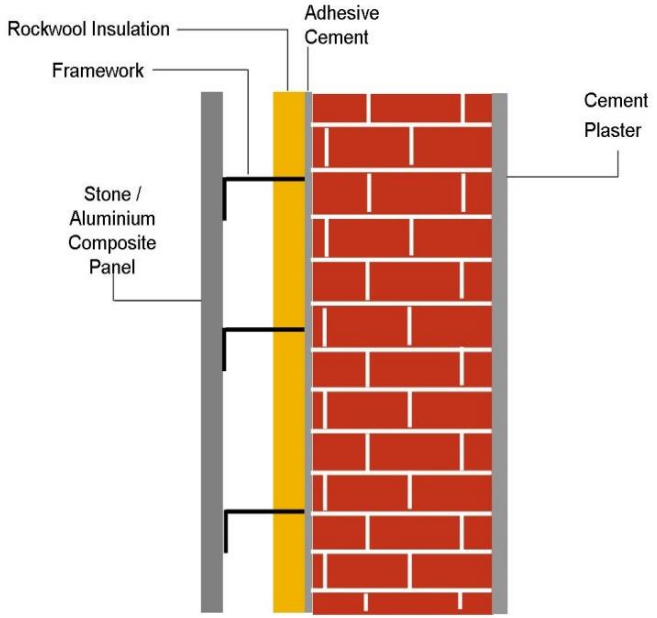
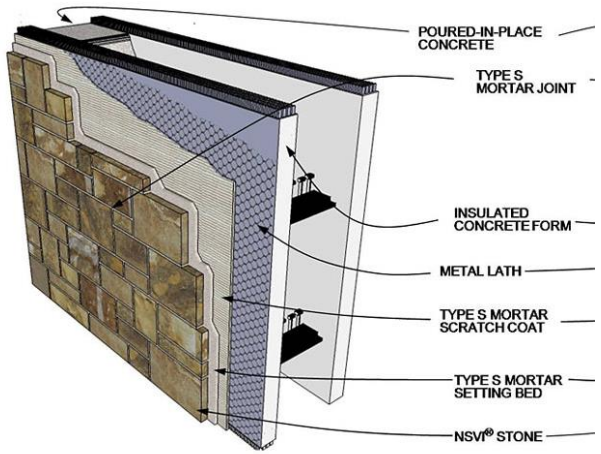
## *Stone Cladding*


# External Wall - ETICS

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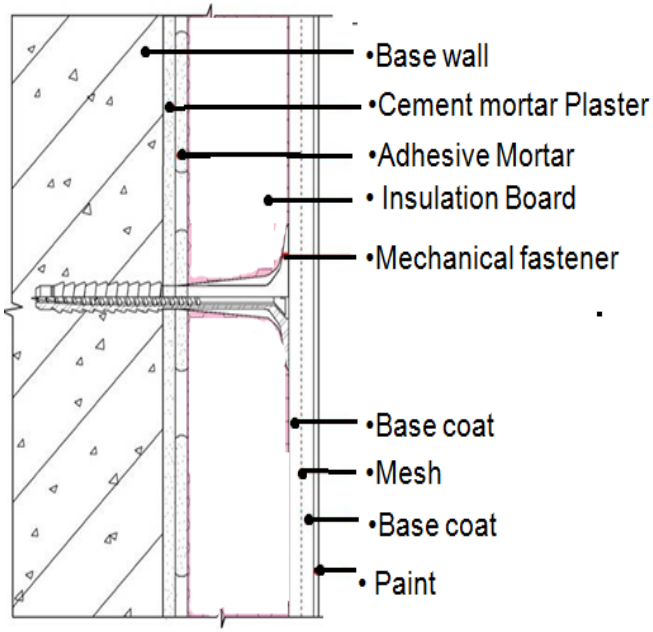
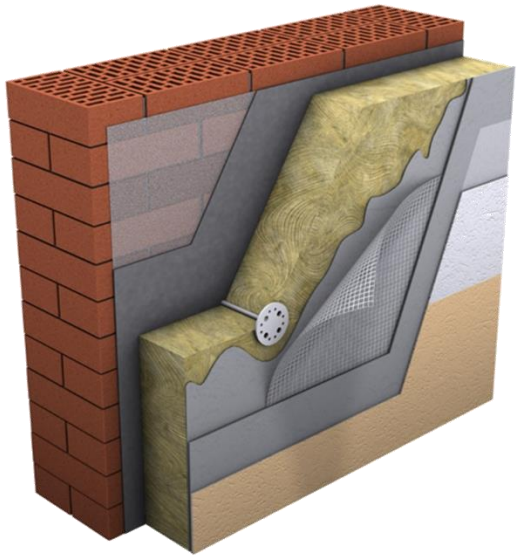
## *External Thermal Insulation Composite System*



# External Wall – Spray Application

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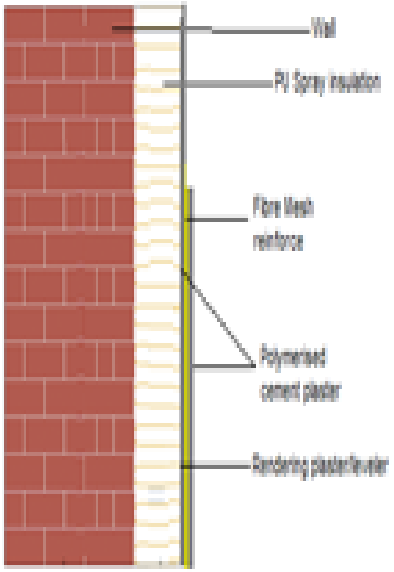


# Internal Wall - Mineralwool

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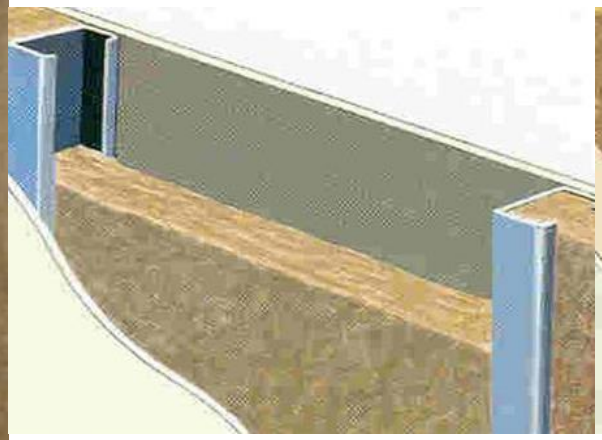
***Internal Wall Insulation with Mineralwool***



# Internal Wall - Partition

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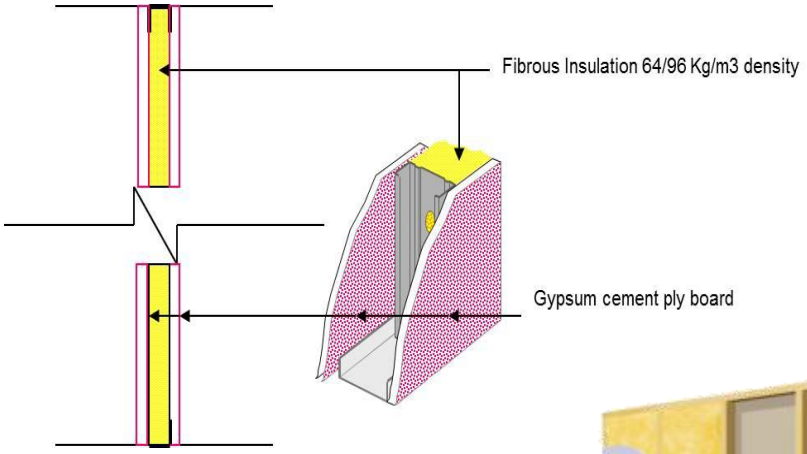


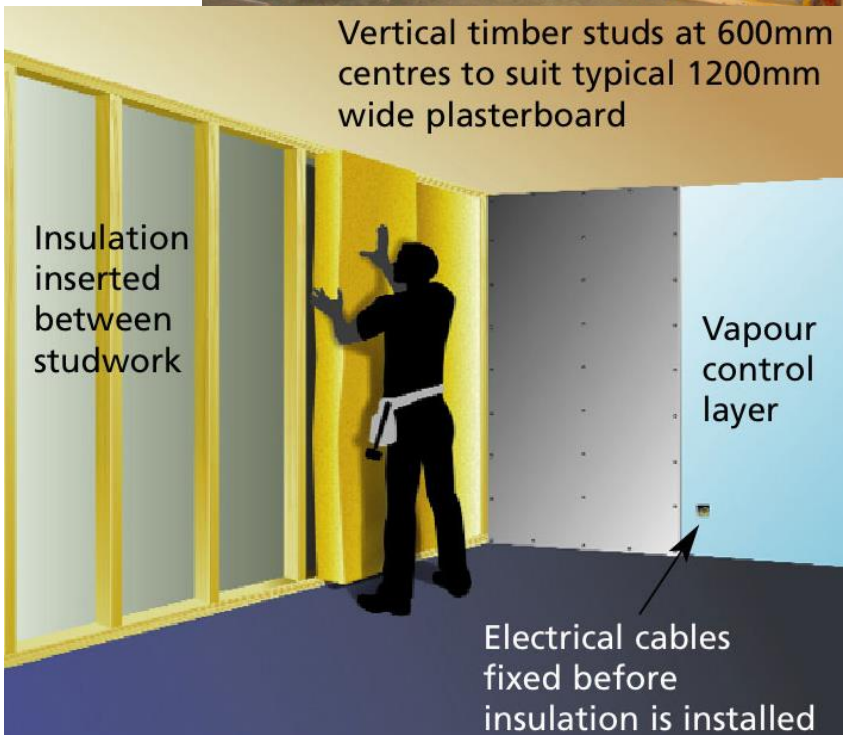


# Typical Industrial Practice

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- Part of civil contract
- Last item in building construction
- Usually no approved list of manufacturers & applicator or turnkey
- Insulation usually not considered a specialized activity
- Sometimes material purchased and applied by civil masons
- Not properly stored at site leading to damages
- Unqualified contractors do the insulation job -→ specs. not followed. Job given to water proofing contractors.

# Typical Industrial Practice

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- Last minute order finalization
- Payment issues
- Financial pressure of civil contractor – budget constraint
- Time pressure to availability and completion → specs compromise
- Work quantity reduced or even short closed contract.
- Financial loss to insulation vendor
- Pull factor missing

# Remedial Recomendations

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- Most Preferred:  Insulation to be made mandatory, highlighting benefits
- Sufficient time to be provided for job execution
- Client / authority to ensure no reduction in scope quantity.
- Sample testing mandatory from authorized labs.
- Municipality clearance only after completion of insulation work.
- Follow global practice.


Thank you
India Insulation Forum