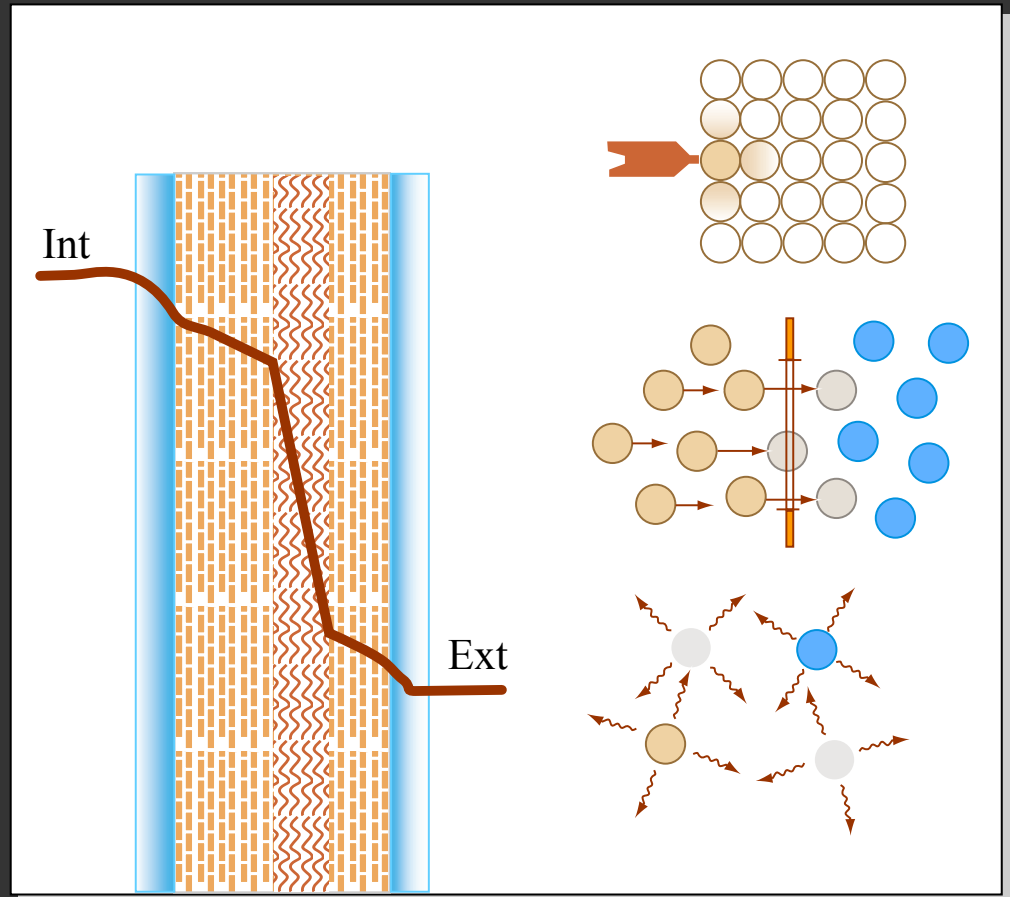


Principles for insulation

► Restrict heat transfer through

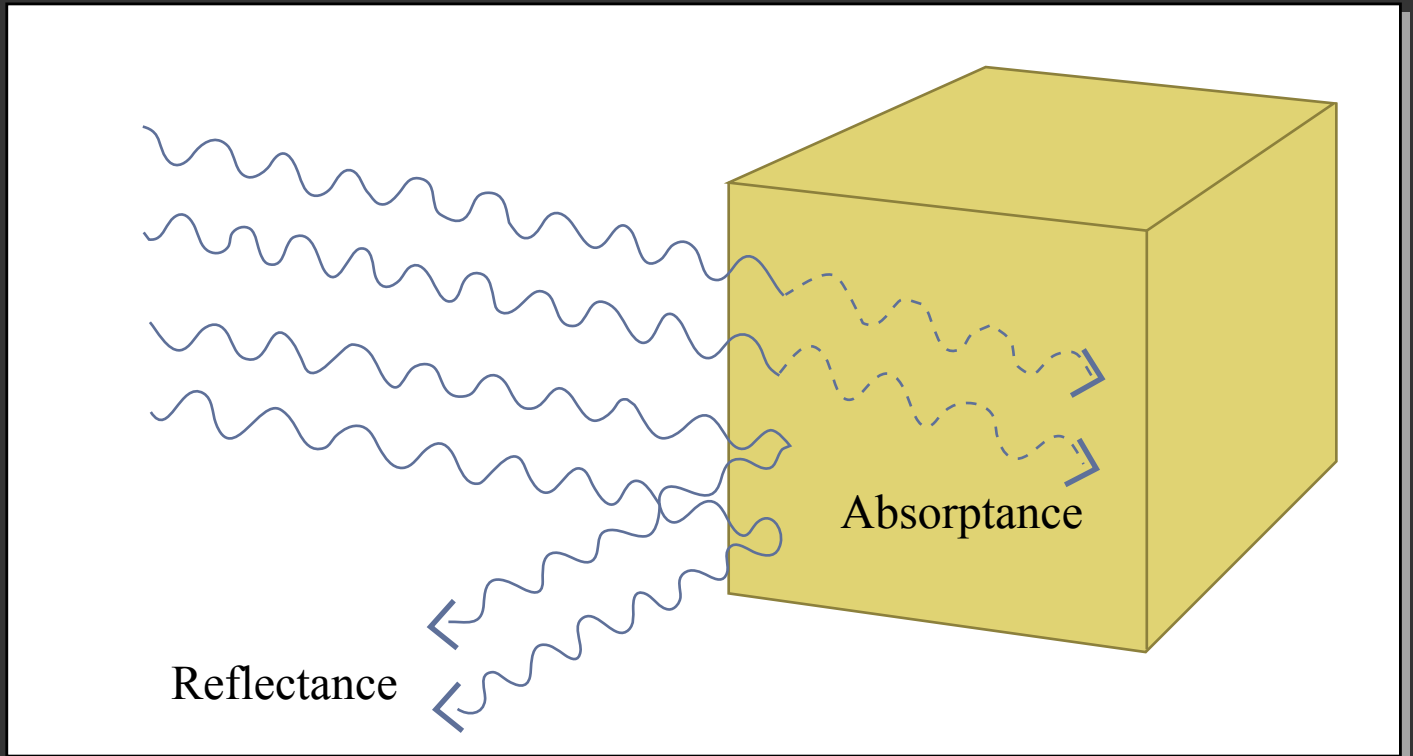
- conduction
- convection
- radiation



Principles for insulation

▶ Three insulation mechanisms

- reflective



Principles for insulation

▶ Three insulation mechanisms

- reflective
- resistive

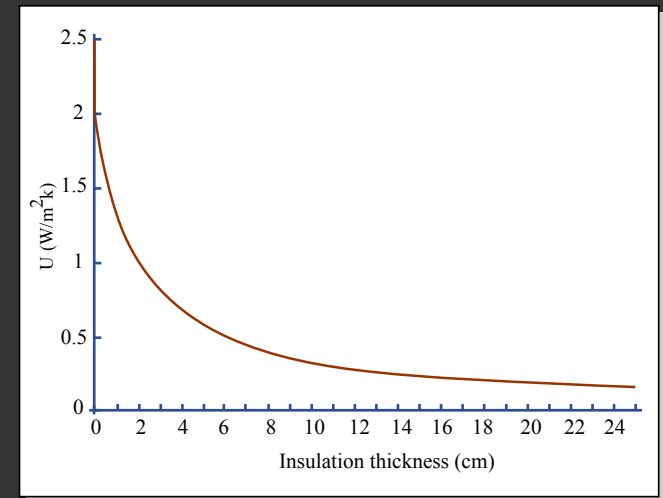
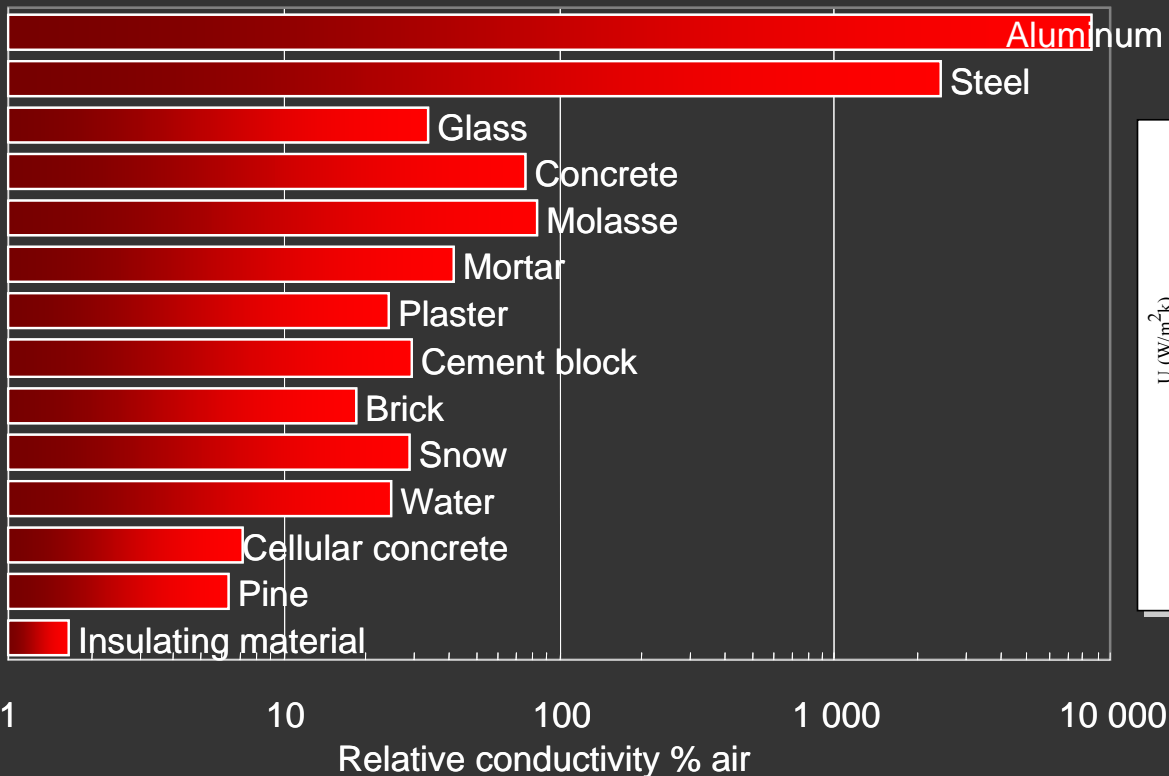


Image by MIT OCW.

Principles for insulation

► Other characteristics and applicability

Applications	Homogeneous surface	Conventional flat roofs	Inverted roof	Ventilted insulation	Insulation between walls	Injected insulation	Floors	Light panels	Compact insulation	Fire protection	Noise absorption	Solid noise insulation
Material												
Light mineral wool	x	x	x	☺	☺	☺	x	x	x	☺	☺	x
Dense mineral wool	x	☺	x	☺	☺		☺		☺	☺	☺	☺
Organic fibers	x	x	x	☺	☺		☹	x	x	x	☺	
Cellulose fiber	x	x	x	☺	☺	☺	x	x	x	x	☺	
Foamglass	x	☺	x	☺	☺	☺	☺	☺	☺		x	x
Cellular concrete	☺	☹	x	☺	☺		☺	☺		☺	x	x
Polyurethane	x	☺	x	☺	☺	☺	☺	☺	☺	x		☹
Expanded Polystyrene	x	☹	x	☺	☺	☺	☺	☺	☺	x	☹	☺
Extruded Polystyrene	x	☺	☺	☺	☺		☺	☺	☺	x	☹	☺
Wood	☺		x				☺	☺	x	☹		
Straw and wood fibers	x	x	x	☺	☺		☺	☺	x	x	☺	☺
Cork	x	☺	x	☺	☺	☺	☺	☺	x	☺	☺	☺

☺ : appropriate

☺ : OK but not optimal

☹ : inappropriate because lacks the required performances

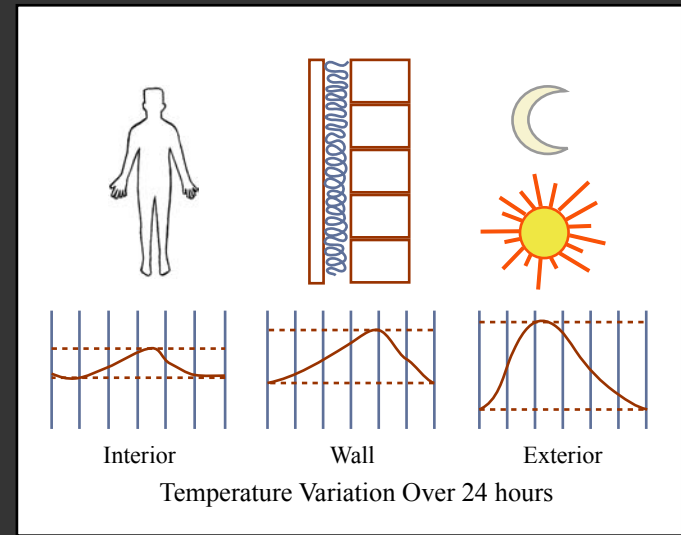
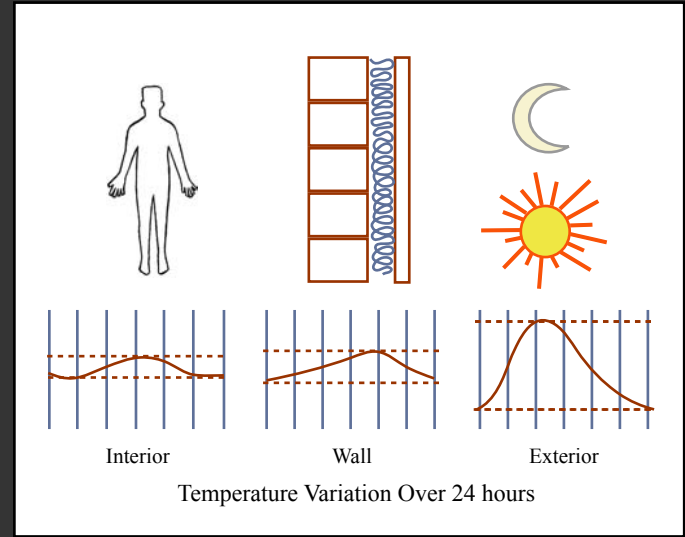
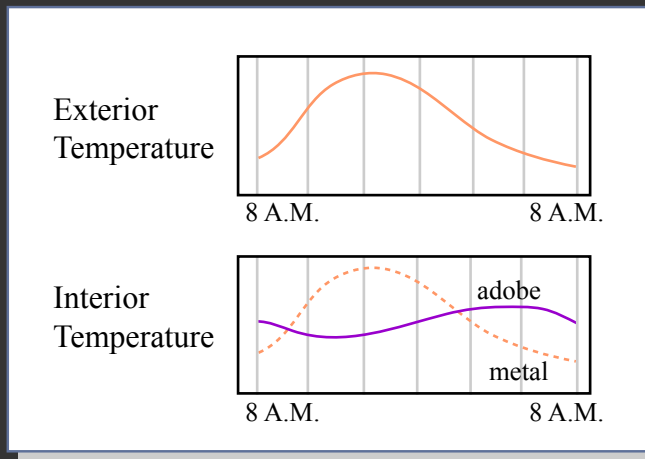
x : to exclude due to high damage risks

☐ : non applicable

Principles for insulation

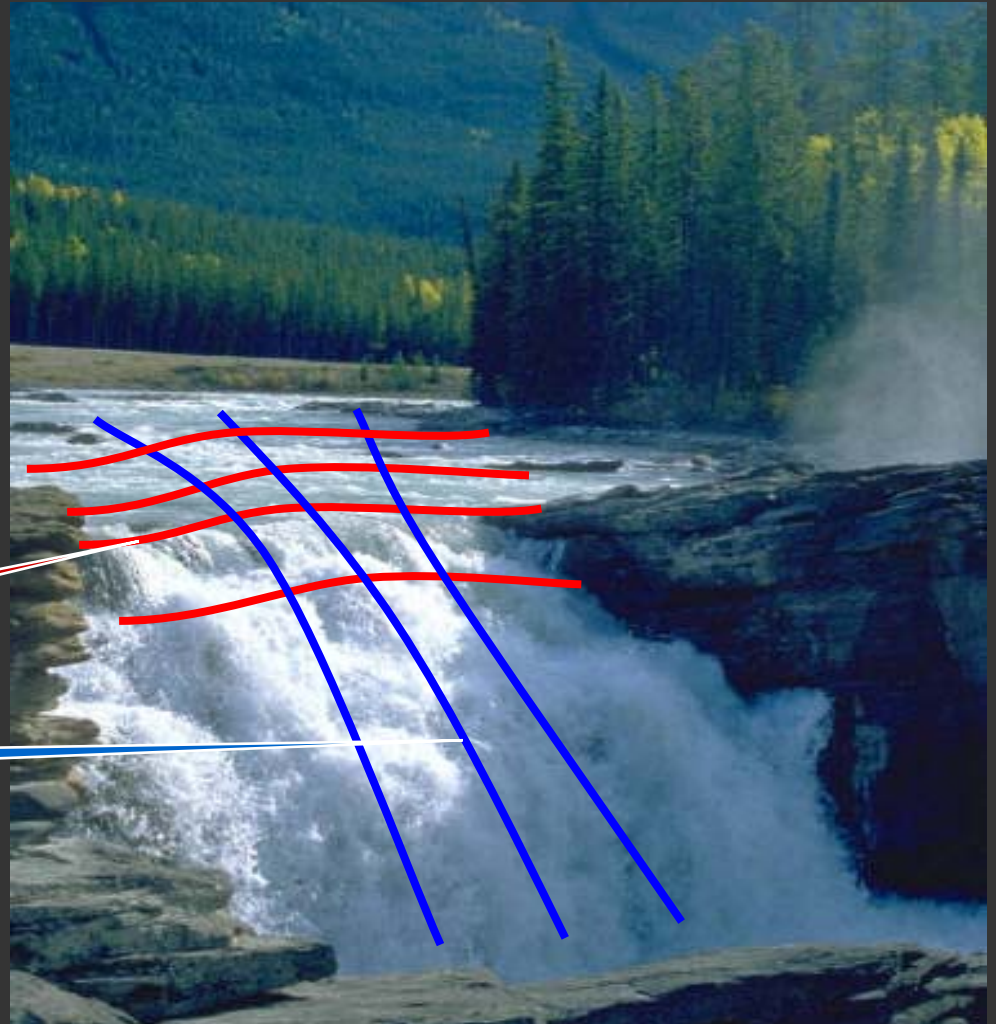
▶ Three insulation mechanisms

- reflective
- resistive
- capacitive



Thermal Insulation

- ▶ Restrict heat transfer
- ▶ Avoid thermal bridges
 - Heat flows like water
 - Heat follows the easiest path (least resistance)

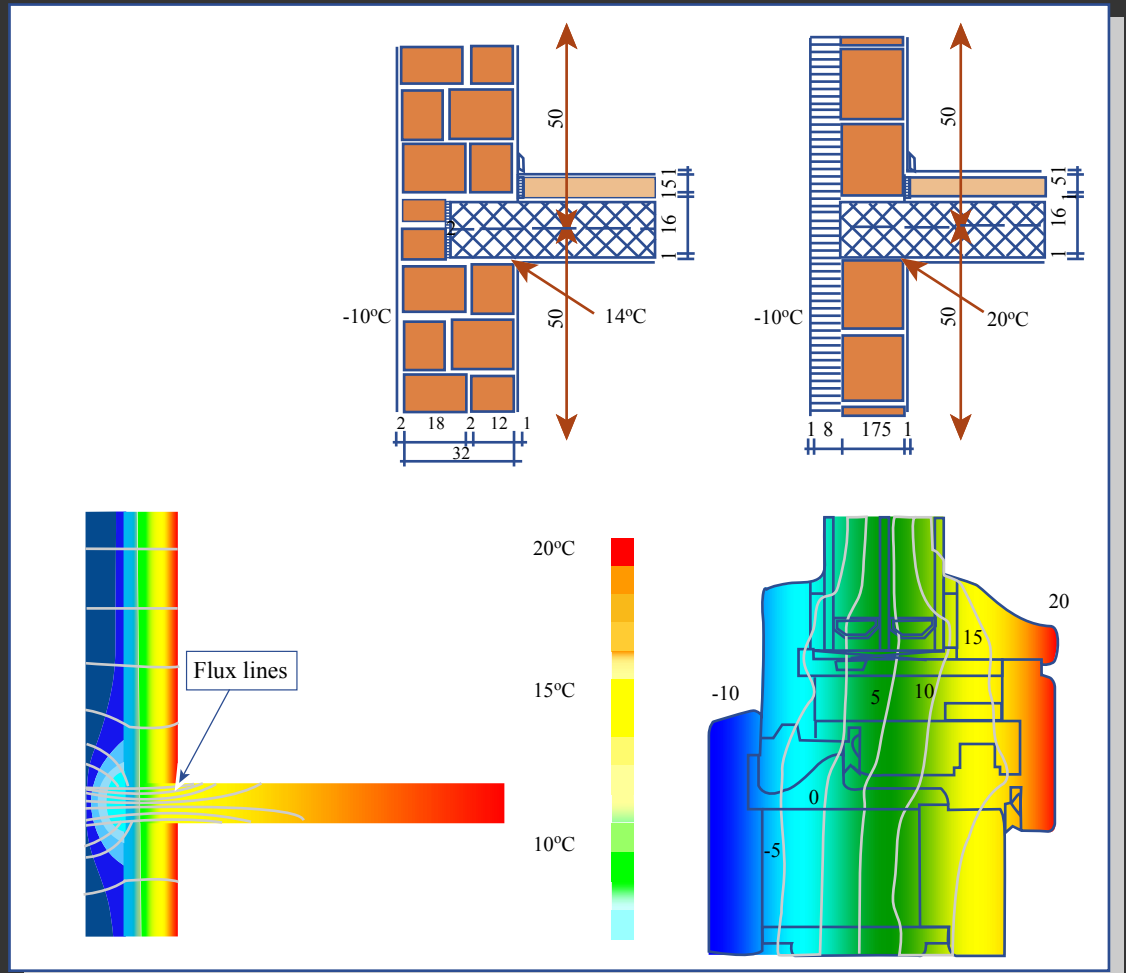


"Isotherms"

Flow lines

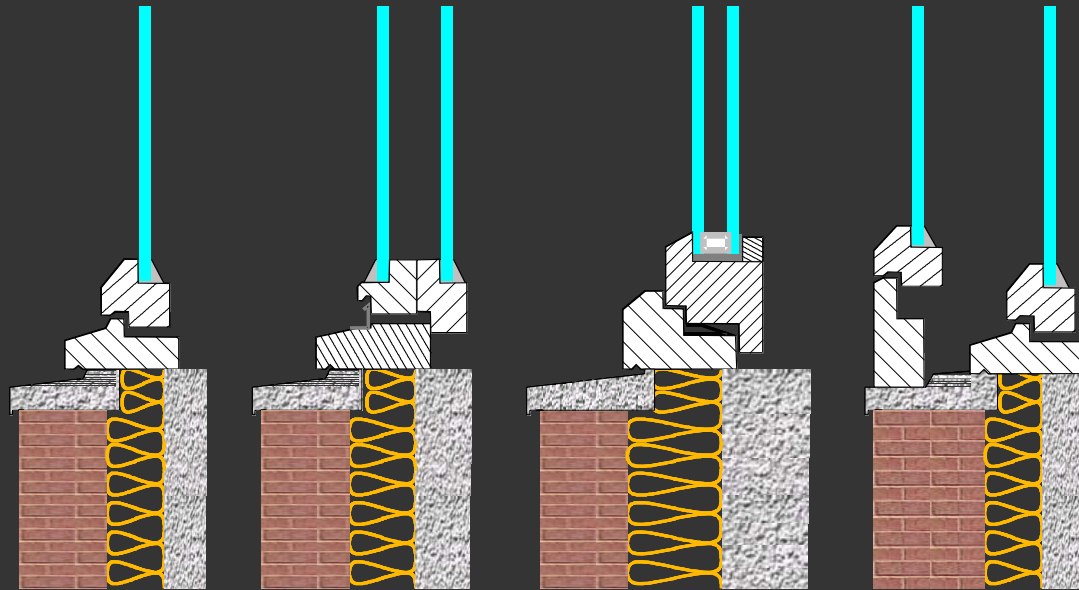
Thermal Insulation

- ▶ Restrict heat transfer
- ▶ Avoid thermal bridges
 - geometry
 - material



Thermal Insulation

- ▶ Restrict heat transfer
- ▶ Avoid thermal bridges
 - geometry
 - material



Simple glazing

Double glazing

Insulating glazing

Double window

Thermal Insulation

- ▶ Restrict heat transfer
- ▶ Avoid thermal bridges
 - geometry
 - material
 - thermography

Photograph and thermal image of house removed due to copyright restrictions.

Thermal Insulation

- ▶ Restrict heat transfer
- ▶ Avoid thermal bridges
- ▶ Continuity of insulation

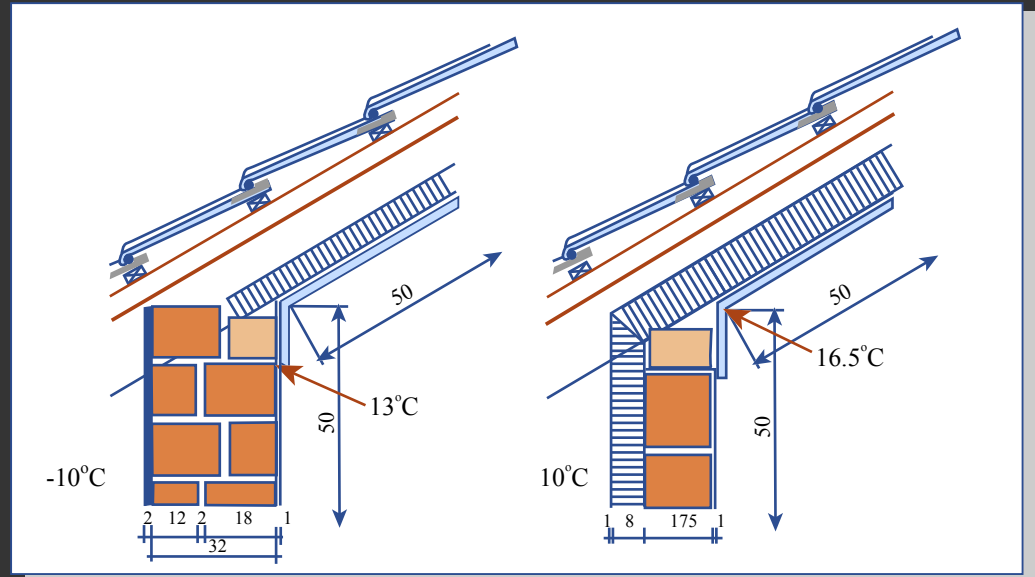


Image by MIT OCW.



insulation outside

