Insulating Plasters in Historic Structures

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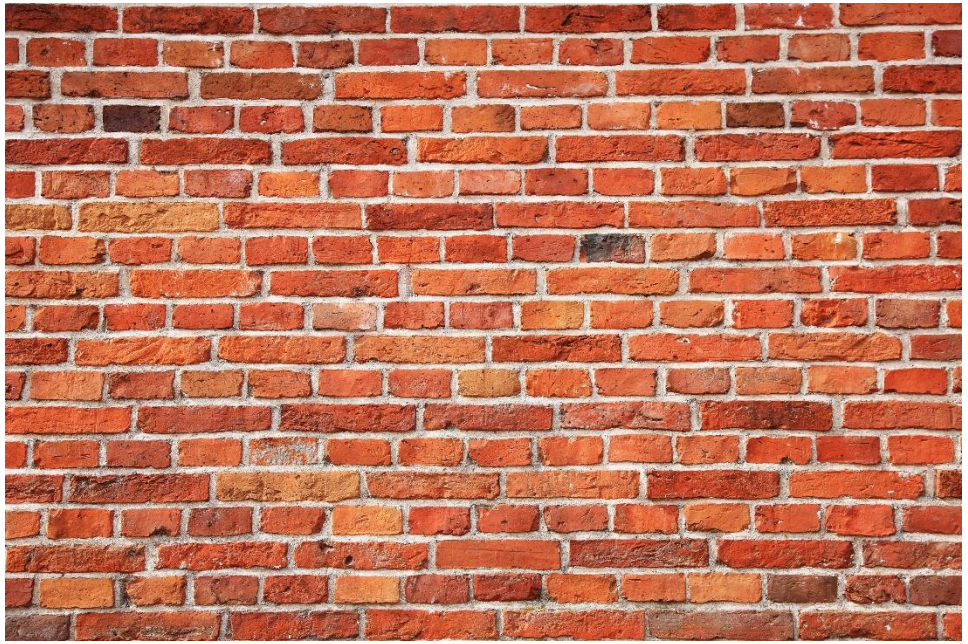
THE MASONRY SOCIETY

US Heritage Group

- Founded in 1998 by Mario Machnicki
- Supplier of Historic Mortars, Plasters, Coatings and Stone Repair Products Based on Lime
- Manufactures Sustainable Masonry Products, including Hempcrete and Insulating Plasters

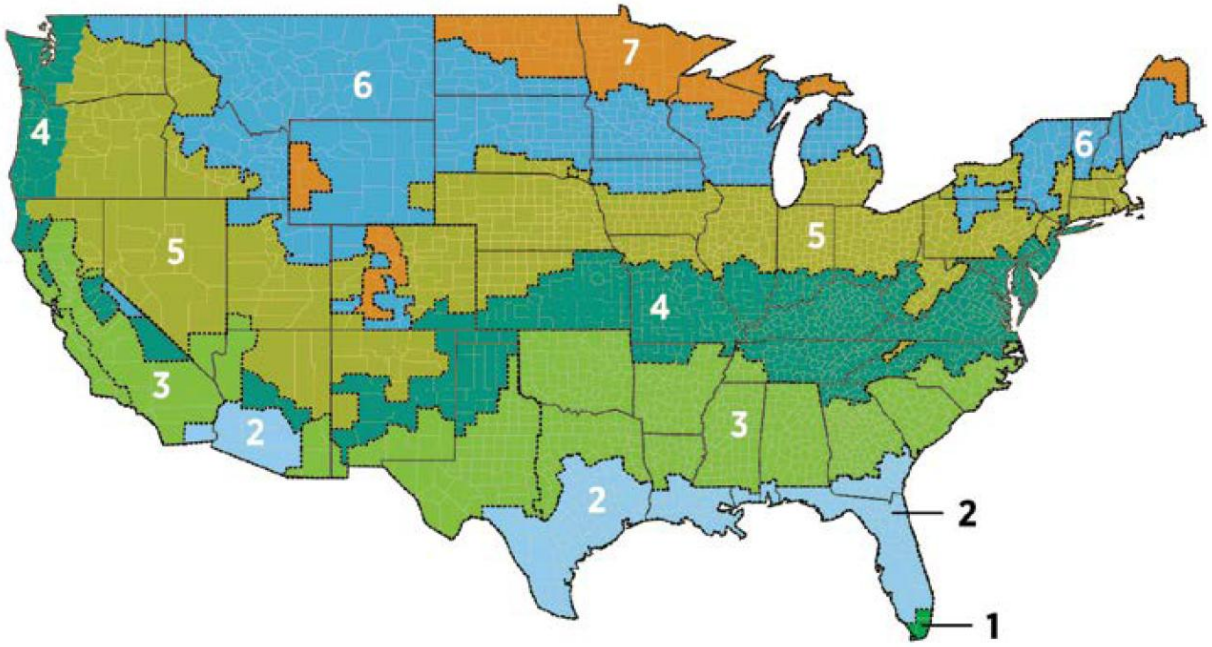
Traditional Masonry Wall Design

- Solid Masonry Walls
  - Multi-Wythe Brick
  - Dimensional Stone
  - Early Poured Concrete or Grout



Modern Energy Standards

- Wall Insulation of R13 to R21
- Ceiling Insulation of R30 to R60
- Air Barriers



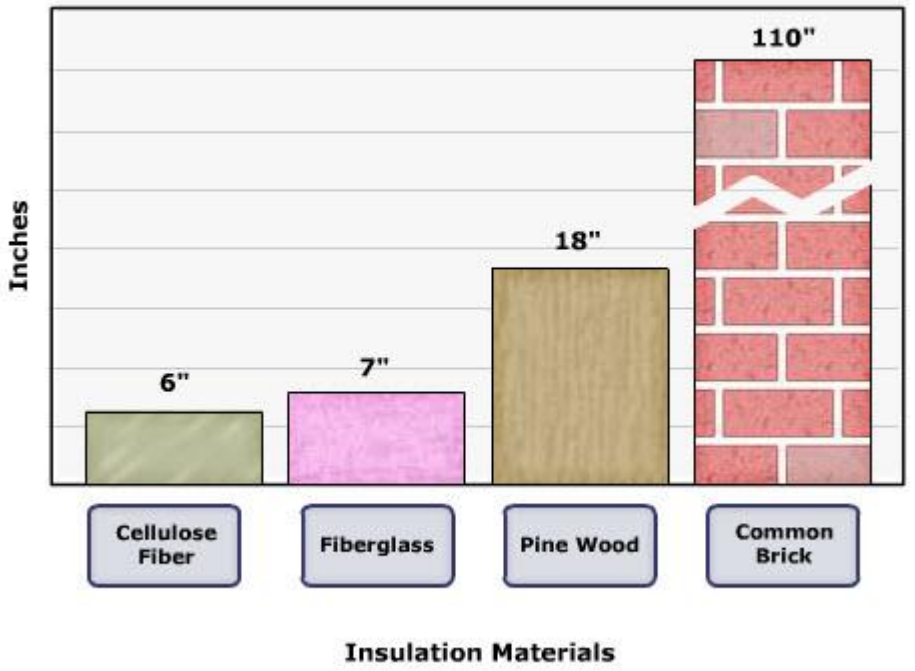
US DOE Climate Zone Map

Credit: www.energy.gov

Energy Efficiency in Traditional Masonry

- Brick
  - 0.2 per inch
- Limestone/Sandstone
  - 0.08 per inch
- Granite
  - 0.05 per inch
- Concrete
  - 0.1-0.5 per inch

Energy Efficiency in Historic Buildings

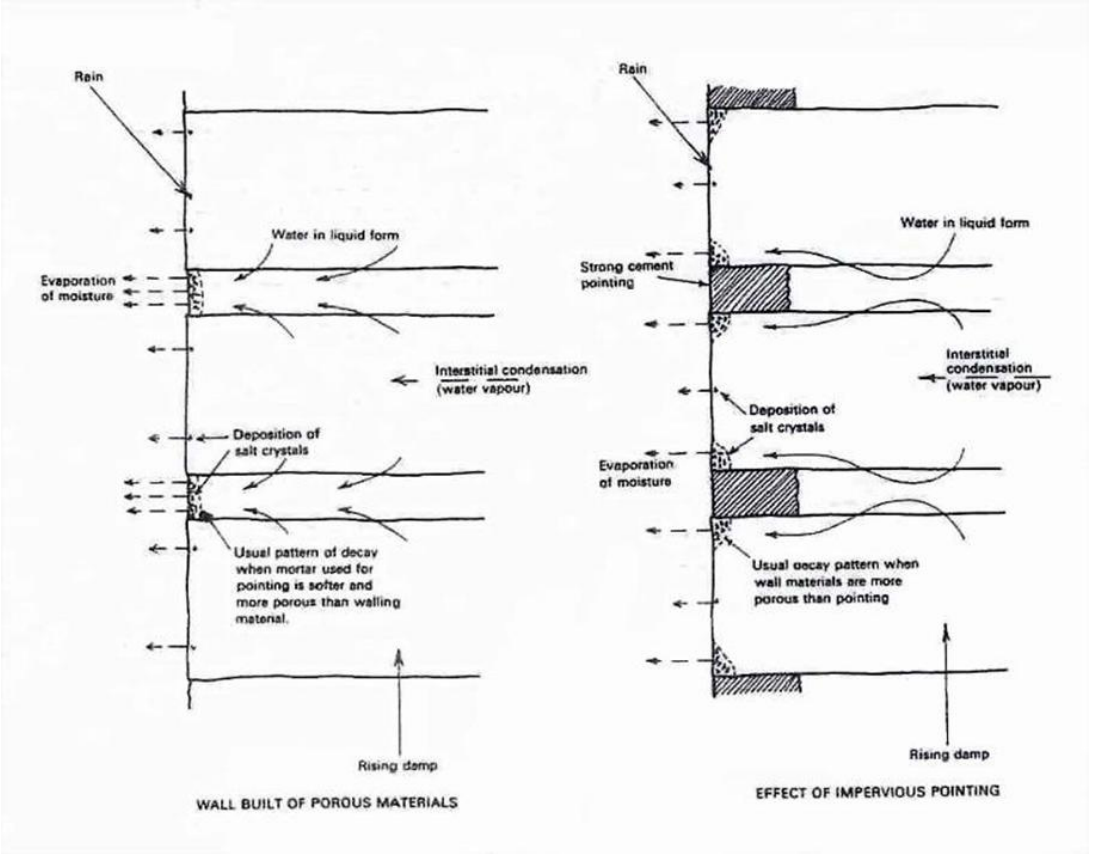


Thickness required of various insulation materials to achieve an R-Value of 22.

Credit: "Insulation Value Of CMAA Australia" LAT Works Construction.

Permeability in Historic Masonry

- Historic Brick, Stone and Mortar are vapor permeable
- Permeability is essential for proper building performance
- Allows passive vapor transmission through building envelope
- Prevents liquid water accumulation



Historic Compatibility

- Sympathetic – How does it react to the existing structure
- Aesthetic – How does it look compared to the original structure
- Performance – How energy efficient is it compared to equivalent new construction

Existing Options

Traditional Insulation

- Batt Insulation in New Framed Wall Cavity
- Spray Foam or Rigid Foam Board
- Exterior Insulation and Finish System (EIFS)

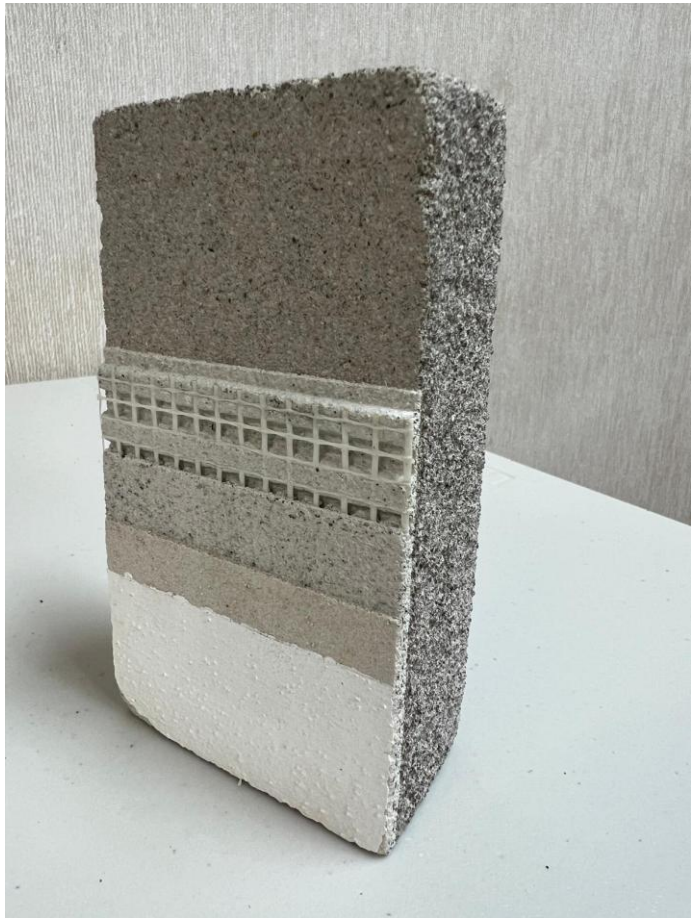
Issues

- Require Water Barriers
- Experience Failures from Water Penetration
- Damaging to Historic Masonry

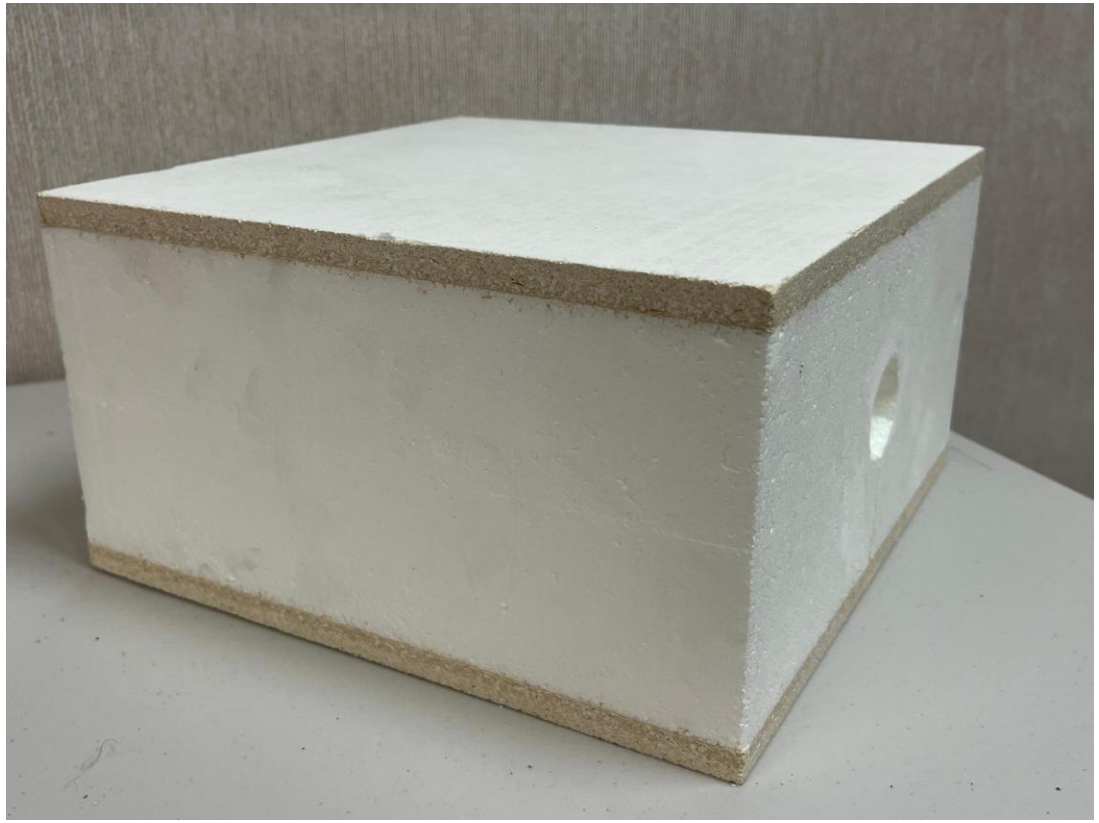
Permeable Insulation

- Insulating Aggregates
  - Natural
    - Hemp
    - Cork
  - Manufactured
    - Polystyrene
    - Expanded Glass
- Lime or Other Compatible Permeable Binder

Permeable Insulation

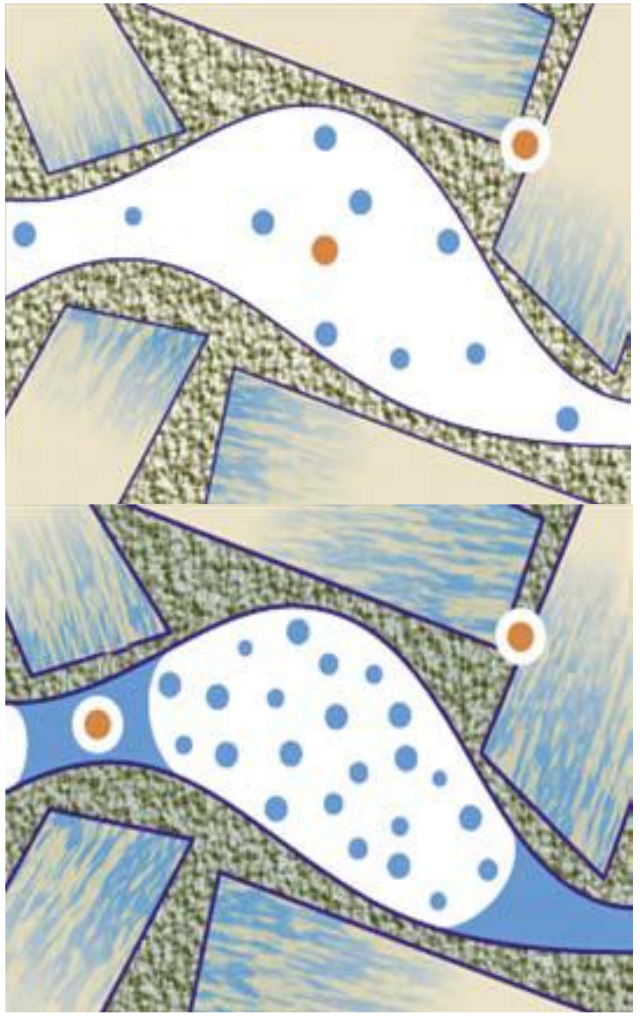


Permeable Insulation



Other Thermal Benefits

- Thermal Mass
  - High Specific Gravity of Historic Masonry
- Thermal Inertia
  - Moisture in Wall Resists Temperature Changes
- Air Barrier
  - Plaster Stops Airflow through Envelope, Reducing Convection



Other Non-Thermal Benefits

- Protection of Historic Building Envelope
- Sound Dampening
- Low or No Off Gassing
- Passive Humidity Control
- Comfortable Occupied Space

Wall Preparation

Wall Conditions

- Masonry Condition
  - Deterioration or damage requires consolidation
- Paint or Sealer
  - Requires bonding agent, either paint on or blended in basecoat

Surface bonding

  - Painted or sealed walls
  - Unstable masonry surfaces

Installation Considerations

Installation methods

- Hand applied
  - Slow and Labor Intensive
  - High Skill Level Required
- Spray applied
  - Faster Installation
  - Requires Specialty Machines

Case Study: Lime Technology UK Office Upgrade

Retrofit of Traditional Masonry Building with Hempcrete and Lime Plasters

Limetechnology UK Office Upgrade

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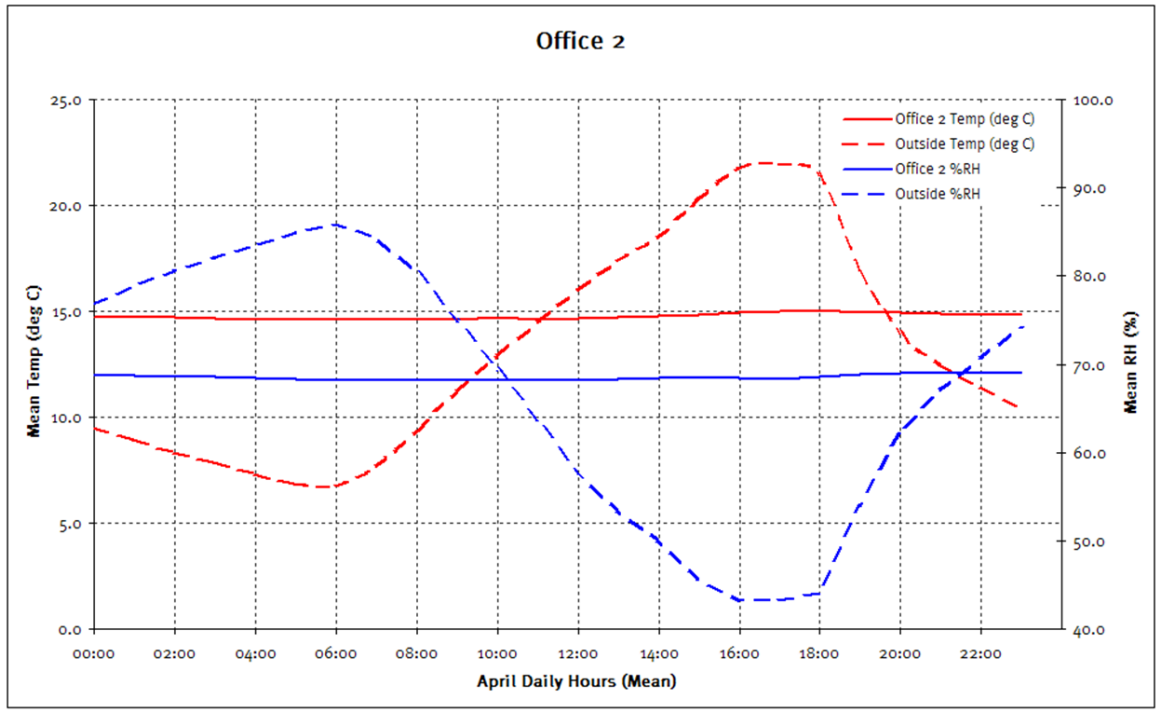
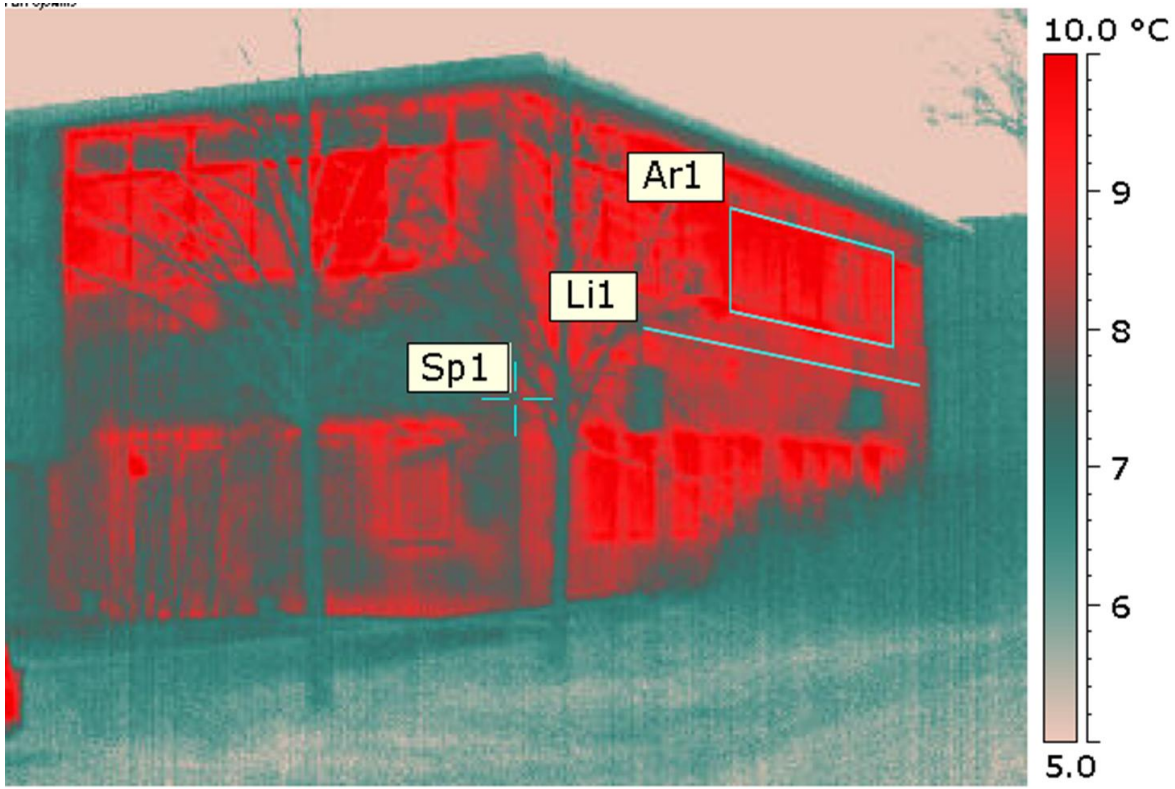


Limetechnology UK Office Upgrade



Case Study: Adnams Brewery

New Construction using Insulating Masonry Materials

Adnams Brewery

Adnams Brewery

- Permeable Insulating Masonry Envelope
- Load Bearing Lime Blocks
- Hempcrete Infill
- Direct Lime Plaster Finish

Adnams Brewery

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